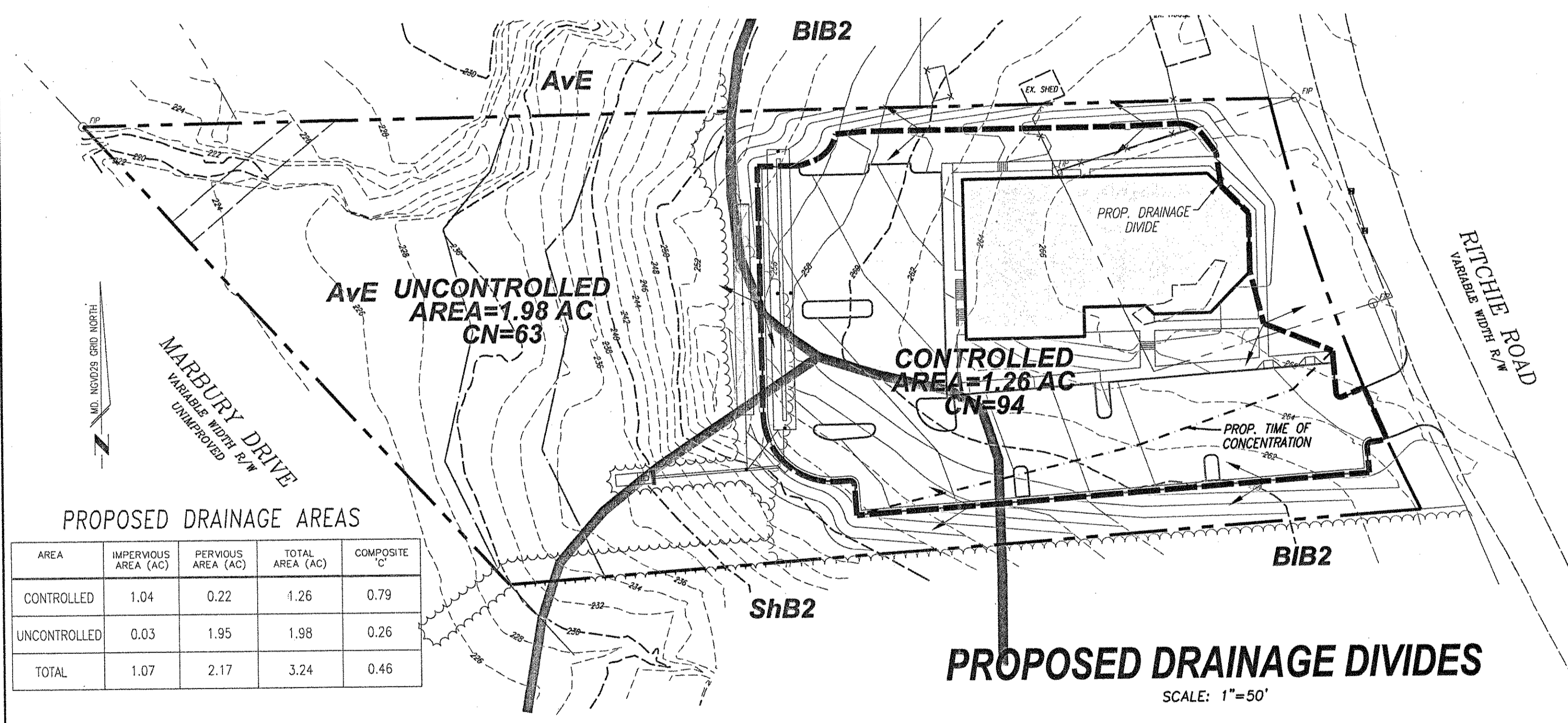


EXISTING DRAINAGE AREAS

| AREA | IMPERVIOUS AREA (AC) | PERVIOUS AREA (AC) | TOTAL AREA (AC) | COMPOSITE C |
|-------|----------------------|--------------------|-----------------|-------------|
| DA#1 | 0.0134 | 3.0230 | 3.0364 | 0.25 |
| DA#2 | - | 0.2024 | 0.2024 | 0.25 |
| TOTAL | 0.0134 | 3.2254 | 3.2388 | 0.25 |

SCALE: 1"=50'



