

STORMWATER PLAN to Serve PETERSON ELEMENTARY SCHOOL PROJECT NUMBER 0022 PPD (607861)

City of Wichita

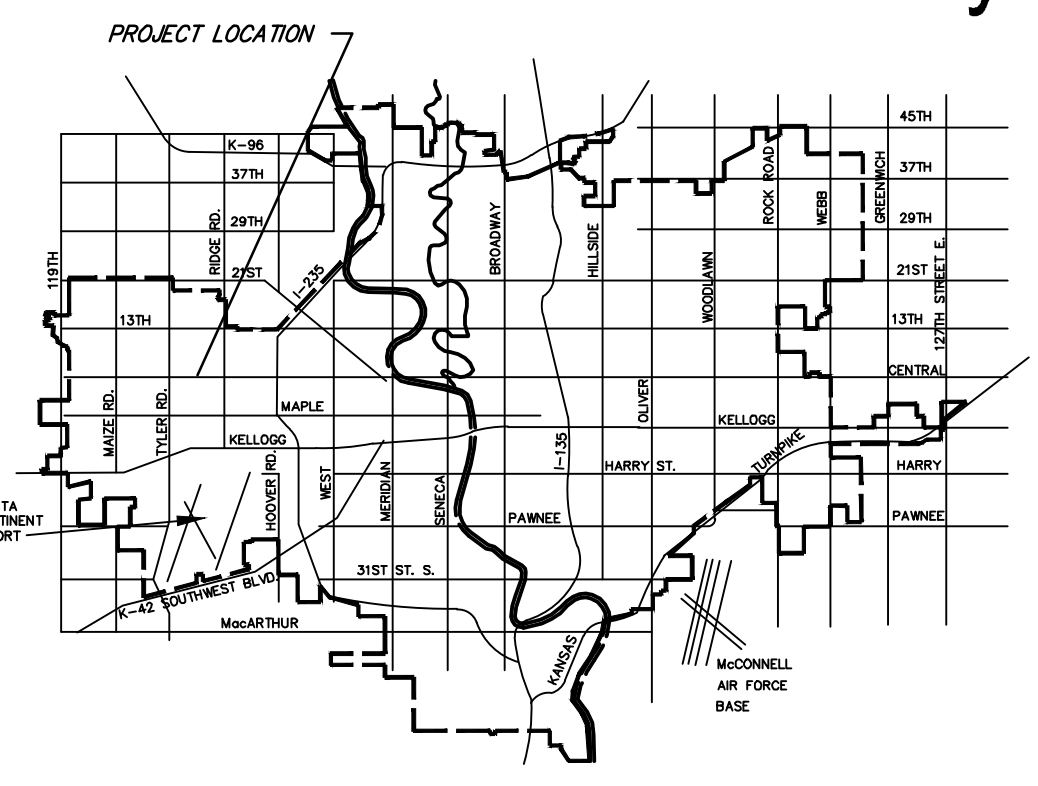
SPANGENBERG PHILLIPS TICE
ARCHITECTURE
121 N Mead Ste 201 Wichita KS 67202
T 316.267.4002 F 316.267.1509
www.sptaarchitecture.com

