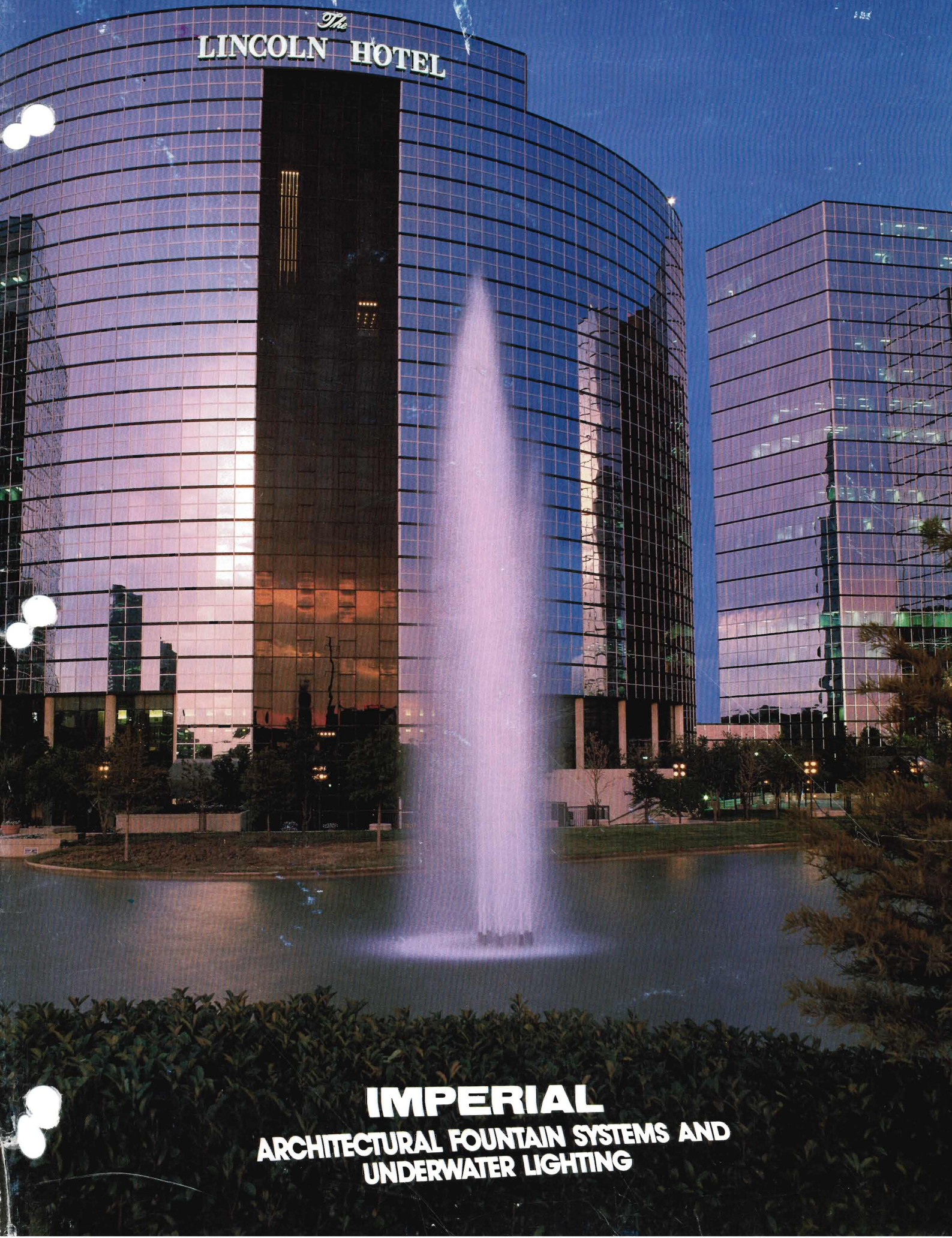


IMPERIAL

ARCHITECTURAL FOUNTAIN SYSTEMS AND UNDERWATER LIGHTING

THE WATERWORKS® SYSTEM

Historically, fountain equipment has been sold and installed using a piece-meal, multiple-source approach. Fountain equipment manufacturers provided only nozzles and special devices, with mechanical equipment furnished by a plumbing contractor and electrical contractor. This method has resulted in fountains being difficult to specify and virtually impossible to coordinate, creating confusion between the mechanical and electrical trades and the burden of responsibility on the architect. Due to this complexity and associated coordination problems, architectural fountains were often very costly to install and difficult to maintain.

In 1979 Imperial offered a solution with the introduction of the WaterWorks system. This system provided a factory-built, tested and guaranteed direct-burial package, with all electrical equipment pre-wired and all mechanical equipment pre-plumbed. Traditional problems associated with specification, installation, high cost and maintenance were greatly reduced, and Imperial provided "single-source" responsibility.

Today Imperial offers a choice of more advanced, more cost-effective systems in the WaterWorks family of modular fountain systems. While these units share all of the benefits of the original WaterWorks concept, a complete range of direct-burial and skid mounted systems with modular equipment assemblies now provides a cost-effective WaterWorks for any size or type of fountain.

Easy to Specify

Unlike other types of fountain systems that require the architect or designer to have an extensive working knowledge of mechanical and electrical design and construction, the pre-packaged WaterWorks system is easy to specify. The capacities and options (of each WaterWorks system) are clearly defined, providing the designer a simple selection process based on need. This frees the designer to concentrate on the creative aspects of a project while Imperial handles the technical construction.

More Accurate Bids

The modular WaterWorks units are completely preassembled. This allows for easy installation and eliminates jobsite labor. Only straightforward, common installation procedures are required. This simplifies jobsite coordination by the architect and allows the contractor to bid installations more accurately, virtually eliminating problems associated with underestimating project costs.

Single Source Responsibility

The pre-engineered and pre-assembled WaterWorks systems come complete with all the components needed and are furnished by a single source — Imperial By taking full responsibility for the performance of each component, the system as a whole, and water features produced, Imperial eliminates problems created by multiple vendors and the job site coordination of multiple contractors. This Imperial guarantee ensures designers, architects, installers and owners that the WaterWorks system will meet all expectations.

Reliable Performance

Only the highest quality commercial-grade, mechanically matched components are used in the WaterWorks systems. This includes all cast bronze or bronze-fitted pumps and valves and permanent-media filtration systems housed in high grade stainless steel or FRP (fiberglass reinforced polyester) tanks. All electrical systems and their component parts are U.L. Listed and installed in accordance with the National Electrical Code.

The quality materials, innovative design and careful fabrication of the WaterWorks systems ensures that all component parts work in harmony to efficiently operate cost-effective, low maintenance, longer-lasting water features.

Lower Maintenance Costs

All WaterWorks systems are specifically designed for low maintenance. Many systems can be supplied as completely automated units requiring no periodic maintenance at all. Manually operated systems are arranged for easy accessibility and service, with clearly labeled components and simple operating instructions that even the most inexperienced maintenance personnel can follow.

General Parameters

General physical design parameters for fountain installations are listed below as an aid to the designer. Adherence to these "rules of thumb" will help avoid critical design problems.

☐ ***POOL SIZE*** should provide distance from the water effect or nozzle to the nearest pool wall equal to, or greater than, the maximum water effect spray height. This "radius equals spray height" rule applies only under normal wind conditions. Spray heights should be lowered or pool size increased by 10% for every 5 mph of wind speed over a base speed of 10 mph. When this is not feasible, a wind control system should be utilized.

☐ ***POOL DEPTHS*** should be the industry standard of 16" whenever possible. Greater pool depths can be utilized, but depths greater than 18" are not recommended for safety reasons. Pool depths less than 16" require adjustments in the selection of pool components, and depths less than 12" are not normally practical. The sizing of return and supply pool fittings should be adjusted by 10% for every inch of decreased water level below the 16" standard.

☐ ***WALL HEIGHTS*** above water level, often referred to as "freeboard," should be the industry standard 6" whenever possible. Less freeboard may be used only when wave action and splash are minimal. A freeboard less than 4" is not recommended. Greater freeboard may be required in the lower pool with waterfall applications, and when heavy wave-production water effects are used.

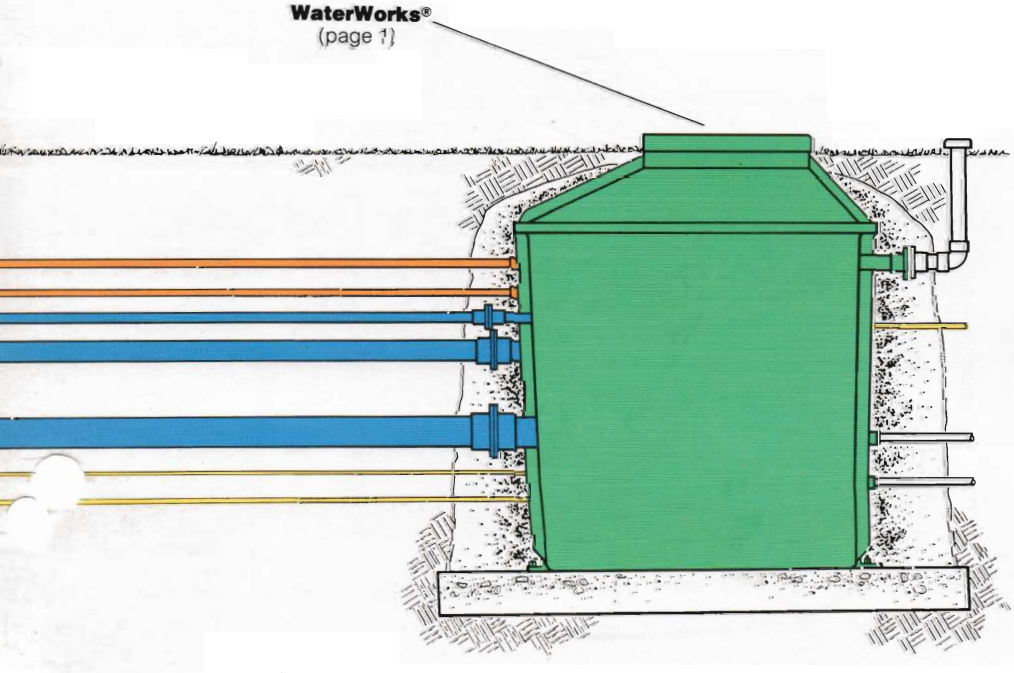
In waterfall applications the freeboard must be adequate to contain the volume of water which is displaced to the upper pools when the recirculating pump(s) is started. In addition, the depth of water which backs-up behind the weirs in the upper pools must be considered in determining the size of upper pool freeboards.

☐ ***WATER EFFECTS*** type and selection should take into account prevalent location conditions such as normal wind speed, water quality, and water depth fluctuation.

Wind speed should not affect nozzle or water feature selection when it is below 10 mph. Where normal wind speeds are expected to be above 10 mph, only "wind-resistant" effects should be used, if possible.

Water quality should be considered in lake applications or whenever water is not filtered. The use of small-orifice nozzles is not recommended in these applications due to possible clogging.

Water level fluctuation should be considered if "water-level dependent" type nozzles are desired. Water effects that depend on a constant water depth can be badly distorted with water level fluctuation. Water level fluctuation will normally occur in lake fountains and in both the upper and lower pools in waterfall fountains. For these applications, a variety of water level "independent" nozzles are available.



Design Services

To free architects and designers to devote their energies into the creative aspects of fountain design, and not be burdened by excessive mechanical detail, Imperial offers complete design assistance. While the new modular WaterWorks systems allow for simple specification and single source mechanical responsibility, Imperial assistance capabilities go much further. A staff of highly experienced and expert fountain designers offer complete mechanical and design assistance. To provide rapid response time 100% CAD generated design is utilized. This provides an average turnaround-time between fountain design request and a completed proposal, including drawings, of less than 10 days. All Imperial services are offered without charge or obligation other than the specification of our product. And Imperial fountain designs are guaranteed to perform as specified.

Proposal Request

Fountain proposals and design assistance can be requested using our "Fountain Proposal Request Form". (Contact your local Imperial representative for a copy.) This form is designed to provide an easy and fast vehicle for communicating the basic information required for a complete and cost-effective design. While the form primarily communicates physical parameters, it also allows for aesthetic considerations such as desired sound level and lighting preferences. Architectural drawings, sketches and/or descriptions of the fountain pool(s) and visual water effects desired should accompany all proposal requests. It is not imperative that all details be resolved prior to forwarding a proposal request. Upon receipt of a proposal request, a Imperial fountain designer will be assigned to the project and will contact the originator to answer questions and discuss details of the fountain design. Imperial assures optimum coordination and the personal attention that each project deserves.

