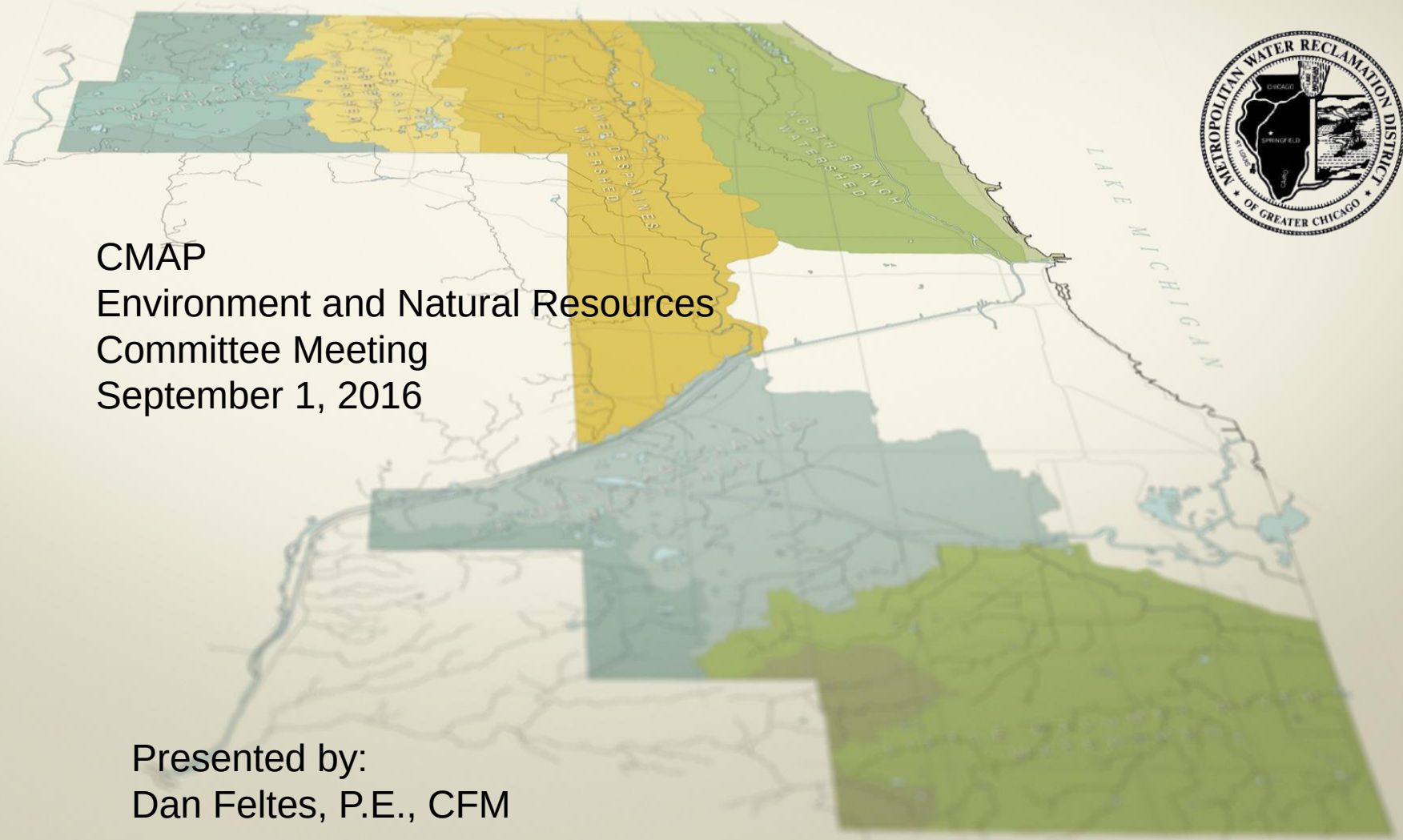
Watershed Management Ordinance (WMO)



CMAP
Environment and Natural Resources
Committee Meeting
September 1, 2016

Presented by:
Dan Feltes, P.E., CFM

MWRDGC - WMO Presentation Agenda

- Brief Background
- How Volume Control is Quantified and Credited
- Examples of Volume Control
- But wait… Don’t forget Runoff!
- WMO Results and amount of Volume Control
- WMO Draft Amendment
- Questions

MWRDGC (District) Background

Summary of MWRD Facilities:

7 Water Reclamation Plants
(including one of the worlds largest)
~ 554 Miles of Interceptors
~ 109 Miles of Deep Tunnel
~ 10.6 Billion Gallons of CSO Storage

Thornton Composite Reservoir

WMO Objective

Establish uniform, minimum, and comprehensive countywide stormwater management regulations

Enabling Legislation

Watershed Management Ordinance

"Stormwater management in Cook County shall be under the general supervision of the Metropolitan Water Reclamation District of Greater Chicago."

"The District may prescribe by ordinance reasonable rules and regulations for floodplain and stormwater management . . . in Cook County."

Public Act 093-1049

Sewer Permit Ordinance

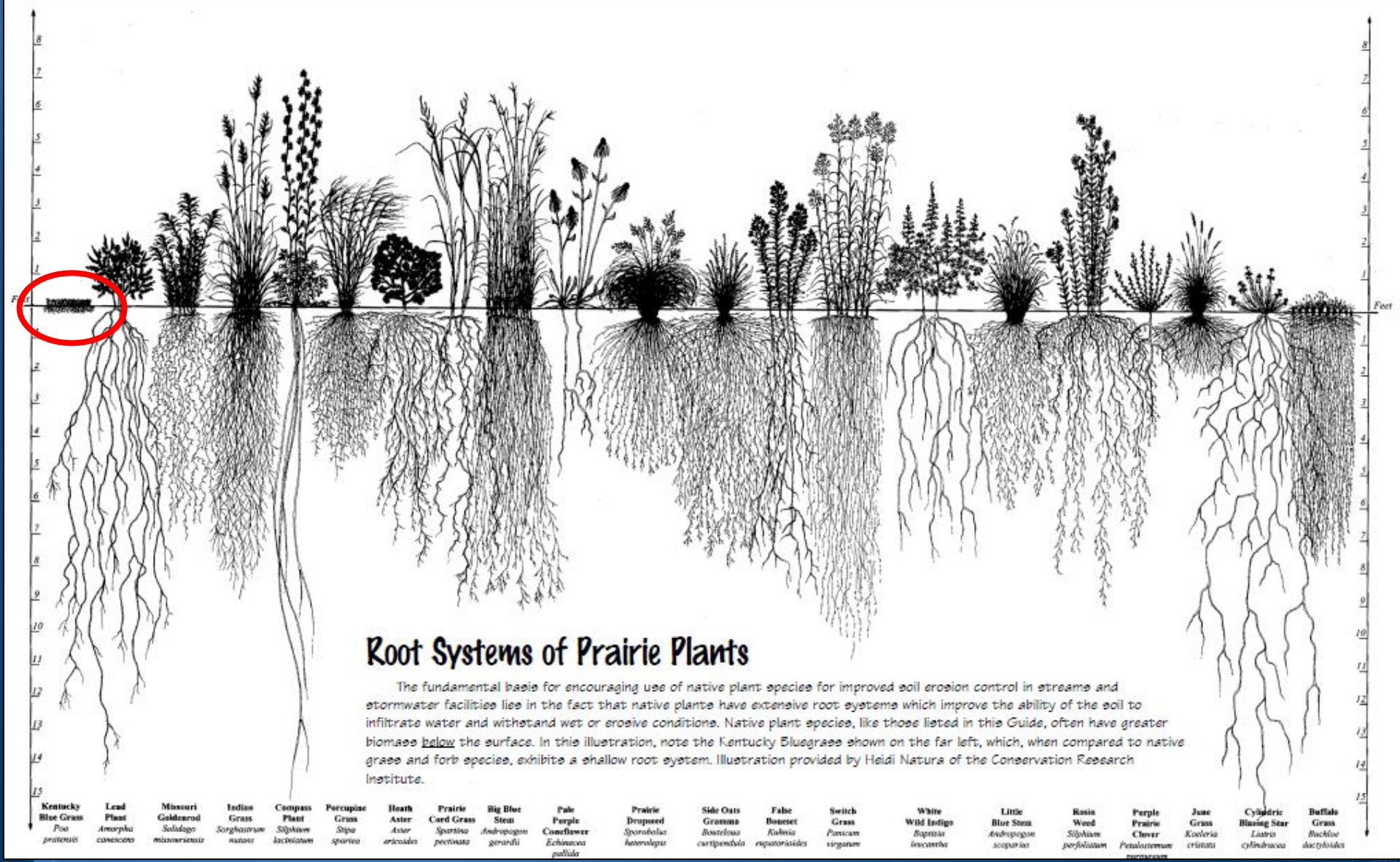
- Sanitary Sewers
- Stormwater Detention
  - TP-40 Rainfall Data
  - Modified Rational Method