APPROVED AS NOTED
BY CITY ENGINEER OF WICHITA

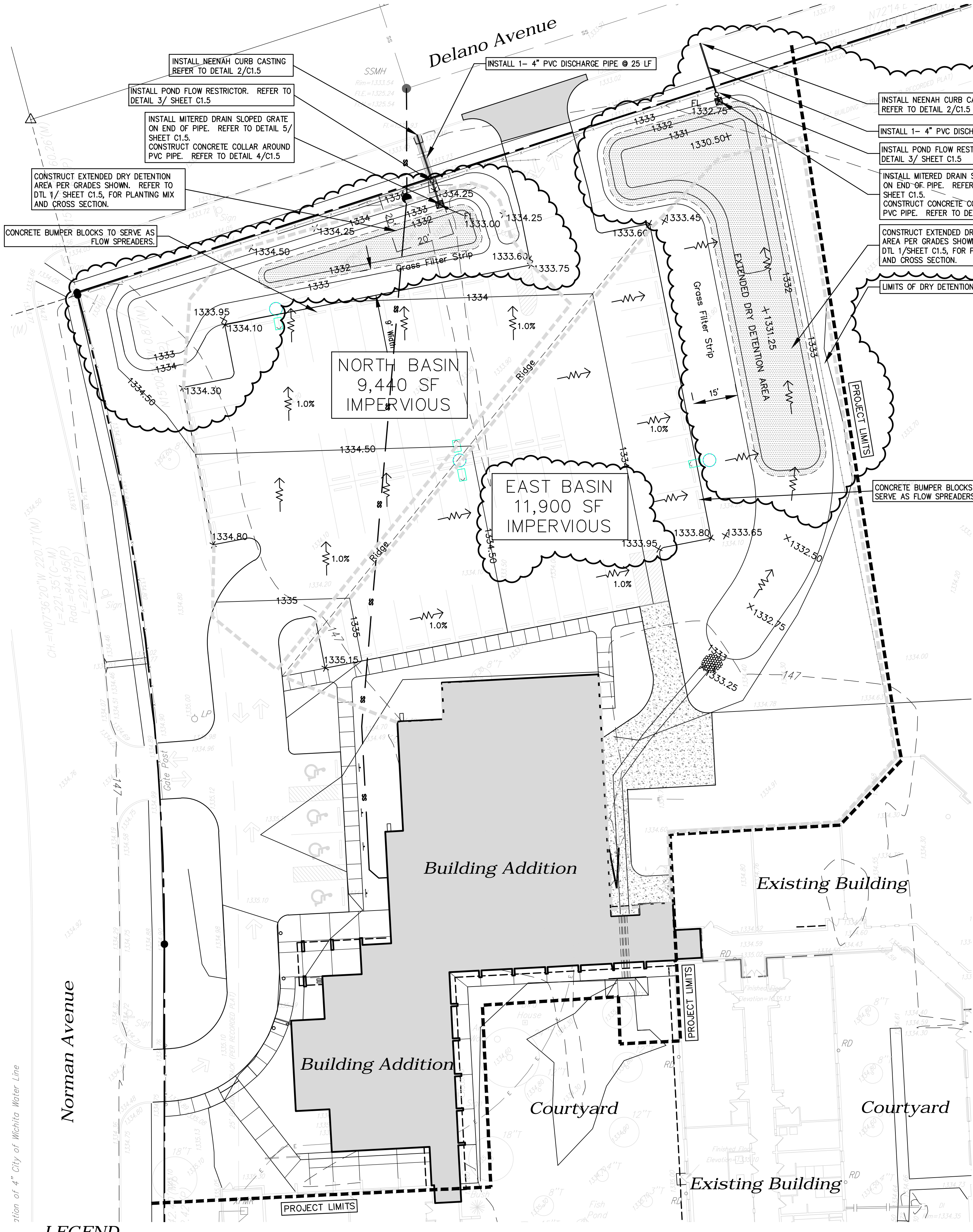
Engineering/ Storm Water Mgmt

NOTE TO CONTRACTORS

Inspection and testing for this project are to be provided by a Licensed Consulting Engineering Firm under contract with the Owner/Developer. Said inspection to be in accordance with the City of Wichita standard construction engineering practices and certified by a Licensed Professional Engineer. No work shall be performed in dedicated easements or public right-of-way by the Contractor without such inspection, nor shall any work be commenced without written authorization by the City Engineer.



VICINITY MAP



SITE CALCULATIONS

| | |
|---|---|
| EXISTING SITE | 296,267 SF (6.80 Acres) |
| Site Area | 296,267 SF (6.80 Acres) |
| Existing Impervious | 101,323 SF |
| Existing Pervious | 194,944 SF |
| BUILDING ADDITION (LIMITS OF CONSTRUCTION) | |
| Area Disturbed by Construction | 66,291 SF (1.52 Acres) |
| New Impervious Area | 40,435 SF |
| Pervious Area w/in Addition | 25,856 SF |
| TOTAL SITE | |
| Impervious Area | 141,758 SF / 3.25 Acres (47.7% of Site) |
| Pervious Area | 154,509 SF / 3.55 Acres (52.3% of Site) |
| TOTAL | 296,267 SF / 6.80 Acres |

LEGAL DESCRIPTION

Lot 1, Peterson Elementary School Addition, Wichita, Sedgewick County, Kansas

BENCHMARK

BENCH MARK: CHISELED SQUARE ON THE TOP OF CURB AT THE SOUTHWEST CORNER OF DELANO AVENUE AND CADDY LANE. ELEVATION = 144.09 (GTY DATUM)

NORTH BASIN

VARIABLES

Drainage Area Treated by Filter= 0.44 Acres (18,960 SF)
Runoff Coefficient (R_v)= 0.58
Slope (S)= 1.1%
Depth (Y)= 0.5 inches
Manning's n= 0.35 (Bermuda Sod)
Time of Concentration (t_c)= 22.7 Minutes

R_v
R_v = R_{vU} + R_{vD} + R_{vI}
R_v = 0.05 (0.05) + 0.25 (0.15) + 0.85 (0.22)
R_v = 0.006 + 0.09 + 0.48
R_v = 0.576

WQ Peak Flow
Q_{wp} = P * R_v
Q_{wp} = 1.2 * 0.58
Q_{wp} = 0.70 inches

WQ Volume
WQ_v = $\frac{P R_v A}{12}$
WQ_v = $\frac{1.2 (0.58) 0.44}{12}$
WQ_v = 0.0225 = 0.03 acre feet= 1306 CF

Time of Concentration (t_c)
t_c = 22.7 Minutes
(as calculated from C.O.W. Excel worksheet)

