# Hi-Cap® Slotted Drainage System

Surface Drainage

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The Zurn Z888 Hi-Cap® is a modular slotted drain system constructed from linear low-density polyethylene and is equivalent to corrugated steel slotted drain. The Zurn Hi-Cap is designed for the collection and conveyance of storm water for high flow applications in highways, ports, and airports.

The Z888 Hi-Cap is available in 12" [305mm], 18" [457mm], and 36" [914mm] equivalent sizes.

## Features and Benefits:

- 80" [2m] long modular lengths for ease of installation.
- Integral “zip strip” on the slotted inlet keeps the body free of debris during installation.
- “V” shaped radiused bottom provides Manning’s coefficient .011 for better flow rate and less debris build up due to higher velocity.
- Smooth polyethylene interior provides 0% water absorption and superior chemical resistance.
- Light weight material can be safely lifted with no sharp metal edges.
- Integral mechanical joint connects without the added time and expense of an external coupling.
- Integral horizontal and vertical rebar connections allow structural slab tie-in and quick elevation adjustment.

## Options:

- Pre-slope frame capabilities.
- ADA heel-proof ductile iron frame.
- Manufactured cleanouts: Use standard connections for ease of maintenance.

# Z888 Installations

## George Bush Intercontinental Airport

Houston, Texas

- FAA (250 psi tires) load rated
- Approximately 6,000 feet of Z888-18


## Suffolk Executive Airport Expansion

Suffolk County, Virginia

- FAA load rated
- Pre-sloped frame
- 800 feet of Z888-12-PSF; Z888-18-PSF

## La Quinta, California

Highway 111 and Washington along the median

- H-20/HS-25 load rated
- 300 feet of Z888-18

## Evergreen Shell Warehouse

Richmond, Virginia

- H-20/HS-25 load rated
- Pre-sloped frame
- 120 feet of Z888-12-PSF

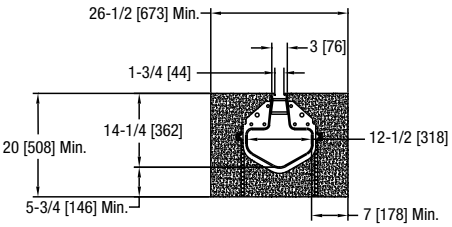
## RAF NATO Air Force Base

Fairford, England

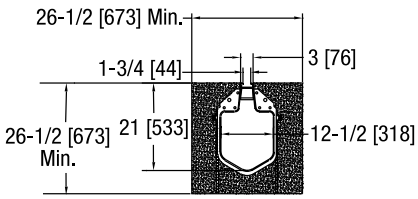
- B-52 (305 psi tires) load rated
- 18,700 feet of Z888-18 and -36

# Z888-12,-18,-36 Engineering Specification

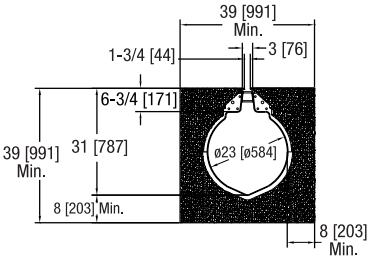
Slot drain shall be 80" long, Z888-12 (14-1/4" deep and 12" wide); Z888-18 (21" deep and 12" wide); or Z888-36 (31" deep and 23" wide). Slot shall be 1-3/4" wide and have spacer bars at 5" intervals. Drain shall be made of Linear Low Density Polyethylene (LLDPE). Drain shall have tongue-and-groove interlocking ends for positive mechanical joint. Clips molded into the sides of the channel to accommodate vertical and horizontal rebar for positioning and anchoring purposes. Drain shall be available with a choice of pedestrian, bicycle, FAA, and/or H-20 grates. End outlets, bottom outlets, and side outlets shall be available in 4", 6", 8", 12", 18", 24", and 36" diameters. Twenty-four-inch long cleanout sections shall be available with removable ductile iron grate.



