

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com





**Construction Technologies for
Water Efficiency in the Desert**

Mark Rehbein
Principal, EVP Business Development
RESI

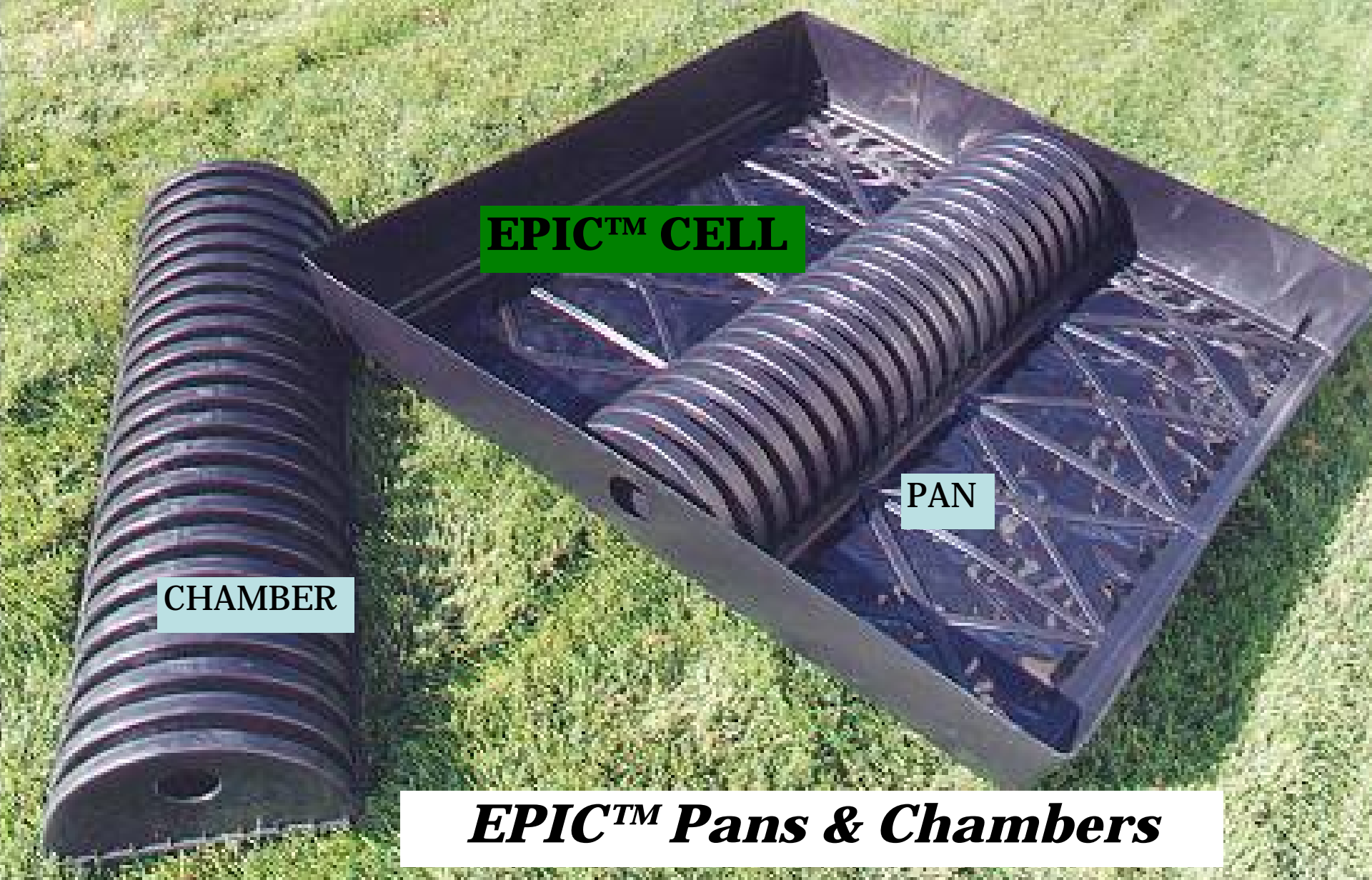
RESI REHBEIN ENVIRONMENTAL SOLUTIONS, INC



Imagine If...