Watershed Management Ordinance

- Sanitary Sewers
- Stormwater Detention
  - Bulletin-70 Rainfall Data
  - Flat Release Rate
  - Hydrograph Method
- Volume Control
- Erosion & Sediment
- Flood Protection Areas
  - Floodplain
  - Floodway
  - Isolated Wetlands
  - Riparian Areas
- Inflow and Infiltration (I/I)

Green Infrastructure (GI) = Volume Control (VC)

(in Consent Decree) (in WMO)



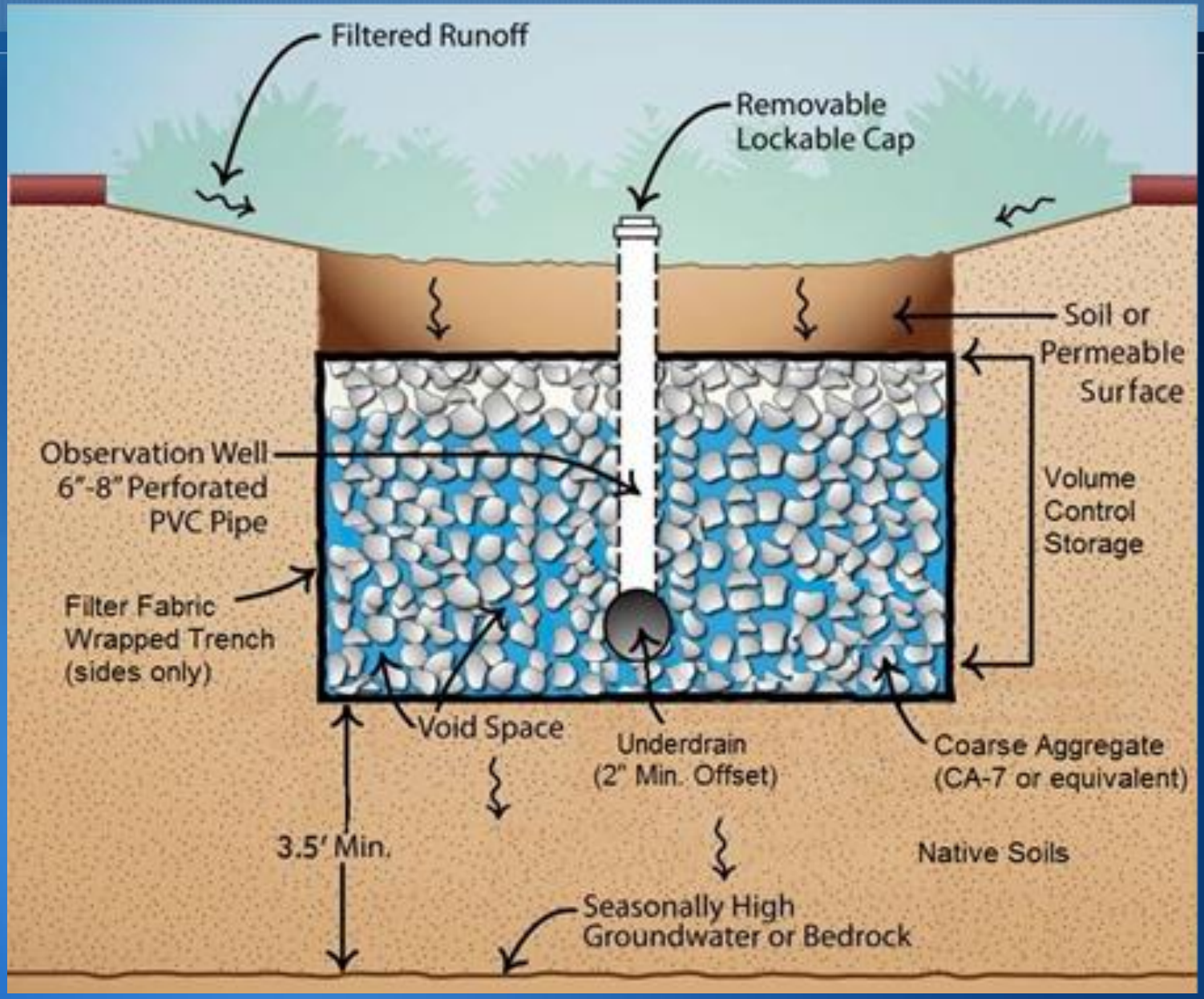
Root Systems:
Turf Grass vs Deep Rooted Vegetation

WMO Volume Control Summary

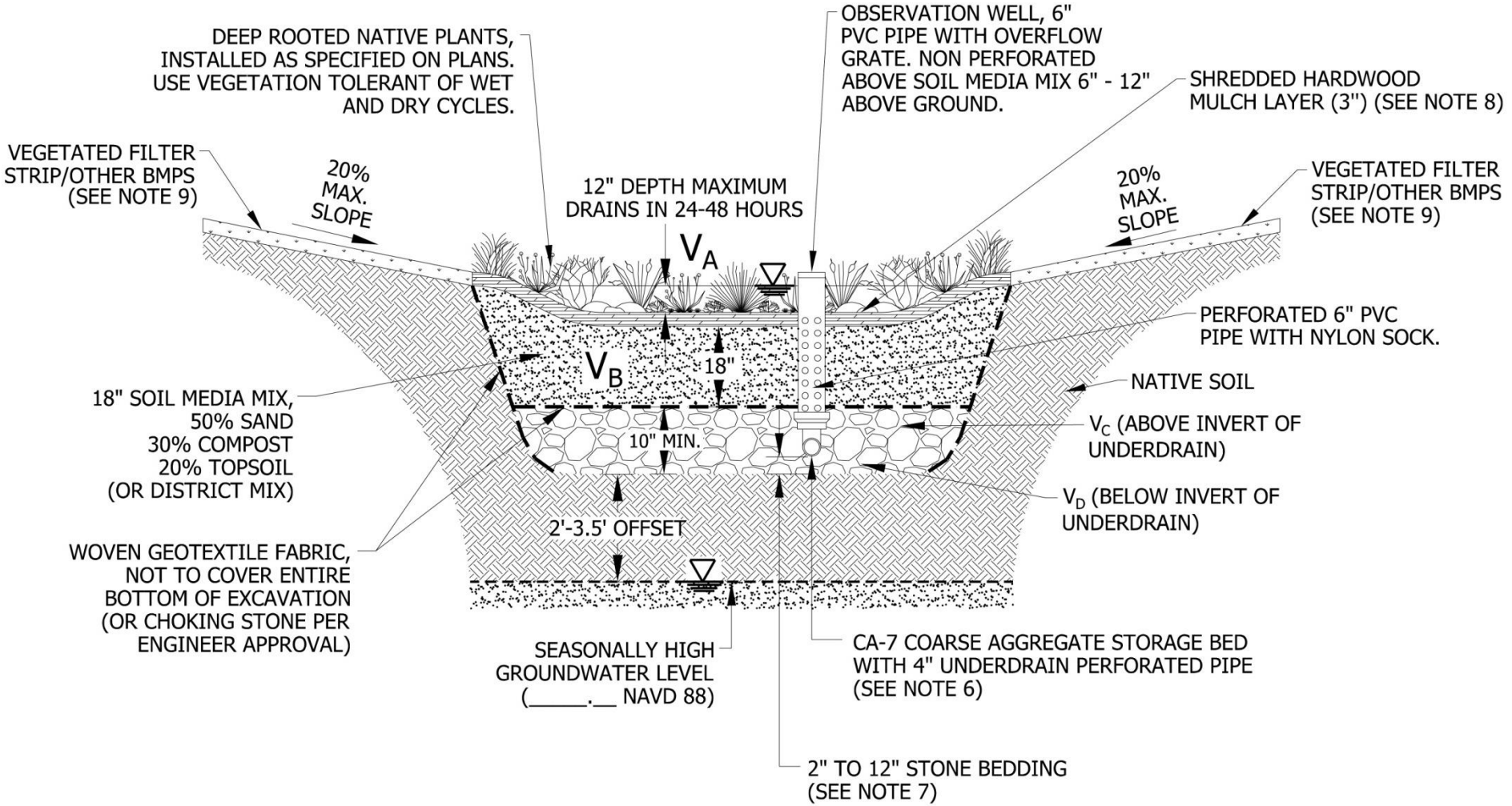
- One inch of volume over total proposed impervious area
- Can be provided in several ways:
  - Infiltration Trenches
  - Infiltration Basins
  - Porous Pavement (storage in the voids below the pavement)
  - Bio-Retention Systems
  - Dry Wells
  - Cisterns
  - Open Channel Practices Fitted With Check Dams
  - Storage Below the Outlet of a Site Detention Facility
- Credit toward required detention volume (CN reduction)