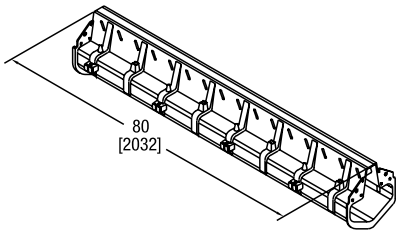

**Z888-12 Cross Section**



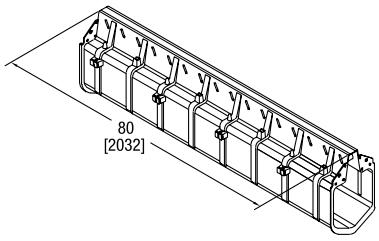

**Z888-18 Cross Section**



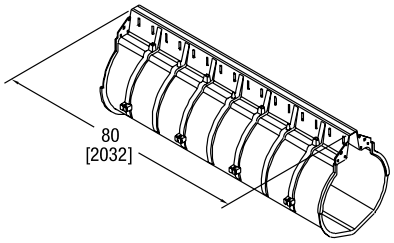

**Z888-36 Cross Section**




**Z888-12 ISO View**




**Z888-18 ISO View**




**Z888-36 ISO View**

# Z889-12,-18,-36 Engineering Specification

Zurn Z889-12, Z889-18, and Z889-36 shall be 8" [302mm] wide, 24" [610mm] long modular linear low-density polyethylene cleanout port. Cleanout port includes integral top frame, mechanically interlocking joints, integral rebar clips, and a smooth, radiused interior. Furnished with a ductile iron grate that meets or exceeds AASHTO H20/HS20-H25/HS25 standards. ADA compliant grates available.

# Z888-12-DYN-HD,-18DYN-HD,-36-DYN-HD

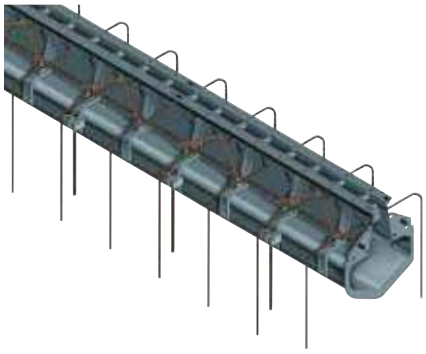
**Extra-Heavy-Duty Frame**

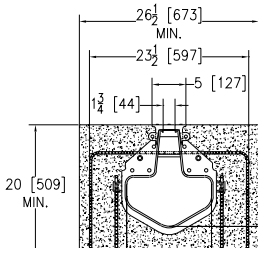
For use in airport applications and any other applications with heavy-duty loading requirements.

FAA Loading Requirements – The loading is a 100,000 lbs. proof load on a 9" x 9" load platen.

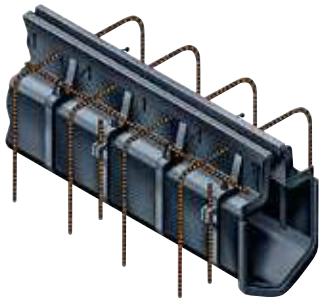
Integral vertical rebar brackets (#4) rebar for elevation set and anchoring. Integral horizontal rebar stances (#4 rebar) for continuous horizontal lengths of rebar for structural integrity when encased in 4,000 psi concrete. Concrete and #4 rebar supplied by others.

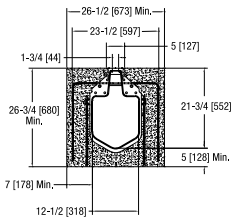
*Consult structural drawings for encasement details.