- Projects were water sustainable
- Projects did not need to drill wells
- Projects had no run-off issues
- Projects had no need for pressurized irrigation water
- Projects were cooler and greener even in desert climates





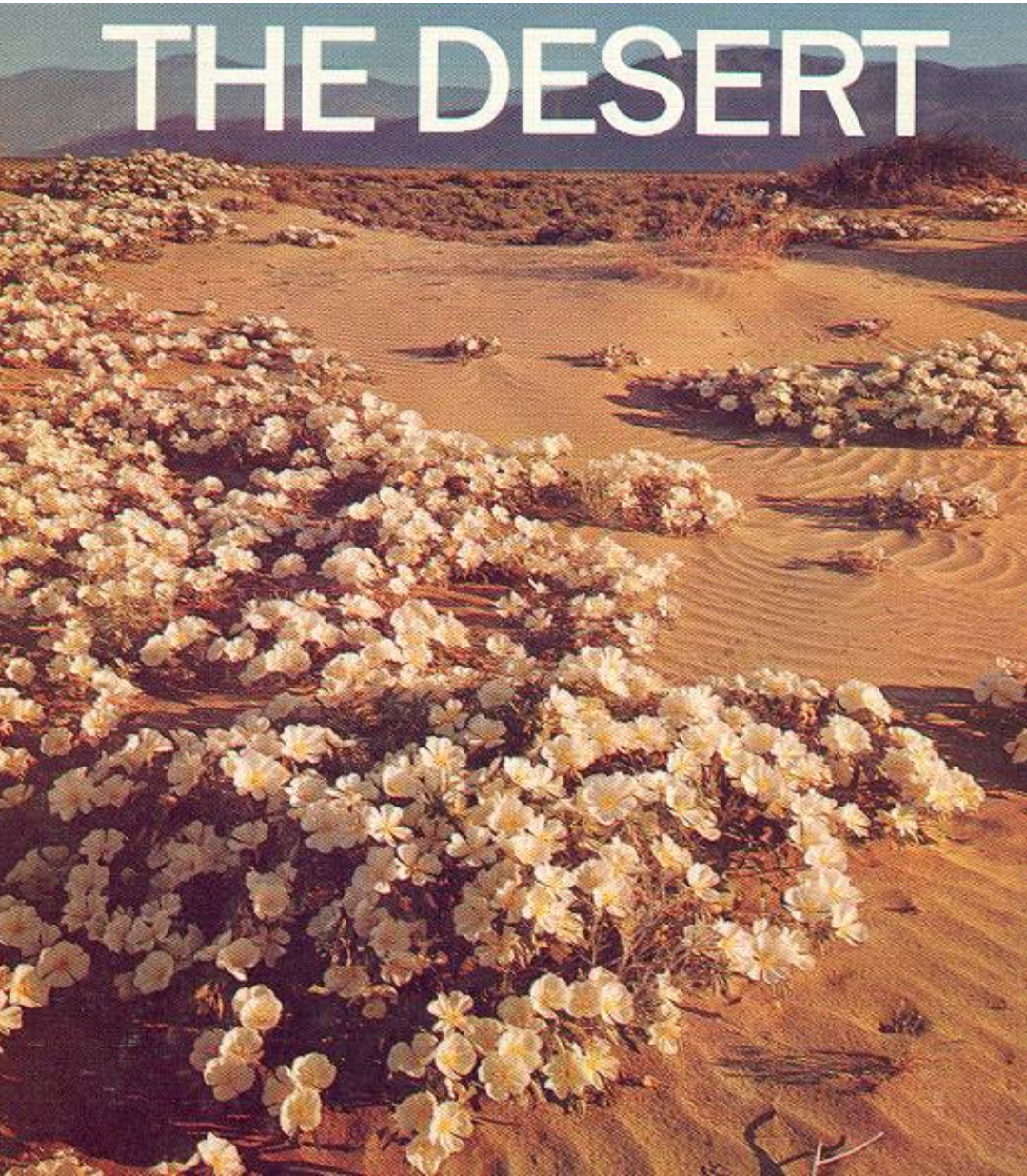
EPIC™ CELL

CHAMBER

PAN

EPIC™ Pans & Chambers

THE DESERT