PROPOSED DRAINAGE AREAS

| AREA | IMPERVIOUS AREA (AC) | PERVIOUS AREA (AC) | TOTAL AREA (AC) | COMPOSITE C |
|--------------|----------------------|--------------------|-----------------|-------------|
| CONTROLLED | 1.04 | 0.22 | 1.26 | 0.79 |
| UNCONTROLLED | 0.03 | 1.95 | 1.98 | 0.26 |
| TOTAL | 1.07 | 2.17 | 3.24 | 0.46 |

SCALE: 1"=50'

STORMWATER MANAGEMENT NARRATIVE

AS EVIDENT IN THE EXISTING DRAINAGE AREA MAP, THE SITE IS CURRENTLY VACANT WITH WOODS ALONG THE WESTERN PORTION OF THE PROPERTY AND OPEN FIELD IN THE REMAINING PORTION. THE ENTIRE SITE DISCHARGES FROM EAST TO WEST WHERE IT IS COLLECTED BY AN EXISTING CHANNEL OFF-SITE TO THE WEST OF THE PROPERTY WHICH FLOWS NORTHWARD. AS DEMONSTRATED BY THE PROPOSED DRAINAGE AREA MAP, AN 16,000 S.F. CHURCH IS PROPOSED ON THE SITE ALONG WITH THE REQUIRED PARKING, LANDSCAPING AND OTHER REQUIREMENTS. THE PROPOSED DEVELOPMENT WILL INCREASE THE ON-SITE IMPERVIOUS AREA BY 1.06 ACRES, AND WILL THEREFORE REQUIRE SWM.

AS DEPICTED ON THE UNIFIED SIZING COMPUTATIONS AN INFILTRATION TRENCH AND UNDERGROUND DETENTION SYSTEM IS PROPOSED AND SIZED TO PROVIDE THE REQUIRED STORAGE FOR THE WATER QUALITY AND CHANNEL PROTECTION VOLUMES. THE ENTIRE SITE ALONG WITH AN ADJACENT OFF-SITE PROPERTY WAS ANALYZED IN THE PRE AND POST DEVELOPMENT CONDITION TO PERFORM THE UNIFIED SIZING COMPUTATIONS.

THE PROPOSED FACILITIES ARE LOCATED ADJACENT TO AN EXISTING FLOODPLAIN AND FLOODPLAIN BUFFER EASEMENT, WEST OF THE PROPOSED BUILDING AND UNDER THE PROPOSED REAR PARKING AREA. AS DEMONSTRATED BY THE GRADING, THE INFILTRATION TRENCH IS AT THE STORM DRAIN DISCHARGE POINT FOR ALL THE PARKING.

TR55 COMPUTATIONS WERE RUN FOR THE EXISTING AND PROPOSED DRAINAGE AREAS. SEE THE COMPUTATIONS BOOKLET. HOWEVER, DUE TO THE RELATIVELY SMALL DRAINAGE AREAS, THE RATIONAL METHOD WAS USED TO DETERMINE THE FLOW TO THE INLET. A 5 MINUTE TIME OF CONCENTRATION WAS USED. TR20 WAS USED TO PERFORM THE ANALYSIS OF THE DOWNSTREAM RECEIVING CHANNEL. THE TR20 COMPUTATIONS CAN BE FOUND IN THE COMPUTATIONS BOOKLET. THE ANALYSIS OF THE DOWNSTREAM RECEIVING CHANNEL IS DISCUSSED FURTHER IN THE ADEQUATE OUTFALL ANALYSIS.

THE UNDERGROUND PIPE SYSTEM WILL STORE ALL OF THE C_{PV} VOLUME, RELEASING THE VOLUME THROUGH A 1-3/64" C_{PV} ORIFICE OVER THE MINIMUM 24 HOUR PERIOD. THE WQV VOLUME WILL BE COLLECTED BY THE INFILTRATION TRENCH AND ALLOWED TO INFILTRATE INTO THE GROUND. ALL RUNOFF EXCEEDING THE WQV WILL OVERFLOW INTO THE UNDERGROUND DETENTION SYSTEM. ONCE THE PIPE IS FILLED, ALL THE REMAINING RUNOFF WILL OVERFLOW INTO THE STORM DRAIN SYSTEM AND DISCHARGE INTO THE EXISTING FLOODPLAIN. THE DETENTION PIPE WILL EMPTY OVER THE MINIMUM 24 HOUR PERIOD INTO THE SAME STORM DRAIN SYSTEM.