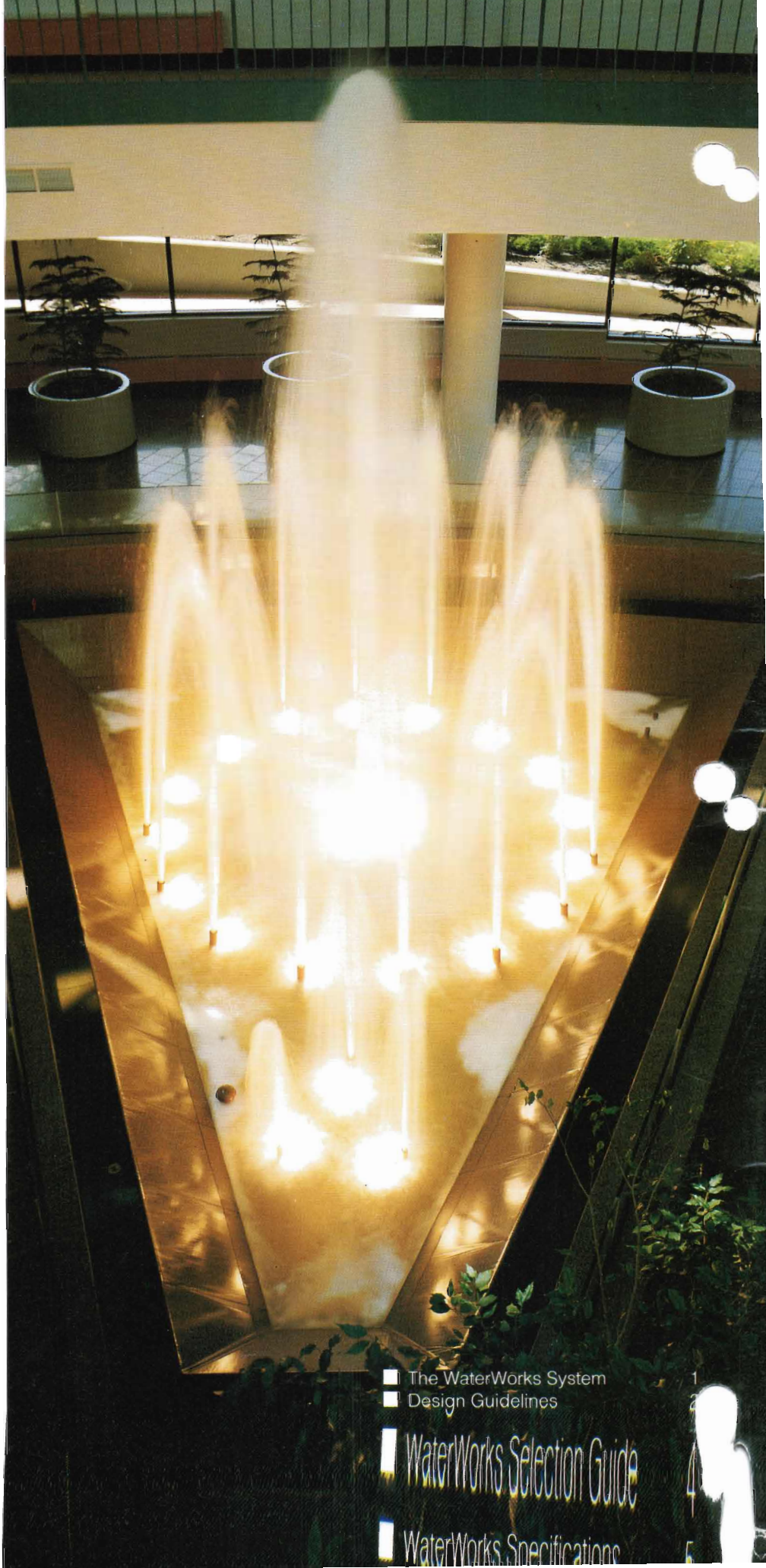
ARCHITECTURAL FOUNTAIN SYSTEMS

Water. Irresistibly attracting, fluid and everchanging, water brings life to architecture and the landscape. Its sight, sound and motion transform ordinary settings into vibrant, stimulating environments. The creative use of water adds immeasurable value to any architectural or commercial project.

Imperial brings water to life more effectively than any other source with the WaterWorks modular fountain system. Completely pre-engineered and pre-assembled, the WaterWorks electrical/mechanical system virtually eliminates design, installation and maintenance problems and provides single source responsibility. A complete family of WaterWorks units now offers a cost-effective system for any size or type of fountain. WaterWorks is simple to install, easy to maintain and easy to specify.

The beauty of the WaterWorks system can be seen in successful water features in major development projects from coast to coast in the U.S., in Canada, and around the world. Working closely with the architect or designer on each project, Imperial experienced designers offer expert assistance and furnish quick turnaround fountain proposals, including concise CAD-generated engineering drawings and complete component specifications. This catalog is offered as an aid to architects and designers for the creation of fountains and water features utilizing the WaterWorks system.

Imperial remains dedicated to providing the architect and his client with fountain systems that successfully produce the desired visual effect, meet the budget, and operate reliably.



▶ ***Duluth Entertainment and Convention Center**, Duluth, Minnesota*
***Architects:** Thomas & Vecchi AIA Architects, Inc. (Duluth, Minnesota)*

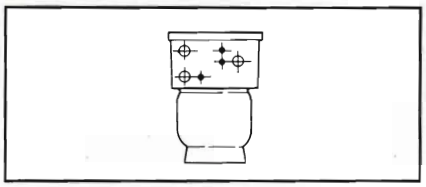
◀ *Imperial "jet-cluster" of aerator and precision jet nozzles create a 65 foot tall water feature at the **Lincoln Hotel** in Dallas, Texas.*
***Landscape Architects:** Myrick, Newman, Dahlberg and Partners, Inc. (Dallas)*

SPECIFICATIONS

WATERWORKS® 1 Series Direct-Burial Systems

GENERAL: Direct-burial modular pumping system shall be Imperial WaterWorks-1 Series. WaterWorks system shall be factory designed, fabricated and tested with all mechanical and electrical equipment furnished, installed and wired at factory. Unit shall be provided with flanged or threaded external piping and conduit connections as required to allow connection to fountain piping and electrical circuits.

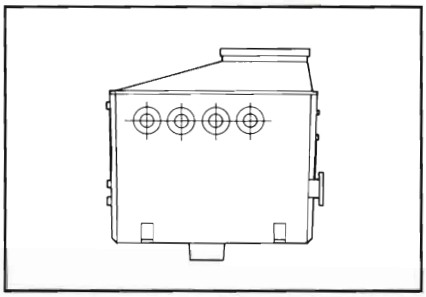
WaterWorks® WW-1-A



Unit shall be 3' × 3' × 4' high and of all fiberglass reinforced polyester construction with a 30" × 30" entry hatch. Unit shall contain a cast bronze, self-priming fountain pump with integral suction strainer and (one, two) horsepower, 120/230 volt, single phase motor; (a 3.0 square foot, permanent sand media filter of fiberglass reinforced polyester construction and integral multi-port backwash valve*), pressure gauge and site glass; a forced air ventilation system; floor drain; all cast bronze valves sized and selected for application; schedule 80 PVC piping with unions provided to allow removal of all equipment; 24 hour, 7 day, time clock; and weather-proof disconnect switches provided for all equipment.

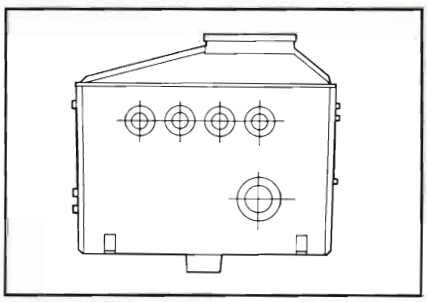
*Not available with WW-1-A-L system

WaterWorks® WW-1-B



Unit shall be 6' × 6' × 6' high and of all fiberglass reinforced polyester construction with a 30" × 30" entry hatch. Unit shall contain a cast iron, self-priming fountain pump with integral strainer and (3, 5, 7.5, 10) horsepower, 120/208 volt, 3 phase motor; a cast bronze, self priming filter pump with integral suction strainer and a (3/4,1) horsepower, 120/208 volt, 3 phase motor; a (18", 24") diameter (stainless steel, FRP) filter with (multi-port, automatic) backwash valve, pressure gauge and site glass; a forced air ventilation system; a cast iron, heavy-duty sump pump with 1/3 horsepower, 120 volt motor; all cast bronze, bronze trimmed or stainless steel trimmed valves sized and selected for application; cast iron or fabricated steel recirculating system piping and schedule 80 PVC filter system piping with unions or flanges supplied as required to allow removal of all equipment; electronically operated water level control system with integral water hammer arrester and by-pass system; and a UL-Listed, NEMA-12 enclosed electrical control system including three time clocks, all main and branch circuit breakers, motor starters, lighting contactors, disconnect switches, H-O-A selector switches and pilot lights as required.

WaterWorks® WW-1-C

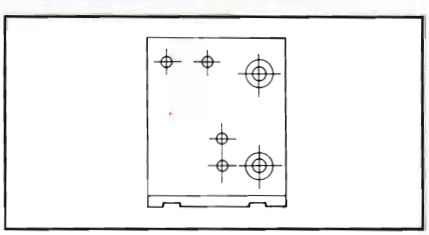


Unit shall be 6' × 8' × 7' high and of all fiberglass reinforced polyester construction with a 30" × 30" entry hatch. Unit shall contain a cast iron fountain pump with suction strainer and (15,20,25) horsepower, 460 volt, 3 phase motor; a cast bronze, self-priming filter pump with integral suction strainer and a (3/4,1) horsepower, 460 volt, 3 phase motor; a (18",24") diameter (stainless steel, FRP) filter with (multi-port, automatic) backwash valve, pressure gauge and site glass; a forced air ventilation system; a cast iron, heavy-duty sump pump with 1/3 horsepower, 120 volt motor; all cast bronze, bronze trimmed or stainless steel trimmed valves sized and selected for application; cast iron or fabricated steel recirculating system piping and schedule 80 PVC filter system piping with union or flanges supplied as required to allow removal of all equipment; electronically operated water level control system with integral water hammer arrester and by-pass system; and a UL-Listed, NEMA-12 enclosed electrical control system including three time clocks, all main and branch circuit breakers, motor starter, lighting contactors, disconnect switches, H-O-A selector switches and pilot lights as required.

WATERWORKS® 2 Series Skid-Mounted Systems

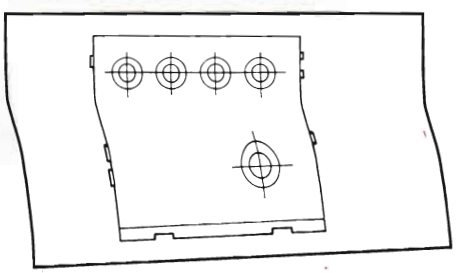
GENERAL: Skid-mounted modular pumping system shall be Imperial WaterWorks-2 Series. WaterWorks system shall be factory designed, fabricated and tested with all mechanical and electrical equipment furnished, installed and wired at factory. Unit shall be provided with flanged or threaded piping connections to allow connection to fountain piping. Skid shall be of all steel construction with all equipment and piping integrally braced and supported.

WaterWorks® WW-2-B



Unit shall be 4' × 5' × 5' high and designed for a minimum room size of 6' × 6' × 6'- 6" high. Unit shall contain a cast iron fountain pump with integral suction strainer and (3,5) horsepower, 120/208 volt, 3 phase motor: a (18",24") diameter (stainless steel, FRP) filter with (multi-port, automatic) backwash valve, pressure gauge and site glass; all cast bronze, bronze trimmed or stainless steel trimmed valves sized and selected for application; cast iron or fabricated steel recirculating system piping and schedule 80 PVC filter system piping with unions or flanges supplied as required to allow removal of all equipment; electronically operated water level control system with integral water hammer arrester and by-pass system; and a UL-Listed, NEMA-12 enclosed electrical control system including three time clocks, all main and branch circuit breakers, motor starters, lighting contactors, disconnect switches, H-O-A selector switches, and pilot lights as required.

WaterWorks® WW-2-C



Unit shall be 5' × 6' × 5' high and designed for a minimum equipment room size of 8' × 8' × 6'-6" high. Unit shall contain a cast iron fountain with suction strainer and (10,15,20,25) horsepower, 460 volt, 3 phase motor; a cast bronze, self-priming filter pump with integral suction strainer and a (3/4,1) horsepower, 460 volt, 3 phase motor; a (18",24") diameter (stainless steel, FRP) filter with (multi-port, automatic) backwash valve, pressure gauge and site glass; all cast bronze, bronze trimmed or stainless steel trimmed valves sized and selected for application; cast iron or fabricated steel recirculating system piping and schedule 80 PVC filter system piping with union or flanges supplied as required to allow removal of all equipment; electronically operated water level control system with integral water hammer arrester and by-pass system; and a UL-Listed, NEMA-12 enclosed electrical control system including three time clocks, all main and branch circuit breakers, motor starters, lighting contactors, disconnect switches, H-O-A selector switches and pilot lights as required.

DESIGN GUIDELINES

Fountain design involves the skillful blending of architectural, hydraulic and electrical disciplines. Successful water features exhibit not only exceptional aesthetic qualities and well-designed electrical/mechanical systems, but also superior attention to detail.

The illustration below depicts, in simplified form, a cross-section of a typical fountain installation, and serves as a reference to the sections to follow. This brochure is organized into six sections: selection and specification information on the complete family of Imperial WaterWorks systems, design, performance and specification data on Imperial's individual water effects, design techniques for waterfalls, water and sculpture, pool components and accessories, and a detailed product selection guide for Imperial underwater lighting products. (Water and sculpture is always a custom application and is not depicted in the simplified diagram below).

The Basics

Beyond the primary considerations in any fountain installation — purpose/intent, location, and budget — the following key items should be addressed in the design process.