Pond Storage Volume Provided
WQ_v Provided= 3390 CF/ 0.07 acre ft

EAST BASIN

VARIABLES

Drainage Area Treated by Filter= 0.76 Acres (33,236 SF)
Runoff Coefficient (R_v)= 0.51
Slope (S)= 1.1%
Depth (Y)= 0.5 inches
Manning's n= 0.35 (Bermuda Sod)
Time of Concentration (t_c)= 33.3 Minutes

R_v
R_v = R_{vU} + R_{vD} + R_{vI}
R_v = 0.05 (0.05) + 0.25 (0.47) + 0.95 (0.29)
R_v = 0 + 0.15 + 0.36
R_v = 0.51

WQ Peak Flow
Q_{wp} = P * R_v
Q_{wp} = 1.2 * 0.51
Q_{wp} = 0.78 inches

WQ Volume
WQ_v = $\frac{P R_v A}{12}$
WQ_v = $\frac{1.2 (0.51) 0.76}{12}$
WQ_v = 0.038 = 0.04 acre feet= 1742 CF

Time of Concentration (t_c)
t_c = 33.3 Minutes
(as calculated from C.O.W. Excel worksheet)

Pond Storage Volume Provided
WQ_v Provided= 4365 CF/ 0.10 acre ft

TREATMENT TRAINS & SITE TREATMENT TOTAL

NORTH BASIN
AREA= 0.44 ACRES/ 18,960 SF
1. FILTER STRIP TSS= 50%
2. DRY DETENTION TSS= 60%
TSStrain= 50 + 60 - (50 x 60) = 80%
100

EAST BASIN
AREA= 0.76 ACRES/ 33,236 SF
1. GRASS CHANNEL TSS= 50%
2. FILTER STRIP TSS= 50%
3. DRY DETENTION TSS= 60%
TSS & TSS2= 75%
TSStrain= 75 + 60 - (75 x 60) = 90%
100

SITE TREATMENT TOTAL
TSS SITE = 0.44 (80) + 0.76 (90) = 86%
1.2

NORTH BASIN OUTLET DESIGN (CPV)

$$D_o = 24 \sqrt{\frac{Q_{wq}}{C_o * 3.14 * \sqrt{2} * g * H_{wq}}} = 24 \sqrt{\frac{0.01}{0.62 * 3.14 * \sqrt{2} * 32.2 * 0.6}} = 1.07 = 1 \text{ inch opening}$$

D_o = Orifice Diameter (inches)

Q_{wq} = Peak WQ Outflow (cfs)

C_o = Orifice Coefficient (0.62 for square-edged entrance)

g = Acceleration of gravity (32.2)

H_{wq} = Head of WQ over invert of WQ outlet (feet) = 0.6 feet

Channel Protection Volume
From Fig 4.6 using I_o/P and t_c= 0.38 hours, q_o= 1000cfs/mi²/in
Eq. 4-18 = q_o ADF_p = 1000 (0.44) (0.70) (1.00) = 0.48 cfs
Eq. 4-17 q_o/q_i=0.02
Eq. 4-27 V_o/V_i=0.682 - 1.43 (0.03) + 1.64 (0.03)² - 0.804 (0.03)³
V_o/V_i=0.682 - 1.43 (0.02) + 1.64 (0.02)² - 0.804 (0.02)³
V_o/V_i=0.682 - 0.0286 + 0.0006 - 0.000006 = 0.71
V_o = ((V_o/V_i) Q_i) / 12 = ((0.71) (2.3) (0.44)) / 12 = 0.06 ac-ft
Channel Protection Volume = (q_o/q_i) t_c = 0.02 * 0.48 = 0.01 cfs

EAST BASIN OUTLET DESIGN (CPV)

$$D_o = 24 \sqrt{\frac{Q_{wq}}{C_o * 3.14 * \sqrt{2} * g * H_{wq}}} = 24 \sqrt{\frac{0.01}{0.62 * 3.14 * \sqrt{2} * 32.2 * 0.7}} = 0.648 = 0.65 \text{ inch opening}$$

D_o = Orifice Diameter (inches)

Q_{wq} = Peak WQ Outflow (cfs)

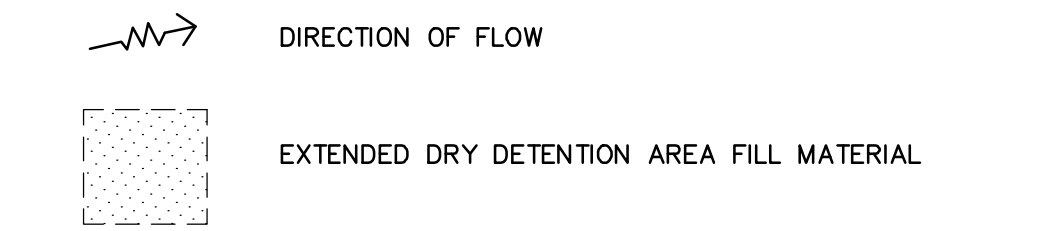
C_o = Orifice Coefficient (0.62 for square-edged entrance)

g = Acceleration of gravity (32.2)