THE PROPOSED INFILTRATION TRENCH AND UNDERGROUND PIPE ARE SIZED TO ADEQUATELY MEET THE UNIFIED SIZING CRITERIA, PROVIDING THE REQUIRED WQV AND C_{PV} VOLUMES. THEREFORE, IT IS THE OPINION OF THE DESIGN ENGINEER THAT THE PROPOSED SWM SYSTEM IS ADEQUATE.

NOTES:

1. SEE COMPUTATIONS BOOKLET FOR EXISTING AND PROPOSED CURVE NUMBER, TIME OF CONCENTRATION, AND DISCHARGE COMPUTATIONS.

STORMWATER MANAGEMENT CONCEPT

PER CHAPTER 3 OF THE STORMWATER MANAGEMENT DESIGN MANUAL, STORMWATER CONCEPT PLANS FOR PROPOSED DEVELOPMENT SITES ARE REQUIRED TO PROVIDE THE FOLLOWING:

- CONFORM TO THE COUNTY'S LID METHODOLOGY.
- PROVIDE THE REQUIRED STORAGE FOR THE THE WATER QUALITY VOLUME (WQV) AND RECHARGE VOLUME (Rev).
- PROVIDE 24-HOUR EXTENDED DETENTION OF THE ONE-YEAR 24-HOUR STORM EVENT, AND
- PERFORM ANALYSIS OF SITE OUTFALL DOWNSTREAM TO DETERMINE IF QUANTITY CONTROL WILL BE REQUIRED FOR THE PROPOSED SITE.

WITH THIS PLAN THE FOLLOWING IS PROPOSED:

AN INFILTRATION TRENCH HAS BEEN PROPOSED TO PROVIDE THE REQUIRED STORAGE FOR THE WATER QUALITY AND RECHARGE VOLUMES AND UNDERGROUND DETENTION PROVIDED FOR THE C_{PV} 24-HOUR STORM EVENT. THE TRENCH IS LOCATED WEST OF THE PROPOSED BUILDING AND THE REAR PARKING AREA. IT COLLECTS THE BUILDING ROOF DRAINS AND THE RUNOFF FROM THE PARKING AREA. THE DETENTION PIPES ARE LOCATED UNDER THE REAR PARKING AREA AND COLLECT THE OVERFLOW FROM THE INFILTRATION TRENCH AS WELL AS THE RUNOFF FROM THE REAR PARKING AREA. THE DETENTION SYSTEM OUTFALLS DIRECTLY TO AN EXISTING FLOODPLAIN.

NOTE: A NATURAL AREA CONSERVATION CREDIT WILL BE UTILIZED AS THE LOWER 0.85 ACRES OF THE SITE IS CURRENTLY LOCATED WITHIN A RECORDED FLOOD PLAN AND FLOOD PLAN BUFFER EASEMENT.

STORMWATER MANAGEMENT VOLUME REQUIREMENTS

WQV COMPUTATION WITH NATURAL AREA CONSERVATION CREDIT

$$WQV = [(P)(Rv)(A-NRA)]/12$$

$$P = 1$$

$$Rv = 0.05 + 0.009(Ia)$$

$$A = \text{SITE AREA}$$

$$NRA = \text{NATURAL AREA CONSERVATION}$$

$$Ia = \% \text{ IMPERVIOUSNESS}$$

PROPOSED CONDITIONS

$$A = 3.24 \text{ AC}$$

$$NRA = 0.85 \text{ AC}$$

$$\text{IMPERVIOUS AREA} = 1.06 \text{ AC}$$

$$Ia = (1.06 \text{ AC} / 3.24 \text{ AC})(100) = 32.7\% \text{ IMPERVIOUSNESS}$$

$$Rv = 0.05 + 0.009(32.7) = 0.34$$

$$P = 1$$

$$WQV = [(1)(0.34)(3.24 - 0.85)]/12 = 0.0677 \text{ AC-FT.} = \boxed{2,949 \text{ C.F.}}$$