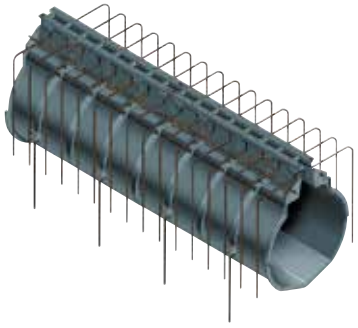


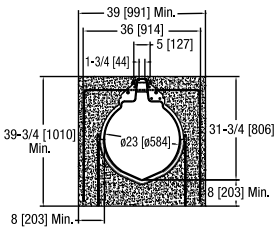

**Z888-12-DYN-HD**






**Z888-18-DYN-HD**

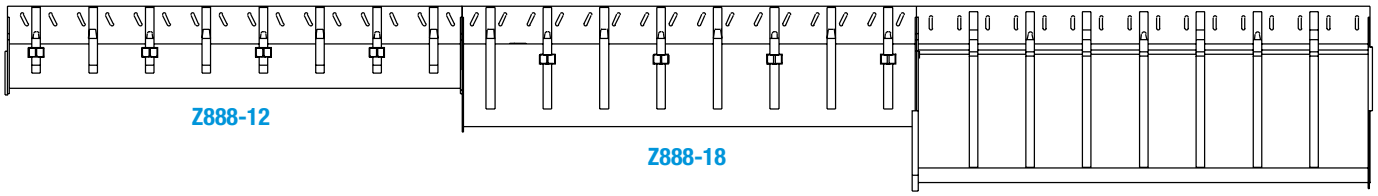





**Z888-36-DYN-HD**

# Z888 Hi-Cap Slotted Drainage System Flow Chart

| Product Size | Flow Rates @ Grades | | | | Storage Capacity (gpf) |
|---|---|---|---|---|---|
| | Laid Flat (cfs) | .3% Slope (cfs) | .6% Slope (cfs) | 1% Slope (cfs) | |
| 888-12 | 0.65 | 1.13 | 1.59 | 2.06 | 3.609 |
| 888-18 | 2.18 | 3.78 | 5.34 | 6.90 | 9.2475 |
| 888-36 | 7.59 | 13.15 | 18.59 | 24.00 | 23.238 |



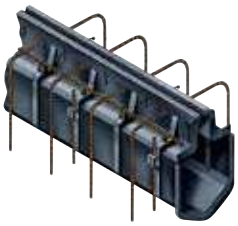
Z888-12

Z888-18

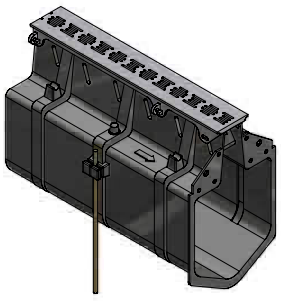
Z888-36

# Z888 Options

**Z888-HD**
**Extra-Heavy-Duty Frame**

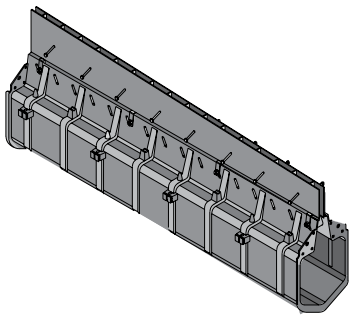


**Z888-HPD**
**Heel-Proof Ductile Iron Grate**

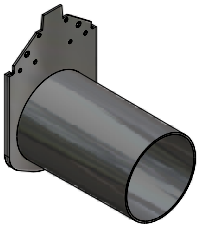


**12-18 -36 Transition**

**Optional Pre-Sloped Frame**



**End Outlet**



**Cleanout Port**

## Zurn High Capacity Slot Drain Design Recommendations

Slotted drain inlet capacities were tested by the Federal Highway Administration and reported in Report No. FHWA-RD-80-081 Vol. 4. Hydraulic Characteristics of Slotted Drain Inlets in February 1980. In regards to drainage of large flat areas (airport pavements, parking lots, and other large sheet flow areas) that use the slot drain to intercept the run-off perpendicular to the flow, the system acts as a weir in the interception of the flow uniformly along the run of drain.

### Total Flow Capture Design Method

Use equation 3-10 in the weir flow conditions, where any overflow is not acceptable. This equation provides the appropriate length of the slotted drain needed to manage gutter flow (Q) and collect all of the water on the upstream side of the trench. This equation was developed from extensive test data using flow rates between Q = 0.3 to 6.0 $ft^3/s$. Flows outside of this range are not verified with this equation.

(3-10) L = [(0.706Q)x(0.442SO)x(A)x (0.849Z)]/(0.385n)

- L = Total capture flow length
- Q = Gutter flow
- SO = Longitudinal slope
- A = Regression coefficient (see Table 2)
- Z = Reciprocal of cross slope
- n = Manning's roughness coefficient

In applications where the slot drain is in a sump situation both equation (3-10) and equation (3-11), detailing non-weir flow, must be calculated, and use the longest slot length.