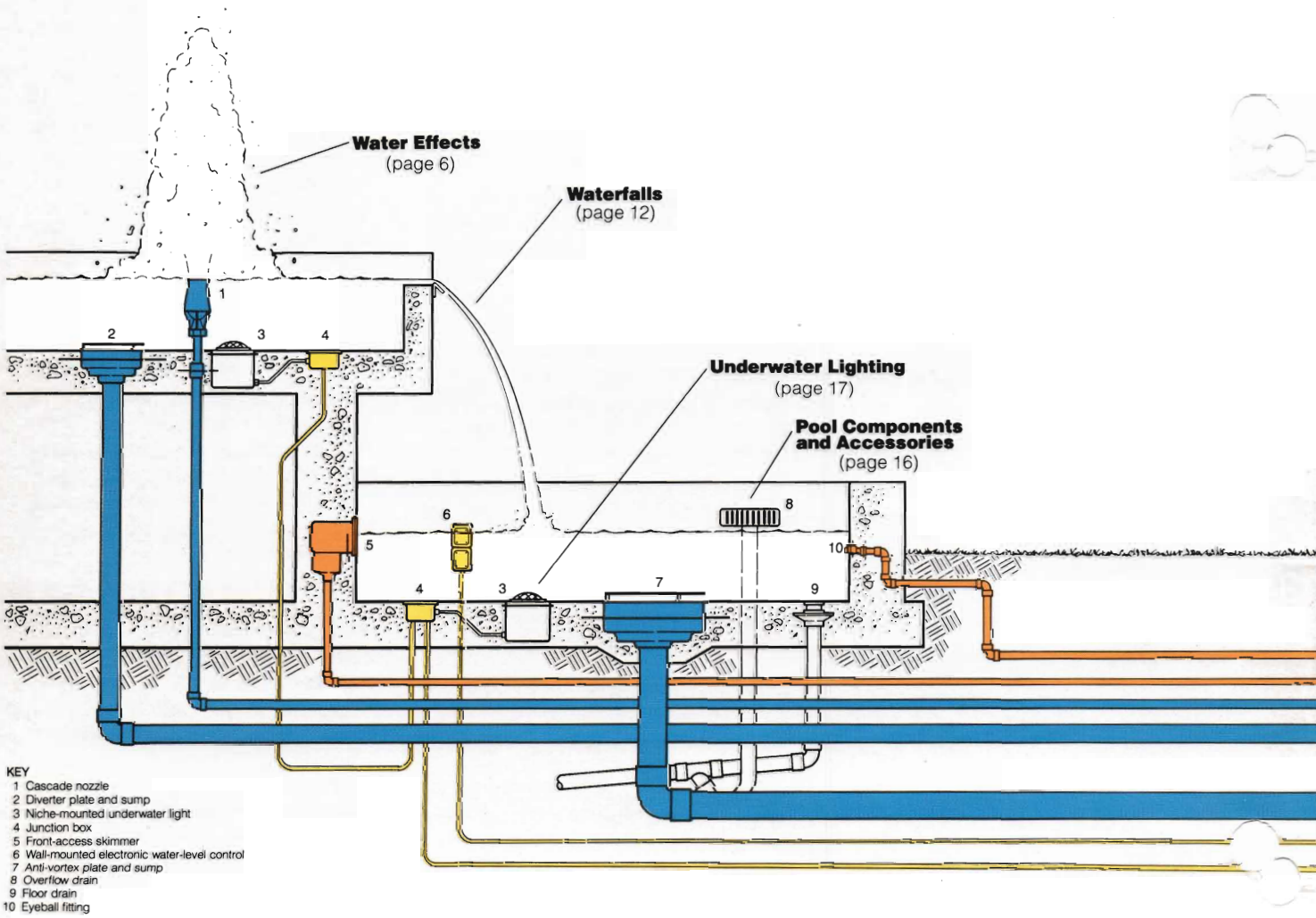
☐ Fountain Parameters
Important physical parameters relating to pool depth, spray height and wall height should be established in the early design stages.

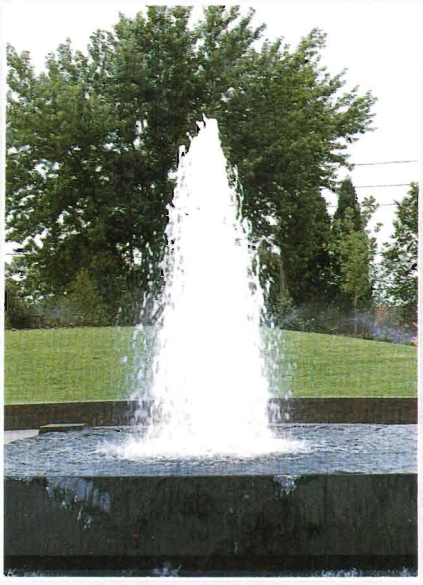
☐ Selection of the Visual Water Features
The fountain designer has a variety of individual nozzle effects, waterfalls and combination water features available. The design options are unlimited.

☐ Aesthetic Concerns
Material choice, color, scale, shape and sound all contribute to the fountain's integration with the architectural or landscape environment. How these factors are handled can affect how well the water feature enhances a setting.

☐ Selection of Underwater Lighting, Pool Components and Accessories
Proper selection and sizing of often over-looked pool components are important in the design of a successful fountain installation.

☐ Selection of the WaterWorks System
Once the general parameters and water features for a fountain have been established, the appropriate electrical/mechanical package can be selected.





Cascade

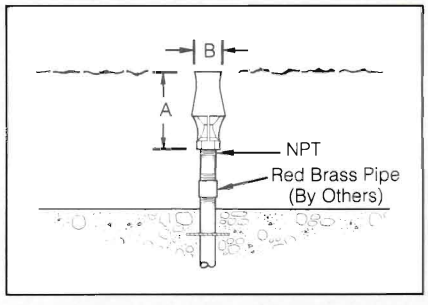
The Cascade produces a massive geyser effect utilizing highly aerated water in a natural conical shape. This full-bodied effect is ideal for a solitary or central water display. Grouped together Cascades form mountains of frothy white water. Cascades are highly visible from a distance and their distinct shape resists wind distortion.

Because the Cascade nozzle is a venturi design and draws water from the surrounding pool, it is water level dependent and any variation in water level will produce a change in spray height and visual appearance. Care should be taken when utilizing Cascade nozzles in very shallow or small pools, and when centered in round pools. Surge action may produce large waves and splash problems. In these situations, a wave baffle should be incorporated in the design.

Spray Ht. (Ft.)	2	4	6	8	10	12	15	20	25	30	Dimensions		
Head (Ft.)	20	28	36	45	55	66	75	93	110	130	A	B	NPT
Catalog No.	Performance in GPM												
C-75	8	12	18								5″	2″	¾″
C-150	20	28	34	38	44	48					9″	3¼″	1½″
C-200		52	60	70	80	100	130	165			12½″	4¼″	2″
C-300			125	145	165	185	205	230	260	300	14-⅛″	7″	3″

SPECIFICATIONS

Imperial Cascade nozzle shall be of one piece bronze construction, machined to produce a conical shape of aerated water. The base shall be National Pipe Thread (NPT) sized as specified. Finish shall be natural bronze.



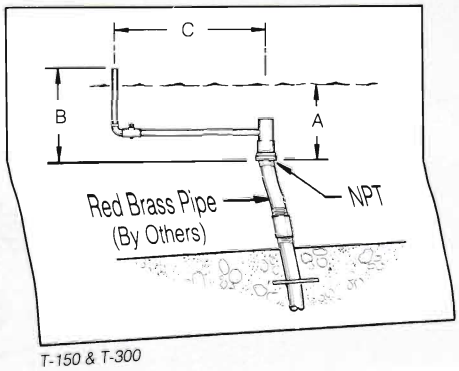
Bubbler

The Bubbler produces a pulsating mound of highly aerated white water. It is an excellent choice when a low height and a highly wind-resistant effect is desired. Note that in multi-level indoor pools, care must be taken to have the water at operating level when the Bubbler is started. Without surrounding water the nozzle will spray higher until the pool is filled.

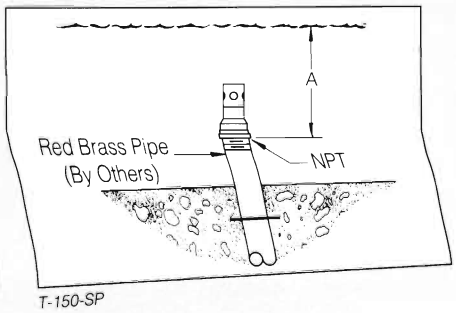
Spray Ht. (Ft.)	1	2	3	4	Dimensions			
Head (Ft.)	6	8	10	12	A	B	C	NPT
Catalog No.	Performance in GPM							
T-150	45	52			8½"	10"	12"	1½"
T-150-SP	45	52			8½"	N/A	N/A	1½"
T-300		100	115	125	13"	15"	18"	3"

SPECIFICATIONS

Imperial Bubbler nozzle shall be of bronze and copper construction with an integral and adjustable air inlet. The base shall be National Pipe Thread (NPT) as specified. Finish shall be natural bronze and copper.

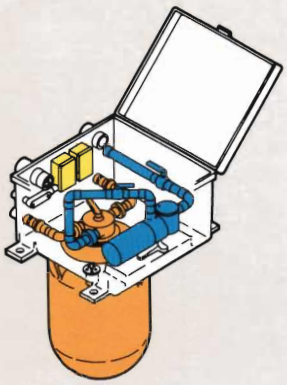


T-150 & T-300



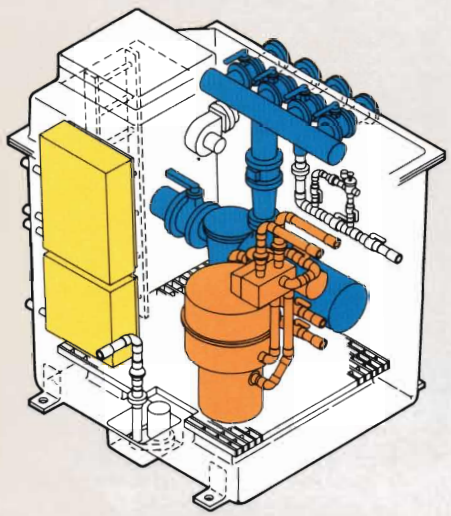
T-150-SP

WATERWORKS® SELECTION GUIDE



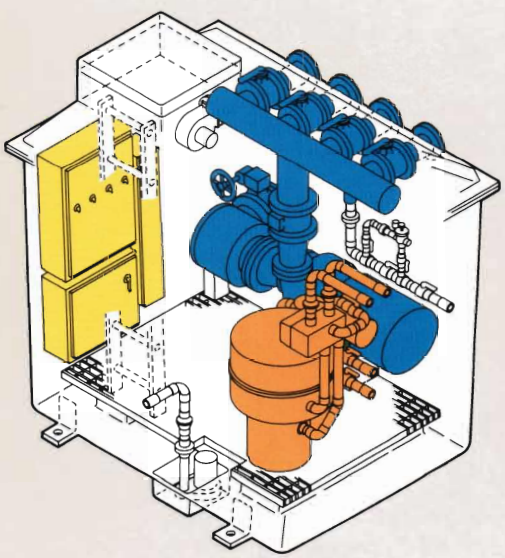
Available Pumping Systems		Available Filter Systems				Electrical System		
Capacity (GPM)	Pump (HP)	Pump (HP)	Backwash Control	Tank Size	Pool Size (Gallons)	Lighting Circuits	Electronic Control Sys	Power Supply
WaterWorks® WW-1-A								
0-60	1	NA*	Manual	24"	20,000	1	NA	115/230 volt, single phase
WaterWorks® WW-1-A-L								
0-60	1	Not Required				1	NA	115/230 volt, single phase
WaterWorks® WW-1-2-A								
0-120	2	NA*	Manual	24"	20,000	1	NA	115/230 volt, single phase
WaterWorks® WW-1-2-A-L								
0-120	2	Not Required				1	NA	115/230 volt, single phase

*Filtration system operates off of main recirculating pump.

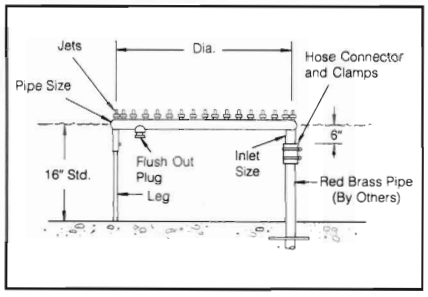


Available Pumping Systems		Available Filter Systems				Electrical System		
Capacity (GPM)	Pump (HP)	Pump (HP)	Backwash Control	Tank Size	Pool Size (Gallons)	Lighting Circuits	Electronic Control Sys	Power Supply
WaterWorks® WW-1-B								
60-150	3	¾	Manual	18"	10,000	6	Yes	120/208 volt, three phase
150-300	5	¾	Automatic	18"	10,000			
300-600	10	1	Manual	24"	20,000			
		1	Automatic	24"	20,000			
WaterWorks® WW-2-B								
60-150	3	NA*	Manual	18"	10,000	6	Yes	120/208 volt, three phase
150-300	5	NA*	Automatic	18"	10,000			
		NA*	Manual	24"	20,000			
		NA*	Automatic	24"	20,000			

*Filtration system operates off of main recirculating pump.



Available Pumping Systems		Available Filter Systems				Electrical System		
Capacity (GPM)	Pump (HP)	Pump (HP)	Backwash Control	Tank Size	Pool Size (Gallons)	Lighting Circuits	Electronic Control Sys	Power Supply
WaterWorks® WW-1-C								
600-800	15	¾	Manual	18"	10,000	6	Yes	120/208 volt, three phase lighting, and 460 volt, three phase pumps
800-1000	20	¾	Automatic	18"	10,000			
1000-1500	25	1	Manual	24"	20,000			
		1	Automatic	24"	20,000			
WaterWorks® WW-2-C								
300-600	10	¾	Manual	18"	10,000	6	Yes	120/208 volt, three phase lighting, and 460 volt, three phase pumps
600-800	15	¾	Automatic	18"	20,000			
800-1000	20	1	Manual	24"	10,000			
1000-1500	25	1	Automatic	24"	20,000			



Spray Rings

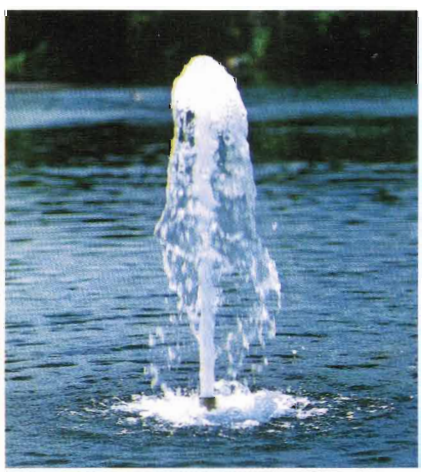
Spray Rings utilize multiple, solid streams of water to produce sparkling circular patterns. A wide variety of distinctive patterns are available. Spray Rings can accent other water effects or serve as individual water features. Imperial offers two types of Spray Rings: SA Series, recommended for interior applications. SHA Series, suitable for outdoor applications where more wind resistance is required. Both Spray Ring types utilize adjustable jets for versatility in pattern selection and flexibility in field adjustment.