WMO Volume Control Summary

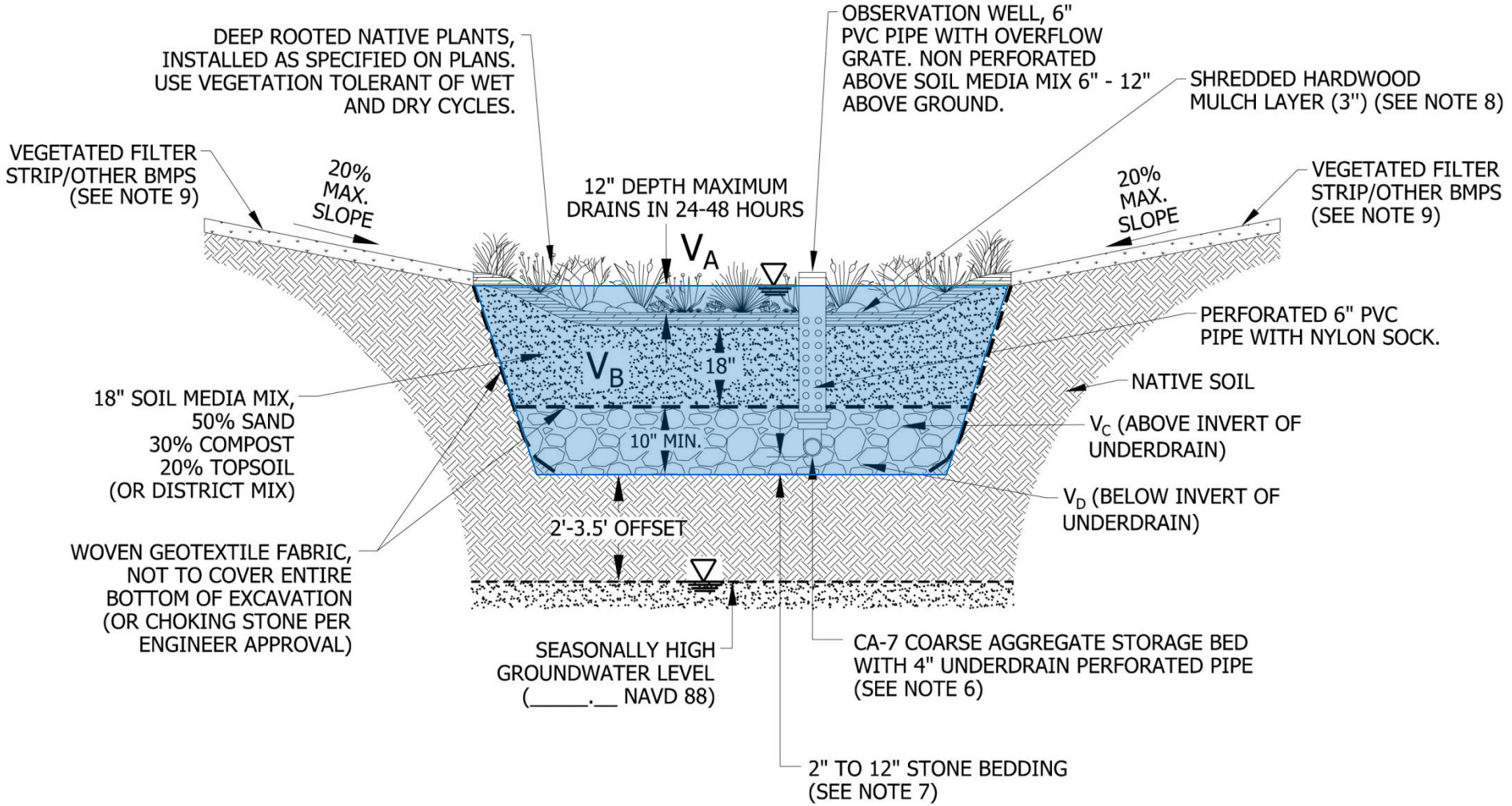
- When providing storage in void space of aggregate, stone must be angular cut and cleaned/washed free of fines. Different aggregate sizes are acceptable
- Underdrains are required, and must be offset at least 2” above bottom of volume control storage
- Bottom of storage must be above groundwater level
  - 2 feet in separate sewer areas
  - 3.5 ft in combined sewer areas
  - Highest seasonal groundwater level established through soil borings
- One monitoring well per 40,000 ft^2 of area



Cross Section - Typical Volume Control System



VOLUME TYPE	POROSITY	MEDIA VOLUME	STORAGE VOLUME	VOLUME PROVIDED
SURFACE STORAGE	1.00	V_A	1.00 x V_A	
SOIL MEDIA MIX	0.25	V_B	0.5 x 0.25 x V_B	
COARSE AGG. (ABOVE INVERT)	0.36	V_C	0.5 x 0.36 x V_C	
COARSE AGG. (BELOW INVERT)	0.36	V_D	0.36 x V_D	
			TOTAL	