All plants can grow in sand

**ALL PLANTS
DO WELL
IN SAND – AS
LONG AS
WATER IS
AVAILABLE**



EPIC™ concept
exists in nature

BEGINNINGS OF ISLAND PLANT COLONIZATION ON BEACH SAND

THE "CASTAWAY"
COCONUT

EPICTM *Profile*

Dry mold free crown zone

7 DAYS →

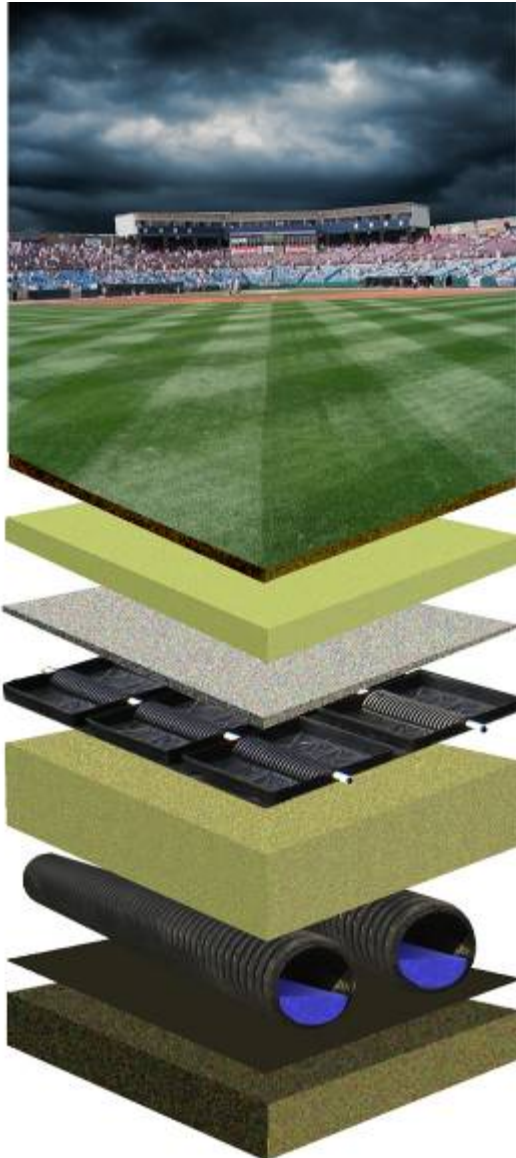
24 HRS →

Capillary Zone
(note root depth)