Spray Ht. (Ft.)	2	4	6	8	10	12	14	16	Dimensions			
Pressure	4	6	8	11	15	18	22	26	Ring Dia.	Pipe Size	Inlet Size	No. Jets
Catalog No.	Performance in GPM											
SA-24	12	20	24						24"	1¼"	(2)1¼"	38
SA-30	15	24	30	36					30"	1¼"	(2)1¼"	48
SA-36	17	29	36	42	49				36"	1¼"	(2)1¼"	56
SA-48	23	38	48	58	65	75			48"	1¼"	(2)1¼"	75
SA-60	29	49	61	73	83	93			60"	1¼"	(4)1¼"	95
SA-72	35	58	73	87	100	114			72"	1¼"	(4)1¼"	114
SHA-24	26	46	51	60					24"	1½"	(2)1½"	26
SHA-36	38	67	76	88					36"	2"	(2)2"	38
SHA-48	50	88	99	115	132				48"	2"	(2)2"	50
SHA-72	65	116	131	152	174	203			72"	2"	(4)2"	66
SHA-96	85	151	170	198	227	264	293		96"	2"	(4)2"	86
SHA-120	91	161	181	212	242	282	313	333	120"	2"	(4)2"	92
SHA-180	126	224	252	294	336	392	434	462	180"	2"	(6)2"	128
SHA-240	166	294	331	386	441	515	570	607	240"	2"	(8)2"	168

SA — Series furnished with .110" adjustable jets. SHA — Series furnished with .187" adjustable jets. Note: Custom Spray Rings, Spray Ovals, Spray Arcs or Spray Bars are available upon request.

SPECIFICATIONS

Imperial Spray Ring shall be of all brass construction with precision adjustable brass nozzles, brass inlets, integral adjustable legs and flush-out plugs. Spray Rings shall be of diameter specified and furnished with appropriate quantity of nozzles and inlets. Inlets shall be designed for and furnished with hose connectors and stainless steel hardware. Finish shall be natural brass. SA Series Spray Rings shall be furnished with .110" orifice nozzles and SHA Series Spray Rings furnished with .187" orifice nozzles.



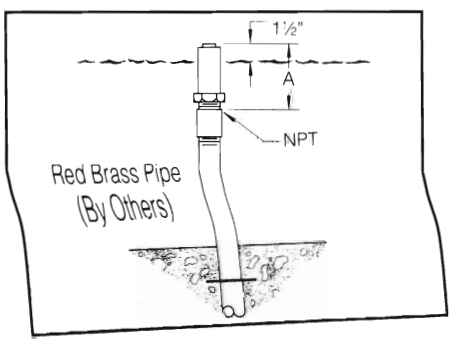
Foam Jet

The Foam Jet produces a uniform column of frothy white water capped with a soft mushroom "crown". This highly aerated effect is an excellent choice as single visual effect or clustered to produce massive columns of water. Because the Foam Jet is totally water level independent it is an ideal choice where a fluctuating water level is expected.

Spray Ht. (Ft.)		1	2	3	4	5	6	7	8	10	12	14
FJ-100	G.P.M.	7	12	15	17	19	22	24				
	HEAD	12	20	22	30	36	42	49				
FJ-150	G.P.M.	21	32	38	43	50	54	60	64	72	80	85
	HEAD	7	11	12	17	21	22	26	30	37	44	51
FJ-200	G.P.M.		36	42	50	56	64	69	73	81	90	100
	HEAD		8	10	12	14	19	21	23	28	34	40

SPECIFICATIONS

Imperial Foam Jet Nozzle shall be of bronze and brass construction designed to produce highly aerated columns of water, independent of the surrounding water level or wave action. The base shall be National Pipe Thread (NPT) sized as specified. Finish shall be natural bronze and brass. Note: adjustable swivel may be added to nozzle by adding "X" designator to catalog number example FJX-150.



Dimensions		
Catalog No.	A	NPT
FJ-100	4⅛"	1"
FJ-150	7"	1½"
FJ-200	7"	2"

WATER EFFECTS

Proper selection of water effects is essential for a successful design. All individual water effects and their visual appearance may be broadly categorized into three basic groups: aerated effects, solid stream effects and sheet effects. The most commonly used effects from each of these groups have been selected and are detailed here with Imperial specification and performance data.

Five basic considerations must be made each time a water effect is selected. These factors are: noise level, wind resistance, water level dependence, clogging potential and desired spray height of the effect. The accompanying "Water Effects Selection Chart" rates the water effects based on these five considerations.

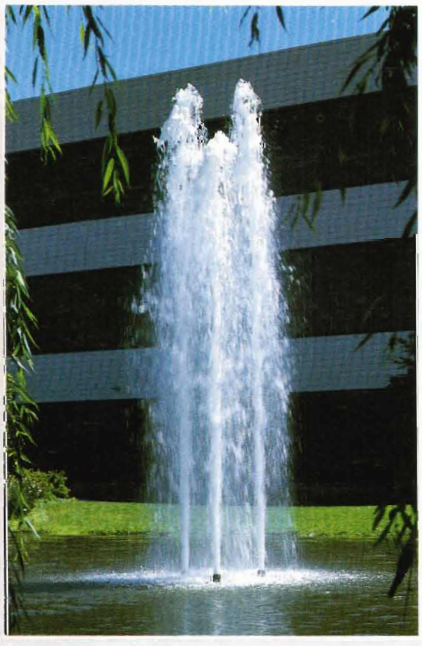
Imperial produces a variety of specialized water effects not included in this catalog, and offers custom effects for specific applications. For further information, contact Imperial or your local representative.

Water Effects Selection Chart

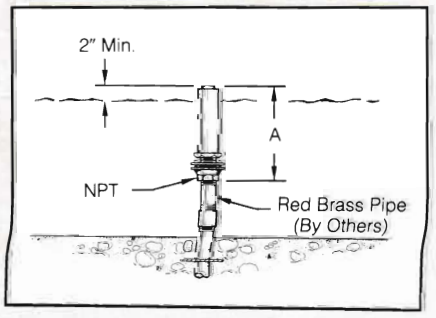
Water Effect	Noise Level	Wind Resistance	Water Level Dependence	Maximum Height
Aerated:				
Aerator	Moderate	Good	None	45 ft.
Cascade	High	Excellent	Dependent	30 ft.
Bubbler	Low	Excellent	Dependent	4 ft.
Foam Jet	Moderate	Good	None	25 ft.
Solid Stream:				
Precision	Moderate	Good	None	250 ft.
Fleur-De-Lis*	Low	Fair	None	15 ft.
Spray Rings*	Low	Fair	None	16 ft.
Sheet:				
Morning Glory	Very Low	Poor	None	4 ft.
Crystal Dome	Very Low	Poor	None	4 ft.
Dan-De-Lion**	Low	Poor	None	12 ft.
Waterfalls:				
Aerated	High	Good	Sets Level	20 ft.
Smooth Sheet	Very Low	Poor	Sets Level	20 ft.

* Indicates effect types which utilize small orifice nozzles and are prone to clogging when a filter system is not used.

** Dan-De-Lion nozzles have an extremely small orifice and must be protected by supplying them with 100% filtered water.



Group of Aerator Nozzles



Aerator

This Aerator produces a column of frothy white water, capped with a pulsating "crown". This well defined, highly visible effect is an excellent choice in producing graceful arches or background curtain walls. Aerators can be clustered to produce massive columns of water. Because of the unique patented nozzle design, the Imperial Aerator is totally water level independent. This makes it ideal for lake applications or situations where the water level is expected to vary.

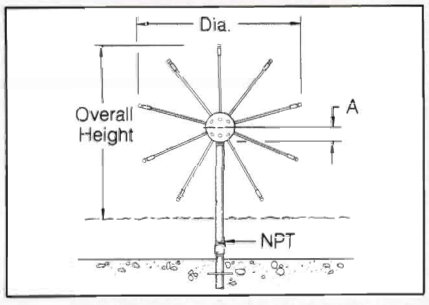
Spray Ht. (Ft.)	2	4	6	8	10	12	15	20	25	30	35	40	45	Dimensions	
Head (Ft.)	6	10	15	20	22	25	30	36	42	48	60	90	100	A	NPT
Catalog No.	Performance in GPM														
AX-50	2	3	4											5⅜"	½"
AX-75	5	10	14	16										6½"	¾"
AX-100	14	19	24	29	36									7½"	1"
AX-125		22	28	32	38	42	46							8⅝"	1¼"
AX-150			30	34	40	44	48	52						11½"	1½"
AX-200			35	42	48	55	65	80	98	115				14"	2"
AX-300				50	56	62	70	85	105	124	142	160	176	21"	3"

SPECIFICATIONS

Imperial Aerator nozzle shall be of bronze and brass construction designed to produce a highly aerated stream of water, independent of the surrounding water level or wave action. Aerator nozzle shall be furnished with a bronze adjustable swivel which allows 360° adjustment in a 30° cone. The base shall be National Pipe Thread (NPT) sized as specified. Finish shall be natural bronze and brass. Note: Adjustable swivel may be deleted by deducting "X" designator from the catalog number.

Dan-De-Lion Sphere

The Dan-De-Lion Sphere is both an impressive water feature and a contemporary piece of sculpture. In operation, the Dan-De-Lion Sphere produces numerous globules of translucent water to form a sparkling, attractive spherical shape. It is particularly enticing when illuminated by underwater lighting. When not in operation, the Dan-De-Lion Sphere becomes an attractive, contemporary sculpture. This effect is best suited for indoor applications because of its low noise level and delicate spray pattern. It is not recommended for applications subject to high wind conditions that can distort it's fine nozzle spray patterns and cause splash problems. Note: Dan-De-Lion Sphere nozzles are machined to very close tolerances and require 100% filtration to prevent clogging.



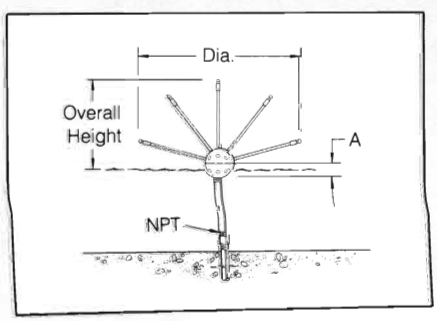
Catalog No.	Sphere Dia.	Overall Ht.	A	No. Arms	Ball Size	Inlet & Riser	Performance GPM	Performance Head (Ft.)
DS-300	3'-0"	5'-0"	4½"	29	9"	2½" NPT	75	15
DS-400	4'-0"	6'-0"	4½"	29	9"	2½" NPT	75	16
DS-401	4'-0"	6'-0"	4½"	61	9"	2½" NPT	155	16
DS-500	5'-0"	7'-0"	4½"	61	9"	2½" NPT	155	17
DS-600	6'-0"	8'-0"	4½"	61	9"	2½" NPT	155	18
DS-800	8'-0"	10'-0"	8¾"	253	20"	6" Flanged	630	19
DS-1000	10'-0"	12'-0"	8¾"	385	20"	6" Flanged	960	20

SPECIFICATIONS

Imperial Dan-De-Lion Sphere shall be of bronze, copper and brass construction machined to produce a sphere of translucent water. Dan-De-Lion Sphere shall be furnished with a central bronze manifold ball with wands of quantity and length as specified. Each wand shall be fitted with a precision machined adjustable brass nozzle factory set to produce effect. Finish shall be natural bronze, copper and brass. The base shall be furnished with either 2½" National Pipe Thread (NPT) or 6" flanged inlet as specified.

Dan-De-Lion Hemisphere

The Dan-De-Lion Hemisphere, like the Dan-De-Lion Sphere, is both a unique water effect and a contemporary sculpture. The Dan-De-Lion Hemisphere consists of a half dome of shimmering, translucent water and appears as though a complete sphere were half-submerged in the pool. Also recommended for indoor settings because of it's low noise level and delicate spray pattern, the Dan-De-Lion Hemisphere illuminates beautifully with underwater lighting. It is not recommended for applications where high winds may be present. Note: Dan-De-Lion Hemisphere nozzles are machined to very close tolerances and require 100% filtration to prevent clogging.



Catalog No.	Sphere Dia.	Overall Ht.	A	No. Arms	Ball Size	Inlet & Riser	Performance GPM	Performance Head (Ft.)
DH-300	3'-0"	1'-6"	4½"	15	9"	2" NPT	38	11
DH-400	4'-0"	2'-0"	4½"	15	9"	2" NPT	38	12
DH-401	4'-0"	2'-0"	4½"	31	9"	2½" NPT	80	12
DH-500	5'-0"	2'-0"	4½"	31	9"	2½" NPT	80	13
DH-600	6'-0"	3'-0"	4½"	31	9"	2½" NPT	80	13
DH-800	8'-0"	4'-0"	8¾"	145	20"	6" Flanged	370	14
DH-1000	10'-0"	5'-0"	8¾"	193	20"	6" Flanged	485	15

SPECIFICATIONS

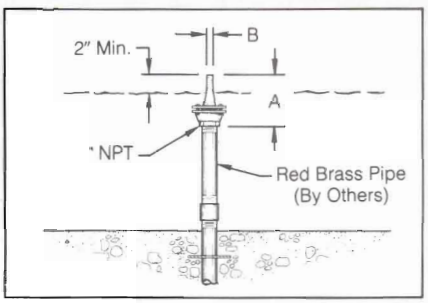
Imperial Dan-De-Lion Hemisphere shall be of bronze, copper and brass construction machined to produce a hemisphere of translucent water. Dan-De-Lion Hemisphere shall be furnished with a central bronze manifold ball with wands of quantity and length as specified. Each wand shall be fitted with a precision machined adjustable brass nozzle factory set to produce effect. Finish shall be natural bronze, copper and brass. The base shall be furnished with either 2", 2½" National Pipe Thread (NPT) or 6" flanged inlet as specified.

