

The background of the slide is a light blue gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance.

WATER QUALITY BMP WISH LIST

APRIL KSA QUARTERLY

SANDY CAMARGO - ADS

The MS4
Coordinator



THE GRINCH
WHO
ENFORCES
REGULATIONS



I MUST STOP POLLUTANTS
FROM DISCHARGING.....

BUT HOW?



← The Engineer

WONDERFUL
AWFUL IDEAS...
FROM THE
DEVELOPER'S
PERSPECTIVE



Abby...or
vendors





Why are we here?









KY MS4 PERMIT MCM6 CRITERIA

- Water Quality Rainfall Event
- Capture, Treat, Infiltrate, Evapotranspire, yada yada yada
- Inspect

The permittee is required to develop and/or adopt structural BMP selection and design guidelines to aid in the planning and design of an appropriate BMP
- Maintain

relative to its intended water-quality protection function, ease of maintenance
- Report

and overall community acceptance

MEP? IDK...TBD, LOL

The MEP standard involves applying best management practices that are effective in reducing the discharge of pollutants in stormwater runoff. This requires that the permittee use known, available, and reasonable methods of prevention and control of stormwater discharges. MEP is an iterative standard, which evolves over time as urban runoff management knowledge increases. As such, the permittee's MS4 program must continually be assessed and modified to incorporate improved programs, control measures, BMPs, etc., to attain compliance with water-quality standards

PERFORMANCE CRITERIA

1. Does it handle the WQ rainfall event?
 2. Does it Capture, Treat.....?
 3. Can you inspect, maintain, report on?
- Choice is up to you
 - 80% TSS or other?
 - Particle size limitations...80% of what?
 - Target Pollutants?
 - GI/LID? Yes, no maybe, depends
 - Draw down time for infiltrative practices?



BENEFITS OF GI & LID

- Habitat
- Water quantity & quality benefits
 - Reduce imperviousness and runoff volumes
 - Reduced pollutant loading
- Community value
 - Aesthetics
 - Added functional space



PHYSICAL CONSTRAINTS OF LID

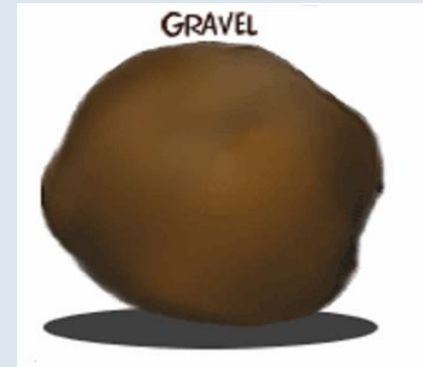
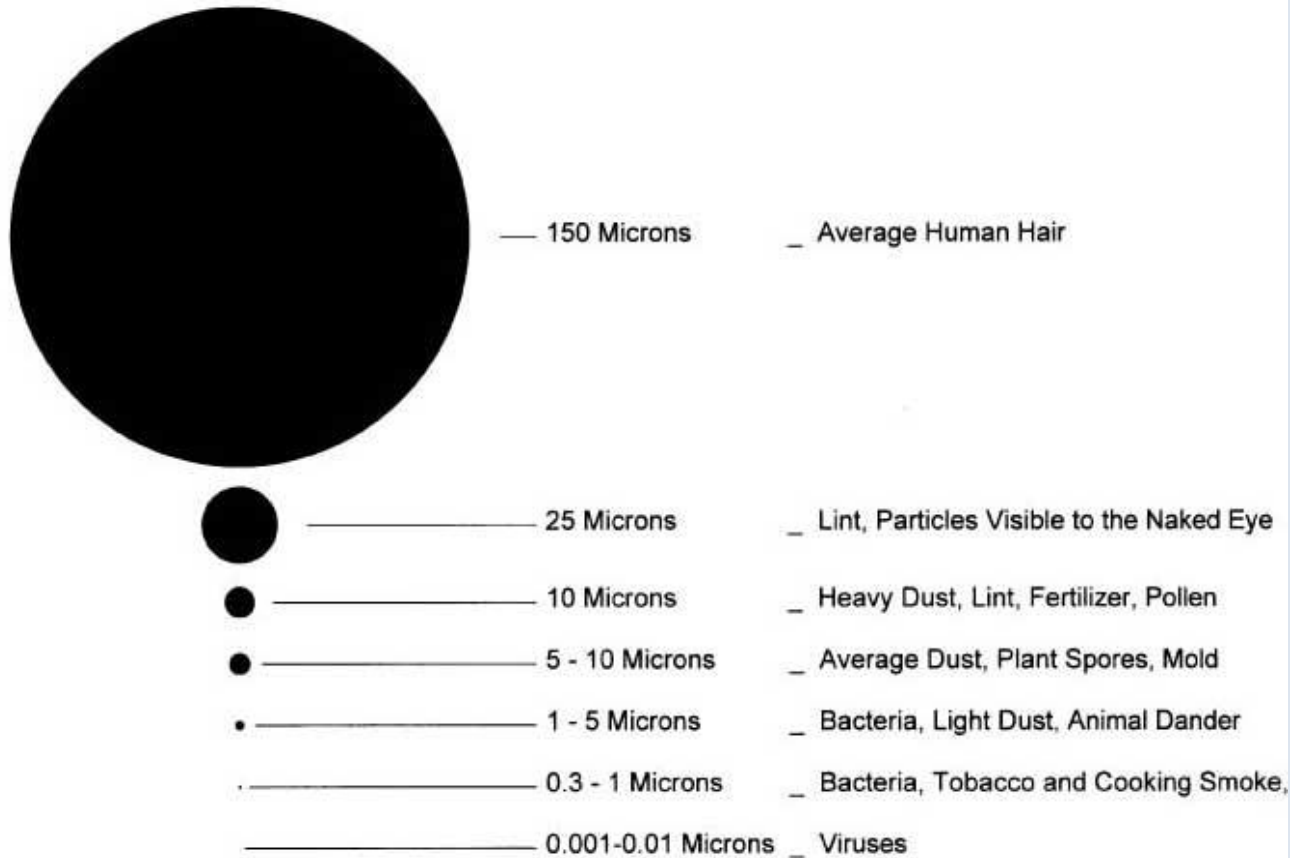
- Climate
 - Small-scale practices may be inundated by high storm intensities (i.e. Type II rainfall intensity)
- Site conditions
 - Low permeability soils
 - Proximity to foundations and utilities
 - Potential contamination of groundwater
 - Steep slopes
- Maximizing size/space constraints