1 HR →

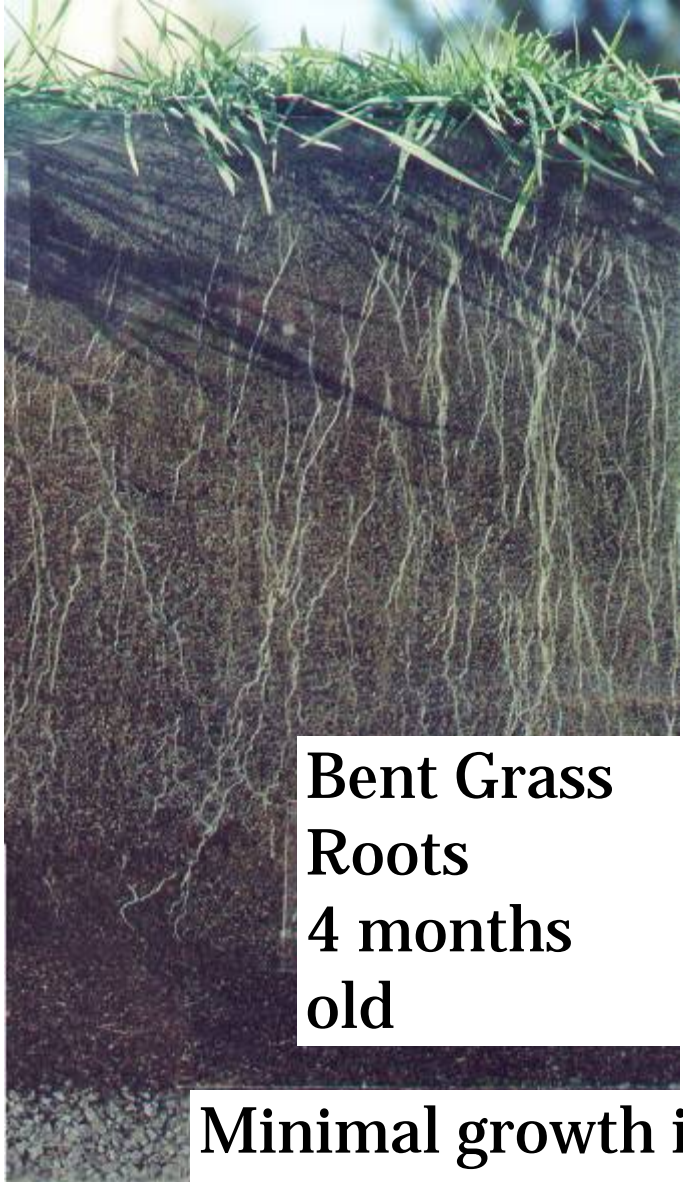
Chamber

Saturated Zone
(Water Reservoir)



Aggressive root growth

15"



**Bent Grass
Roots
4 months
old**

Minimal growth into saturated zone of fine gravel



Sand based sod 3 months

“Half the water and better grass quality” with EPIC

USGA Standard

EPIC

CONSTRUCTION: E2S - Evaporative Control System
(patented tile for irrigation and drainage)

ROOT ZONE: Sand

IRRIGATION: subground (through tile)

WATER USE: May 16 - Sep 14
irrigator 0.37 cfs
sprinkler 0.012 cfs

More Benefits



“The Greens With Subsurface
Ground Irrigation (EPIC) used

50 – 80%

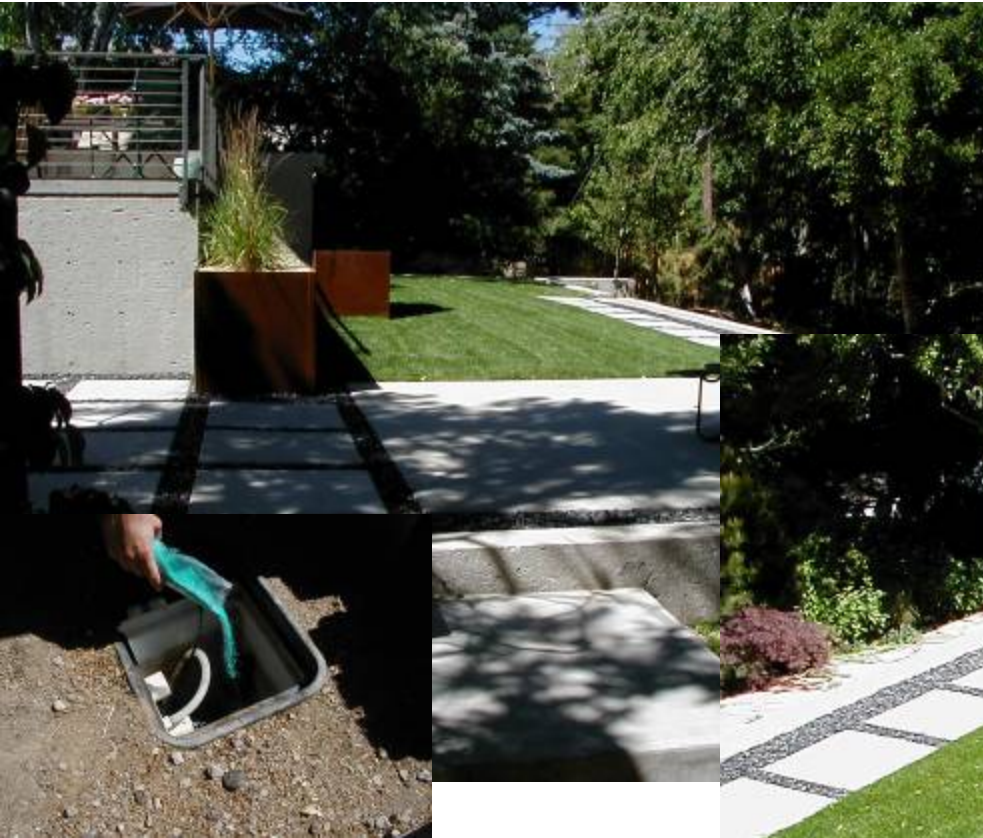
**Less Water With Better Turf
Quality
Than Standard USGA Greens.”**

Dr. Bernd Leinauer, Ph D, Assistant Professor and
Extension Turf Grass specialist at NMSU, Las Cruces NM.