Precision Jet

The Precision Jet produces a solid, non-aerated clear stream of water. It is an excellent choice for accenting sculpture, producing archway patterns or, when mounted on spray rings or manifolds, creating distinct water features of precise definition and shape. Precision jets are also ideal for applications requiring extremely high spray heights and are capable of heights over one hundred feet. When clustered, Precision Jets produce massive columns of water.

Spray Ht. (Ft.)	2	4	6	8	10	12	15	20	25	30	40	50	60	70	80	90
Head (Ft.)	4	6	8	10	13	16	19	26	33	40	52	65	78	91	104	117
Catalog No.	Performance in GPM															
PX-1	4	6	8	10	12	14										
PX-2	10	15	20	25	30	35	40	45								
PX-3		25	30	38	52	60	68	78	92	105						
PX-4			45	52	60	68	78	95	110	140	170	200				
P-5				82	100	125	150	185	220	250	300	340	380	420		

Note: Nozzles with "X" are furnished with swivel as standard.



Dimensions			
Catalog No.	A	B	NPT
PX-1	5¼"	⅜"	1"
PX-2	6"	⅝"	1½"
PX-3	7½"	⅞"	2"
PX-4	12"	1⅛"	3"
P-5	11¼"	1½"	4"

SPECIFICATIONS

Imperial Precision Jet nozzle shall be of bronze construction machined to produce a solid, non-aerated stream of water. The base shall be National Pipe Thread (NPT) sized as specified. Finish shall be natural bronze. Note: Precision Jet nozzles up to 3" NPT shall be furnished with an integral, adjustable bronze swivel which allows 360° adjustment in a 30° cone. Integral adjustable swivel may be deleted by deducting "X" designator from catalog number.

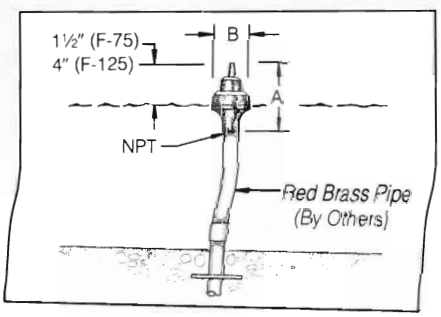
Fleur-De-Lis

The Fleur-De-Lis produces a distinctive, sparkling three-tiered pattern. This delicate effect is appropriate for intimate settings in courtyards, gardens and interiors.

Spray Ht. (Ft.)	2	4	6	8	10	12	15	Dimensions		
Head (Ft.)	6	9	12	15	18	22	28	A	B	NPT
Catalog No.	Performance in GPM									
F-75	10	16	21	24				3"	4⅝"	¾"
F-125		28	34	40	46	52	60	8"	4¼"	1¼"

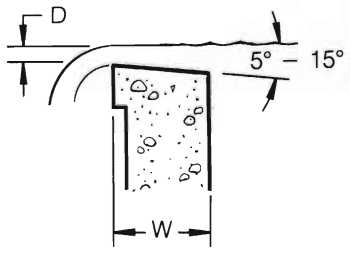
SPECIFICATIONS

Imperial Fleur-De-Lis nozzle shall be of bronze construction machined to produce a three-tiered water pattern. Base shall be National Pipe Thread (NPT) sized as specified. Finish shall be natural bronze.



TAPERED WEIR

Tapered Weirs are generally cast in place or are formed with cap stones. They require more water than other weir types because of low velocity at weir edge.

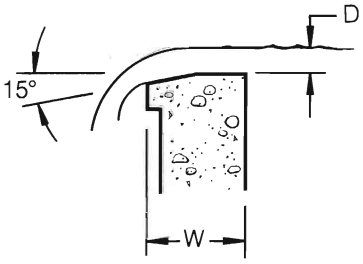


Height	Depth (D)	Wall Width (W)
0′- 2′	½″	8″-12″
2′- 4′	¾″	10″-14″
04′-06′	1″	12″-16″

Not recommended over 6 feet high.

FLAT WEIR (BETTER)

Flat Weirs are very effective in creating smooth sheets and are generally formed using a cap stone.

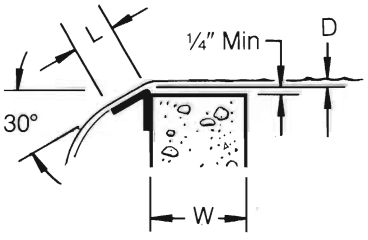


Height	Depth (D)	Wall Width (W)
0′- 2′	⅜″	6″- 8″
2′- 4′	½″	8″-10″
4′- 6′	¾″	10″-12″
6′- 8′	1″	12″-14″
8′-10′	1¼″	12″-14″
10′-12′	1½″	14″-16″
12′-14′	1¾″	14″-16″
14′-16′	2″	16″-18″

Not recommended over 16 feet high.

METAL EDGE WEIR (BEST)

Metal Edge Weirs are the most effective of all smooth sheet weirs. They can be adjusted to produce a perfectly level weir.

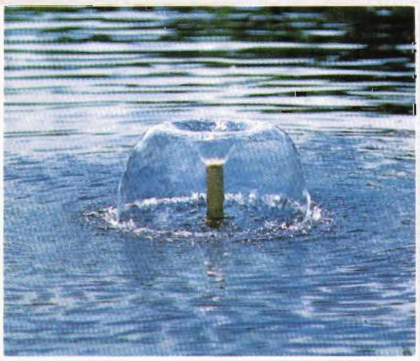


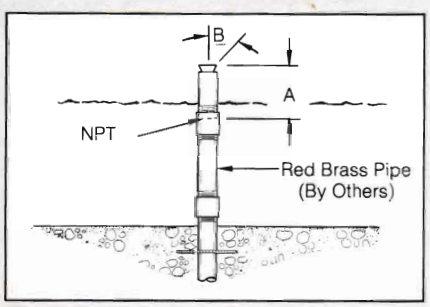
Height	Depth (D)	Width (W)	Length (L)
00′-02′	¼″	4″- 6″	1″
02′-04′	⅜″	5″- 7″	1½″
04′-06′	½″	6″- 8″	2″
06′-08′	¾″	7″- 9″	2½″
08′-10′	1″	8″-10″	3″
10′-12′	1¼″	9″-11″	3″
12′-14′	1½″	10″-12″	4″
14′-16′	1¾″	11″-13″	5″
16′-18′	2″	12″-14″	6″

Waterfall Performance Data*

GPM/FT. (Nominal)	Water Depth (D) Thickness Sharp Metal Weir	Water Depth (D) Thickness (W) = 6″ to 11″	Water Depth (D) Thickness (W) = 12″ or more
6.0	¼″	3⁄16″	⅛″
10.0	⅜″	5⁄16″	¼″
15.0	½″	⅜″	5⁄16″
28.0	¾″	9⁄16″	7⁄16″
40.0	1″	¾″	5⁄8″
55.0	1¼″	1″	¾″
75.0	1½″	1¼″	1″
93.0	1¾″	1½″	1¼″
112.0	2″	1¾″	1½″
155.0	2½″	2″	1¾″
200.0	3″	2½″	2″
255.0	3½″	3″	2½″
305.0	4″	3½″	3″

*Recommend 10% be added to performance data if metal edge wier is not used.





Morning Glory

The Morning Glory produces a circular sheet of water, similar in form to the flower from which this effect derives its name. The water pattern may be adjusted from a full translucent sheet to a broken half sheet. In full sheet this effect produces minimal noise or splash, while the half sheet provides a sparkling ring of water. Because of the soothing nature of this effect, the Morning Glory is recommended for indoor applications where intimacy and a relaxing ambience are desired. Ideal for settings in close proximity to people, the Morning Glory is also a dramatic feature when illuminated with underwater lighting.

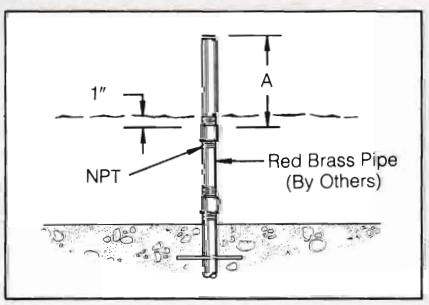
The Morning Glory is not recommended in applications with high wind. Wind will distort the sheet effect and cause splash problems.

	Full Sheet			Half Sheet			Dimensions		
Catalog No.	Spray Ht.	Spray Dia.	GPM	Spray Ht.	Spray Dia.	GPM	A	B	NPT
J-75-35	12″	12″	5	18″	24″	10	4″	35°	¾″
J-125-35	12″	18″	10	18″	36″	12	6½″	35°	1¼″
J-200-25	18″	36″	35	24″	54″	40	8″	25°	2″
J-200-35	12″	36″	40	24″	66″	45	8″	35°	2″
J-300-25	24″	52″	55	36″	108″	80	12″	25°	3″
J-300-35	24″	66″	60	36″	120″	85	12″	35°	3″
J-400-25	30″	60″	90	36″	120″	130	12″	25°	4″
J-400-35	30″	72″	110	60″	144″	150	12″	35°	4″

Note: Head-Feet requirement is 2 ft. on Full Sheet.
Head-Feet requirement is 4 ft. on Half Sheet.

SPECIFICATIONS

Imperial Morning Glory nozzle shall be constructed of machined brass to produce a translucent sheet of water with an adjustable 35° or 25° brass cone to control size and density of the pattern. The base shall be National Pipe Thread (NPT) sized as specified. Finish shall be natural brass.



Crystal Dome

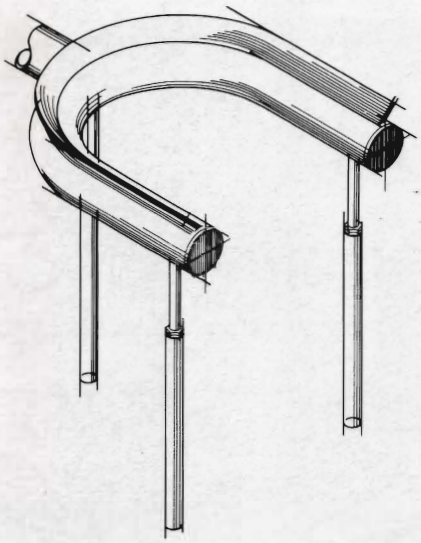
The Crystal Dome is a transluscent sheet of clear water resembling a bubble. This delicate water feature is recommended for indoor applications where a soothing, intimate effect is required. The Crystal Dome produces virtually no splash and minimal noise, and is an ideal choice for settings with close proximity to people. Underwater lighting beautifully enhances this effect. (Refer to the Underwater Selection Guide on pages 18 & 19).

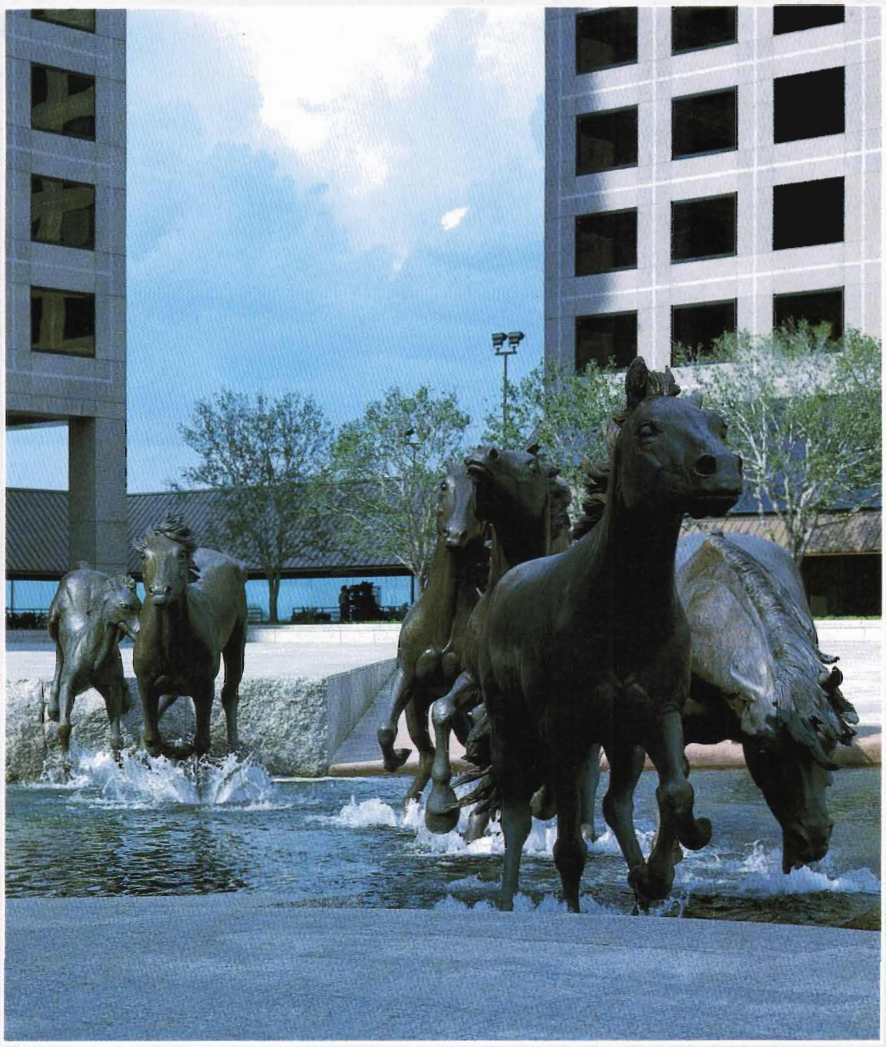
The Crystal Dome is not recommended where wind conditions are present. Wind will distort the sheet effect and cause splash problems.

