DEVELOPMENT PLANS

FOR

"SANITARY SEWER EXTENSION TO SERVE LOTS IN BOTETOURT EAST"

SITUATED IN

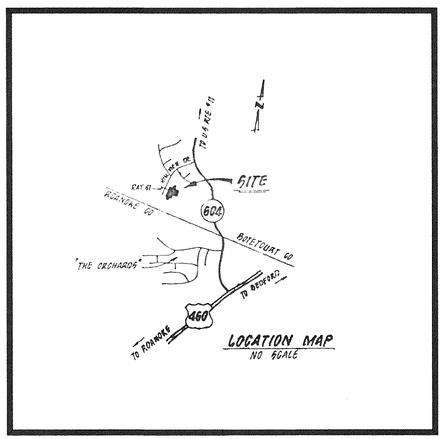
BOTETOURT COUNTY, VIRGINIA

DATE: 16 MAY, 1990

AS-BUILT : 31 AUGUST 1990

PROPERTY OF

F & W COMMUNITY DEVELOPMENT CORP.



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LUMSDEN ASSOCIATES, P.C.

ENGINEERS–SURVEYORS–PLANNERS

ROANOKE, VIRGINIA

*85-165

P.B.____PG.____

KNOW ALL MEN BY THESE PRESENTS, TO WIT:

THAT F & W COMMUNITY DEVELOPMENT CORP., IS THE FEE SIMPLE OWNER AND PROPRIETOR OF THE LAND SHOWN HEREON TO BE SUBDIVIDED, BOUNDED BY OUTSIDE CORNERS 1 THROUGH 28 TO 1 INCLUSIVE, WHICH COMPRISES PART OF THE LAND CONVEYED TO SAID OWNER BY DEED FROM J. RAYMOND CRUMPACKER AND VELA E. CRUMPACKER, DATED 2 JANUARY 1973, AND RECORDED IN THE CLERK'S OFFICE OF THE CIRCUIT COURT OF BOTETOURT COUNTY, VIRGINIA, IN DEED BOOK 205, PAGE 166, AND WHICH ALSO COMPRISES A PORTION OF THAT LAND CONVEYED TO SAID OWNER BY DEED FROM MAX A. MURRAY AND DOROTHY G. MURRAY, DATED 9 JANUARY 1985, AND RECORDED IN THE CLERK'S OFFICE OF THE CIRCUIT COURT OF BOTETOURT COUNTY, VIRGINIA, IN DEED BOOK 300, PAGE 691.

THE SAID OWNER CERTIFIES THAT IT HAS SUBDIVIDED THIS LAND, AS SHOWN HEREON, ENTIRELY WITH ITS OWN FREE WILL AND CONSENT AND PURSUANT TO AND IN COMPLIANCE WITH THE VIRGINIA CODE OF 1950, AS AMENDED TO DATE, AND FURTHER PURSUANT TO AND IN COMPLIANCE WITH THE COUNTY OF BOTETOURT LAND SUBDIVISION ORDINANCES.

THE SAID OWNER DOES BY VIRTUE OF THE RECORDATION OF THIS PLAT, DEDICATE IN FEE SIMPLE TO THE COUNTY OF BOTETOURT ALL OF THE LAND EMBRACED WITHIN THE STREETS OF THIS SUBDIVISION AND ALL OF THE EASEMENTS WITHIN THE BOUNDARY AND ALL P.U.E.'S, D.E.'S, S.S.E.'S AND ROANOKE GAS EASEMENTS OUTSIDE THE BOUNDARY AS SHOWN HEREON ARE DEDICATED FOR PUBLIC USE.

THE SAID OWNER DOES AS A CONDITION PRECEDENT TO THE APPROVAL OF THIS PLAT AND SUBDIVISION AND THE ACCEPTANCE OF THE DEDICATION OF THE STREETS SHOWN HEREON BY THE BOARD OF SUPERVISORS OF BOTETOURT COUNTY, VIRGINIA, ON ITS BEHALF AND FOR AND ON ACCOUNT OF ITS HEIRS, DEVISEES, SUCCESSORS AND ASSIGNS, SPECIFICALLY RELEASES THE COUNTY OF BOTETOURT, VIRGINIA AND THE VIRGINIA DEPARTMENT OF TRANSPORTATION FROM ANY OR ALL CLAIM OR CLAIMS FOR DAMAGES WHICH SAID OWNER, ITS SUCCESSORS, DEVISEES AND ASSIGNS, MAY OR MIGHT HAVE AGAINST THE COUNTY OF BOTETOURT OR THE VIRGINIA DEPARTMENT OF TRANSPORTATION BY REASON OF ESTABLISHING PROPER GRADE LINES ON OR ALONG SUCH STREETS AS SHOWN ON THIS PLAT OF SUBDIVISION (OR SUCH CHANGED STREETS AS MAY BE AGREED UPON IN THE FUTURE) AND BY REASON OF DOING NECESSARY GRADING, CUTTING OR FILLING FOR THE PURPOSE OF PLACING SUCH STREETS UPON PROPER GRADE AS MAY FROM TIME TO TIME BE ESTABLISHED BY SAID COUNTY OR VIRGINIA DEPARTMENT OF TRANSPORTATION AND SAID COUNTY OR VIRGINIA DEPARTMENT OF TRANSPORTATION SHALL NOT BE REQUIRED TO CONSTRUCT ANY RETAINING WALL OR WALLS ALONG THE STREETS AND PROPERTY LINES THEREOF OR MAINTAIN ANY EASEMENTS AS SHOWN HEREON.