MANUFACTURED TREATMENT DEVICES

- Typically proprietary stormwater treatment systems
- Variety of treatment mechanisms
 - Settlement
 - Screening
 - Hydrodynamic separation
 - Filtration
- Benefits
 - Space
 - Consistent sizing
 - Performance verification programs
 - Maintenance

Performance Factors

- PARTICLE SIZE DISTRIBUTION



SILT



CLAY



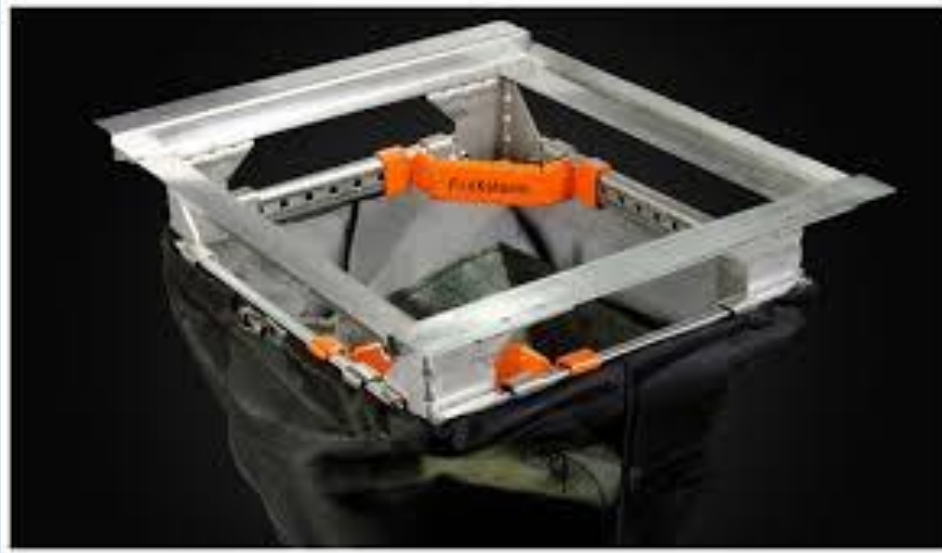
invisible at this scale



Menu of Options



INSERTS AND TRAPS





High Flow Rate: 200 GPM

PROS AND CONS

PROS

- LOW COST - \$
- EASY INSTALLATION
- FLEXIBLE DESIGN
- MEET THE CRITERIA?