GOLF WEEK Super NEWS, September 3, 2004

Private Residence, Reno, NV

**NON-PRESSURIZED
GRAVITY FLOW
DISTRIBUTION**

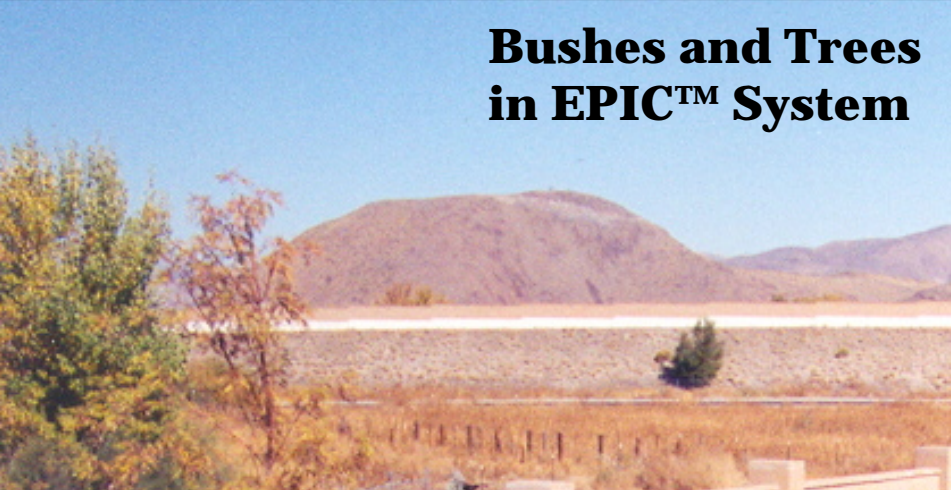


**NO EXPOSED
SPRINKLER HEADS**

**NO EXPOSED
DRIP LINE**



**Bushes and Trees
in EPIC™ System**



**Chinese
Maple
2000**



**2007 Trunk diameter
6.5" from 1.5" in 2000**



**Chinese
Maple
2007**

ANY SIZE OR SHAPE



CONNECTION TO ROOF DRAIN

Vegetable Gardens



← **EPIC™ (Garden)**
Tomato Yield
6.25 pounds per sq.ft.



Average Commercial
Tomato Yield
1.5 pounds per sq. ft.

