

**UNDERGROUND PIPE DETENTION (UPD) – GENERAL NOTES:**

- AN UNDERGROUND PIPE DETENTION FACILITY (UPD - THIS DESIGN SHEET) MAY BE PROPOSED IF THE ENTIRE FACILITY IS TO BE MORE THAN 10 FEET FROM THE RESIDENTIAL STRUCTURE.
- THIS UPD DESIGN DOES NOT QUALIFY FOR BMP CREDIT, AND NO UPD FACILITY CAN RECEIVE DISCHARGE FROM ANY OTHER SWM/BMP FACILITY, FOR THIS DESIGN.
- ALL PORTIONS OF UPD FACILITIES MUST BE LOCATED OUTSIDE OF DRIVEWAYS AND ANY OTHER POTENTIAL DRIVE OR PARKING AREA.
- ONLY ONSITE IMPERVIOUS AREA IS PERMITTED TO BE DRAINED TO A UPD FACILITY, AND THE MINIMUM AND MAXIMUM IMPERVIOUS AREAS CONTRIBUTING TO A SINGLE FACILITY ARE LIMITED TO 600 SQ.FT. AND 25,000 SQ.FT., RESPECTIVELY, PER THE DIRECTOR. PIPED DOWNSPOUT-ONLY CONTRIBUTIONS ARE PREFERRED, WHERE PRACTICAL, AND CONTRIBUTIONS FROM OTHER ONSITE IMPERVIOUS AREAS MUST BE DIRECTLY COLLECTED WITHIN OR CONTIGUOUS TO THE IMPERVIOUS AREA. PERVIOUS AREA CONTRIBUTIONS ARE NOT PERMITTED.
- A PROPOSED UPD FACILITY IS PRESUMED TO BE BELOW GROUNDWATER, UNLESS DEMONSTRATED OTHERWISE. AND WATER-TIGHT JOINTS AND ANCHORAGE TO PREVENT FLOTATION ARE REQUIRED. CERTIFIED SITE-SPECIFIC/LOCATION-SPECIFIC FIELD TESTING (PER PFM 4-700) TO SHOW THAT THE SEASONAL HIGH WATER TABLE IS AT LEAST 2 FEET BELOW THE FACILITY'S FLOW CONTROL ELEVATION IS REQUIRED TO ELIMINATE THIS REQUIREMENT. A PROPOSED ANCHORAGE DESIGN MUST BE PROVIDED IN THE PLANS IF GROUNDWATER TESTING RESULTS ARE NOT PROVIDED OR ACCEPTABLE. GROUNDWATER TABLE AT THE GROUND SURFACE MUST BE ASSUMED IF NOT DEMONSTRATED OTHERWISE.
- THE ALLOWED UPD FACILITY PIPE SIZES ARE LIMITED TO INSIDE DIAMETERS OF 24", 30" & 36"; THE ALLOWED PIPE MATERIALS ARE LIMITED TO HIGH-DENSITY POLYETHYLENE (HDPE), POLYPROPYLENE (PP), AND CORRUGATED ALUMINUM (CAP); ONLY ONE PIPE SIZE AND MATERIAL COMBINATION CAN BE INSTALLED IN AN INDIVIDUAL FACILITY; AND AN UNDERGROUND FACILITY MUST HAVE A SMOOTH BOTTOM THROUGHOUT, IN ORDER TO FACILITATE MAINTENANCE AND STORAGE VOLUME RECOVERY.
- ALLOWED UPD FACILITY CONFIGURATIONS ARE LIMITED TO 1) DOUBLE-MANIFOLD PIPE SYSTEMS, WHERE EACH UNIFORM-LENGTH PIPE ROW OF THE SYSTEM IS CONNECTED TO A MANIFOLD OR HEADER PIPE AT EACH END, AND 2) SINGLE PIPELINES, WHERE STRAIGHT, L-SHAPED (WITH ONE BEND OR CORNER), AND C-SHAPED/Z-SHAPED (WITH TWO BENDS OR CORNERS) ALIGNMENTS ARE PERMITTED (SEE THE TYPICAL UPD GENERALIZED PLANVIEW, THIS SHEET). DEAD-END PIPE SEGMENTS ARE NOT ALLOWED.
- A PROFILE, OR AN EQUIVALENT DEMONSTRATION, MUST BE PROVIDED TO SHOW THE 10-YR WATER SURFACE ELEVATION OF THE RECEIVING CHANNEL/PIPELINE WILL BE BELOW THE UPD FACILITY'S FLOW CONTROL ORIFICE INVERT ELEVATION.
- THE GRADING PLAN MUST SHOW THE POTENTIAL DRAINAGE PATH FOR UPD FACILITY OVERFLOW AND MUST CONSIDER THIS FLOW PATH WHEN ANALYZING OVERLAND RELIEF FOR THE PROJECT.
- A REASONABLY-SCALED FACILITY DRAINAGE AREA MAP MUST BE PROVIDED ON THIS SHEET TO IDENTIFY THE ONSITE AREA REQUIRED TO DRAIN TO EACH UPD FACILITY PROPOSED ON THIS SHEET. ALL CONTRIBUTING DOWNSPOUTS AND PIPES, ALL INFLOW AND OUTFLOW CONVEYANCE CONNECTIONS AND EROSION PROTECTIONS, AND ALL OUTLETS MUST ALSO BE SHOWN, ALONG WITH THE EXISTING AND PROPOSED ELEVATION CONTOURS, AND PERTINENT ELEVATION SPOT SHOTS; THE ACTUAL PROPOSED CONFIGURATION AND ALIGNMENT/ORIENTATION; THE REQUIRED PIPE SIZE & TOTAL LENGTH, AND NUMBER & LENGTH OF ROWS (SEE DESIGN DATA & DESIGN QUANTITIES TABLES, THIS SHEET); THE APPROXIMATE LIMITS OF EXCAVATION; AND RELEVANT PROPOSED PLAN VIEW DESIGN DIMENSIONS, CONTOURS AND SPOT ELEVATIONS MUST ALSO BE DEPICTED FOR EACH UPD FACILITY.
- THE CONTRACTOR IS TO ENSURE THE SPECIFIC GUTTERS, DOWNSPOUTS, AND PIPES DISCHARGE INTO THE SPECIFIC UPD FACILITIES, AS DESIGNATED ON THE APPROVED PLAN. THE COUNTY SITE INSPECTOR MUST BE NOTIFIED IMMEDIATELY IF IT BECOMES APPARENT THIS REQUIREMENT CANNOT BE MET. THE PROPERTY OWNER/DEVELOPER AND DESIGN ENGINEER SHALL THEN BE RESPONSIBLE FOR PROPERLY REVISING THE APPROVED PLAN TO RESOLVE THE APPARENT DESIGN DISCREPANCIES.
- ALL UPD INSTALLATIONS AND ALLOWED MATERIALS MUST MEET THE REQUIREMENTS AND SPECIFICATIONS OF THE PFM, INCLUDING THE REQUIREMENTS OF PFM PLATE 61-G FOR HDPE AND PP FACILITY INSTALLATIONS, AND VDOT ROAD AND BRIDGE STANDARD DWG. 107.01 FOR CAP FACILITY INSTALLATIONS. HOWEVER, FACILITY BACKFILL MATERIAL REQUIREMENTS MAY BE PER THE MANUFACTURER IF THE PROPOSED SITE-SPECIFIC FACILITY LAYOUT IS PROVIDED BY OR IS OTHERWISE CERTIFIED IN WRITING BY THE MANUFACTURER.