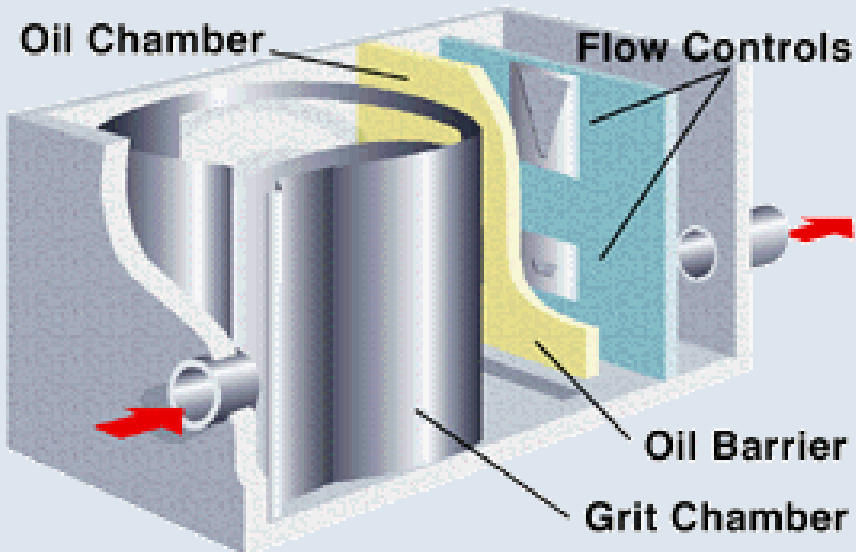
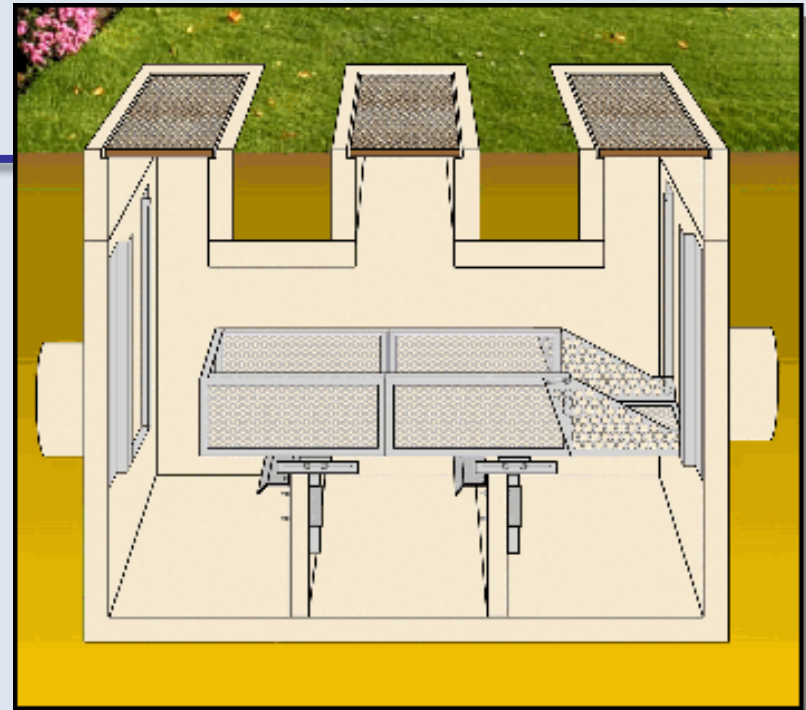
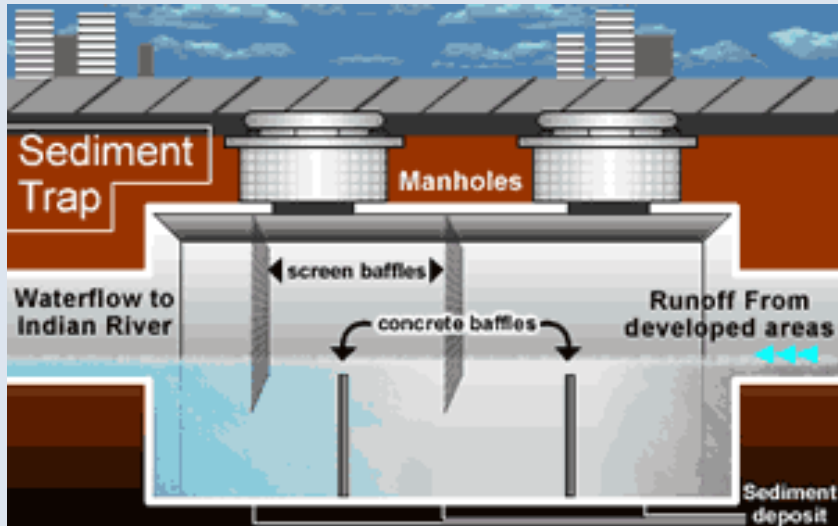
CONS