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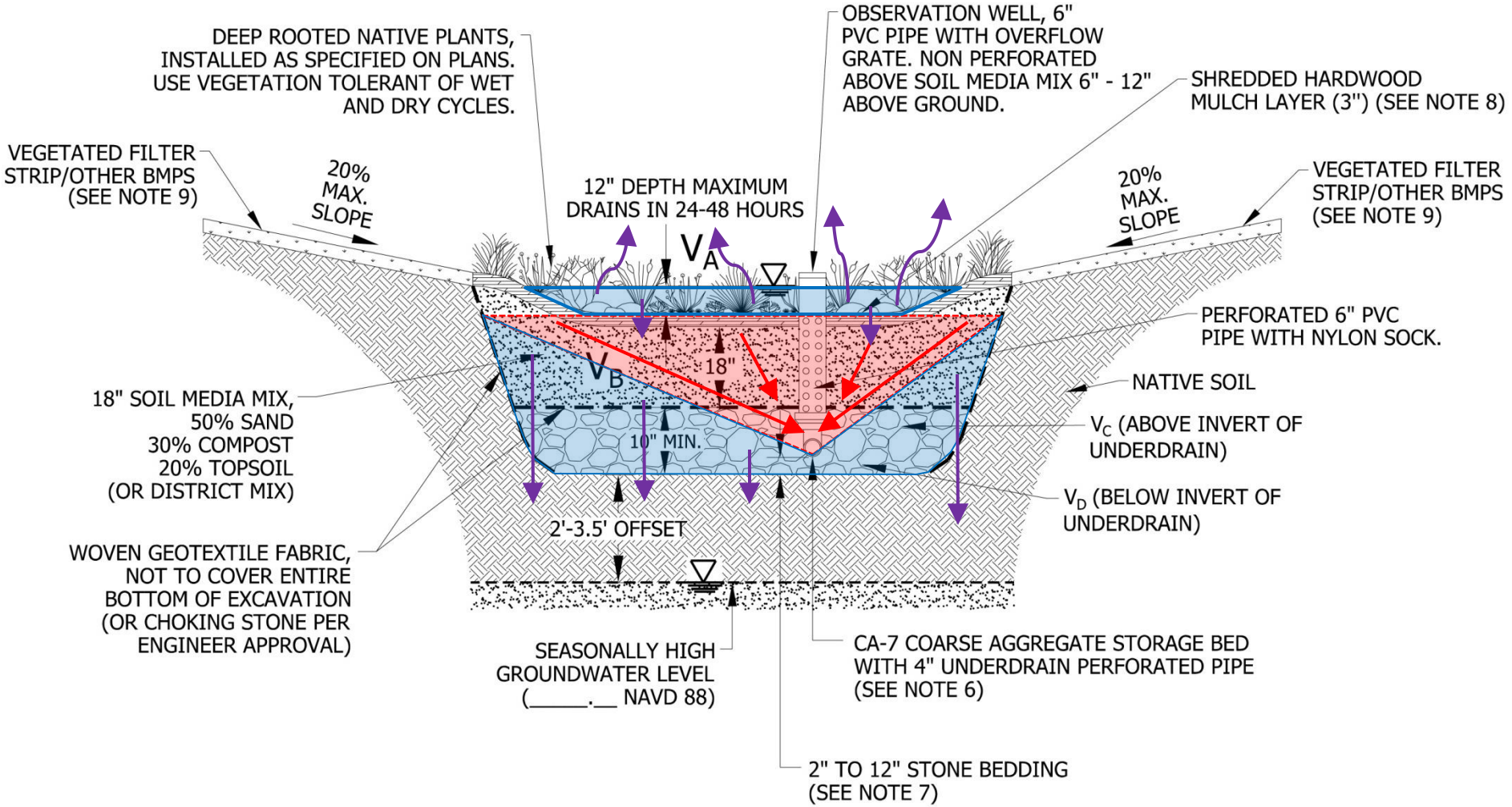
			TOTAL	



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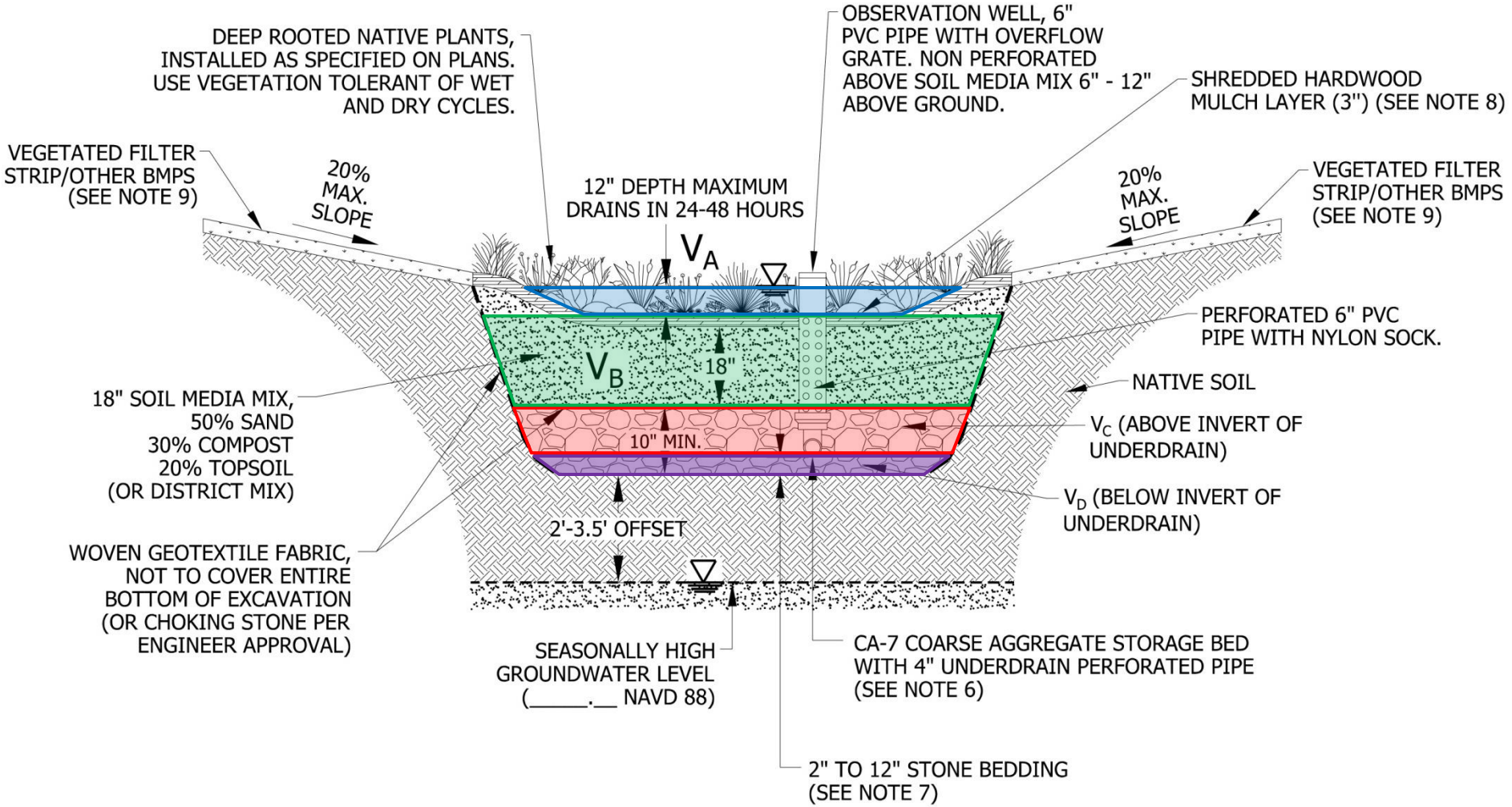