**PRETREATMENT NOTES:**

- SEE THE "PRETREATMENT/OUTLET PROTECTION DETAILS" SHEET FOR THE SPECIFICATIONS AND DETAILS FOR THE PRETREATMENT PRACTICES SELECTED FOR EACH PROPOSED UPD FACILITY IN THE DESIGN DATA TABLES (THIS SHEET) INCLUDING:
- GUTTER SCREEN MUST BE INSTALLED ALONG THE ENTIRE SECTION OF ANY ROOF THAT IS TO DRAIN TO A UPD FACILITY, IN ORDER TO HELP MAINTAIN THE CAPACITY OF THE CONTRIBUTING GUTTERS AND DOWNSPOUTS.
- AN IN-LINE LEAF STRAINER MUST BE INSTALLED ON EACH CONTRIBUTING DOWNSPOUT, IN ORDER TO HELP MAINTAIN PIPE CAPACITY.
- A DEBRIS TRAP IS REQUIRED ON ANY INFLOW PIPELINE THAT CONVEYS STORMWATER FROM ANY NON-ROOF IMPERVIOUS AREA, IN ORDER TO HELP MAINTAIN PIPE CAPACITY.

**STRUCTURE AND FOUNDATION NOTES:**

- MEANS AND METHODS OF ANY PROPOSED STRUCTURAL SUPPORT OR COMPONENT FOR THE UPD FACILITY ARE THE RESPONSIBILITY OF THE DESIGN ENGINEER AND ARE NOT REPRESENTED BY ANY FAIRFAX COUNTY DETAIL.
- THE DESIGN OF ANY PROPOSED UPD FACILITY STRUCTURAL COMPONENT IS THE RESPONSIBILITY OF THE DESIGN ENGINEER.

**MAINTENANCE NOTES FOR UPD FACILITIES:**

- A PRIVATE MAINTENANCE AGREEMENT (PMA) IS REQUIRED BEFORE PLAN APPROVAL.
- A UPD FACILITY MUST BE LOCATED WITHIN 100' OF A PAVED PARKING OR DRIVING SURFACE TO ALLOW REASONABLE ACCESS FOR JET/VAC MAINTENANCE EQUIPMENT.
- FACILITY ACCESS RISERS WITH SOLID, LOCKABLE (AND LOCKED) LIDS SHALL BE 24" (MIN.) DIA., AND MUST BE PROVIDED AT ALL FACILITY CORNERS EXCEPT AT INLETS & OUTLETS; OR ACCESS RISERS SHALL BE PER MFG RECOMMENDATIONS FOR EFFECTIVE MAINTENANCE, IF LAYOUT DETAILS ARE PROVIDED BY MFG. THE 24" DIAMETER FLOW CONTROL STRUCTURE MUST INCLUDE THE LARGEST ALLOWED SOLID, LOCKABLE (AND LOCKED) LID TO PROVIDE MAX. ACCESS FOR CLEANING CONTROL ORIFICE.
- A 6" DIA. CLEANOUT PORTAL WITH SOLID, LOCKABLE (AND LOCKED) CAP MUST BE INSTALLED AT EACH INLET, AND ALSO AT EACH PIPE ROW NOT CONNECTED TO A CORNER THAT HAS AN ACCESS RISER.
- FOLLOWING SIGNIFICANT STORMS, AND AT LEAST TWICE ANNUALLY (SPRING AND FALL), INSPECT INLETS, GUTTERS, DOWNSPOUTS, INLET PIPES & DEBRIS TRAPS, OVERFLOW & CHIMNEY PIPES, THE FLOW CONTROL STRUCTURE & OUTLET PIPE/DISCHARGE POINT, DRY WELLS, AND POP-UP EMITTERS FOR BLOCKAGES OR CLOGS, AND FOR EROSION ISSUES.