- FREQUENT MAINTENANCE
- LARGER PSD
- MEETING WQ REQTS
- NO VOLUME CONTROL

BAFFLE BOXES

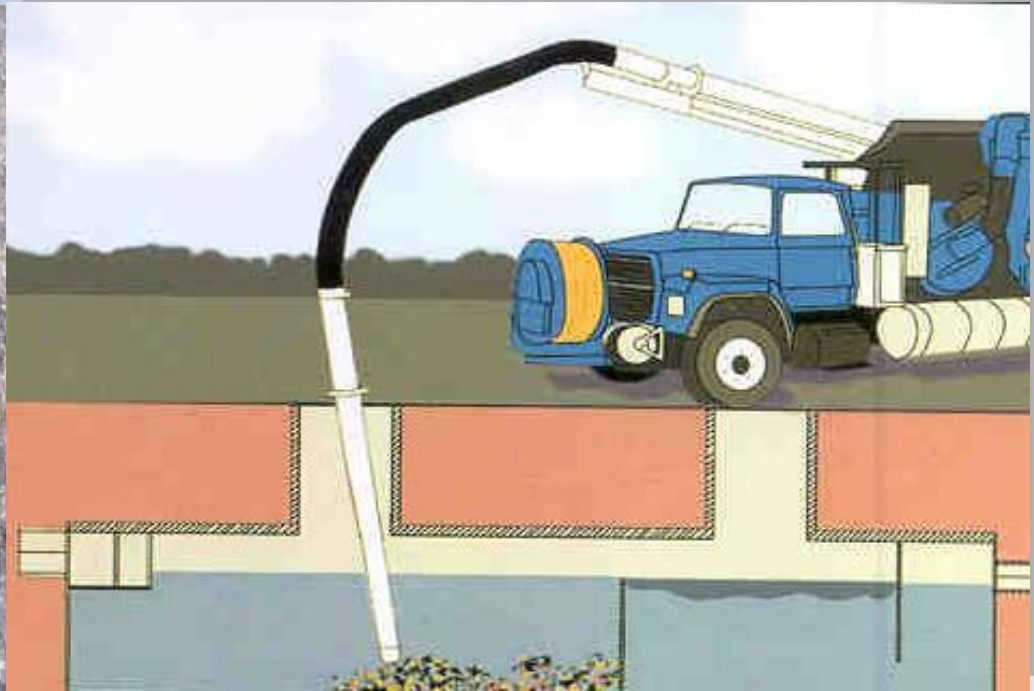


VAULT TYPE



MAINTENANCE

- SEDIMENT AND FLOATABLES CAN BE REMOVED WITH A VACUUM TRUCK AND DISPOSED OF OFFSITE.



PROS AND CONS

PROS

- LOW COST - \$\$
- LARGE CAPACITY
- SHALLOW PROFILE
- HIGH PEAK BYPASS
- MEET THE CRITERIA?