H_{wq} = Head of WQ over invert of WQ outlet (feet) = 0.7 feet

Channel Protection Volume
From Fig 4.6 using I_o/P and t_c= 0.55 hours, q_o= 550cfs/mi²/in
Eq. 4-18 = q_o ADF_p = 550 (0.76) (1.00) = 0.51 cfs
Eq. 4-17 q_o/q_i=0.03
Eq. 4-27 V_o/V_i=0.682 - 1.43 (0.03) + 1.64 (0.03)² - 0.804 (0.03)³
V_o/V_i=0.682 - 1.43 (0.02) + 1.64 (0.02)² - 0.804 (0.02)³
V_o/V_i=0.682 - 0.0429 + 0.0001 - 0.000002 = 0.639
V_o = ((V_o/V_i) Q_i) / 12 = ((0.639) (2.26) (0.76)) / 12 = 0.09 ac-ft
Channel Protection Volume = (q_o/q_i) t_c = 0.03 * 0.51 = 0.015 cfs

LEGEND



STORM WATER QUALITY PLAN
Scale 1" = 20'-0"

Ruggles & Bohm, P.A.
E engineering, S surveying, L Land Planning

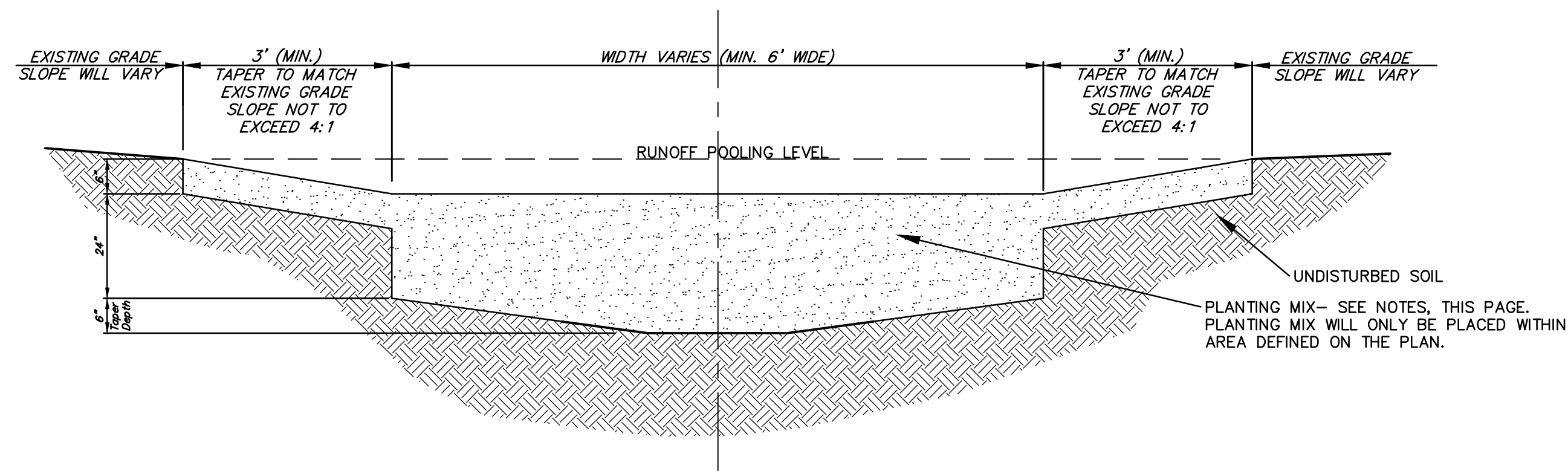
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DWG FILE: ENGINEERING BASE
PROJECT NO. 3757E
JANUARY 4, 2011

PETERSON ELEMENTARY SCHOOL ADDITION
USD 259 WICHITA SCHOOL DISTRICT
9710 WEST CENTRAL - WICHITA, KS 67212

SW QUALITY REVISIONS
29 APR 2011
BID SET
09 FEB 2011
Storm Water Quality
Plan
BID NO. 11-25044

C1.4



EXTENDED DRY DETENTION NOTES

- CONTRACTOR SHALL EXERCISE CAUTION WHEN EXCAVATING AROUND EXISTING TREES TO REMAIN. WHEN ENCOUNTERING ROOTS LARGER THAN ONE INCH, ROOTS SHALL BE HAND PRUNED TO AVOID DAMAGE TO THE TREE. AVOID DRIVING MACHINERY OR STORING MATERIALS WITHIN THE DRIPLINE OF TREES.
- PLANTING MIX SHALL CONSIST OF THE FOLLOWING MIX:
 - 50% CONSTRUCTION SAND
 - 30% TOPSOIL WITH LESS THAN 5% CLAY CONTENT
 - 20% COMPOSTED MATERIAL