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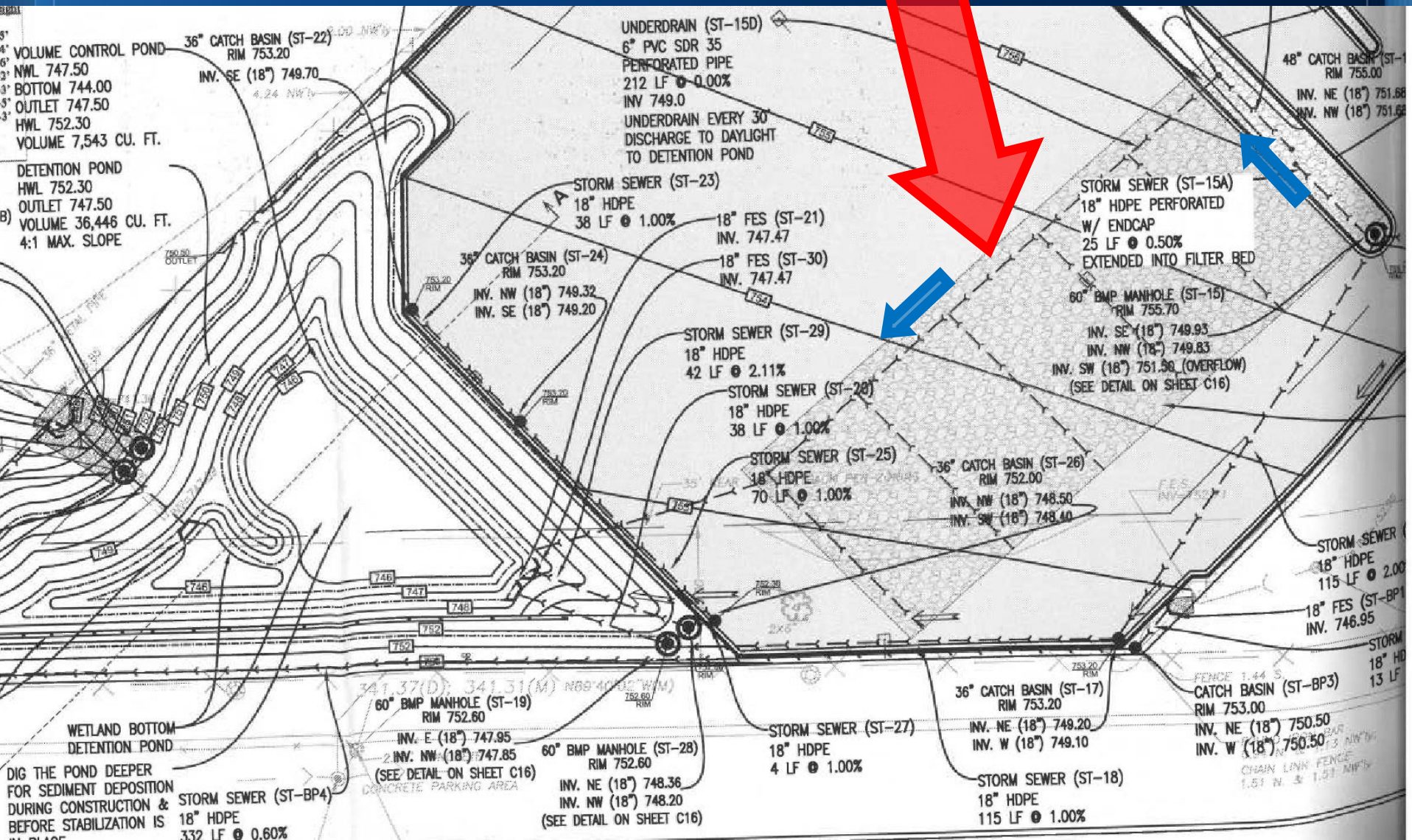
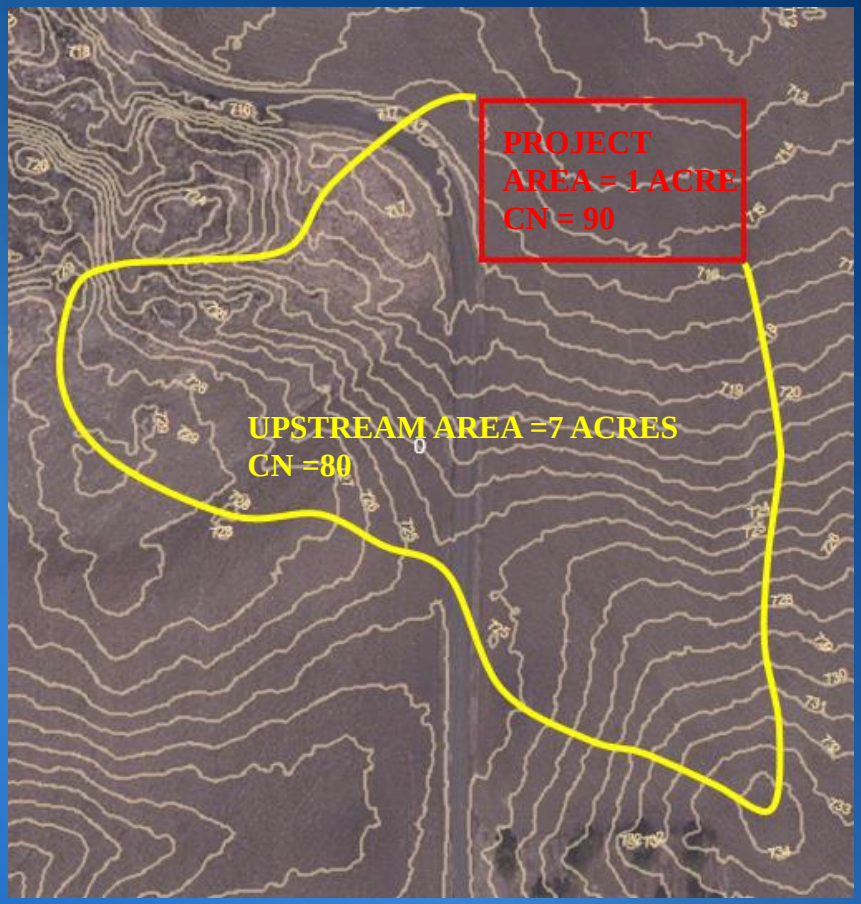

VOLUME CONTROL POND
NWL 747.50
BOTTOM 744.00
OUTLET 747.50
HWL 752.30
VOLUME 7,543 CU. FT.
DETENTION POND
HWL 752.30
OUTLET 747.50
VOLUME 36,446 CU. FT.
4:1 MAX. SLOPE
36" CATCH BASIN (ST-22)
RIM 753.20
INV. SE (18") 749.70
UNDERDRAIN (ST-15D)
6" PVC SDR 35
PERFORATED PIPE
212 LF @ 0.00%
INV 749.0
UNDERDRAIN EVERY 30'
DISCHARGE TO DAYLIGHT
TO DETENTION POND
STORM SEWER (ST-23)
18" HDPE
38 LF @ 1.00%
18" FES (ST-21)
INV. 747.47
18" FES (ST-30)
INV. 747.47
36" CATCH BASIN (ST-24)
RIM 753.20
INV. NW (18") 749.32
INV. SE (18") 749.20
STORM SEWER (ST-29)
18" HDPE
42 LF @ 2.11%
STORM SEWER (ST-28)
18" HDPE
38 LF @ 1.00%
STORM SEWER (ST-25)
18" HDPE
70 LF @ 1.00%
36" CATCH BASIN (ST-26)
RIM 752.00
INV. NW (18") 748.50
INV. SW (18") 748.40
STORM SEWER (ST-15A)
18" HDPE PERFORATED
W/ ENDCAP
25 LF @ 0.50%
EXTENDED INTO FILTER BED
60" BMP MANHOLE (ST-15)
RIM 755.70
INV. SE (18") 749.93
INV. NW (18") 749.83
INV. SW (18") 751.50 (OVERFLOW)
(SEE DETAIL ON SHEET C16)
48" CATCH BASIN (ST-1
RIM 755.00
INV. NE (18") 751.68
INV. NW (18") 751.68
STORM SEWER
18" HDPE
115 LF @ 2.00
18" FES (ST-BP1
INV. 746.95
STORM
18" HD
13 LF
WETLAND BOTTOM
DETENTION POND
DIG THE POND DEEPER
FOR SEDIMENT DEPOSITION
DURING CONSTRUCTION &
BEFORE STABILIZATION IS
STORM SEWER (ST-BP4)
18" HDPE
332 LF @ 0.60%
60" BMP MANHOLE (ST-19)
RIM 752.60
INV. E (18") 747.95
INV. NW (18") 747.85
(SEE DETAIL ON SHEET C16)
CONCRETE PARKING AREA
60" BMP MANHOLE (ST-28)
RIM 752.60
INV. NE (18") 748.36
INV. NW (18") 748.20
(SEE DETAIL ON SHEET C16)
STORM SEWER (ST-27)
18" HDPE
4 LF @ 1.00%
36" CATCH BASIN (ST-17)
RIM 753.20
INV. NE (18") 749.20
INV. W (18") 749.10
STORM SEWER (ST-18)
18" HDPE
115 LF @ 1.00%
CATCH BASIN (ST-BP3)
RIM 753.00
INV. NE (18") 750.50
INV. W (18") 750.50
FENCE
CHAIN LINK FENCE