IN WITNESS THEREOF IS HEREBY PLACED THE FOLLOWING SIGNATURES AND SEALS ON THIS 6th DAY OF September 1990.

F & W COMMUNITY DEVELOPMENT CORP.

BY: James A. Beavers
JAMES A. BEAVERS, VICE PRESIDENT

STATE OF VIRGINIA AT LARGE:

I, Sara V. Guillaman, A NOTARY PUBLIC IN AND FOR THE AFORESAID STATE DO HEREBY CERTIFY THAT JAMES A. BEAVERS, VICE PRESIDENT, HAS PERSONALLY APPEARED BEFORE ME IN MY AFORESAID STATE AND ACKNOWLEDGED THE SAME ON September 6, 1990.

MY COMMISSION EXPIRES March 24, 1991.

Sara V. Guillaman
NOTARY PUBLIC

NOTES:

1) THIS PROPERTY IS NOT LOCATED WITHIN THE LIMITS OF A 100 YEAR FLOOD BOUNDARY AS DESIGNATED BY FEMA. THIS OPINION IS BASED ON AN INSPECTION OF THE FLOOD INSURANCE RATE MAP AND HAS NOT BEEN VERIFIED BY ACTUAL FIELD ELEVATIONS.
2) THIS PLAT WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT AND THERE MAY EXIST ENCUMBRANCES NOT SHOWN HEREON.
3) IRON PINS SET AT ALL CORNERS UNLESS OTHERWISE NOTED.
4) THIS PLAT IS BASED ON A CURRENT FIELD SURVEY.

UNDER AUTHORITY OF BOTETOURT COUNTY SUBDIVISION ORDINANCE, BOTETOURT COUNTY ZONING ORDINANCE, AND ACTING ON BEHALF OF BOTETOURT COUNTY, VIRGINIA, THIS SUBDIVISION PLAT IS HEREBY APPROVED FOR RECORDING.

_____ _____
PLANNING DIRECTOR, BOTETOURT COUNTY VIRGINIA — DATE

_____ _____
BOTETOURT COUNTY SUBDIVISION AGENT — DATE

IN THE CLERK'S OFFICE FOR THE CIRCUIT COURT OF BOTETOURT COUNTY, VIRGINIA, THIS PLAT WAS PRESENTED AND WITH THE CERTIFICATE OF ACKNOWLEDGMENT THERETO ANNEXED, ADMITTED TO RECORD AT_____ O'CLOCK ON THIS___ DAY OF _____, 1990.

ATTEST: _____

_____
CLERK

BOUNDARY COORDINATES
ORIGIN OF COORDINATES ASSUMED

CORNER	NORTH	EAST
1	12703.421	7833.230
2	13153.000	7786.518
3	13155.231	7948.848
4	13159.977	7998.810
5	13172.379	8118.167
6	13213.207	8139.360
7	13291.383	8215.075
8	13169.250	8333.888
9	13184.358	8349.385
10	13028.887	8511.234
11	13043.562	8652.473
12	12833.065	8674.345
13	12826.061	8874.222
14	12631.181	8867.393
15	12599.901	8688.587
16	12587.181	8473.964
17	12572.126	8289.577
18	12269.674	8148.050
19	12279.704	8027.299
20	12259.956	8036.173
21	12261.712	7967.445
22	12280.982	7977.316
23	12283.850	7977.389
24	12298.619	7799.604
25	12418.851	7809.592
26	12415.202	7853.510
27	12514.859	7861.789
28	12518.507	7817.870

TOTAL ACREAGE = 14.967

NOTE:
ALL LOTS TO HAVE PRESSURE REDUCING VALVE INSTALLED BY BUILDER.