**CONSTRUCTION NOTE FOR UPD FACILITIES:**

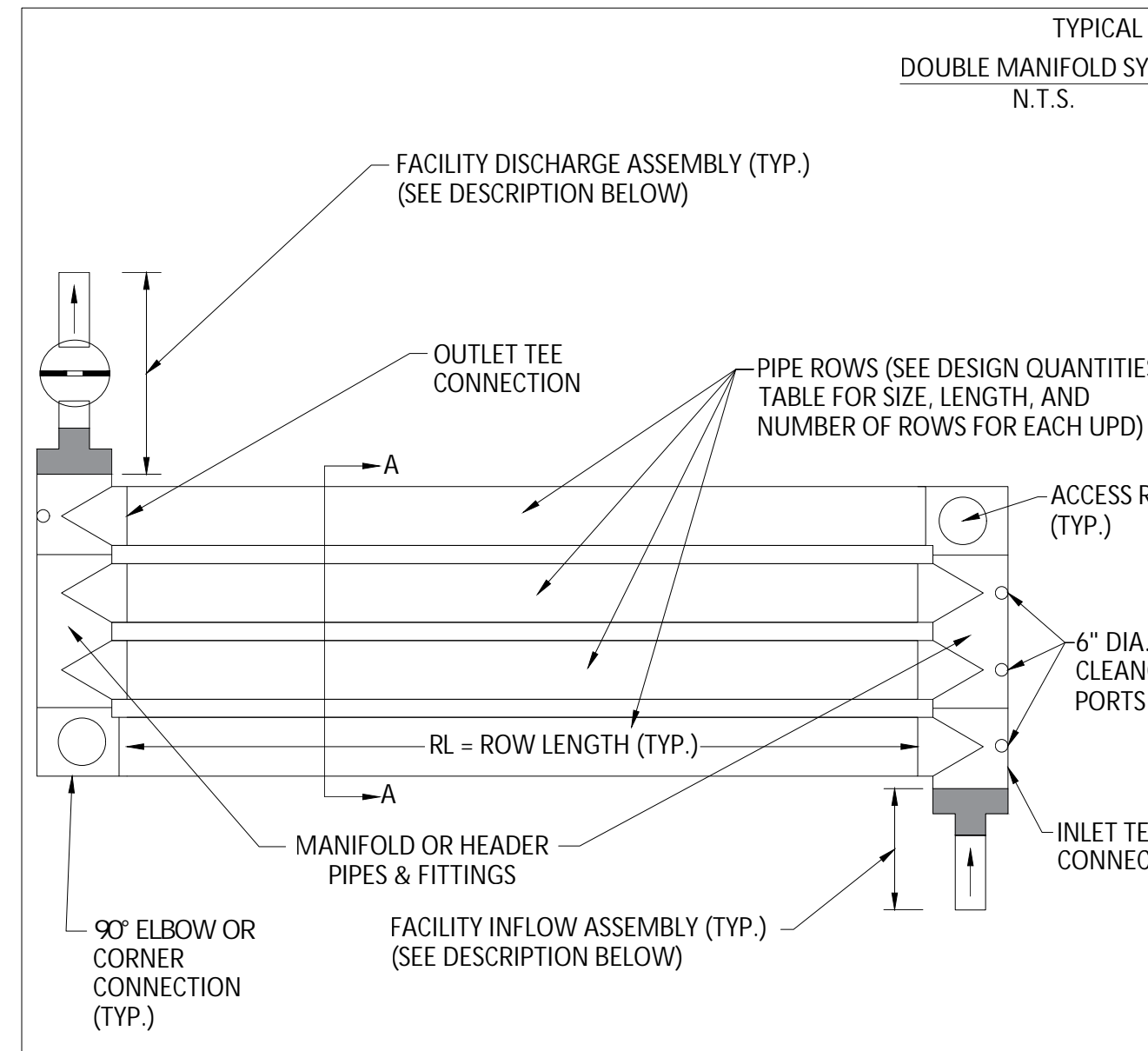
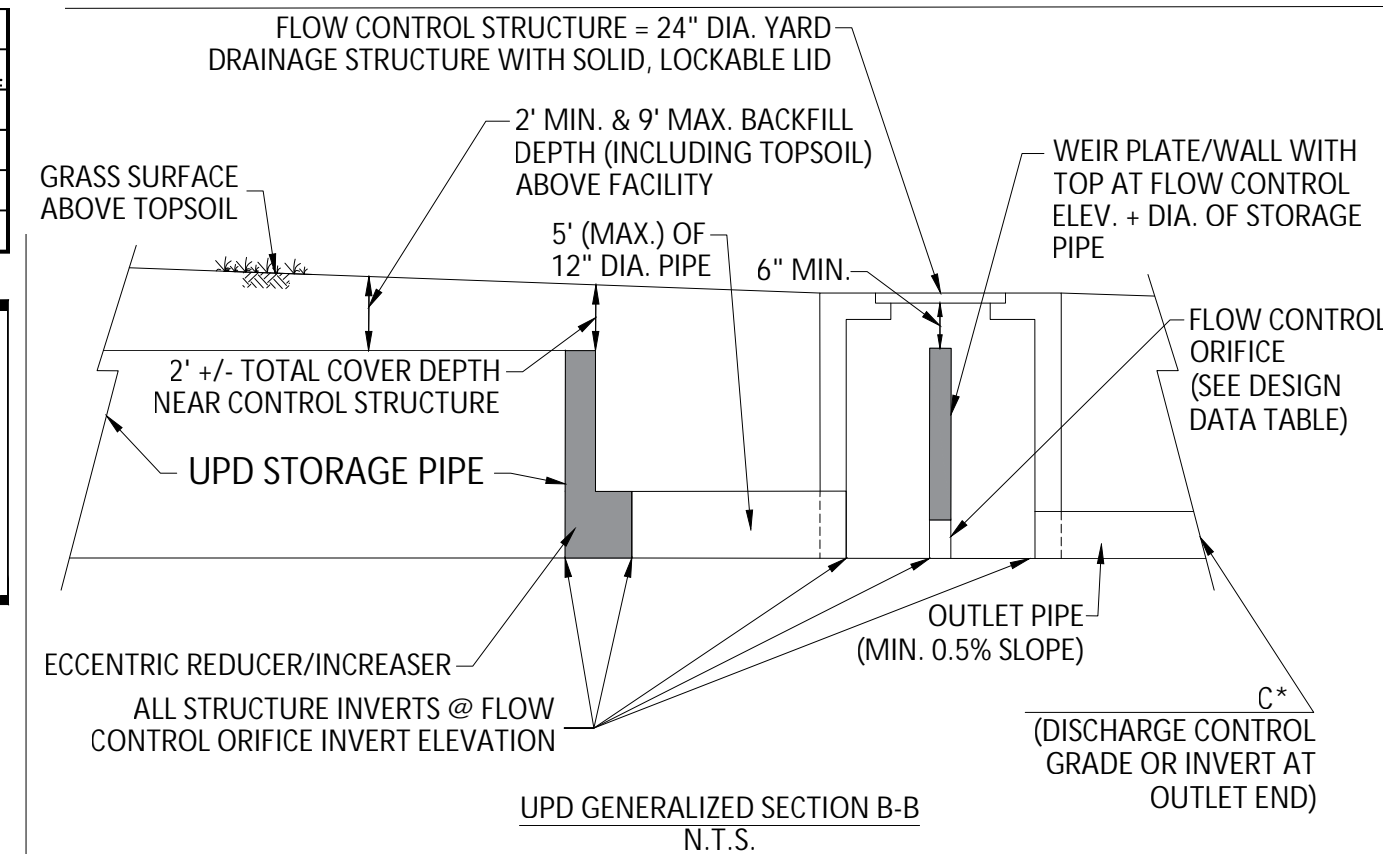
ALL UPD SYSTEM CONSTRUCTION MUST CONFORM, WHERE APPLICABLE, TO THE CURRENT VDOT ROAD AND BRIDGE SPECIFICATIONS, PFM, AND MANUFACTURER'S REQUIREMENTS AND RECOMMENDATIONS, WITH THE MOST STRINGENT CRITERIA GOVERNING FOR ANY PARTICULAR REQUIREMENT.