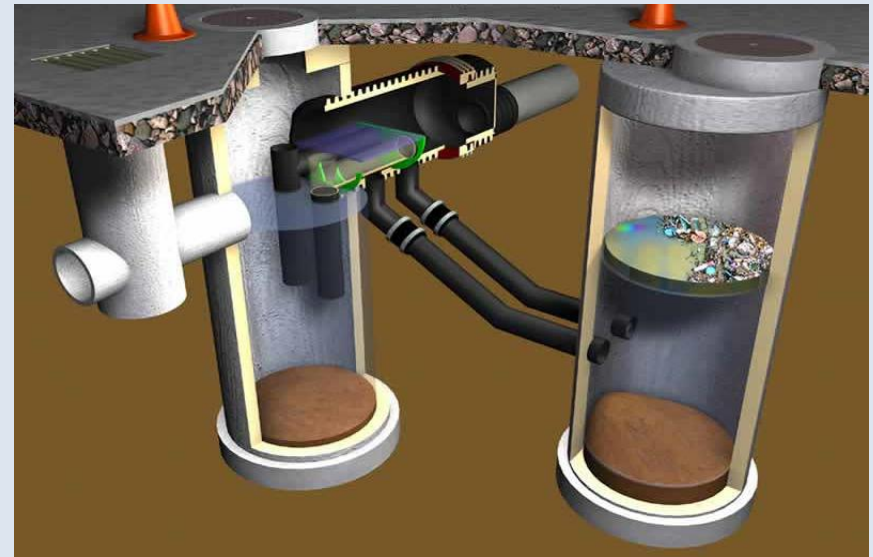
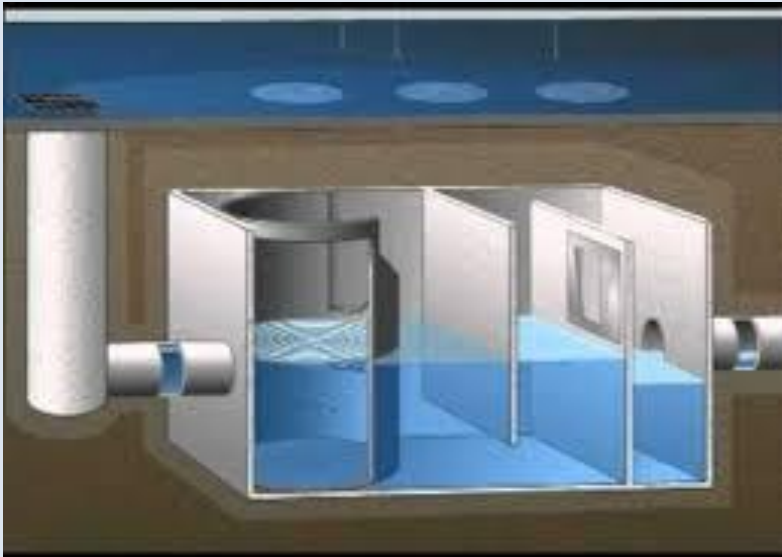
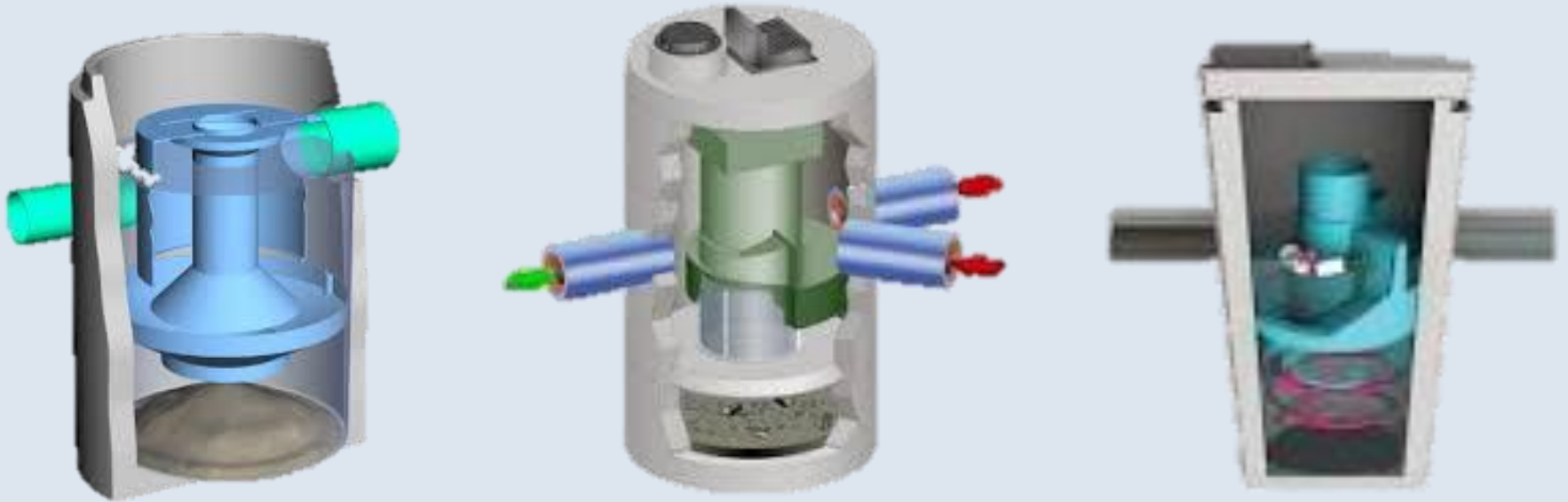
CONS