SPORTS
MEDICINE
ATHLETICO


INFILTRATION
TRENCH

Runoff Requirements



A. DEVELOPMENT INFORMATION

1) Total parcel area: 1 acres
2) Total development area on the parcel: 1 acres

B. SITE RUNOFF REQUIREMENTS

1) On-site development area tributary to overland conveyance system: 1 acres
2) Upstream off-site tributary drainage area: 7 acres
3) Total tributary drainage area to conveyance system *(B.1 + B.2)*: 8 acres
   A. Ratio of upstream tributary area to on-site development area: 7:1
   B. Composite CN for total tributary area: 81.25
   C. Time of concentration for total tributary area: 30 minutes
4) Design 100-year peak flowrate for total tributary area: ..... 37.8 cfs
5) Overland conveyance capacity (actual flowrate provided): ..... 38.73 cfs
6) Describe overland conveyance system type/location: Depressed curb
   (including pond overflow weir)
   Weir length: 20 ft Weir crest HGL elevation: 712.57 ft (NAVD88)
   Weir elev: 712.00 ft (NAVD88) Lowest structure entry elev: 715.00 ft (NAVD88)
   Other (describe):

Watershed Management Permit No. _____

WMO SCHEDULE D
WATERSHED MANAGEMENT FACILITIES

Name of Project: _____

(Submit additional Schedule D for each stormwater facility, as needed)

A. DEVELOPMENT INFORMATION

1) Total parcel area: _____ acres
2) Total development area on the parcel: _____ acres

B. SITE RUNOFF REQUIREMENTS

1) On-site development area tributary to overland conveyance system: _____ acres
2) Upstream off-site tributary drainage area: _____ acres
3) Total tributary drainage area to conveyance system *(B.1 + B.2)*: _____ acres
   A. Ratio of upstream tributary area to on-site development area: _____
   B. Composite CN for total tributary area: _____
   C. Time of concentration for total tributary area: _____ minutes
4) Design 100-year peak flowrate for total tributary area: ..... _____ cfs
5) Overland conveyance capacity (actual flowrate provided): ..... _____ cfs
6) Describe overland conveyance system type/location: _____
   (including pond overflow weir)
   Weir length: _____ ft Weir crest HGL elevation: _____ ft (NAVD88)
   Weir elev: _____ ft (NAVD88) Lowest structure entry elev: _____ ft (NAVD88)
   Other (describe): _____

C. SITE VOLUME CONTROL (VC) REQUIREMENTS

1) Existing impervious area of development: _____ acres
2) Proposed impervious area of development: _____ acres
3) Gross VC storage required *(0.083 x Line C.2)*: _____ ac-ft
4) Site constraints preclude the use of retention-based practices in full? ☐ Yes ☐ No
   If yes, provide a brief rationale: _____
   _____
   In lieu of complete volume control, compliance provided via: _____
   _____
   A. VC reduced impervious area allowance *(25%)(C.3)(C.1 – C.2)/(C.1* x *5%)*: _____ ac-ft
   B. Area treated by a flow through practice: _____ acres
5) Net VC required *(C.3 – C.4.A)*: ..... _____ ac-ft
6) VC storage provided *(must be greater than line C.5)* : ..... _____ ac-ft
7) VC description and location: _____
   _____

Watershed Management Permit No. _____

WMO SCHEDULE D
WATERSHED MANAGEMENT FACILITIES

D. SITE DETENTION REQUIREMENTS

1) Type of stormwater detention facility: _____
2) Total Unrestricted Area: _____ acres
   A. Native Plantings: _____ acres
   B. On-site trade-off $(C_{unrestricted} \times A_{unrestricted})/(C_{trade\text{-}off})$: _____ acres
   C. Net Development Area *(Submit calculations)*: _____ acres
3) Release Rate
   A. Allowable release rate *(0.30 x D.2.C)*: _____ cfs
   B. Release rate deduction *(Submit calculations)*
      1. Unrestricted release rate deduction *(100-year, 24-hour storm)*: _____ cfs
      2. Depressional storage deduction: _____ cfs
   C. MWRD required release rate *(D.3.A – D.3.B.1 – D.3.B.2)*: _____ cfs
4) Detention Volume
   (Submit calculations for items D.3.A through D.3.H)
   A. Methodology: ☐ Nomograph ☐ Hydrologic model _____
   B. Composite CN for the development: _____
   C. Adjusted CN for the development, based on volume control: _____
   D. Time of concentration for the development: _____ minutes
   E. Required detention volume at MWRD required release rate: ..... _____ acre-feet
   F. Actual volume provided at MWRD required release rate: ..... _____ acre-feet
   G. Detention restrictor/outlet conveyance structure *(provide details and calculations)*
      1. Release rate at MWRD required volume *(must be ≤ MWRD required release rate)*: _____ cfs at HWL _____ ft (NAVD88)
      2. Type: _____
      3. Discharge coefficient: _____
      4. Diameter: _____ in
      5. Orifice invert elevation _____ ft (NAVD 88)
      6. Drawdown time: _____ hours

Name _____ Title _____

Signature _____ Date _____

Engineering Firm _____

PE SEAL

7.9 MG of Required Volume Control =
90 Miles of Rain Barrels
Chicago to Milwaukee

30.5 MG of Required Compensatory Storage =
350 Miles of Rain Barrels
Chicago to Cleveland

Projected in 2016:
9.7 MG of Required VC

Total VC so far ('14 thru '16):
17.5 MG
200 Miles of Rain Barrels
Chicago to Springfield

102 MG of Required Detention =
1,200 Miles of Rain Barrels
Chicago to Disney World

2015 WMO Volume Results

How Large is the Thornton Composite Reservoir?

The TCR will be able to store 7.9 billion gallons of CSO or the equivalent to 144 million rain barrels… enough to circle the earth 3.64 times when laid end to end!