PIPE SPACING TABLE		
PIPE DIA.	PIPE-TO-PIPE	PIPE-TO-WALL
24"	14"	12"
30"	18"	18"
36"	22"	18"

OR PER MFG IF LAYOUT PER MFG

**CERTIFICATION OF NO CHANGE**  
 I HEREBY CERTIFY THAT NO CHANGES HAVE BEEN MADE TO, OR ARE PROPOSED FOR, THE UPD STANDARD DESIGN SHEET NOTES, SPECIFICATIONS OR DETAILS, AND NO CHANGES HAVE BEEN MADE TO, OR ARE PROPOSED FOR, THE DESIGN CALCULATIONS GENERATED FOR THIS PROJECT BY THE UPD STANDARD DESIGN CALCULATIONS SPREADSHEET.

SIGNATURE \_\_\_\_\_  
 DESIGNER \_\_\_\_\_ NAME \_\_\_\_\_ DATE \_\_\_\_\_

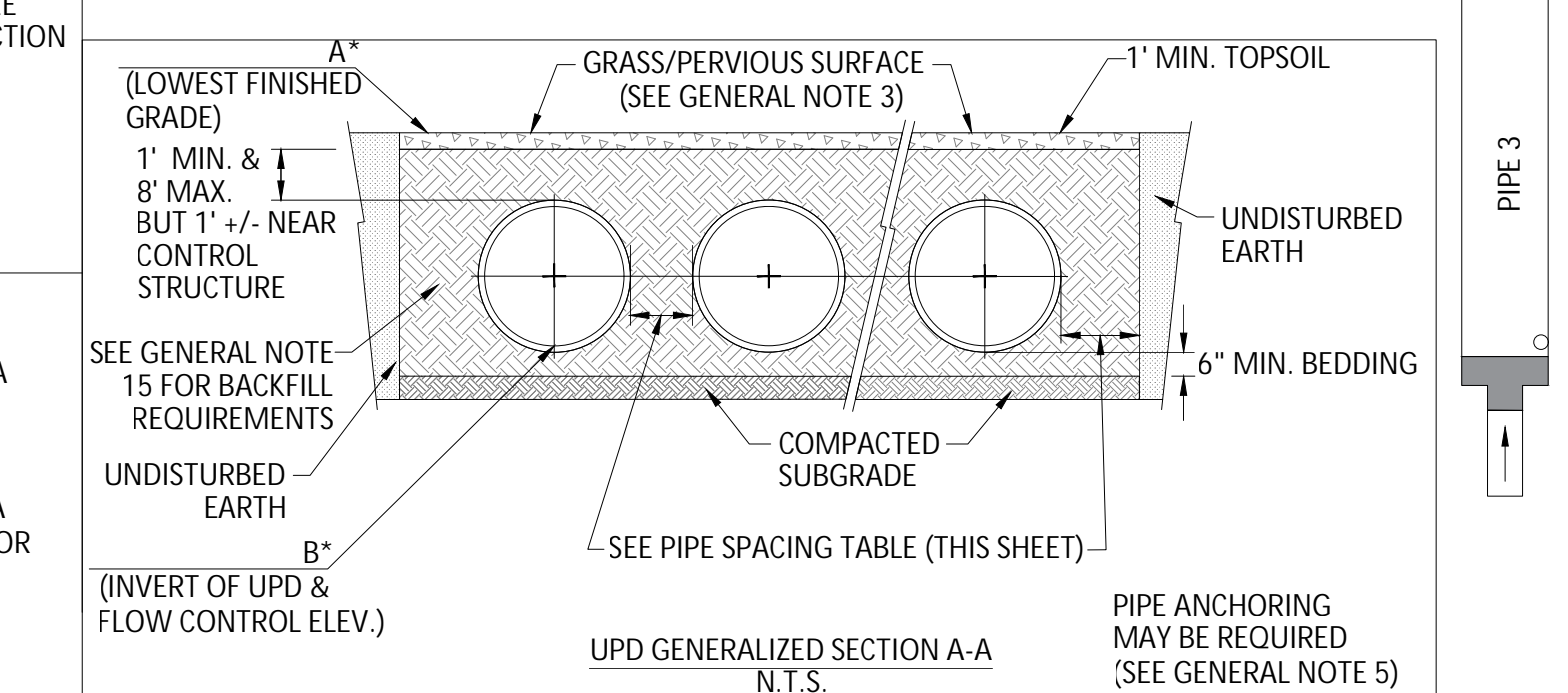
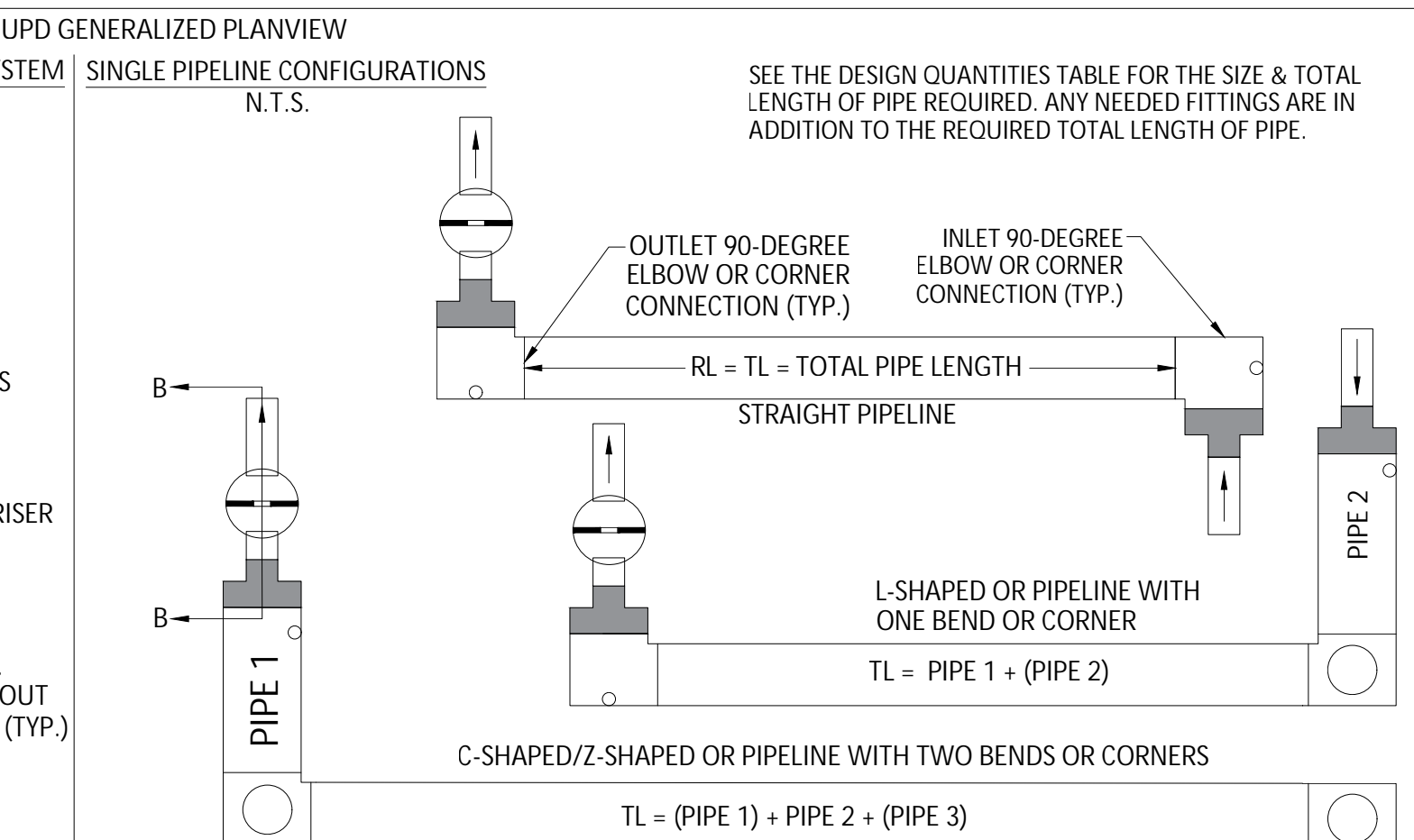