Catalog No.	Spray Ht.	Spray Dia.	GPM	Head (Ft.)	Dimensions A	Dimensions NPT
CD-75	12"	14"	5	3	12"	¾"
CD-125	18"	24"	10	3	18"	1¼"
CD-200	24"	30"	16	4	24"	2"
CD-300	36"	36"	40	5	36"	3"

SPECIFICATIONS

Imperial Crystal Dome nozzle shall be constructed of machined brass with an adjustable brass diverter plate to produce a translucent sheet of water in the shape of a dome. The base shall be National Pipe Thread (NPT) sized as specified. Finish shall be natural brass.





The Mustangs of Los Colinas
On this much publicized water feature, Imperial was challenged to create the illusion of wild horses crossing a river. With the sculptures in place, this project required field measurement of each hoof in order to have a special spray bar engineered and bent to the exact size of each hoof. The finished product created the dramatic effect seen here.

▶ ***The Mustangs of Las Colinas*** *in Williams Square, Dallas, Texas.*
Owner: *Las Colinas Corporation*
Landscape Architects: *The SWA Group (Houston)*
Sculptor: *Robert Glen*

Plaza of the Whales
The unique mosaic of the Texas State Aquarium entryway depicts a variety of aquatic animals. The challenge was to artistically portray, in near life size, ocean dwelling creatures in a stylized Gulf Stream environment. Water flows from the extended fluke of a diving whale and spouts from the blowhole of its surfacing companion.

The specialized construction techniques employed for the development of the plaza required the testing of water effect prior to embedding the piping in the architectural concrete. In maintaining a relatively flat plaza, special fittings were required for the unusually shallow water depths. A combination of compressed air and a custom nozzle creates the realistic looking water spout every 30 seconds.

◀ *Plaza of the Whales,* ***Texas State Aquarium,***
Corpus Christi, Texas
Architects: *Phelps/Garza/Bomberger (San Antonio, Texas)*

WATERFALLS

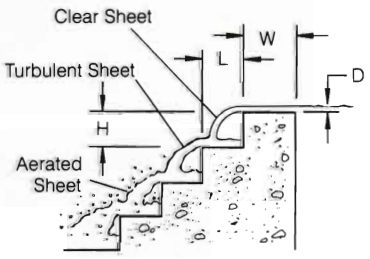
Properly designed waterfalls are among the most exciting and dramatic of all water features. Their universal appeal is due not only to the visual attraction of the flow of water and the sounds created, but also their affinity with water as it exists in nature.

A waterfall occurs when water falls over an edge or surface known as a "weir". Weirs can be made in many shapes and configurations. The secret to designing a successful waterfall is in the weir design and in knowing how much water is required to produce the desired effect. It is generally recommended that a ½" minimum water depth be used. This is due to the inaccuracies in making weirs level and will generally insure, even if a weir is not perfectly level, that uniform water coverage will be obtained.

Waterfalls may be categorized in two basic types: aerated waterfalls and smooth sheet waterfalls. Other names given to particular waterfall effects are generally derived from the weir type or shape of the waterfall structure.

Aerated Waterfalls

Aerated waterfalls are best created using the "three-step" method. Three steps will produce a frothy, foamy flow of water. The first step produces a smooth sheet, the second will distort the water, and the third will produce aerated water. The use of additional steps will not result in a corresponding increase of aeration, while fewer steps will not produce enough aeration.



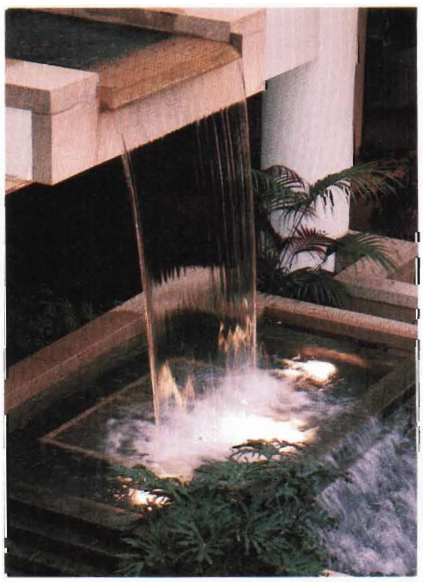
(D) Depth	(L) Length	(H) Height
½"	4" to 8"	4"
¾"	6" to 10"	6"
1"	8" to 12"	8"
1¼"	10" to 16"	10" (8" min.)
1½"	12" to 18"	12" (9" min.)
1¾"	12" to 18"	18" (10" min.)
2"	12" to 18"	18" (12" min.)

(W) Width: 4" min. to 8" max.

The size of the steps and the amount of water required in an aerated waterfall are interdependent. Normally, the water depth flowing over the first step should be one-eighth of the step height, or the step height should be eight times the water depth. Minimum water depth should be at least ½". Step lengths or runs may vary from 75% to 200% of step heights. The optimum step length for best results is 100% to 125% of step heights.

Smooth Sheet Waterfalls

Smooth sheet waterfalls can be created by a variety of different weir configurations, ranging from a simple flat wall top to a metal weir edge. The water depth over the weir necessary to produce a sheet will depend on the height of the waterfall, the weir type, and the wind conditions.



▲ *Detail of smooth sheet waterfall at* ***Charleston Town Center*** *(Charleston, West Virginia)*

As a sheet of water falls it becomes thinner. The greater the height of the waterfall, the thicker the sheet must be at the weir in order for the sheet to maintain its form to the pool.

Wind tends to lift a waterfall sheet. If the wind is strong enough it can destroy the visual effect and produce serious splash problems. Although sheet waterfalls will always be distorted by wind, increasing the sheet thickness will provide added resistance to wind *distortion.*

Weir configuration is the most important consideration in establishing water depth requirements. The difference between an efficient weir design and one that is inefficient can more than double the water depth requirements. Generally, the sharper the edge the water falls over, the more efficient the weir. This is simply a function of the cohesion of the water to the surface of the weir. Since water tends to adhere to the weir's surface, the sharper the angle at the weir edge, the easier it is to form a sheet.

Metal attached weirs tend to have the greatest efficiency, and can produce a sheet with as little as ¼" of water. The sharp metal edge makes it impossible for the water to turn under or "wick" at the weir's edge, and insures a crisp sheet.

Long, shallowing tapered weirs and rounded weirs are among the most difficult types to produce a smooth sheet, and will generally not create a sheet if less than a ½" of water is used. On rounded weirs which terminate with a sharp edge pointed straight down, a sheet can be produced but the water tends to bend or whip back under the structure. This is a result of friction, with the water directly against the weir moving slower than the water further from the weir. When the water breaks free of the weir, the sheet bends backwards due to the difference in the water speeds on each side of the sheet.

Refer to the accompanying charts (following page) to determine nominal water depth requirements for smooth sheet waterfalls, based on the three most common weir types. The depths shown are the minimum recommended for the designated height of the waterfall and no wind. In low wind conditions, use the next higher set of figures, and in high wind conditions use the figures that are two steps higher.

UNDERWATER LIGHTING

Imperial offers a complete line for underwater luminaires for dramatic illumination of fountain effects, waterfalls, reflection pools and commercial swimming pools. Our expertise in the design and manufacture of architectural lighting equipment, and our commitment to quality, insure superior optical performance and years of reliable, safe operation.

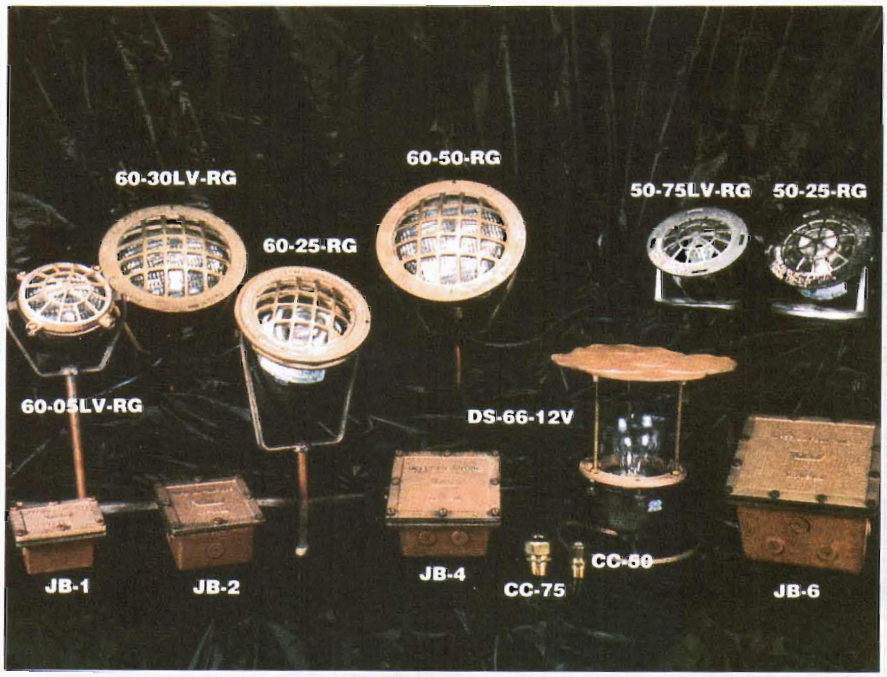
Imperial underwater lighting fixtures and accessories are built to high quality standards using the finest materials — carefully selected to withstand the corrosive effects of underwater use. Key features include:

- ☐ HOUSINGS of heavy-duty cast bronze, nickel-plated cast brass or nickel-plated spun copper.
- ☐ NICHES of stainless steel or nickel-plated spun copper.
- ☐ FASTENERS of silicone bronze or stainless steel.
- ☐ GASKETS of high-grade molded silicone.
- ☐ LENSES of clear, heat-resistant tempered glass.
- ☐ POWER CORDS of heavy-duty, STOWA submersible cord with naval brass compression seals and epoxy-encapsulated leads.
- ☐ U.L. LISTED
- ☐ One-year Limited Products Warranty

Imperial freestanding, wet niche-mounted, and swimming pool luminaires will provide excellent illumination for virtually any underwater application. Basic design data is furnished on the following page to assist the fountain designer, architect, and engineer in the selection of fixture type, wattage, quantity, and accessories from the Underwater Lighting Selection Guide.

While these general guidelines are helpful for most applications, underwater lighting for complex water effects and unusual shape pools, sculpture and waterfalls may require expert assistance. For these applications, we recommend calling on your Imperial representative or Imperial's experienced underwater lighting design staff.

Niche-Mounted Fixtures with Junction Boxes*



Freestanding Fixtures with Junction Boxes

* Adjustable Niche-Mounted Fixtures Available January 1992.

WATER AND SCULPTURE

Water adds life to sculpture. It can provide a striking interplay with sculpture or emulate the character of the artwork. As an integral element, water can extend the form of scupture, add movement, mirror its surroundings for an illusory effect, or serve as the setting for a piece.

Imperial has fast become the specified leader in combining water effects with sculpture. Working with world renowned artists, the fountain experts at Imperial can custom design an enhancement to the movement of any element of a sculpture — bringing it to life.

The following are examples of custom fountain applications.

Flight of Geese

The custom nozzle designed by Imperial creates the landing effect of the geese. The natural appearance of the water effect enhances the "movement" of the sculpture and completes the design.

The landing geese effect was created by mocking up the actual sculptures in a test pool and prototyping the water effects until the final water pattern was selected. This included videotaping and photographing the mock-up to obtain owner approval prior to the start of construction. This helped avoid costly changes after installation.

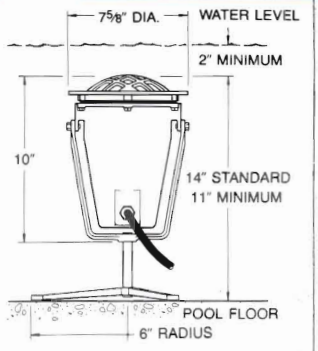
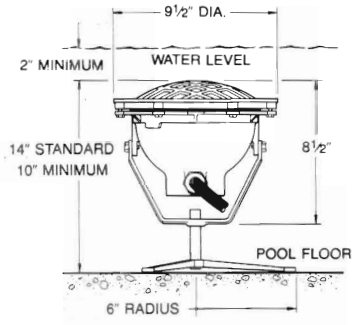
▶ *Flight of Geese,* ***Cherry Creek Shopping Center,*** *Denver, Colorado*
Sculptor: *Jim Dolan*
Architects: *Brown/McDaniel, Inc. (San Francisco, California)*

Freeform Sculpture

The water enhanced stainless steel sculpture provides a theatrical backdrop for this architectural setting.

Imperial provided the custom 10" stainless steel piping required to create this special waterfall. The heavy gauge piping was bent, machined and then polished to a mirror finish before shipment. The installation of the pipe as a final step avoided any jobsite damage to the freeform sculpture.