COMMONWEALTH OF VIRGINIA
VINCENT K. LUMSDEN
No. 1428B
LAND SURVEYOR B

PLAT SHOWING
"THE ORCHARDS"
SECTION 1
"BOTETOURT SOUTH"
PROPERTY OF
F & W COMMUNITY DEVELOPMENT CORP.
LOCATED IN
VALLEY MAGISTERIAL DISTRICT
BOTETOURT COUNTY, VIRGINIA
DATE: 31 AUGUST 1990

LUMSDEN ASSOCIATES, P.C.
ENGINEERS - SURVEYORS - PLANNERS
ROANOKE, VIRGINIA

#85-16 A&S1
SHEET # 1 OF 3

PB____PG____

P.B.____PG.____

TAX # 107 (A) 252
REMAINING PROPERTY OF
F & W COMMUNITY DEVELOPMENT CORPORATION
D.B. 205 PG. 166

MERIDIAN OF BOTETOURT EAST, P.B. 8 PG. 140

"E" BOUNDARY

FOR CONTINUATION & LOCATION OF 15' U.E. SEE SHEET #3 OF 3.

HILLVIEW DRIVE (50' R/W)

RAY STREET

VELA CIRCLE

ROME DRIVE

BLOCK 2, SECTION #5, BOTETOURT EAST, P.B. 8 PG. 140

EXIST. 15' G.&P. EASMT. P.B. 8 PG. 140

EXIST. 35' M.B.L.

EXIST. 10' P.U.E.

EXIST. 15' D.&P. EASEMENT, P.B. 8 PG. 140

EXIST. 10' D.E. P.B. 8 PG. 140

WELL LOT

TEMPORARY CUL-DE-SAC, AREA OUTSIDE REGULAR 50' WIDTH STREET TO REVERT TO ADJOINING OWNERS WHEN STREET IS EXTENDED ; 0.23 AC.

TAX #107 (A) 254
F & W COMMUNITY DEVELOPMENT CORPORATION
D.B. 300 PG. 691

FOR CONTINUATION & LOCATION 20' S.S.E. SEE SHEET #3 OF 3.

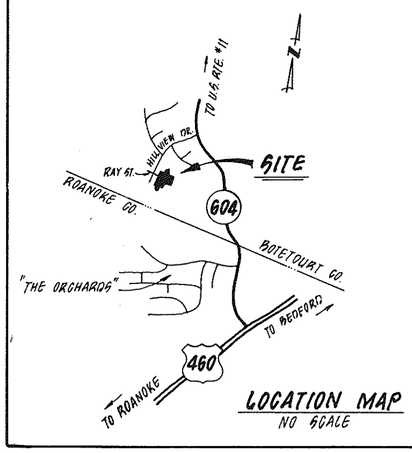
20' SAN. SEWER ESM'T

PROPERTY OF JOHN RAYMOND CRUMPACKER & VELA CRUMPACKER D.B. 206 PG. 166

TAX # 107 (A) 251
PROPERTY OF
DOUGLAS A. & LOUISE G. RIGNEY
D.B. 245 PG. 219

CURVE DATA

CUR	LOT	BLK	ANGLE	RADIUS	ARC	CHORD	CH. BEARING
A	TOT.		90°00'00"	25.00'	39.27'	35.36'	S 39°04'05" W
B	TOT.		5°08'41"	420.00'	37.71'	37.70'	S 3°21'35" E
C	TOT.		5°46'24"	370.00'	37.28'	37.27'	N 3°02'43" W
D	TOT.		90°00'00"	25.00'	39.27'	35.36'	N 50°55'55" W
E	TOT.		40°13'10"	330.00'	231.65'	226.92'	N 63°57'30" E
E	2	3	18°13'50"	330.00'	105.00'	104.56'	S 74°57'10" W
E	3	3	18°13'50"	330.00'	105.00'	104.56'	S 56°43'20" W
F	TOT.		16°37'20"	380.00'	110.24'	109.86'	S 52°09'35" W
G	TOT.		82°52'22"	25.00'	36.16'	33.09'	N 18°59'48" E
H	TOT.		52°20'00"	255.00'	232.91'	224.90'	S 48°36'24" E
H	6	4	3°22'13"	255.00'	15.00'	15.00'	N 24°07'30" W
H	7	4	20°13'19"	255.00'	90.00'	89.53'	N 35°55'16" W
H	8	4	25°50'22"	255.00'	115.00'	114.03'	N 58°57'07" W
H	9	4	02°54'06"	255.00'	12.91'	12.91'	N 73°19'21" W
I	TOT.	4	58°40'48"	25.00'	25.60'	24.50'	S 75°53'12" W
J	TOT.		282°03'45"	55.00'	270.76'	69.18'	S 07°34'41" W
J	9	4	60°42'43"	55.00'	58.28'	55.59'	S 76°54'10" W
J	10	4	64°35'39"	55.00'	62.01'	58.77'	N 40°26'39" W
J	11	4	52° 51' 42"	55.00'	50.74'	48.96'	N 18°17'01" E
J	12	4	56°43'57"	55.00'	54.46'	52.26'	S 73°04'51" W
J	13	4	47°09'44"	55.00'	45.27'	44.01'	N 54°58'19" W