- GROSS POLLUTANT BMP
- SIZE
- LOW TREATMENT FLOW FOR SMALL PSD
- NO VOLUME CONTROL

Hydrodynamic Separation

- Low velocity swirl or vortex action
 - Increases flow path
 - Concentrates solids in low velocity flow field
- Flow controls
 - Minimizes turbulence and velocity
 - Prevents flow surges and re-suspension
 - Retains floating pollutants
- Pollutants of Concern
 - Sediments
 - Floatables
 - Oils
- Maintenance

Hydrodynamic Separation





- [HTTPS://WWW.YOUTUBE.COM/WATCH?V=JRJO79QJKMG](https://www.youtube.com/watch?v=JRJO79QJKMG)

PROS AND CONS

PROS

- LOW COST PER TREATED CFS - \$\$ TO \$\$\$
- FLEXIBLE DESIGN
- SMALL FOOTPRINT
- EASY INSTALLATION
- EASY MAINTENANCE
- MEET THE CRITERIA?

CONS

- CAN GET PRICEY WITH HIGH PEAKS
- MAY NEED OFFLINE
- NO CONTRIBUTION TO VOLUME CONTROL

Filtration

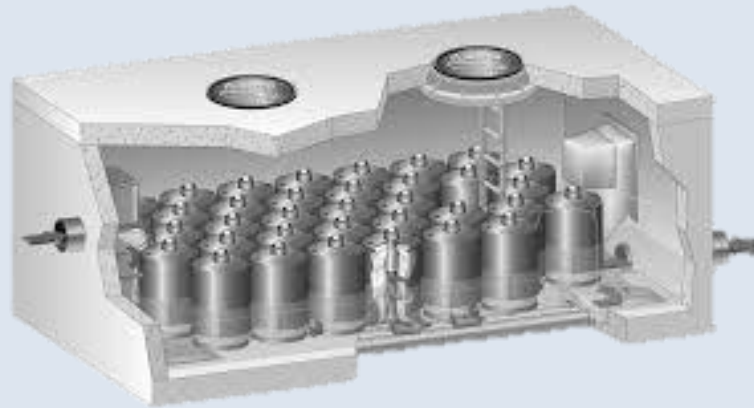
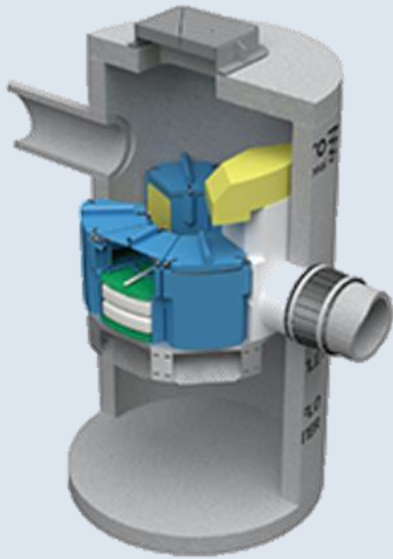
- TYPES OF FILTRATION
 - SEDIMENTATION
 - PHYSICAL FILTRATION
 - REACTIVE FILTRATION
- POLLUTANTS OF CONCERN
 - SEDIMENTS
 - METALS
 - NUTRIENTS
- MAINTENANCE
 - ROUTINE
 - REPLACEMENT



Hot Tub Filters



Filtration



PROS AND CONS

PROS

- EXCELLENT FINE PARTICLE REMOVAL ~ 20 MICRON
- METAL AND NUTRIENT REMOVAL
- POSSIBLE VOLUME REDUCTION AS PART OF DETENTION SYSTEM
- MEET THE CRITERIA?