**FACILITY INFLOW & DISCHARGE ASSEMBLY DESCRIPTIONS:**

INFLOW ASSEMBLY - 4" TO 15" SMOOTH-INTERIOR INLET PIPE (@ MIN. 0.5% SLOPE) CONNECTED TO A PIPE INCREASER/REDUCER FITTING.

DISCHARGE ASSEMBLY - REDUCER/INCREASER FITTING CONNECTED TO 5" (MAX.) OF 12" SMOOTH-INTERIOR CONNECTION PIPE, THEN CONNECTED TO A CONTROL STRUCTURE CONTAINING A WEIR PLATE/WALL WITH FLOW CONTROL ORIFICE, THEN CONNECTED TO A 4" TO 8" SMOOTH-INTERIOR OUTLET PIPE. (SEE UPD GENERALIZED SECTION B-B)

SEE PRETREATMENT/OUTLET PROTECTION DETAILS SHEET FOR REQUIRED INFLOW AND OUTLET PIPE DIAMETERS.



UNDERGROUND PIPE DETENTION (UPD) FACILITIES FOR INFILL LOTS: DESIGN DATA									
UPD Facility ID	Drainage Area Source	Facility Configuration	Pipe Dia. (in)	Pipe Material	# Pipe Rows	Orifice Dim. (in)	Elevations (ft)		
							A	B	C
UPD- 100	Roof Only	Double Manifold	30	HDPE	4	1.5	250.00	245.25	244.00
UPD- 200	Other IA Only	Double Manifold	24	PP	4	1.2	248.00	243.55	243.00

UPD Facility ID	PRETREATMENT PRACTICES			OUTLET PROTECTION	MIN. UPD GRND COVER (FT)
	for Roof Gutter	for Downspout	for Inflow Pipeline		
UPD- 100	Gutter Screen	In-line Leaf Strainer/Separator		Small Rock Riprap	2.0
UPD- 200			Debris Trap	Exist. Adequate Conveyance	2.2

**UNDERGROUND PIPE DETENTION (UPD) FOR INFILL LOTS: DESIGN QUANTITIES TABLE**

(A UPD facility MUST be located at least 10' from a residential structure and drain only impervious area)

A separate stand-alone design & Design Quantities Table is required for each lot

Enter the requested design data in the yellow cells below.

Net additional impervious area created by proposed project: **6000** sq. ft.

**UNDERGROUND PIPE DETENTION (UPD) FOR INFILL LOTS: DESIGN QUANTITIES TABLE**

(A UPD facility MUST be located at least 10' from a residential structure and drain only impervious area)

A separate stand-alone design & Design Quantities Table is required for each lot

Enter the requested design data in the yellow cells below.

Net additional impervious area created by proposed project: **6000** sq. ft.