Reducing the heat island effect in urban areas



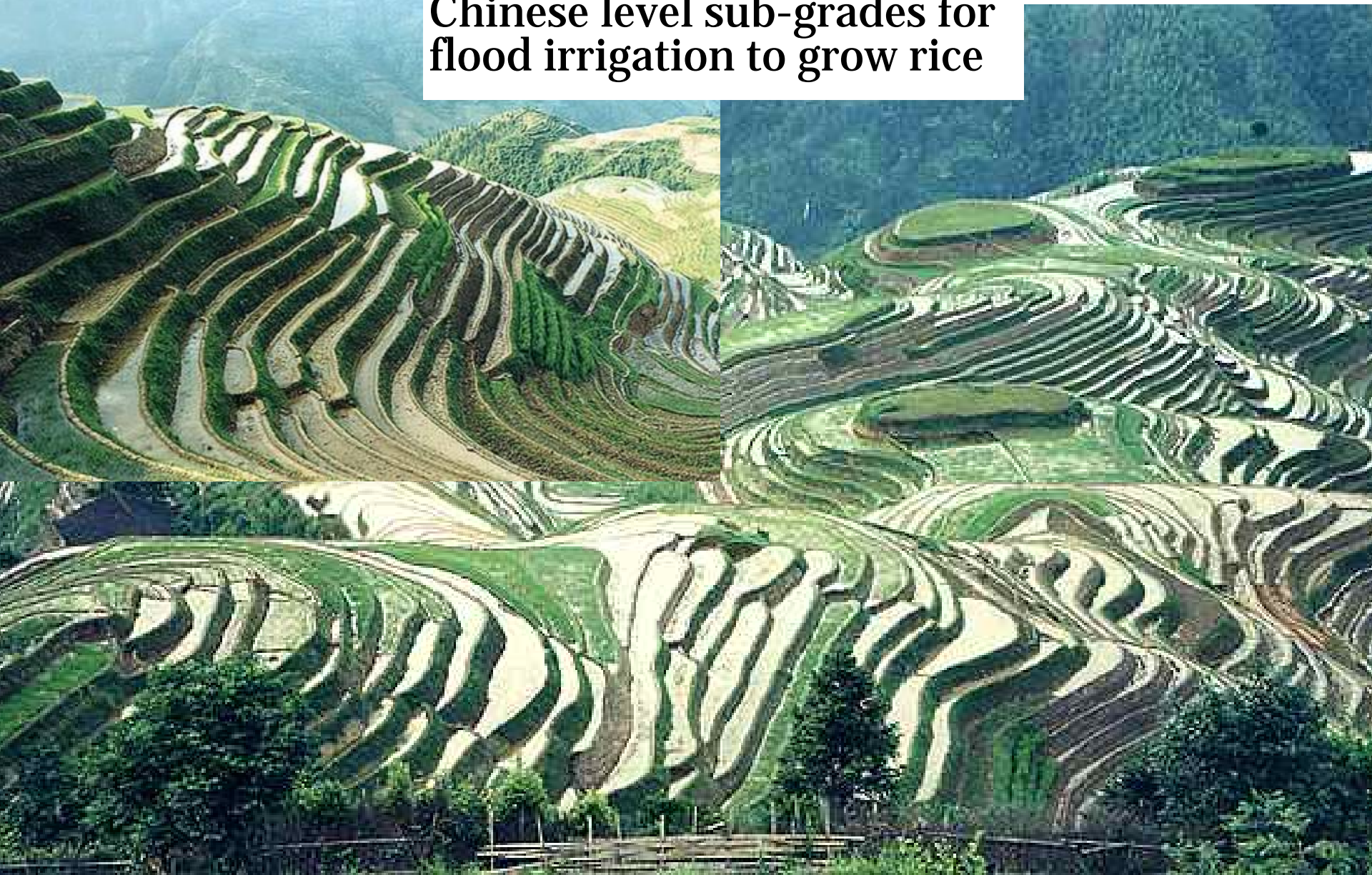
Vegetated areas around buildings can reduce temperatures significantly

Phoenix study
10° lower

($80^{\circ} + 70^{\circ}/2 - 65 = 10$ cooling days)

33% reduction on original **3392 kWh** model for
1890 Cooling Degree Days **(1119 kWh savings)**

Chinese level sub-grades for
flood irrigation to grow rice







Spring 2006 – Carlsbad resort fire lane
Reflex mesh elements installed 1997

Santa Barbara, CA

Water Harvesting Courtyard

EPIC™ System now mandated as standard in coastal regions of Santa Barbara County



FEATURES

- Infiltration
- Filtration
- Storage
- Clean water
- Reuse
- Sub-Irrigation
- Load bearing
- 0% Slope
- Biotreatment
- Simple
- Permanent



Climatic Applications



Dubai
+120 F.



MN, USA:
-40 F.





Al-Sammaliah Island, Abu Dhabi, UAE

**Comparison of top surface
with sub surface irrigation to
determine fresh water usage
over the summer of 2007 on
Al-Sammaliah Island, Abu
Dhabi, UAE.**