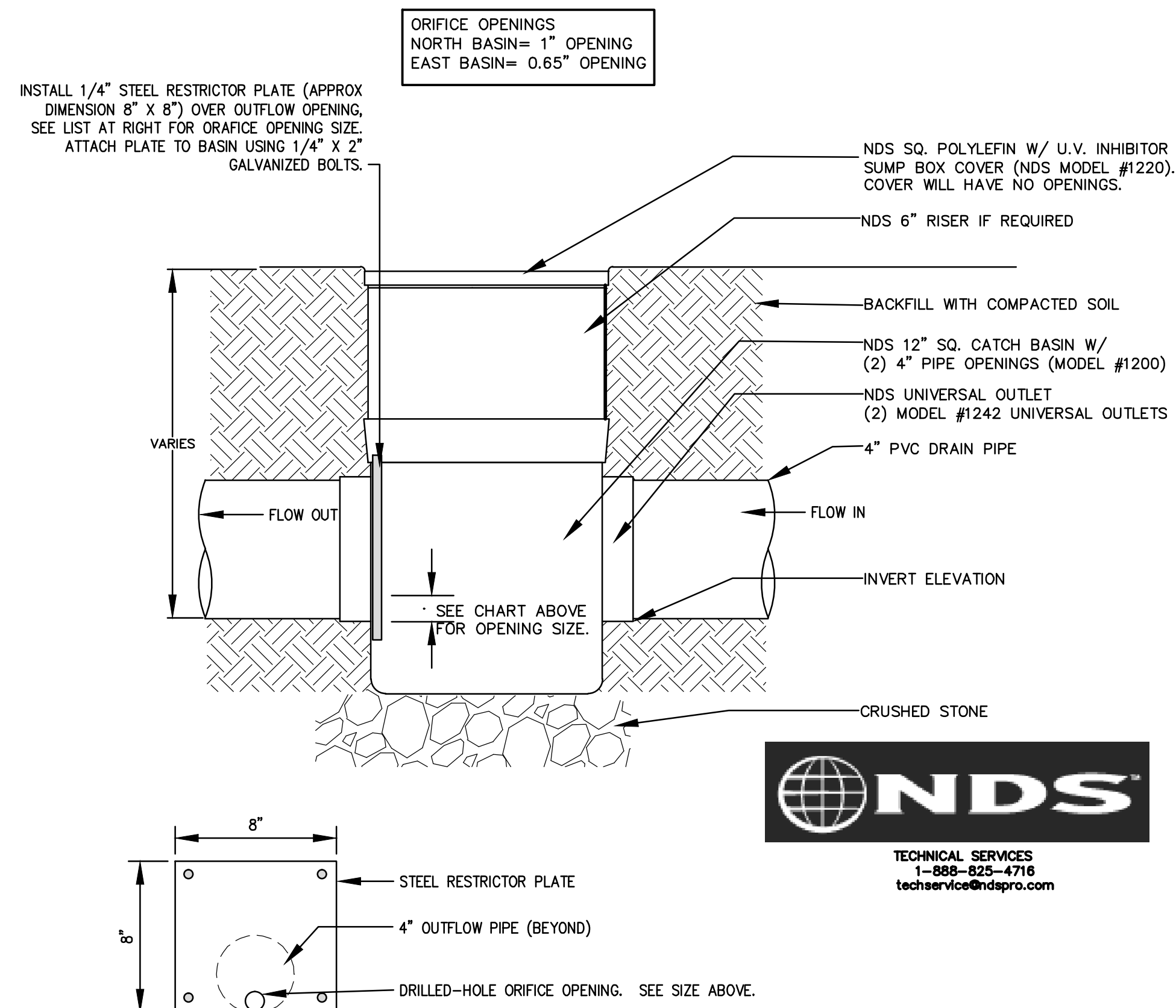
-COMPOST SHALL BE COMPOSTED PRODUCT AVAILABLE FROM:
EVERGREEN RECYCLE, LLC (formerly Wood Recyclers)
302 W. 53rd STREET NORTH
WICHITA, KANSAS 67204
PHONE 316-832-0400