**MUST match net additional impervious area value identified on Cover Sheet**

For UPD(s) proposed on this sheet:

Total onsite impervious area drained to UPD(s) (not < 600 sq. ft.): **4000** sq. ft.

onsite pervious area and all offsite area **MUST NOT** drain into UPD facilities

% of equivalent net impervious area to be drained to UPD(s): **67** %

Total required stormwater volume to be detained by UPD(s): **853** cu. ft.

Number of individual UPD(s) proposed: **2**

Provide the total contributing onsite impervious area, the pipe diameter and material, and the typical row length (RL) for each proposed UPD facility, below, to obtain the required # of equal-length pipe rows and other design quantities. NOTE: min. allowed contributing onsite (only) impervious area to a UPD facility is 600 sq. ft. (& max. is 25,000 sq. ft.), with no pervious area allowed - offsite flows must be bypassed.

Data table #1 (below) MUST be used 1st for entering the individual UPD design data, and #2 used 2nd. Not following this order may lead to erroneous "remaining" quantities.

#1 UPD- 100 (enter plan number for UPD)

Contributing onsite impervious area = **2500** sq. ft.

impervious area must not be less than 600 sq. ft.: **ok**

pervious and offsite area prohibited

UPD facility Pipe Diameter, and Pipe Material: polyethylene (HDPE), polypropylene (PP), or aluminum (CAP) **smooth bottom required per PFM**

Required UPD facility stormwater storage capacity = **533** cu. ft.

Minimum total length of required UPD facility pipe = **109** ft.

Approx. equiv. pipe-length for 90° corner connections = **4** ft.

Approx. equiv. pipe-length for tee-connections = **5** ft.

Length (RL) of typical UPD facility pipe row = **18** ft.

Number of typical Pipe Rows required for UPD facility = **4**

Total length of proposed UPD facility equiv. pipe = **110** ft.

proposed pipe length must not be less than required **ok**

This facility has excess capacity for future imperv. area = **0** sq. ft.

Remaining onsite imperv. area to be captured by UPD(s) = **1500** sq. ft.

10-yr predevelopment Q = allowable facility discharge = **0.12** cfs

Design head for control-orifice calc. = pipe diameter = **2.5** ft.

Square (or round) Q-control orifice dimension for allow. Q = **1.5** in.

Design Q-control Orifice dimension (min. = 1.0 inch) = **1.5** in.

#2 UPD- 200 (enter plan number for UPD)

Contributing onsite impervious area = **1500** sq. ft.

impervious area must not be less than 600 sq. ft.: **ok**

pervious and offsite area prohibited

UPD facility Pipe Diameter, and Pipe Material: polyethylene (HDPE), polypropylene (PP), or aluminum (CAP) **smooth bottom required per PFM**

Required UPD facility stormwater storage capacity = **320** cu. ft.

Minimum total length of required UPD facility pipe = **102** ft.

Approx. equiv. pipe-length for 90° corner connections = **3** ft.

Approx. equiv. pipe-length for tee-connections = **4** ft.

Length (RL) of typical UPD facility pipe row = **18** ft.

Number of typical Pipe Rows required for UPD facility = **4**

Total length of proposed UPD facility equiv. pipe = **102** ft.

proposed pipe length must not be less than required **ok**

The facilities have excess capacity for future imperv. area = **0** sq. ft.

Remaining onsite imperv. area to be captured by UPD(s) = **0** sq. ft.

10-yr predevelopment Q = allowable facility discharge = **0.07** cfs

Design head for control-orifice calc. = pipe diameter = **2.0** ft.

Square (or round) Q-control orifice dimension for allow. Q = **1.2** in.

Design Q-control Orifice dimension (min. = 1.0 inch) = **1.2** in.

SCALE: 1" = XX'  
 (MAX. SCALE 1"=30')

**DRAINAGE MAP(S) AND ADDITIONAL CALCULATIONS/NOTES**

DESIGN ENGINEER / SURVEYOR \_\_\_\_\_

FIRM NAME: \_\_\_\_\_ ADDRESS: \_\_\_\_\_ PHONE NO: \_\_\_\_\_ FAX NO: \_\_\_\_\_ EMAIL: \_\_\_\_\_

PROFESSIONAL SEAL

PROFESSIONAL SEAL

DATE \_\_\_\_\_

DATE \_\_\_\_\_

DISTRICT FAIRFAX COUNTY, VIRGINIA

**PROJECT NAME**

**UNDERGROUND PIPE DETENTION (UPD)**

FAIRFAX COUNTY STANDARD DESIGN SHEETS FOR INFILL LOTS

SHEET \_\_\_ OF \_\_\_