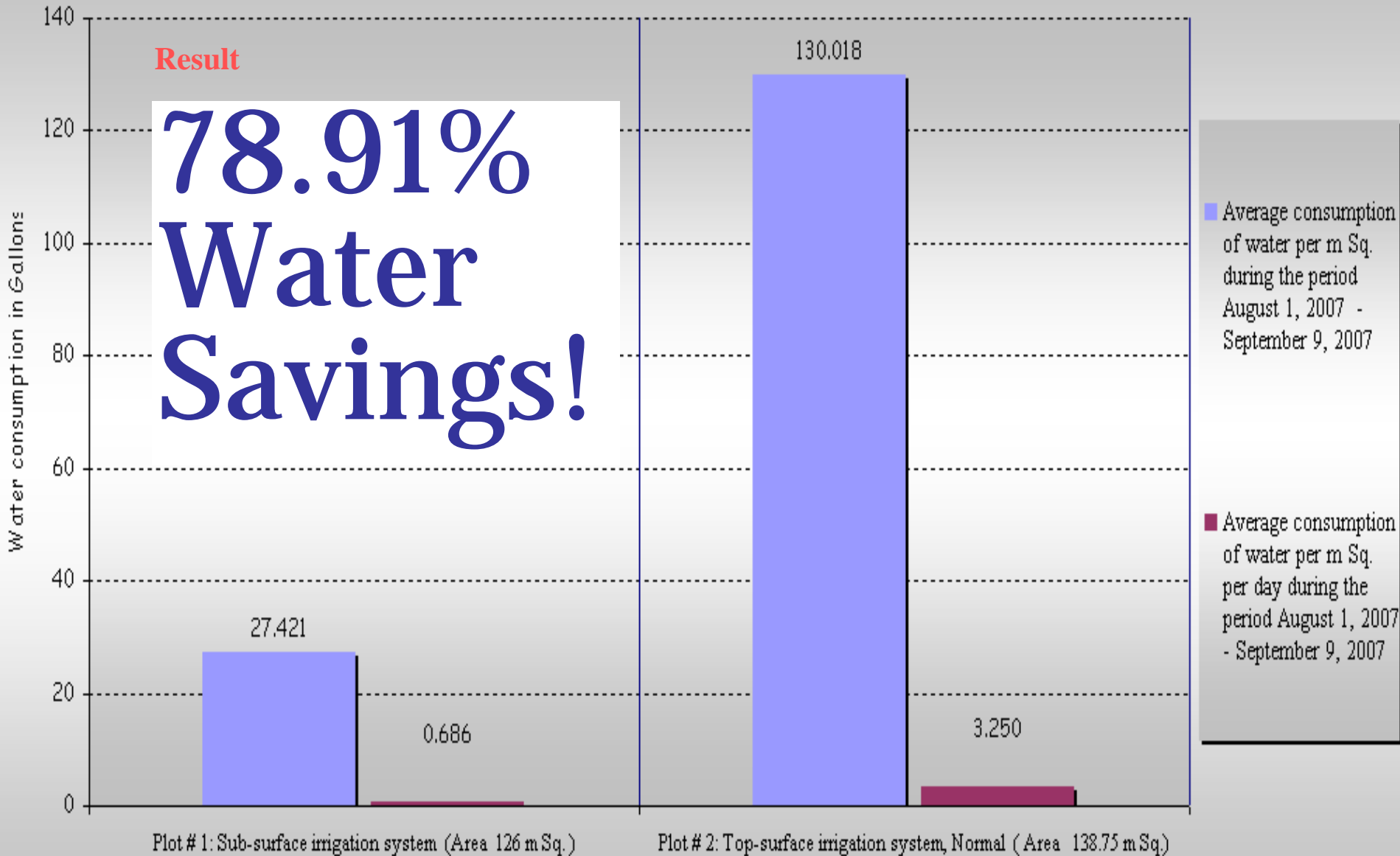
**Fresh water top-
surface irrigation
system.
(Conventional)**



Graph illustrates the comparison of water consumption between Sub-surface irrigation system and Top-surface irrigation system (Conventional) at Al-Sammaliah Island, Abu Dhabi.

Result

**78.91%
Water
Savings!**



Plot # 1 saves 78.91 % water consumption per m Sq. compared to Plot # 2 during the period 01-08-2007 - 09-09-2007.