LOCATION MAP
NO SCALE

20' SANITARY SEWER EASEMENT

CORNER	BEARING	DIST.
A-B	S 80°04'39" W	159.53'
B-C	S 88°19'54" W	338.70'
C-D	S 47°11'02" W	189.12'
D-E	S 25°04'35" W	128.57'

LEGEND

M.B.L. - MINIMUM BUILDING LINE
S.S.E. - SANITARY SEWER EASEMENT
D.E. - DRAINAGE EASEMENT
W.L.E. - WATERLINE EASEMENT
P.U.E. - ELECTRIC, GAS, TELEPHONE & CABLE TELEVISION EASEMENT

COMMONWEALTH OF VIRGINIA
VINCENT K. LUMSDEN
No. 1428B
LAND SURVEYOR B

PLAT SHOWING

"THE ORCHARDS"

SECTION 1

"BOTETOURT SOUTH"

PROPERTY OF

F & W COMMUNITY DEVELOPMENT CORP.

LOCATED IN

VALLEY MAGISTERIAL DISTRICT
BOTETOURT COUNTY, VIRGINIA

SCALE: 1" = 80' DATE: 31 AUGUST 1990

LUMSDEN ASSOCIATES, P.C.
ENGINEERS - SURVEYORS - PLANNERS
ROANOKE, VIRGINIA

80 40 0 80
GRAPHIC SCALE

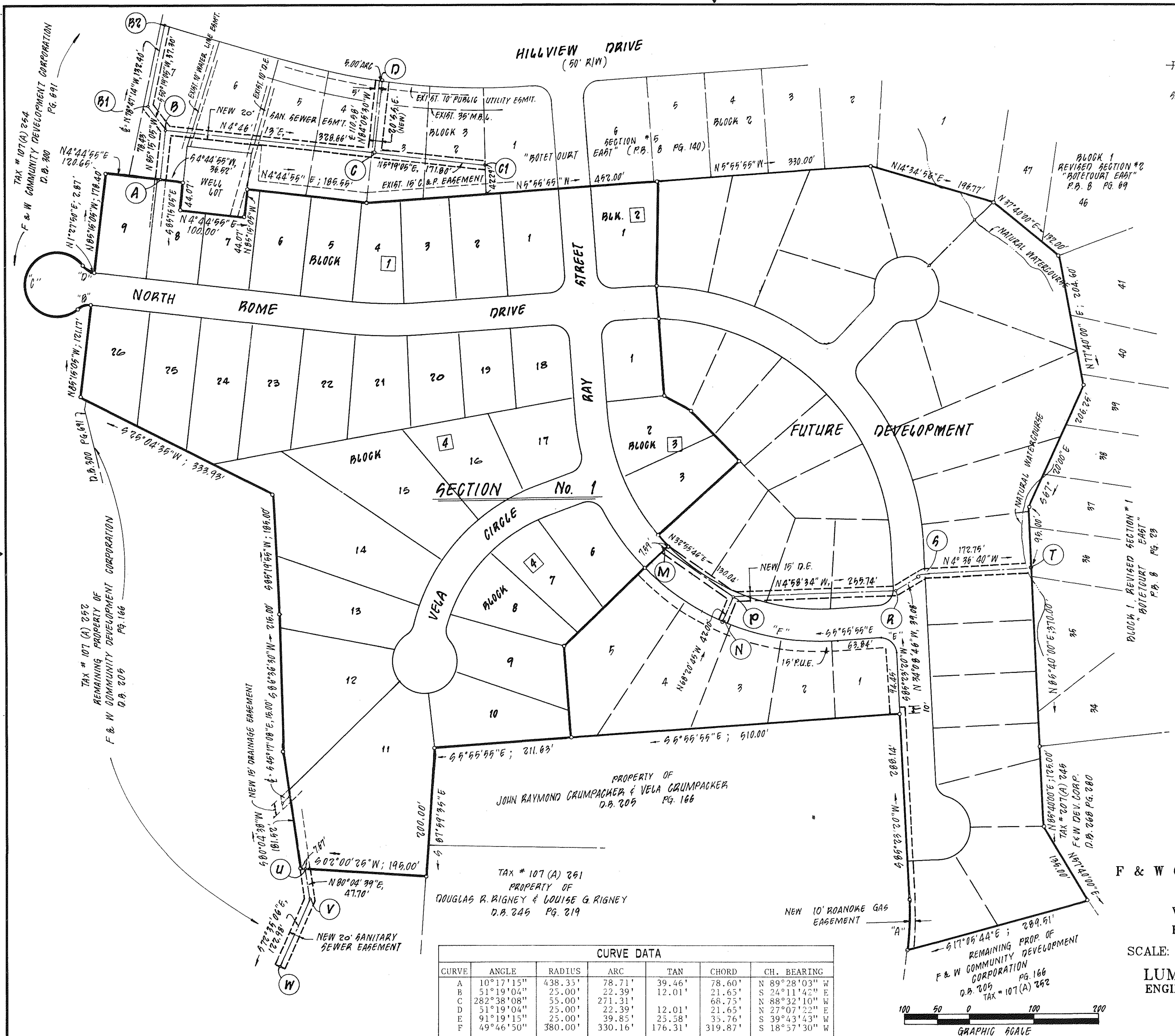
#85-16 BS1

SHEET #2 OF 3

CURVE DATA

CURVE	LOT	BLK	ANGLE	RADIUS	ARC	CHORD	CH. BEARING
K	TOT.		45°42'31"	25.00'	19.94'	19.42'	N 54°14'42" W
L	TOT.		54°39'34"	305.00'	290.97'	280.06'	N 49°46'10" W
L	13	4	04°34'23"	305.00'	24.34'	24.34'	S 74°48'46" E
L	14	4	14°51'58"	305.00'	79.14'	78.92'	S 65°05'35" E
L	15	4	15°49'31"	305.00'	84.24'	83.97'	S 49°44'50" E
L	16	4	15°33'33"	305.00'	82.83'	82.57'	S 34°03'19" E
L	17	4	3°50'09"	305.00'	20.42'	20.42'	S 24°21'28" E
M	TOT.		82°54'30"	25.00'	36.18'	33.10'	S 63°53'39" E
N	TOT.		9°24'59"	380.00'	62.45'	62.38'	N 79°31'36" E
P	TOT.		90°00'00"	25.00'	39.27'	35.36'	N 39°04'05" E
R	TOT.		7°23'45"	666.87'	86.08'	86.02'	S 02°14'02" E