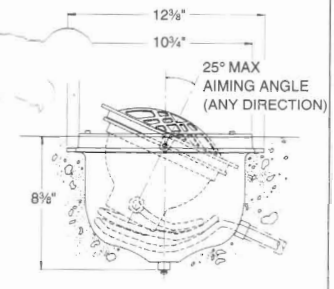
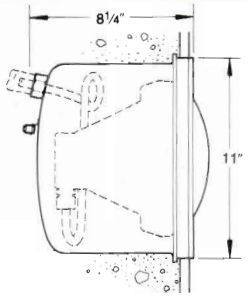
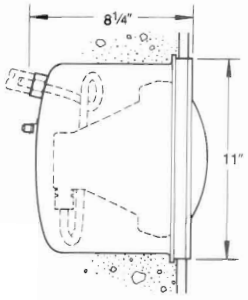
◀ *Stainless steel sculpture and Imperial water feature at the* ***Concord Airport*** *in Concord, California*
Landscape Architects: *Fong & LaRocca Associates (Los Angeles, California)*

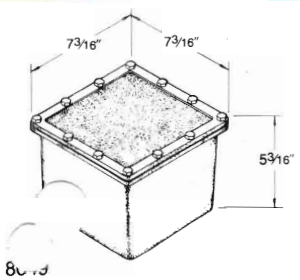
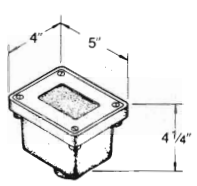
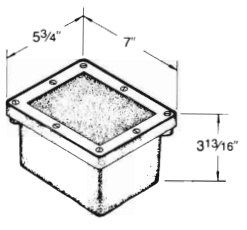
60-25-RG	60-50-RG	60-30LV-RG
		
8029	8031	8034
Medium to large fountains and reflection pools	Medium to large fountains and reflection pools	
250 watt, PAR-38, 120 volt Quartz or 150 watt, R-40, 120 volt Incandescent lamp	500 watt, PAR-56, 120 volt Quartz or 300 watt, PAR-56, 120 volt Incandescent lamp	300 watt, PAR-56, 12 volt Incandescent lamp
Optional *	Optional *	
Integral Thermal Cut-off[1]	Integral Thermal Cut-off[1]	Integral Thermal Cut-off[1] Transformer req'd.[3]

Notes:

1. Integral thermal cut-off device is required for certain installations to conform to NEC Article 680-51, and is furnished as standard on all fixtures. For use in installations without an external low-water cut-off device.
2. For fixtures installed pointing upward, rock guard is required to conform to NEC Article 680-51.
3. Specify Imperial LVT-3 Low Voltage Transformer.
4. Fixture is U.L. Listed for use in a submersible or wet location installation.

** Consult factory for delivery information on colored lenses.*

61-50/61-50-A**	BU-6000	SW-500	SW-300LV
			
8032	8158	8026	8028
Medium to large fountains, reflection pools and waterfalls	Reflection pools and waterfalls	Swimming Pools	Swimming Pools
500 watt, PAR-56, 120 volt Quartz or 300 watt, PAR-56 120 volt Incandescent lamp	116 watt, A-21, 120 volt Incandescent lamp 50 watt, A-21, 120 volt Incandescent lamp[4] 300 watt, T-3, 120 volt Quartz lamp	500 watt, PAR-56, 120 volt Quartz or 300 watt, PAR-56 120 volt Incandescent lamp	300 watt, PAR-56, 12 volt Incandescent lamp
Optional *	Not available	Not available	Not available
Integral Thermal Cut-off[1] Rock Guard[2] (Specify RG)	Integral Thermal Cut-off[1] Rock Guard[2] (Specify RG)	*Safety Grid and Integral Thermal Cut-off furnished as standard.*	*Safety Grid and Integral Thermal Cut-off furnished as standard.* Low voltage Transformer req'd.[3]

JB-6	SJB-10	SJB-30
		
8079	8050	8051
125.7 Cubic Inches	21 Cubic Inches	70 Cubic Inches
(2) 2" Maximum	Single ¾"	(3) 1" Maximum
(20) ½" or (16) ¾"	(2) ½" or ¾", one each end	(5) ½"

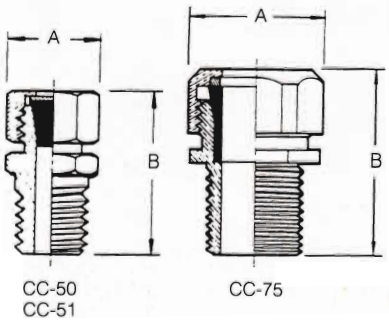
Ordering Information

Imperial catalog numbers are shown above each illustration. To order, select product catalog number and add accessory designator (if any) as a suffix. For example, the complete catalog number for Imperial model 51-25 niche-mount, underwater light with rock guard & TCO would be: **51-25-RG**

Cord Compression Seals Selection Guide

Imperial cord compression seals are designed to provide a watertight connection for flexible cord entering an underwater junction box utilizing freestanding fixtures. Construction is of machined naval brass with a neoprene packing seal and brass friction ring.

Catalog Number	N.P.T.	DIM. "A"	DIM. "B"	For Use With Cord Size
CC-50	½"	13/16"	1⅝"	#16-3
CC-51	½"	13/16"	1⅝"	#18-3 and all Submersible Pumps
CC-75	¾"	1¼"	1¾"	#10-3



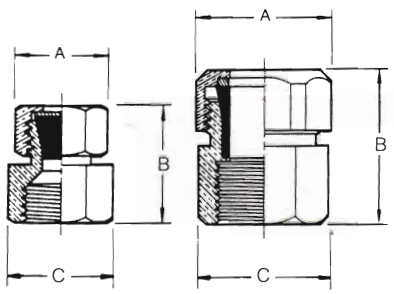
CC-50
CC-51

CC-75

Cord Strain Reliefs

Imperial strain reliefs are designed to secure the cord while maintaining a positive connection in flush mounted junction boxes utilizing niche-mounted fixtures. Construction is of machined naval brass with a neoprene packing seal and brass friction ring.

Catalog Number	N.P.T.	DIM. "A"	DIM. "B"	DIM. "C"	For Use With Cord Size
CC-50-F	½"	1"	1¼"	1⅛"	#16-3
CC-75-F	¾"	1½"	1⅝"	1 7/16"	#10-3



CC-50-F

CC-75-F

Minimum Beam Candlepower Requirements*

Height of Water Effect (Feet)	Lens Color			
	Clear	Amber & Turquoise	Red	Blue & Green
5	4,000	6,000	8,000	14,000
10	11,000	16,000	22,000	38,000
15	21,000	31,000	42,000	73,000
20	34,000	51,000	68,000	119,000
25	50,000	75,000	100,000	175,000
30	69,000	103,000	138,000	241,000
35	91,000	136,000	182,000	318,000
40	115,000	174,000	230,000	406,000
45	144,000	216,000	288,000	504,000
50	170,000	256,000	340,000	595,000

* ASSUMES: a) that lens is approximately 2" below water surface; b) that water is clear, and; c) that lens is free from mineral or other deposits.

Lens Data

Lens Color	Approximate Visible Transmission	Coefficient Of Linear Expansion
Dark Red	5-12%	41 x 10-7
Dark Blue	2.2-12%	64 x 10-7
Amber	45-58%	41 x 10-7
Dark Green	6-20%	54 x 10-7
Clear	92%	39 x 10-7

Lamp Data

Standard Available Lamps (by others)	Initial Average Max. Beam Candlepower
25 Watt Par-36 spot	15,000
25 Watt Par-36 flood	1,500
50 Watt Par-36 spot	11,100
50 Watt Par-36 flood	900
75 Watt MR-16 spot	11,500
75 Watt MR-16 flood	2,000
150 Watt Par-38 spot	10,500
150 Watt Par-38 flood	3,500
150 Watt R-40 spot	6,300
150 Watt R-40 flood	1,300
250 Watt Quartz Par-38 spot	34,000
250 Watt Quartz Par-38 flood	6,000
300 Watt Par-56 spot	70,000
300 Watt Par-56 med. flood	22,000
300 Watt Par-56 wide flood	10,000
500 Watt Quartz Par-56 spot	90,000
500 Watt Quartz Par-56 med. flood	49,000
500 Watt Quartz Par-56 wide flood	18,000
1000 Watt Quartz Par-64 spot	160,000
1000 Watt Quartz Par-64 med. flood	60,000
1000 Watt Quartz Par-64 wide flood	27,000

Architects: RTKL and Associates (Baltimore/Dallas)

Imperial sequencing fountain and underwater lighting installation at White Marsh Mall, White Marsh (near Baltimore), Maryland.

Barton Creek Square

Austin, Texas

Architect: Gordon Sibeck
Developer: Melvin Simon & Associates, Inc.

Imperial bubbler effects in a shopping mall. A WaterWorks installation.

Tanner Building Sculpture

Salt Lake City, Utah

Architect: Boyd A. Blackner & Associates

Stainless steel water sculpture in front of an office complex. An Imperial WaterWorks installation.

Capitola Mall

Capitola, California

Architects: James W. Foug & Associates (Palo Alto, California)

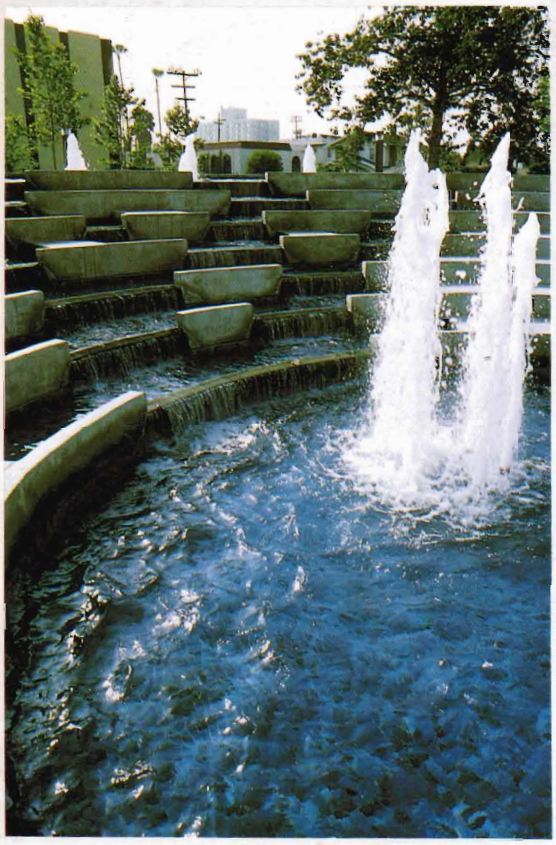
Shopping mall application with Imperial dan-de-lion spheres.

Mercy Hospital

San Diego, California

Landscape Architects: Kawasaki, Theilacker and Associates

Amphitheatre arrangement of waterfalls and aerators in front of the hospital.



Mormon Church Plaza

Salt Lake City, Utah

Large sequencing fountain installation.

Edmonton Legislative Grounds

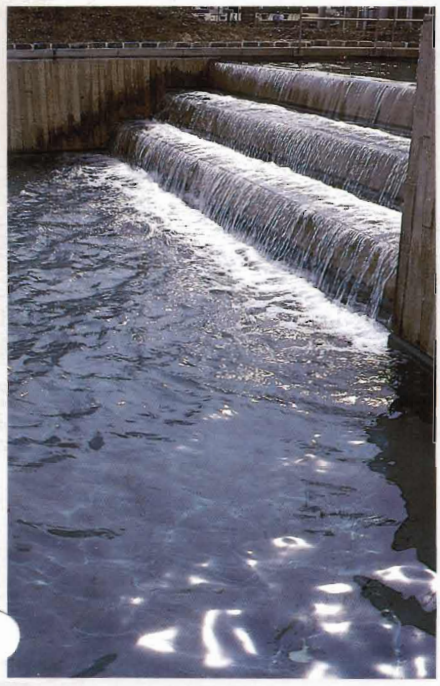
Edmonton, Canada

Architects: McIntosh, Workun, Cherenenko Architects, Ltd.

One of the largest fountain installations in North America. This Imperial installation consists of three major sections: a large reflecting pool, a large dome fountain with thirty-six precision jet nozzles in a twenty meter square pool, and a multi-level waterfall area with twelve bubbler and eight aerator effects.

Landscape Architects:Fong and Associates (Costa Mesa, California)

ni-circular stairstep water feature. One of several unique effects at the Imperial installation at Home Savings Headquarters, Baldwin Park, California.