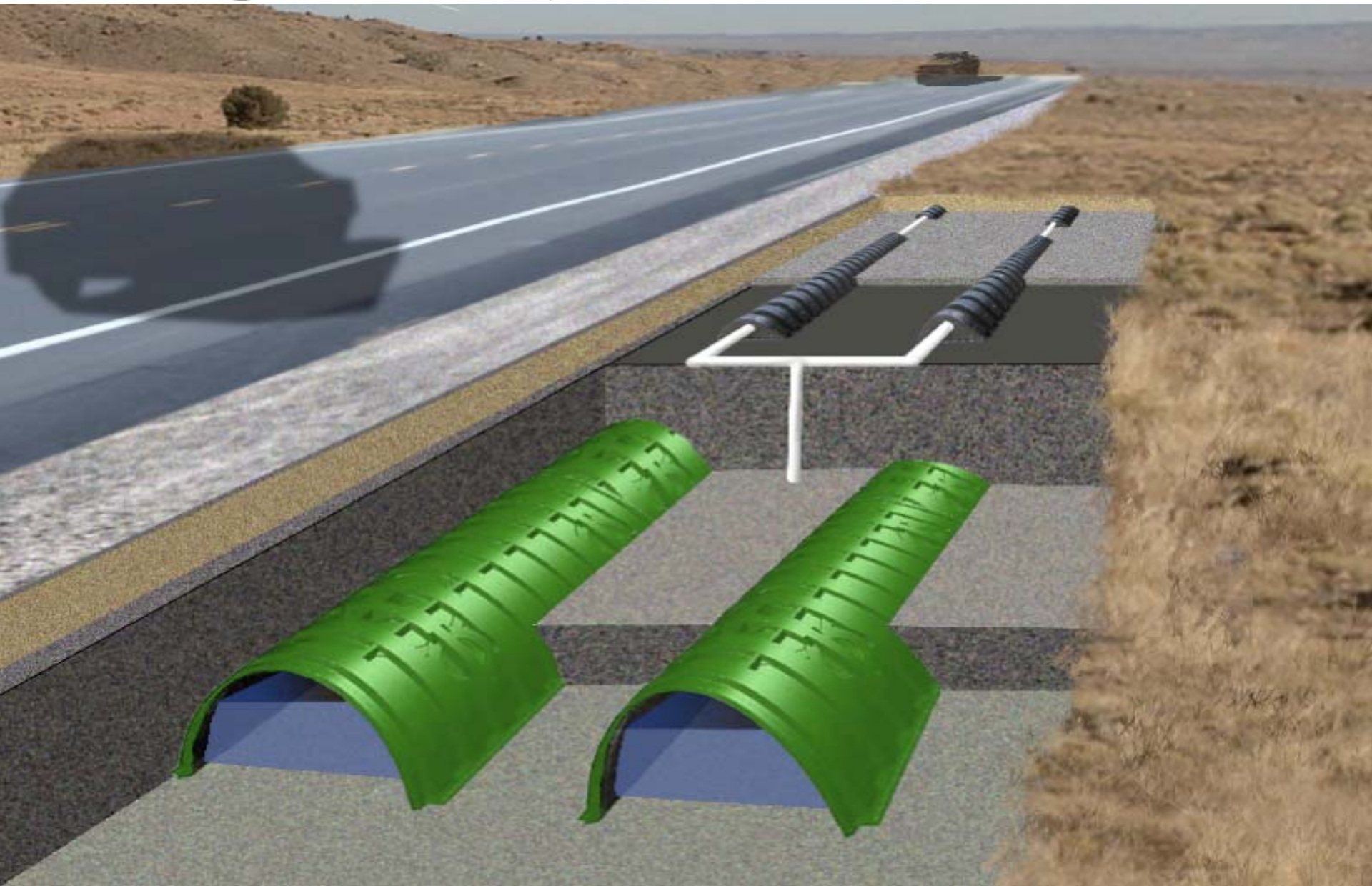














100' wide hardscape

60 mi. long

4.7" annual rainfall



92,000,000

gal. of new water / year

- **Free gravity delivery**
- **No moving parts**
- **No maintenance**
- **Road collection surface already in place**
- **Less than \$0.02 / gal after 20 years**

**The Primary Infrastructure for
Storm Water Capture Already
Exists.**



THE UNUSED PHOENIX POTENTIAL

515 sq. miles of hardscape

In an **7.3"** annual rainfall climate

Can produce

60,886,000,000 gallons of water

CAN WE COLLECT IT?

There is **NO** water
CRISIS!

...Only an inefficient
water management
infrastructure
and philosophy.

Questions?