CONS

- EXPENSIVE - \$\$\$\$\$
- LOW TREATMENT FLOW
- EXPENSIVE MAINTENANCE
- OFTEN REQUIRE PRETREATMENT

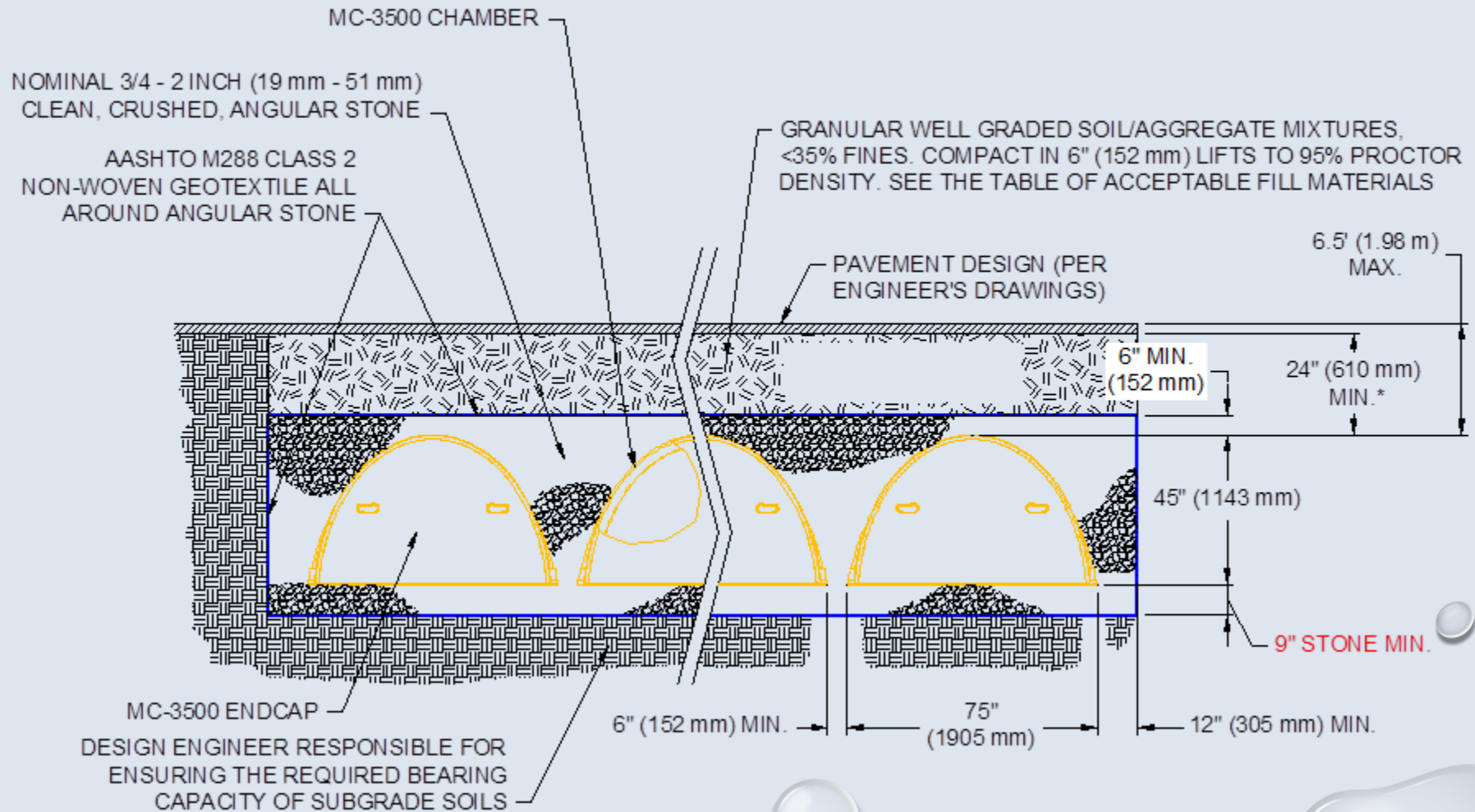
BAM - ANOTHER NOTCH!