R	20	4	1°56'57"	666.87'	22.69'	22.68'	N 4°57'27" W
R	21	4	05°26'48"	666.87'	63.39'	63.37'	S 01°15'34" E
S	TOT.		51°19'04"	25.00'	22.39'	21.65'	S 24°11'42" E
T	TOT.		282°38'08"	55.00'	271.31'	68.75'	N 88°32'10" W
U	TOT.		51°19'04"	25.00'	22.39'	21.65'	N 27°07'22" E
V	TOT.		07°23'45"	616.87'	79.63'	79.57'	N 02°14'02" W
V	3	1	2°13'00"	616.87'	23.87'	23.87'	S 4°49'23" E
V	4	1	05°10'45"	616.87'	55.76'	55.74'	N 01°07'32" W
W	TOT.		90°00'00"	25.00'	39.27'	35.36'	S 50°55'55" E
E	BOUNDARY		03°45'30"	330.01'	21.65'	21.64'	N 45°43'40" E

P.B. PG.



LEGEND

C&P = CHESAPEAKE & POTOMAC
D.E. = DRAINAGE EASEMENT
S.S.E. = SANITARY SEWER EASEMENT
W.L.E. = WATER LINE EASEMENT
M.B.L. = MIN. BUILDING LINE
P.U.E. = ELECTRIC, GAS, TELEPHONE & CABLE TELEVISION EASEMENT

NOTE:

THE PURPOSE OF THIS SHEET IS TO SHOW ALL OF THE EASEMENTS OUTSIDE THE LIMITS OF THE BOUNDARY OF SECTION #1, BOTETOURT SOUTH. SEE SHEET #2 OF 3 FOR RECORD PLAT.

CURVE DATA

CURVE	ANGLE	RADIUS	ARC	TAN	CHORD	CH. BEARING
A	10°17'15"	438.35'	78.71'	39.46'	78.60'	N 89°28'03" W
B	51°19'04"	25.00'	22.39'	12.01'	21.65'	S 24°11'42" E
C	282°38'08"	55.00'	271.31'		68.75'	N 88°32'10" W
D	51°19'04"	25.00'	22.39'	12.01'	21.65'	N 27°07'22" E
E	91°19'15"	25.00'	39.85'	25.58'	35.76'	S 39°43'43" W
F	49°46'50"	380.00'	330.16'	176.31'	319.87'	S 18°57'30" W

COMMONWEALTH OF VIRGINIA
VINCENT K. LUMSDEN
No. 1428B
LAND SURVEYOR

PLAT SHOWING

"THE ORCHARDS"

SECTION 1

"BOTETOURT SOUTH"

PROPERTY OF

F & W COMMUNITY DEVELOPMENT CORP.