HERZOG ENVIRONMENTAL (Brooks Landfill Operator)
PHONE 316-722-0601

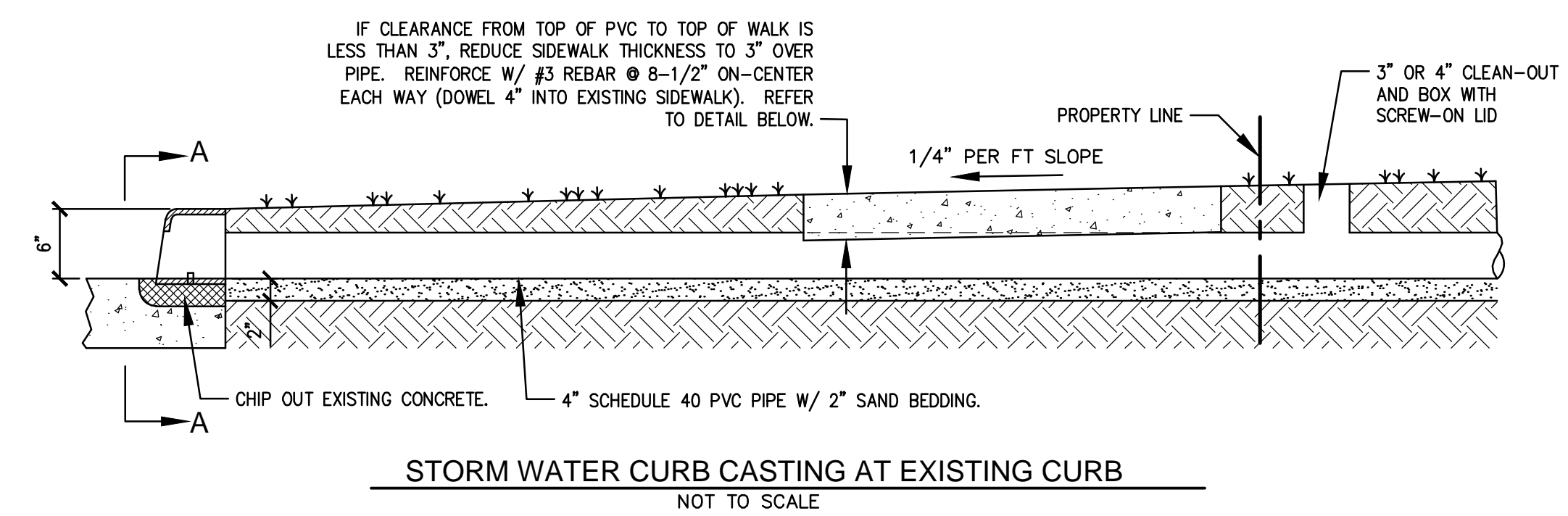
-OR APPROVED EQUAL (CONTRACTOR SHALL PROVIDE INFORMATION ON THE OF COMPOSTED MATERIAL FROM PROVIDER)

- PLANTING MIX SHALL BE PLACED IN 6-12" LIFTS, LIGHTLY COMPACTED BY TAMPING WITH THE BUCKET OF A BULLDOZER OR BACKHOE.
- PLANTING MIX SHALL BE MIXED THOROUGHLY BEFORE PLACEMENT ON-SITE.
- PLANTING MIX SHOULD HAVE A pH OF 5.5- 6.5, AS TESTED BY A LOCAL TESTING LABORATORY. PROVIDE TEST RESULTS TO PROJECT LANDSCAPE ARCHITECT. SHOULD THE SOIL BE OUTSIDE OF THAT RANGE, APPROPRIATE AMENDMENTS SHOULD BE ADDED TO REACH THAT RANGE.
- AFTER PLACEMENT OF SOIL, AVOID DRIVING HEAVY MACHINERY ACROSS DETENTION AREAS IN ORDER TO AVOID COMPACTION OF PLANTING MIX.

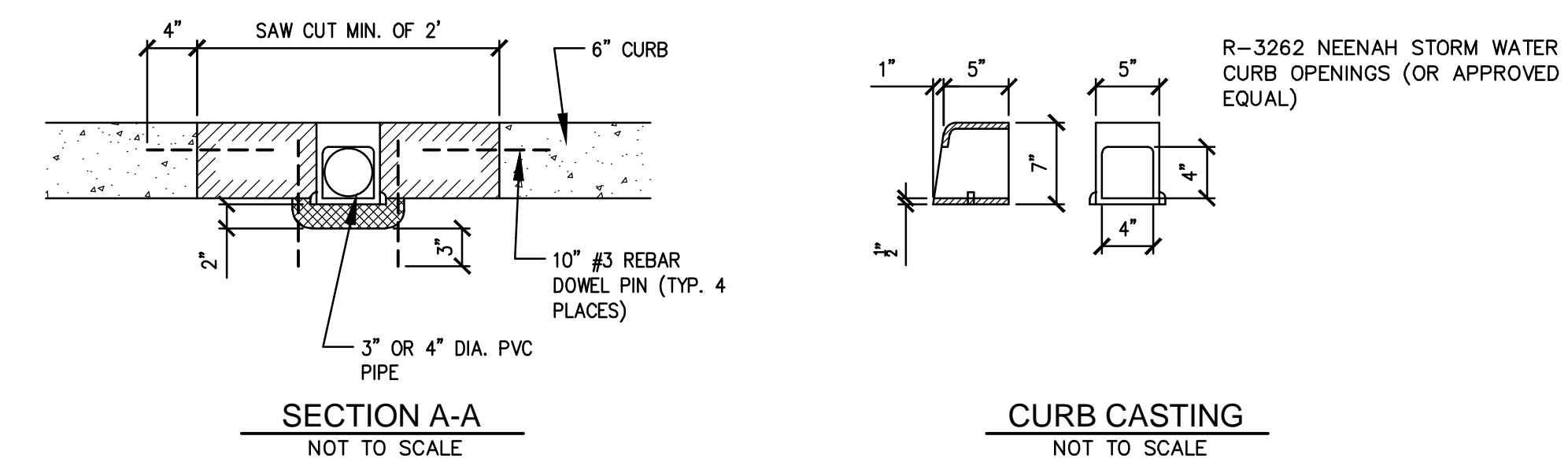
1 EXTENDED DRY DETENTION SECTION
NOT TO SCALE