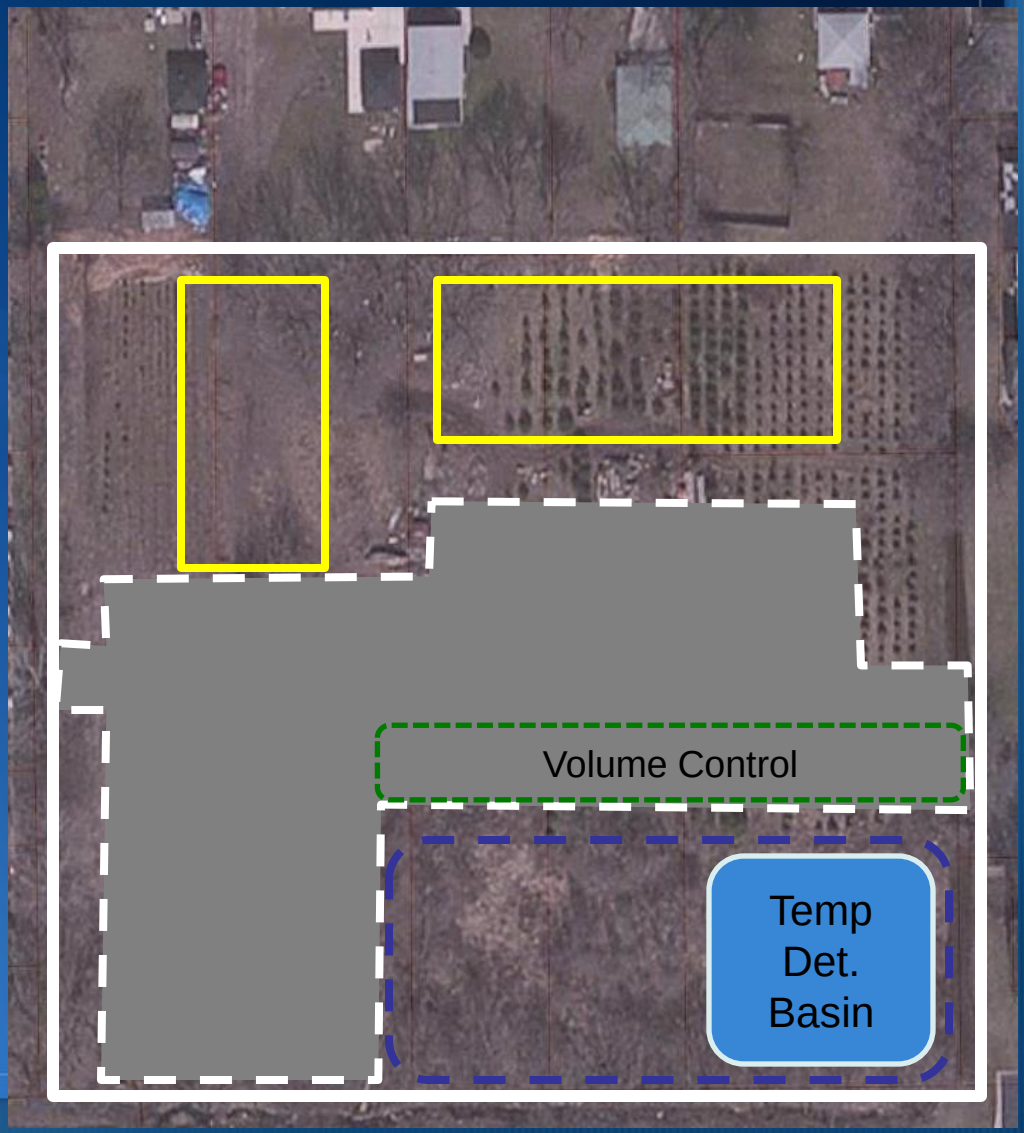
Suggested Ordinance Changes

- Nearly 100 edits to formatting, footer dates, and typographical errors
- Ten corrections to references
- Clarifications to align with administrative procedures
  - § 200.4.A; *Move agriculture exemption to cover all cases (delete from 201.1)*
  - § 200.4.H; *Flood control projects still require permit for 201.2 activities*
  - § 200.4.G/I; *Separate "Development undertaken by the District" exemption*
  - § 201 (Table 1); *"Disturbance" becomes "Development disturbing"*
  - § 201.1.B and Table 1; *Clarify both direct and indirect wetland impacts*
  - § 201.1.C and Table 1; *"existing building" becomes "single-family home"*
  - § 201.1.D.3; *Remove utility work… "not part of other development"*
  - And other minor changes…

Draft Concept
"Foundation / Earthwork Only Permit"

Example #1

- Total Site: 4.5 acres
- Two buildings, parking lot, detention pond
- Permit to start grading and foundation work (yellow area)
- Temporary detention required for impervious area (blue area)
- Volume Control design provided in later permit (green dashed area)

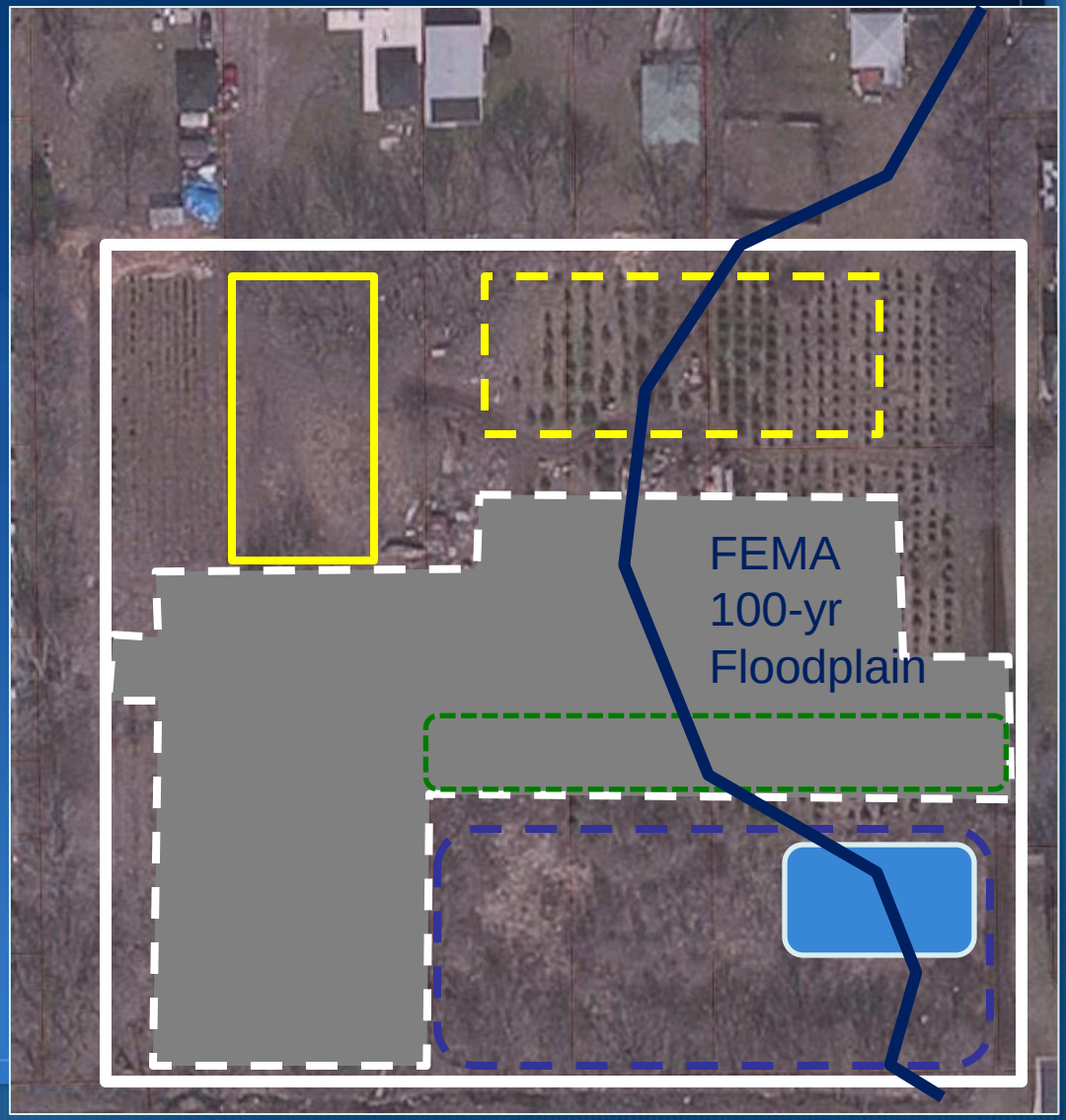


Draft Concept
"Foundation / Earthwork Only Permit"

Example #2 (w/ floodplain)

- Total Site: 4.5 acres
- Two buildings, parking lot, detention pond
- Permit to start grading and foundation work

  (yellow area)
- No foundation work allowed in floodplain
- Temporary detention – cut only – allowed in floodplain (blue area)



Volume Control Trading

Conceptualize

- Allowing a municipality to create an exchange within their community to trade constructed volume control credits towards new development that would otherwise need onsite volume control.