LOCATED IN

VALLEY MAGISTERIAL DISTRICT

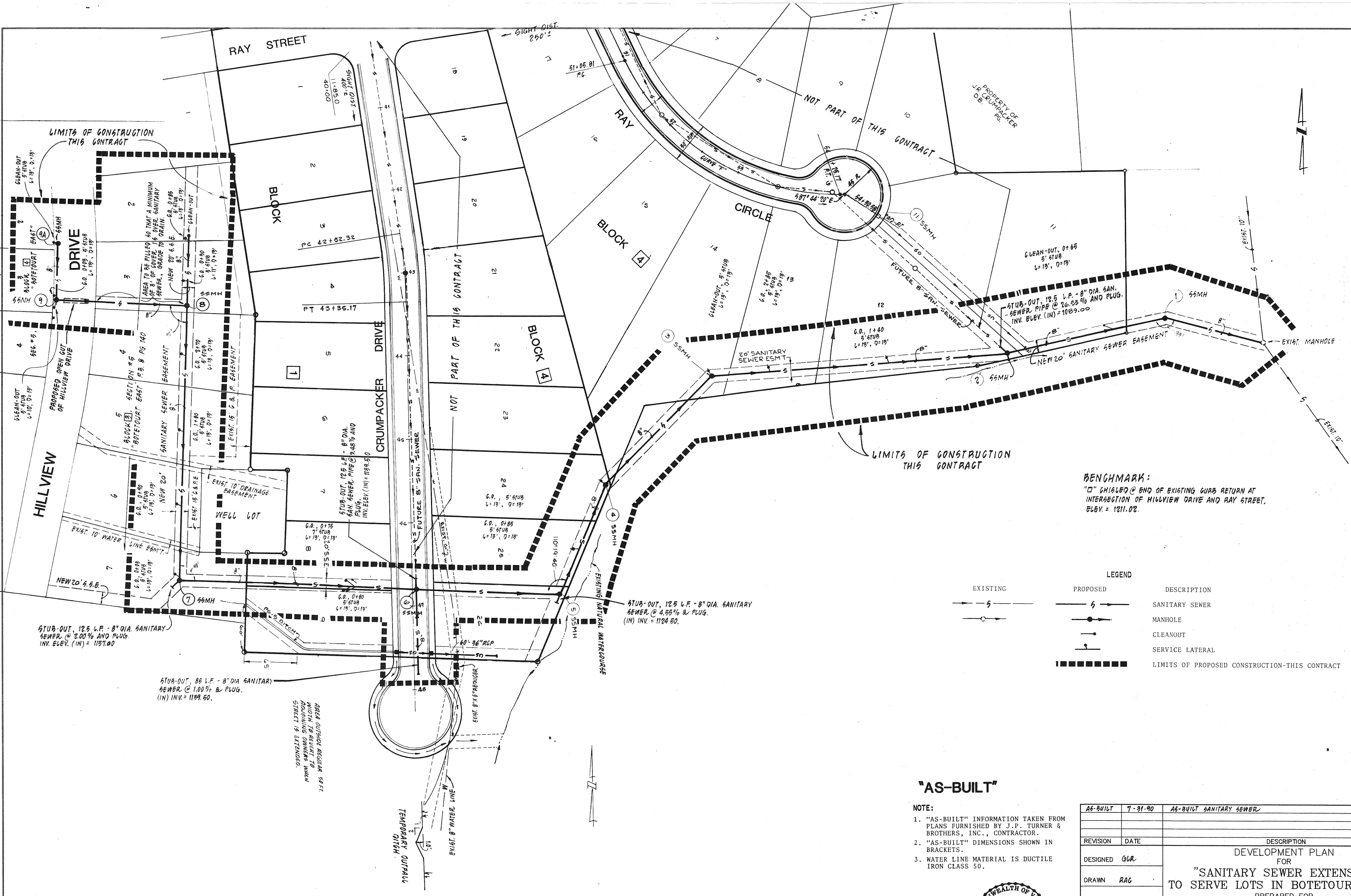
BOTETOURT COUNTY, VIRGINIA

SCALE: 1" = 100' DATE: 31 AUGUST 1990

LUMSDEN ASSOCIATES, P.C.
ENGINEERS - SURVEYORS - PLANNERS
ROANOKE, VIRGINIA

#85-16B51

P.B._____PG._____



"AS-BUILT"

NOTE:

1. "AS-BUILT" INFORMATION TAKEN FROM PLANS FURNISHED BY J.P. TURNER & BROTHERS, INC., CONTRACTOR.
2. "AS-BUILT" DIMENSIONS SHOWN IN BRACKETS.
3. WATER LINE MATERIAL IS DUCTILE IRON CLASS 50.