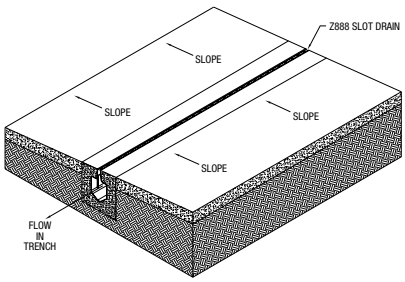
(3-11) L = [(0.394Q)x(0.649SO)x(0.410Z)x(0.45)]/(0.811n)

- L = Total capture flow length
- Q = Gutter flow
- SO = Longitudinal slope
- Z = Reciprocal of cross slope
- n = Manning's roughness coefficient

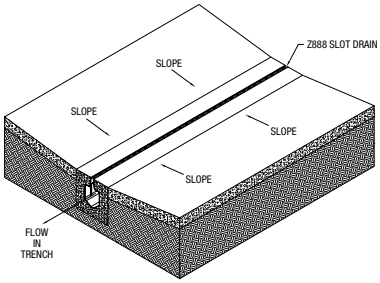
**Table 2 – Values of "A" For Use in Equation (3-10)**

| | Z | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **So** | **16** | **20** | **24** | **28** | **32** | **36** | **40** | **44** | **48** |
| 0.005 | 0.302 | 0.315 | 0.324 | 0.330 | 0.333 | 0.333 | 0.330 | 0.323 | 0.313 |
| 0.010 | 0.310 | 0.321 | 0.330 | 0.335 | 0.337 | 0.336 | 0.332 | 0.324 | 0.313 |
| 0.015 | 0.317 | 0.327 | 0.335 | 0.339 | 0.340 | 0.338 | 0.333 | 0.324 | 0.312 |
| 0.020 | 0.322 | 0.332 | 0.339 | 0.342 | 0.342 | 0.339 | 0.332 | 0.323 | 0.310 |
| 0.025 | 0.327 | 0.336 | 0.341 | 0.344 | 0.343 | 0.339 | 0.331 | 0.321 | 0.307 |
| 0.030 | 0.331 | 0.339 | 0.343 | 0.345 | 0.343 | 0.338 | 0.329 | 0.318 | 0.303 |
| 0.035 | 0.334 | 0.341 | 0.344 | 0.345 | 0.342 | 0.336 | 0.326 | 0.314 | 0.298 |
| 0.040 | 0.336 | 0.342 | 0.344 | 0.344 | 0.340 | 0.333 | 0.323 | 0.309 | 0.293 |
| 0.045 | 0.337 | 0.342 | 0.343 | 0.342 | 0.337 | 0.329 | 0.318 | 0.303 | 0.286 |
| 0.050 | 0.337 | 0.341 | 0.346 | 0.339 | 0.333 | 0.324 | 0.312 | 0.297 | 0.278 |
| 0.055 | 0.336 | 0.339 | 0.339 | 0.335 | 0.328 | 0.318 | 0.305 | 0.289 | 0.269 |
| 0.060 | 0.334 | 0.336 | 0.335 | 0.330 | 0.323 | 0.312 | 0.297 | 0.280 | 0.260 |
| 0.065 | 0.332 | 0.333 | 0.331 | 0.325 | 0.316 | 0.304 | 0.289 | 0.270 | 0.249 |
| 0.070 | 0.328 | 0.328 | 0.324 | 0.318 | 0.308 | 0.295 | 0.279 | 0.260 | 0.237 |
| 0.075 | 0.323 | 0.322 | 0.318 | 0.310 | 0.300 | 0.286 | 0.269 | 0.248 | 0.225 |
| 0.080 | 0.318 | 0.316 | 0.310 | 0.302 | 0.290 | 0.275 | 0.257 | 0.236 | 0.211 |
| 0.085 | 0.311 | 0.308 | 0.302 | 0.292 | 0.280 | 0.264 | 0.245 | 0.222 | 0.197 |
| 0.090 | 0.303 | 0.299 | 0.292 | 0.282 | 0.268 | 0.251 | 0.231 | 0.208 | 0.182 |

***Non-Sump Installation***




***Sump Installation***




### Flow Through The Channel

When designing the trench size use the standard Manning's equation with the following properties.

- Q = $^1/_n$ A $R^{2/3}$ $S^{1/2}$ (metric)
- Q = $^{1.486}/_n$ A $R^{2/3}$ $S^{1/2}$ (English)
- Q = Flow through the trench
- n = Manning's coefficient (.009)
- A = Cross sectional area (Z888-18 = 178.017-$inches^2$)
- R = Average wetted perimeter (56.400-inches)
- S = Slope of invert in channel

*Concrete encasement and structural design requirements may vary; please visit our website for further installation details and consult the plans, details, and specifications of the job.

DOT approved. Consult your local DOT specifications or contact Zurn at 1-855-ONE-ZURN.

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