Rev COMPUTATION

$$Rev = [(S)(Rv)(A)]/12$$

$$S = 0.25 \text{ FOR HSG 'B' SOILS}$$

$$S = 0.13 \text{ FOR HSG 'C' SOILS}$$

$$S = 0.06 \text{ FOR HSG 'D' SOILS}$$

$$Rv = 0.05 + 0.009(Ia)$$

$$Ia = \% \text{ IMPERVIOUSNESS}$$

$$A = \text{SITE AREA}$$

PROPOSED CONDITIONS

$$A = 3.24 \text{ AC}$$

$$A(\text{HSG 'B'}) = 1.28 \text{ AC}$$

$$A(\text{HSG 'C'}) = 1.55 \text{ AC}$$

$$A(\text{HSG 'D'}) = 0.41 \text{ AC}$$

$$S = [0.25(1.28) + (0.13)(1.55) + (0.06)(0.41)]/3.24 = 0.17$$

$$Ia = (1.06 \text{ AC} / 3.24 \text{ AC})(100) = 32.7\% \text{ IMPERVIOUSNESS}$$

$$Rv = 0.05 + 0.009(32.7) = 0.34$$

$$Rev = [(0.17)(0.34)(3.24)]/12 = 0.0156 \text{ AC-FT.} = \boxed{680 \text{ C.F.}}$$

C_{PV} COMPUTATION

$$A = \text{SITE AREA} = 3.24 \text{ AC OR } 0.00506 \text{ SQ MI}$$

$$P = 2.7$$

$$Ia = (200/CN) - 2$$

$$qi = qaQa$$

$$qo = (qo/qi)qi$$

$$Vs/Vr = 0.683 - [1.43(qo/qi)] + [1.64(qo/qi)^2] - [0.804(qo/qi)^3]$$

$$Vs = [(Vs/Vr)Vr]A/12$$

PROPOSED CONDITIONS

$$Ic = 0.03 \text{ hr (SEE COMPS. BOOKLET, USE 0.1 hr MIN.)}$$

$$Qa = 0.77 \text{ in (SEE COMPS. BOOKLET)}$$

$$CN = 75 \text{ (SEE COMPS. BOOKLET)}$$

$$Ia = (200/75) - 2 = 0.67$$

$$Ia/P = 0.67/2.7 = 0.25$$

$$qu = 960 \text{ csm/in FROM FIGURE D.11.1 (SEE COMPS. BOOKLET)}$$

$$qi = (960)(0.00506)(0.77) = 3.74 \text{ CFS}$$

$$qo/qi = 0.020 \text{ FROM FIGURE D.11.2 (SEE COMPS. BOOKLET)}$$

$$qo = (0.020)(3.74) = 0.075 \text{ CFS}$$

$$Vs/Vr = 0.683 - [1.43(0.020)] + [1.64(0.020)^2] - [0.804(0.020)^3]$$

$$Vs/Vr = 0.655$$

$$Vs = [(0.655)(0.77)(3.24)]/12 = 0.1362 \text{ AC-FT.} = \boxed{5,933 \text{ C.F.}}$$

C_{PV} ORIFICE REQUIRED

$$Ao = qo / [C(2gho)^{0.5}]$$

$$qo = 0.075 \text{ cfs}$$

$$g = 32.2 \text{ FT/S}^2$$

$$ho = 1 \text{ FT}$$

$$Ao = (0.075) / [0.60(2 \times 32.2 \times 1)^{0.5}]$$

$$Ao = 0.0156 \text{ SF}$$

$$do = [4Ao/\pi]^{0.5}$$

$$do = [4(0.0156)/3.1415]^{0.5} = 0.1409 \text{ FT}$$

$$do = 0.1409 \text{ FT} [12 \text{ IN/FT}] = \boxed{1.69 \text{ IN MAX.}}$$

CAUTION - NOTICE TO CONTRACTOR

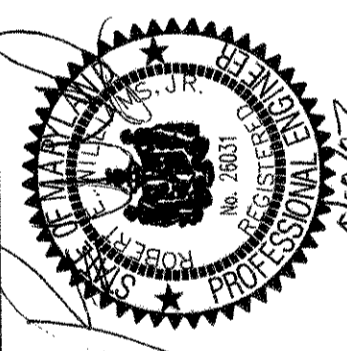
THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS AND TO VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

REVISIONS:

| | |
|---------|------------------------------|
| 3/31/07 | SHIFT PROP. IMP'S |
| | TO EAST, REDUCE TO FROM |
| | 1.18 TO 1.06 AC. REDUCE DET. |
| | PIPE FROM 8" TO 5" DIA. |

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weinc@hughes.net



DATE: MARCH 2007
SCALE: 1"=50'
DRAWING NAME:
19D09-SWMI-REV5

DRAINAGE AREA MAPS

PROJECT: **BETH SHALOM AME ZION CHURCH**
6TH ELECTION DISTRICT
PRINCE GEORGES COUNTY, MARYLAND

SHEET
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OF
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FILE No.
MDPG-19D09-01