COMMONWEALTH OF VIRGINIA
GARY LEE ROBERTSON
No. 14508
PROFESSIONAL ENGINEER

REVISION	DATE	DESCRIPTION
AS-BUILT	7-31-90	AS-BUILT SANITARY SEWER

DESIGNED GLR	DEVELOPMENT PLAN FOR "SANITARY SEWER EXTENSION TO SERVE LOTS IN BOTETOURT EAST" PREPARED FOR F & W COMMUNITY DEVELOPMENT CORP. VALLEY MAGISTERIAL DISTRICT BOTETOURT COUNTY, VIRGINIA
DRAWN RAC	
CHECKED GLR	

LUMSDEN ASSOCIATES, P.C. ENGINEERS-SURVEYORS-PLANNERS ROANOKE, VIRGINIA	SCALE: 1" = 50'	COMM: # 85-166
	DATE: 16 MAY, 1990	SHEET 3 of 7

NOTES:

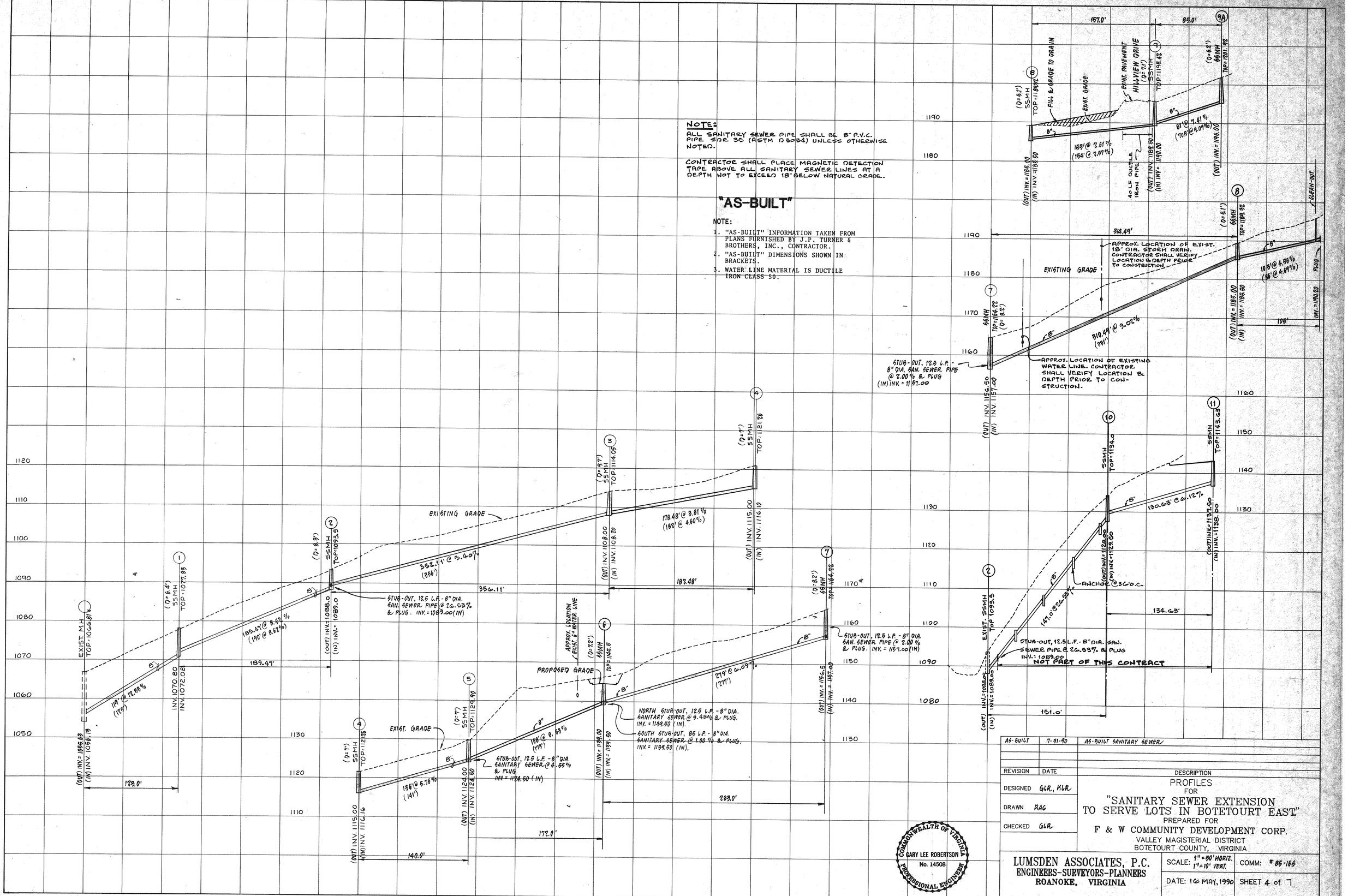
ALL SANITARY SEWER PIPE SHALL BE 8" P.V.C. PIPE SDR 35 (ASTM D3034) UNLESS OTHERWISE NOTED.

