

ADEQUATE OUTFALL NARRATIVE

UNDER EXISTING CONDITIONS THE 10-YEAR UNCONTROLLED FLOW (8.53 CFS) FROM THE UNDEVELOPED WOODED SITE FLOWS TO PEASANTDALE DRIVE AND TO MERRIFIELD APARTMENTS WHERE IT IS PICKED UP IN THE DROP INLETS EX 35, EX 36, AND EX 37. THE TOTAL 10-YEAR FLOW TO STRUCTURE EX 35 IS 15.94 CFS. THE 10-YEAR FLOW FROM EX 35 TO STRUCTURE EX 33 PASSES THROUGH A PIPE WITH A CAPACITY OF 18.76 CFS.

WITH THE DEVELOPMENT OF THIS PROPERTY A BMP VAULT AND AN UNDERGROUND SWM SYSTEM IS PROPOSED (SEE SHEET 13 FOR NARRATIVE AND COMPUTATIONS). MOST OF THE FLOW FROM THIS SITE IS ROUTED THROUGH THESE FACILITIES. THE REMAINING UNCONTROLLED FLOW CAN BE DIVIDED INTO 32% AND 68% FLOWS. THE 32% FLOW CAN BE PICKED UP IN THE PROPOSED MANHOLE 32% FLOW POINT. THE 68% FLOW CAN BE PICKED UP IN THE PROPOSED MANHOLE 68% FLOW POINT. THE TOTAL 10-YEAR FLOW FROM THIS SITE TO EX 35 IS 9.75 CFS. THIS FLOW IS LESS THAN THE EXISTING FLOW TO MANHOLE EX 35 AND THE PIPE SYSTEM.

WE ANALYZED THE 10-YEAR FLOWS AND THE CAPACITIES OF THE DOWNSTREAM PIPE SECTIONS (CONDITIONS) AND FOUND THE FLOWS TO BE AS FOLLOWS:

| PIPE RUN | PIPE CAPACITY |
|----------------|---------------|
| EX 35 TO EX 33 | 18.76 cfs |
| EX 33 TO EX 32 | 24.45 cfs |
| EX 32 TO EX 31 | 24.33 cfs |

IN EACH CASE THE PIPE CAPACITY IS SIGNIFICANTLY HIGHER THAN THE ACTUAL FLOW.

THE PIPE SYSTEM FURTHER DOWNSTREAM WAS ANALYZED WITH SITE PLAN 7462-SP-08-2, PREPARED BY DEMBERRY AND DAVIS, AND APPROVED BY FAIRFAX COUNTY ON JAN. 13, 1998.

BASED ON THE PIPES CAPACITIES AND THE FLOWS TO EACH OF THE PIPES, IT IS OUR OPINION THE EXISTING PIPE SYSTEM IS ADEQUATE AND IT WILL BE CARRYING A REDUCED FLOW AFTER THE DEVELOPMENT OF THE PROPERTY.

OFFSITE STORM SEWER OUTFALL COMPUTATION

PREDEVELOPMENT CONDITIONS

MERRIFIELD APARTMENTS
FAIRFAX, VIRGINIA
BY: CEH
Date: 10-Mar-90

DESIGN STORM: 10-YR STORM
I(T=50) = 1.0
I(T=10) = 0.013

| FROM POINT | TO POINT | AREA ACRES | RUNOFF COEFF | CA INCREMENT | CA ACCUM | TIME OF CONC | RAIN FALL | RUNOFF G.F.S | INVERT ELEV. (ft) | INVERT ELEV. (ft) | LENGTH FT | SLOPE % | DIA IN | CAPACITY CFS | VELOCITY FT/S | FLOW TIME MIN |
|------------|----------|------------|--------------|--------------|----------|--------------|-----------|--------------|-------------------|-------------------|-----------|---------|--------|--------------|---------------|---------------|
| EX 34 | EX 33 | 1.10 | 0.44 | 0.48 | 0.48 | 5.00 | 7.27 | 3.49 | 356.67 | 356.11 | 61 | 5.84% | 18 | 25.45 | 14.40 | 0.07 |
| EX 33 | EX 32 | 1.21 | 0.67 | 0.81 | 3.51 | 5.45 | 7.15 | 25.10 | 355.02 | 352.89 | 111 | 1.89% | 27 | 42.69 | 10.74 | 0.17 |
| EX 32 | EX 31 | 0.00 | 0.00 | 0.00 | 3.51 | 5.52 | 7.13 | 25.03 | 355.03 | 352.89 | 111 | 1.89% | 27 | 42.69 | 10.74 | 0.17 |