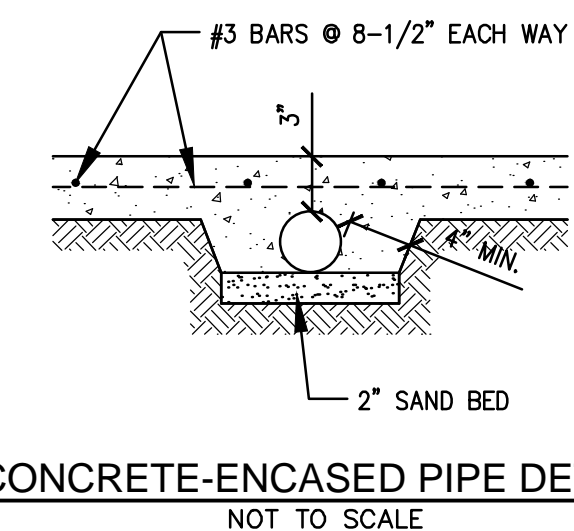
3 DRY DETENTION FLOW RESTRICTOR
NOT TO SCALE



STORM WATER CURB CASTING AT EXISTING CURB
NOT TO SCALE

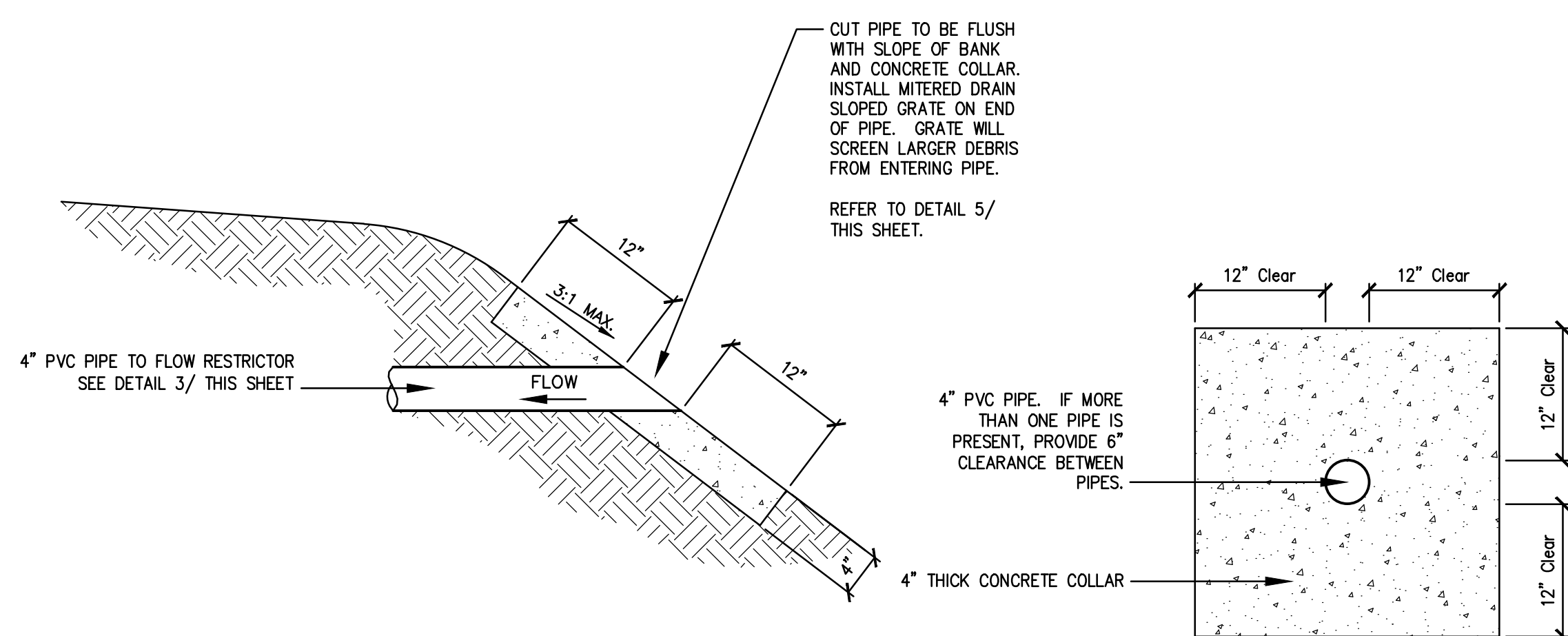


- NOTES:**
- REMOVE AND REPLACE ONE 5' SECTION OF SIDEWALK.
 - IF PIPE COMING FROM PRIVATE PROPERTY IS LARGER THAN 4" IN DIAMETER, A MANIFOLD WILL BE USED SO THAT ONLY 3-INCH OR 4-INCH PIPES WILL BE BROUGHT TO AND THROUGH THE SIDEWALK CURB.
 - IF THICKNESS OF SIDEWALK IS LESS THAN 3" OVER THE PIPE (I.E. WHEN SIDEWALK IS ADJACENT TO CURB), THEN USE CONCRETE-ENCASED PIPE (SEE DETAIL).
 - THERE SHALL BE A DUMMY JOINT IN THE SIDEWALK AT THE CENTERLINE OF DRAIN PIPE.