Volume Control Trading

Draft Guidelines:

- Provide for 1-inch over all proposed impervious area
- VC Trading facility must be permitted and inspected by MWRD
- VC Trading facility must exist or be permitted before development is approved
- VC Trading only allowed within boundaries of the sub-watershed
- Site seeking credits must provide flow through device for water quality
- To implement, will require an Ordinance Change

Watershed Management Ordinance

The Watershed Management Ordinance (WMO) establishes uniform, minimum, countywide stormwater management regulations throughout Cook County. Components which are regulated under the WMO include drainage and detention, volume control, floodplain management, isolated wetland protection, riparian environment protection, and soil erosion and sediment control. The WMO went into effect on May 1, 2014 and the District's Board of Commissioners most recently amended the WMO on July 10, 2014. The WMO is accessible through the link below.

WMO (As amended on July 10, 2014 meeting) (7.2 MB)

WMO Comparison Documents (Compares changes from May 1, 2014 WMO to July 10, 2014 latest amendments) (6.08 MB)

Article 8: Infiltration / Inflow Control Program (Incorporated into WMO on July 10, 2014) (68.3 KB)

The District developed a Technical Guidance Manual (TGM), which will serve as a technical reference to the WMO. The TGM documents are accessible through the link below.

» Technical Guidance Manual (TGM) (Updated September 2015)

» Appendix C. Standard Details & Notes (Updated July 2015)

The District will conduct training for stakeholders to ease the transition from the Sewer Permit Ordinance to the WMO.

» Training Schedule

Permit Resources:

» Information Pamphlets for Developers and Homeowners

» Watershed Management Permit Flow Charts, Checklist and Forms

Minimum Permit Submittal Checklist (184 KB)

» WMO Design Calculators

» WMO Model Templates

» Authorized Municipalities and Multi-County Municipalities

Other Resources:

» Watershed Management Ordinance: Short Summary

» Permit Inquiries (Request Copies of Past Issued Permits)

» Permit Revision Information

» Existing Development Plans List

» Frequently Asked Questions (FAQs)

» Presentations

» WMO Advisory Committee Resource Page

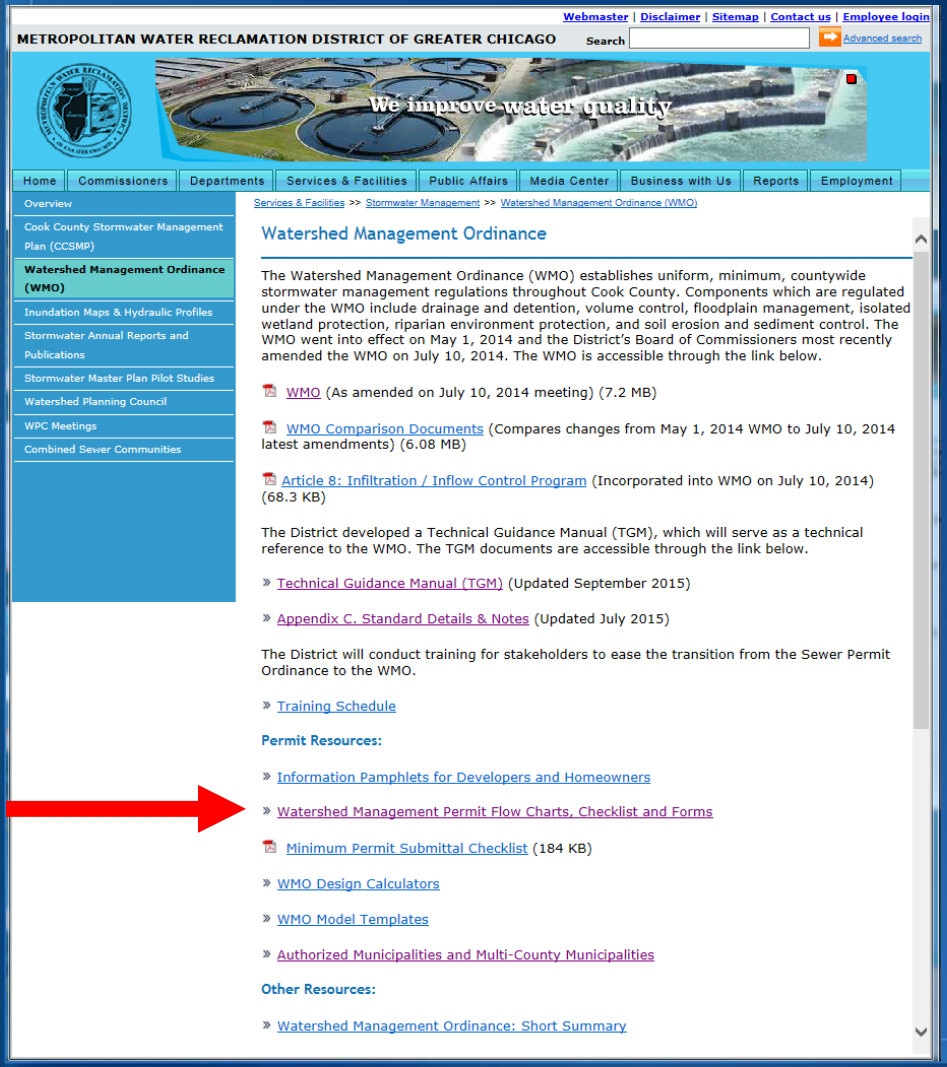
If you have any questions about the WMO, contact Mr. Dan Feltes at (312) 751-3247 or daniel.feltes@mwrd.org.

wmo.mwrd.org

Thank you
Questions?

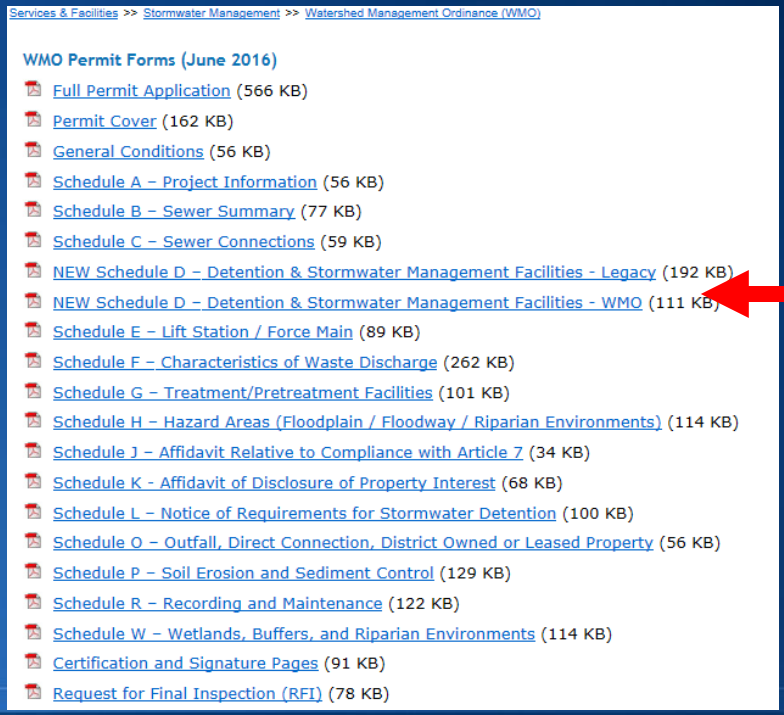
Dan Feltes, P.E., CFM
feltesd@mwrd.org
312.751.3247

Metropolitan Water Reclamation District of Greater Chicago
100 E. Erie Street
Chicago, Illinois



wmo.mwrd.org

- *Watershed Management Permit Flow Charts, Checklist and Forms*



Revised Schedule D

- **Site Runoff**
  - Replaces Upstream and Bypass
  - Includes weir information (emergency overflow for entire site)
  - Moved to the top of the form
- **Volume Control**
  - Requires explanation for site constraints
  - Describe type of volume control
- **Detention**
  - Open-ended detention facility type
  - Start with unrestricted area and types
  - Calculate release rate reduction to find MWRD require release rate
  - Volume calculation unchanged
  - Move weir information under Site Runoff
  - Add drawdown time (hours)