POST DEVELOPED CONDITIONS

MERRIFIELD APARTMENTS
FAIRFAX, VIRGINIA
BY: CEH
Date: 10-Mar-90

DESIGN STORM: 10-YR STORM
I(T=50) = 1.0
I(T=10) = 0.013

| FROM POINT | TO POINT | AREA ACRES | RUNOFF COEFF | CA INCREMENT | CA ACCUM | TIME OF CONC | RAIN FALL | RUNOFF G.F.S | INVERT ELEV. (ft) | INVERT ELEV. (ft) | LENGTH FT | SLOPE % | DIA IN | CAPACITY CFS | VELOCITY FT/S | FLOW TIME MIN |
|------------|----------|------------|--------------|--------------|----------|--------------|-----------|--------------|-------------------|-------------------|-----------|---------|--------|--------------|---------------|---------------|
| EX 33 | EX 32 | 1.21 | 0.67 | 0.81 | 2.71 | 5.45 | 7.15 | 24.38 | 356.67 | 356.11 | 61 | 5.84% | 18 | 25.45 | 14.40 | 0.07 |
| EX 32 | EX 31 | 0.00 | 0.00 | 0.00 | 2.71 | 5.52 | 7.13 | 24.33 | 356.03 | 352.89 | 111 | 1.89% | 27 | 42.69 | 10.74 | 0.17 |

STORM SEWER DESIGN COMPUTATIONS

| FROM POINT | TO POINT | AREA ACRES | RUNOFF COEFF | CA INCREMENT | CA ACCUM | TIME OF CONC | RAIN FALL | RUNOFF G.F.S | INVERT ELEV. (ft) | INVERT ELEV. (ft) | LENGTH FT | SLOPE % | DIA IN | CAPACITY CFS | VELOCITY FT/S | FLOW TIME MIN |
|------------|----------|------------|--------------|--------------|----------|--------------|-----------|--------------|-------------------|-------------------|-----------|---------|--------|--------------|---------------|---------------|
| 40 | 39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 118.50 | 118.50 | 4.5 | 15.17 | 0.55 | 24 | 600 | 15.70 |
| 39 | 38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 118.50 | 118.50 | 4.5 | 15.17 | 0.55 | 24 | 600 | 15.70 |
| 38 | 37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 118.50 | 118.50 | 4.5 | 15.17 | 0.55 | 24 | 600 | 15.70 |

- NOTES:
1. SD = ROOF/GARAGE DRAIN AREA TO STRUCTURE
2. ALL ROOF DRAINS TO BE BUILT UNDER PLUMBING PERMIT.
3. SEE SHEET 13 TO REFERENCE DRAINAGE DIVISIONS FOR THIS MAIN LINE