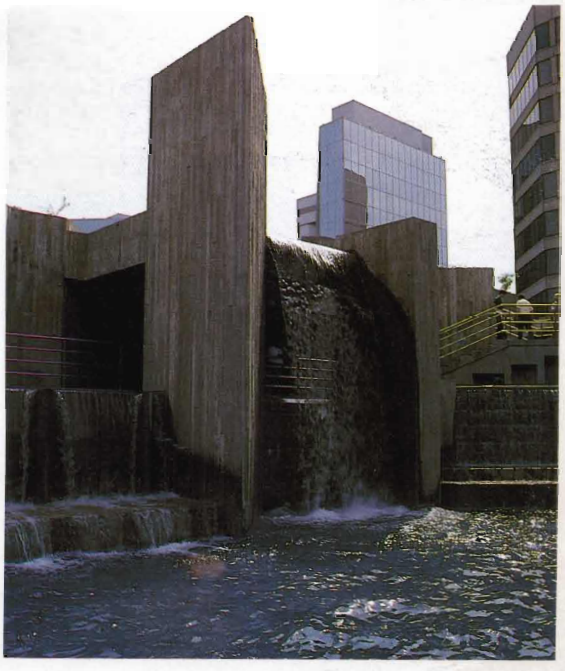


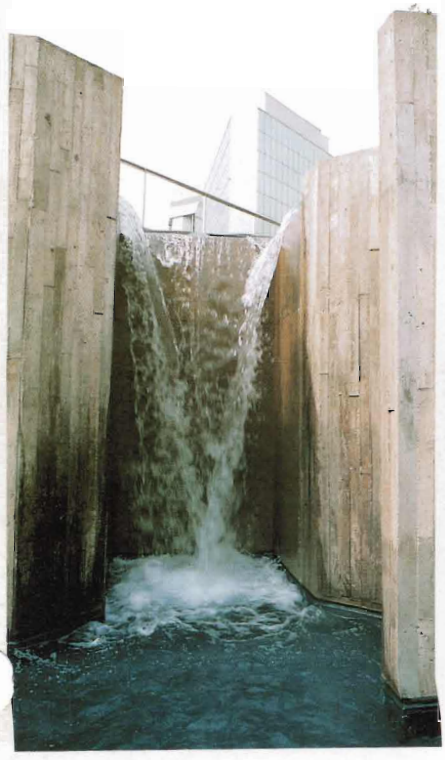
McKeldin Plaza Fountain

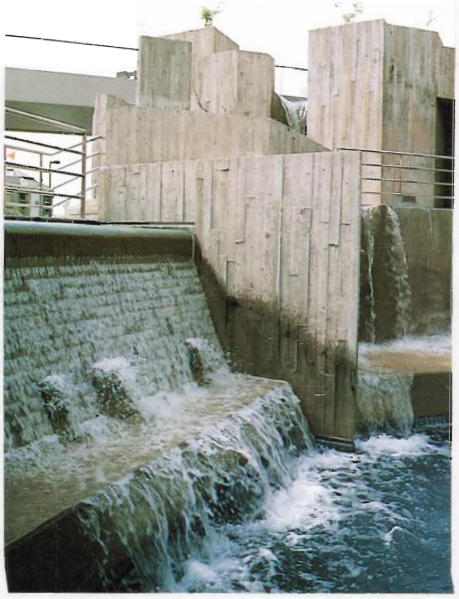
Baltimore, Maryland

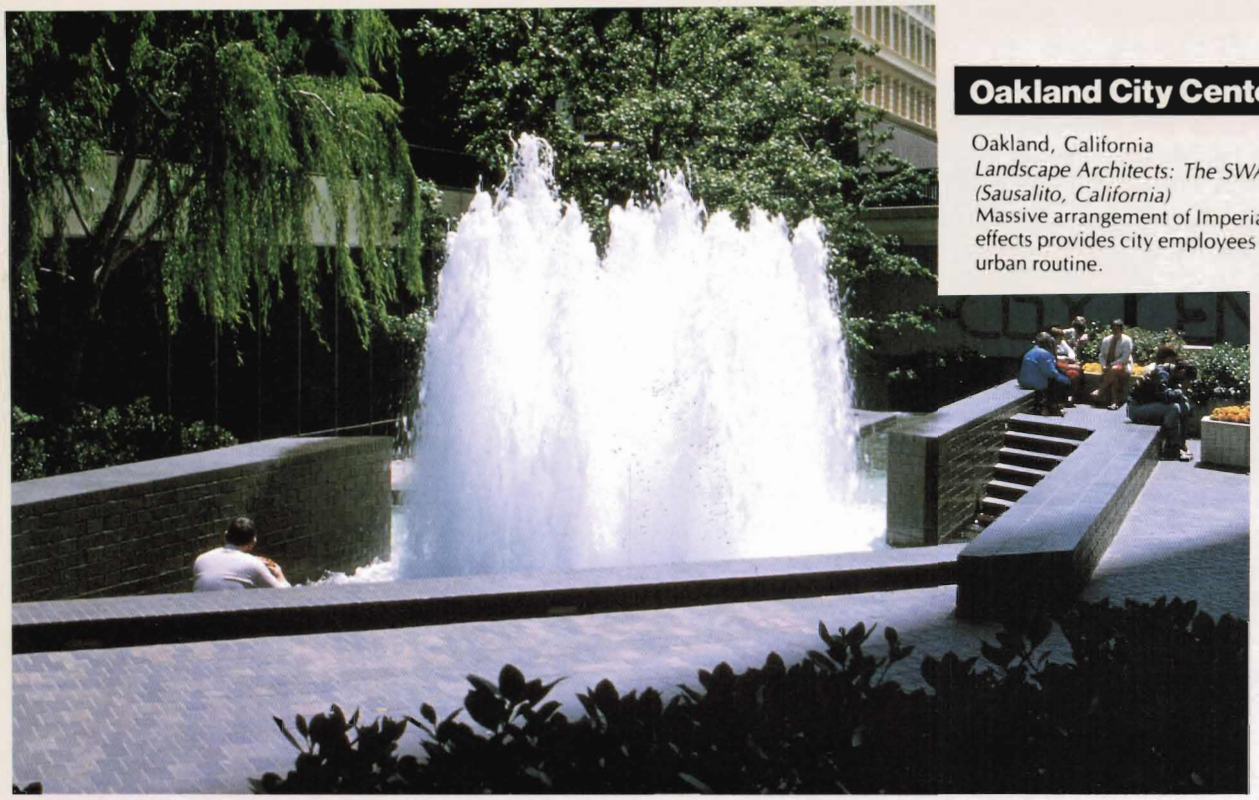
Architects/Landscape Architects: Wallace, Roberts & Todd (Philadelphia, Pennsylvania)

Interactive fountain installation in the renovated Inner Harbor district. Tourists and city residents can walk over, around and through a variety of waterfalls and water effects. Walkways connect the large plaza with downtown offices and hotels on one side, and to the "Harborplace" tourist/shopping area on the other.









Oakland City Center

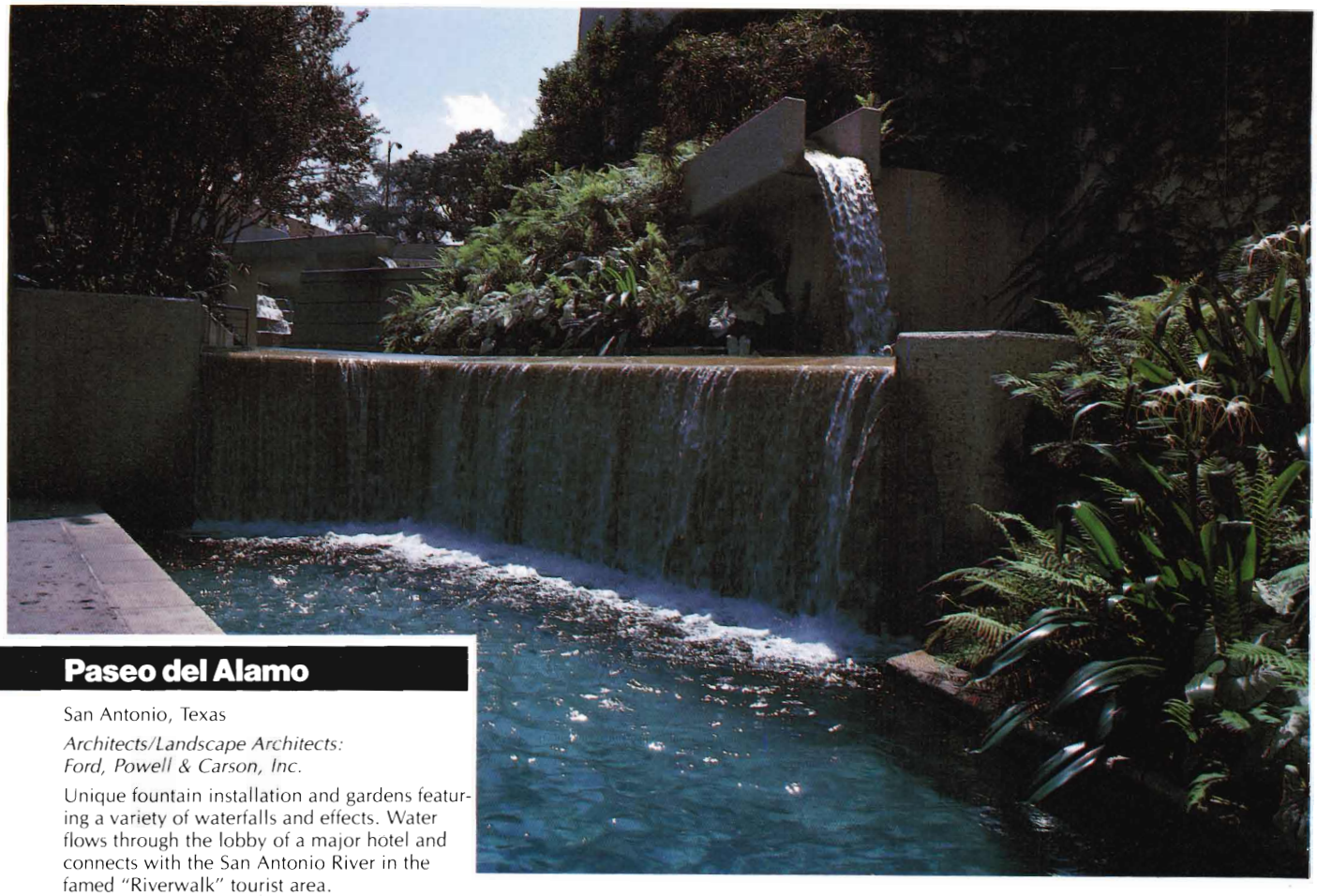
Oakland, California
Landscape Architects: The SWA Group (Sausalito, California)
Massive arrangement of Imperial cascade effects provides city employees with a respite from urban routine.

Page Mill Hill

Palo Alto, California
Landscape Architects: Anthony M. Guzzardo & Associates, Inc. (San Francisco, California)
Natural landscaping with water design at an executive office complex.

Salt Lake City, Utah
Landscape Architects: Maas Grassli & Associates
A cluster of Imperial precision jet nozzles create an eighty-foot high effect in a natural lake setting. A WaterWorks installation.

Salt Lake City Airport

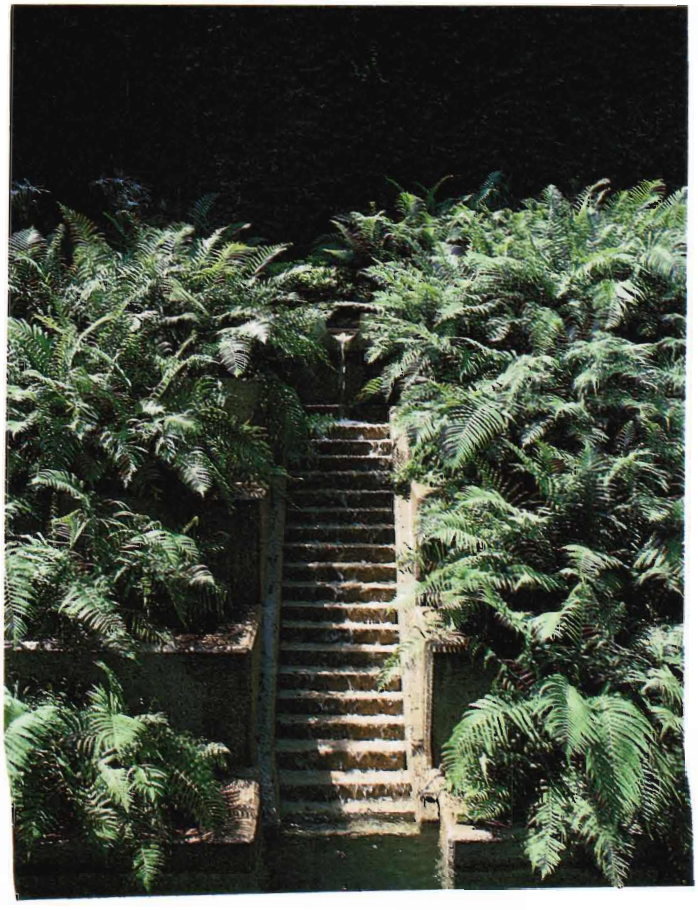


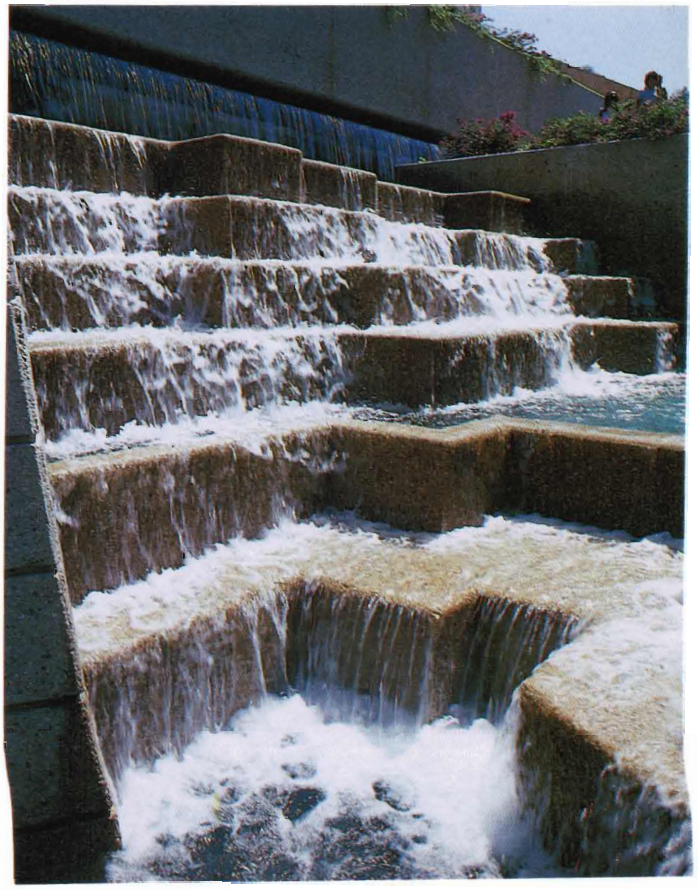
Paseo del Alamo

San Antonio, Texas

Architects/Landscape Architects:
Ford, Powell & Carson, Inc.

Unique fountain installation and gardens featuring a variety of waterfalls and effects. Water flows through the lobby of a major hotel and connects with the San Antonio River in the famed "Riverwalk" tourist area.





IMPERIAL

A typical installation where a cluster of aeration nozzles is used effectively as a heat-exchanger on air conditioning systems.

Your choice of effects is now virtually limitless. For example, our computer-controlled system lets you s water scenes and lighting for thousands of variations. You control the fade rate from one scene to the next. An audio interface is available to integrate the dimensions of sound and music to water, motion and light creating scenes that stimulate all the senses.

For less elaborate fountains, a reliable, solid-state digital sequencer allows pre-programmed, sequenced effects at the push of a button.

Imperial is represented in your area by:

IMPERIAL
FOUNTAINS
Over 30 Years Fountain Company In U.S.A.

Office:
45 Red Top Dr., W. Hartford, CT 06110 U.S.A.
TEL: (203) 521-8996 FAX: (203) 561-5982
Warehouse:
4412 Brooks St., Montclair, CA 91763 U.S.A.
TEL: (909) 398-1388 FAX: (909) 398-1389