- UNDERGROUND DETENTION!
 - ENHANCE WHAT YOU HAVE
 - TAKE ADVANTAGE OF THE VERTICAL SPACE – 3D
 - CAN HANDLE INCREASED SITE IMPERVIOUS AREA
 - VERY FLEXIBLE – CAN CONFORM TO MOST SITES
 - **TREATMENT** WITH SOME SYSTEMS
 - **INFILTRATION** WITH SOME SYSTEMS
 - **PEAK REDUCTION** WITH ALL SYSTEMS



CROSS SECTION - STORAGE

- Peak Reduction -



TREATMENT - INTERNAL



Isolator™ Row Inlet Control System



This Isolator Row
was cleaned after
one year of service

Typical
Maintenance 3-5yrs

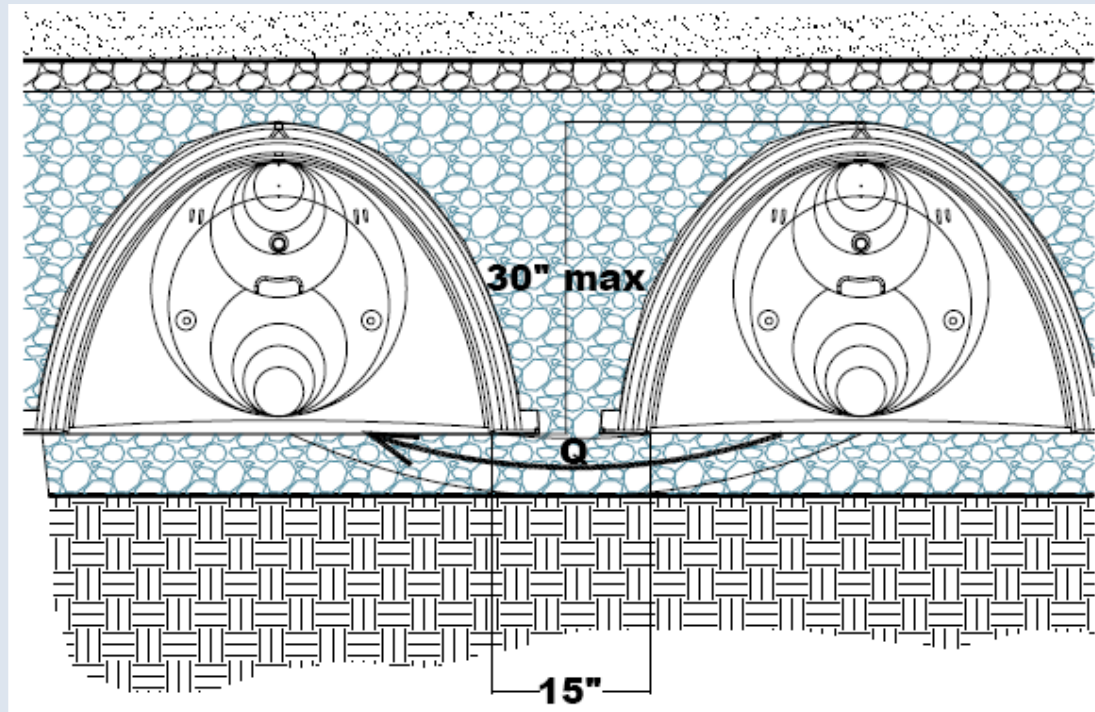


Before

After

VOLUMETRIC REDUCTION

CREATE SURFACE AREA FOR INFILTRATION TO OCCUR



UNDERGROUND DETENTION PROVIDES NECESSARY VOLUME (AND TIME) FOR INFILTRATION

PROS AND CONS

PROS

- COULD BE LOW COST - \$
- REDUCED FOOTPRINT – 3D
- QUALITY AND QUANTITY
- VOLUME CONTROL
- FLEXIBLE DESIGN
- MAXIMIZE USE OF SITE
- MEET THE CRITERIA?

CONS

- HIGHER COST THAN SURFACE BASINS IF LAND IS INEXPENSIVE
- RECOGNITION
 - ENGINEER
 - CONTRACTOR
 - OWNER
 - MS4
- GEOLOGIC CONDITIONS

WRAP UP

- THE MS4 NEEDS TO IDENTIFY AND WEIGH THE COST ON DEVELOPMENT AND PERFORMANCE BENEFITS IN CREATING THEIR REGULATIONS
- ENGINEER HAS TO DO MORE IN DESIGN
- CONTRACTOR HAS ANOTHER LAYER OF CONSTRUCTION
- OWNER/DEVELOPER HAS MORE COST

...BUT, IT IS WHAT IT IS, AND DESPITE IT ALL...

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DEVELOPMENT
CAME!

IT CAME JUST THE
SAME!

QUESTIONS?