HYDRAULIC GRADE LINE COMPUTATIONS

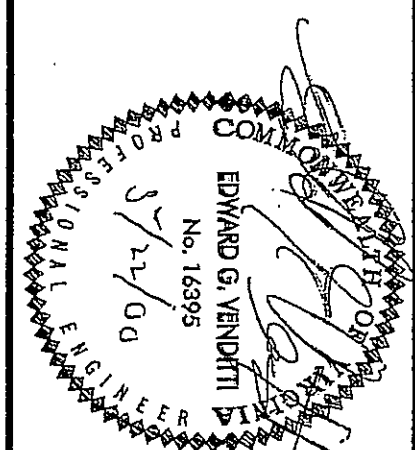
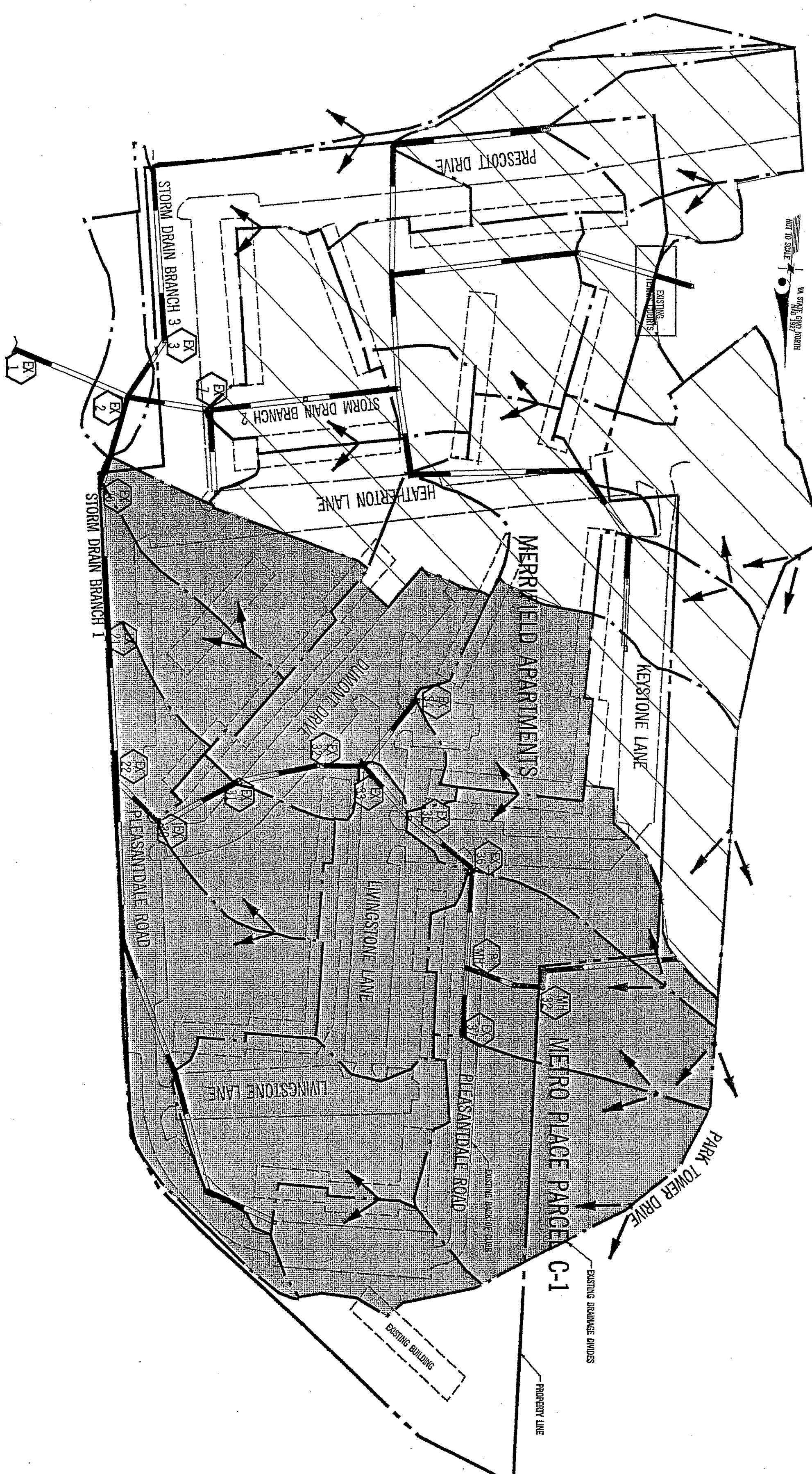
| Structure | Surface Elev. (ft) | Drainage Elev. (ft) | Drainage Area (sq ft) | Runoff Coeff | CA | Time of Conc (min) | Rain Fall (in) | Runoff G.F.S | Invert Elev. (ft) | Invert Elev. (ft) | Length (ft) | Slope (%) | Dia (in) | Capacity (cfs) | Velocity (ft/s) | Flow Time (min) |
|-----------|--------------------|---------------------|-----------------------|--------------|------|--------------------|----------------|--------------|-------------------|-------------------|-------------|-----------|----------|----------------|-----------------|-----------------|
| 30 | 317.28 | 317.28 | 115,820 | 0.70 | 0.70 | 5.42 | 7.15 | 24.38 | 356.67 | 356.11 | 61 | 5.84% | 18 | 25.45 | 14.40 | 0.07 |
| 31 | 317.28 | 317.28 | 115,820 | 0.70 | 0.70 | 5.42 | 7.15 | 24.38 | 356.67 | 356.11 | 61 | 5.84% | 18 | 25.45 | 14.40 | 0.07 |
| 32 | 317.28 | 317.28 | 115,820 | 0.70 | 0.70 | 5.42 | 7.15 | 24.38 | 356.67 | 356.11 | 61 | 5.84% | 18 | 25.45 | 14.40 | 0.07 |