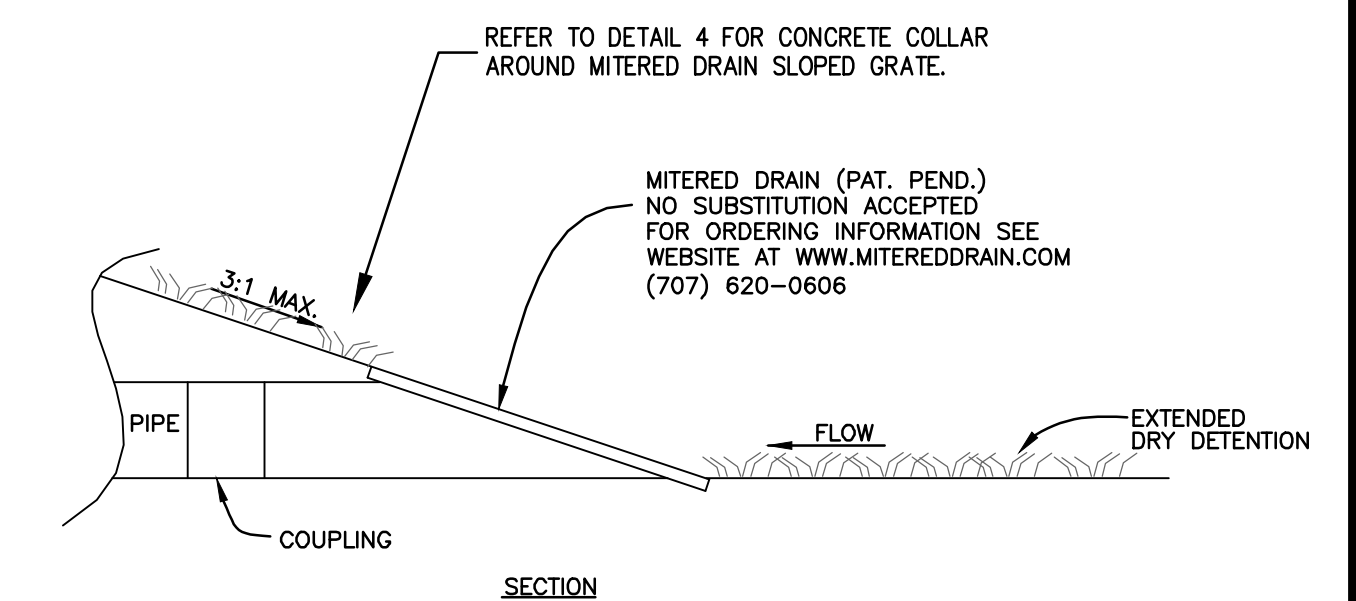


CONCRETE-ENCASED PIPE DETAIL
NOT TO SCALE

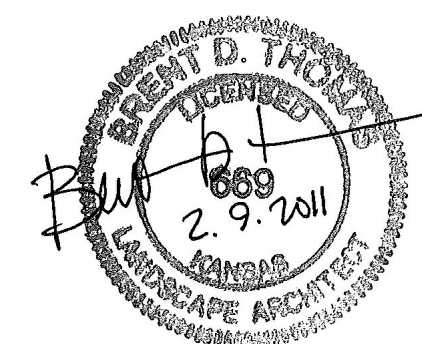
2 STORM WATER CURB CASTING
NOT TO SCALE



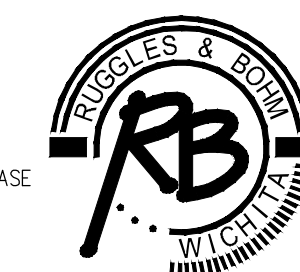
4 CONCRETE PIPE COLLAR
NOT TO SCALE



5 MITERED DRAIN SLOPED GRATE
NOT TO SCALE

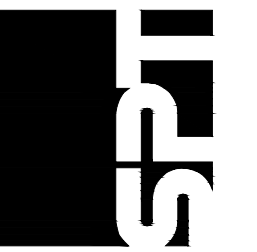


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Ruggles & Bohm, P.A.
E engineering, S urveying, L and P lanning

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USD 259 WICHITA SCHOOL DISTRICT
9710 WEST CENTRAL - WICHITA, KS 67212

BID SET
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Storm Water Quality
Details
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C1.5