- NOTES:
1. ** VDOT SHARPING REQUIRED
2. THE OUTLET WATER SURFACE ELEVATION FOR STRUCTURE 40 IS THE 10-YEAR WATER SURFACE ELEVATION FOUND ON THE TR-20 OUTPUT
3. THE OUTLET WATER SURFACE ELEVATION FOR STRUCTURE 30 IS 3'-0" PEAKWATER+THE PIPE INVERT.

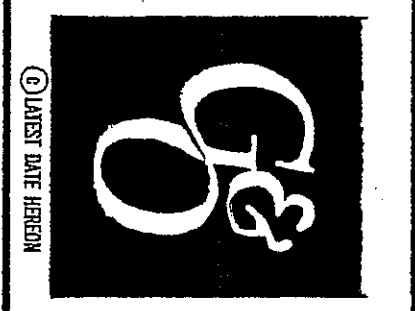
STORM WATER INLET COMPUTATIONS

| NUMBER | TYPE | LENGTH | STATION | Q INCH (CFS) | Q (10) BUTTER FLOW | S BUTTER SLOPE (FT/FT) | SK BUTTER SLOPE (FT/FT) | T SPREAD | TIME | FEEL | TIME | FEEL | TIME | FEEL | TIME | FEEL | TIME |
|--------|--------|--------|---------|--------------|--------------------|------------------------|-------------------------|----------|------|------|------|------|------|------|------|------|------------|
| 33 | 12-24" | 5 | C | 0.24 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 4.2 | 1.00 | 3.5 | 0.47 | 0.17 | 0.0 | 3.12 | Conditions |
| 40 | 12-24" | 4 | C | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 3.2 | 1.00 | 3.4 | 0.41 | 0.17 | 0.0 | Conditions |
| 41 | 12-24" | 5 | C | 0.13 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 1.54 | 2.0 | 1.56 | 0.33 | 0.37 | 0.17 | 0.0 | Conditions |
| 45 | 12-36" | 3 | C | 0.18 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.01 | 2.0 | 1.10 | 0.33 | 0.37 | 0.17 | 0.0 | Conditions |
| 46 | 12-36" | 10 | C | 0.30 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.01 | 2.0 | 1.10 | 0.33 | 0.37 | 0.17 | 0.0 | Conditions |

* USE MODIFIED VDOT D-22/28 WITHOUT GUTTER GRADE



| No. | REVISION | DATE | BY |
|-----|----------|------|----|
| | | | |



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STORM SEWER DESIGN AND ADEQUATE OUTFALL CALCULATIONS
METRO PLACE AT DUNN LORING
 PARCEL L (PREVIOUSLY PARCEL C-1)
 PROVIDENCE DISTRICT
 FAIRFAX COUNTY, VIRGINIA

| DESIGN | CEH | SCALE | AS NOTED |
|---------|----------|------------|----------|
| 6/99 | CEH | 14" OF 35" | |
| CHECKED | MP | | |
| DATE | SHEET | | |
| | 51691ADE | | |
| | PROJ No. | | |
| | FILE No. | | |