CONTRACTOR SHALL PLACE MAGNETIC DETECTION TAPE ABOVE ALL SANITARY SEWER LINES AT A DEPTH NOT TO EXCEED 18" BELOW NATURAL GRADE.

"AS-BUILT"

NOTE:

1. "AS-BUILT" INFORMATION TAKEN FROM PLANS FURNISHED BY J.P. TURNER & BROTHERS, INC., CONTRACTOR.
2. "AS-BUILT" DIMENSIONS SHOWN IN BRACKETS.
3. WATER LINE MATERIAL IS DUCTILE IRON CLASS 50.



AS-BUILT	7-31-90	AS-BUILT SANITARY SEWER
REVISION	DATE	DESCRIPTION

DESIGNED GLR, KLR

DRAWN RAG

CHECKED GLR

PROFILES
FOR
"SANITARY SEWER EXTENSION TO SERVE LOTS IN BOTETOURT EAST"
PREPARED FOR
F & W COMMUNITY DEVELOPMENT CORP.
VALLEY MAGISTERIAL DISTRICT
BOTETOURT COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
GARY LEE ROBERTSON
No. 14508
PROFESSIONAL ENGINEER

LUMSDEN ASSOCIATES, P.C.
ENGINEERS-SURVEYORS-PLANNERS
ROANOKE, VIRGINIA

SCALE: 1" = 50' HORIZ. 1" = 10' VERT.

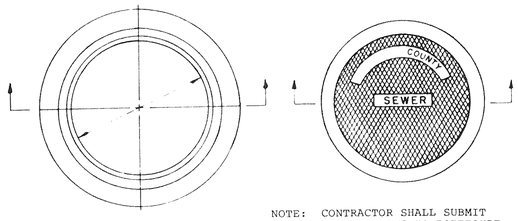
COMM: # 85-166

DATE: 16 MAY, 1990

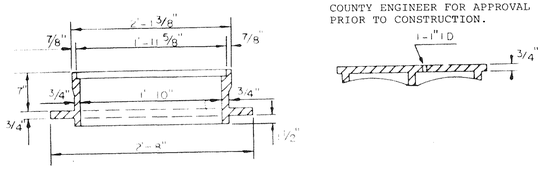
SHEET 4 of 7

MANHOLE FRAME AND COVER

RICHARD FOUNDRY CO. DESIGN NO. B-1444,
DEWEY BROS., INC. MH-RCR-56, OR EQUIVALENT

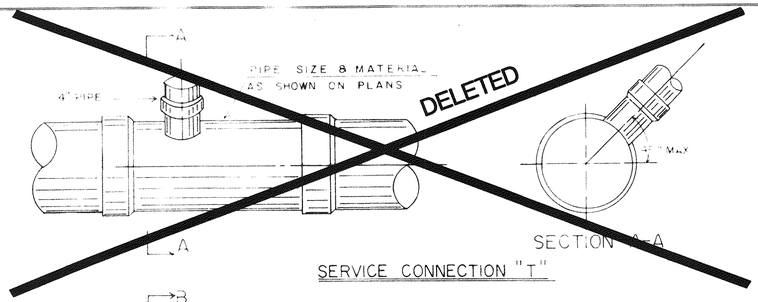


NOTE: CONTRACTOR SHALL SUBMIT SHOP DRAWING TO BOTETOURT COUNTY ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

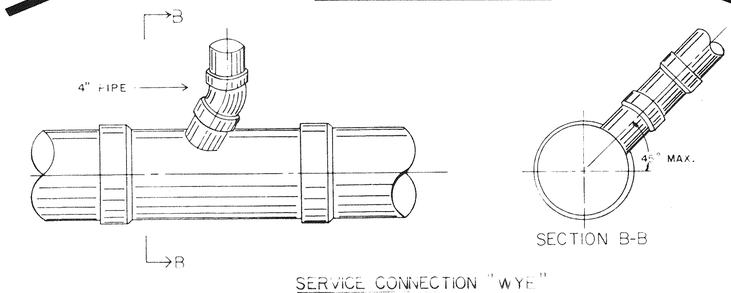


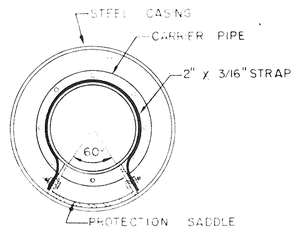
SERVICE CONNECTION "T"

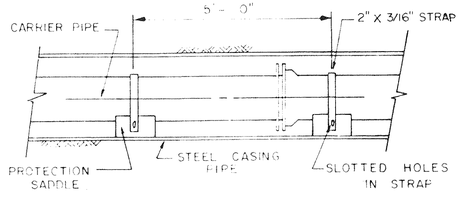
DELETED



SERVICE CONNECTION "WYE"

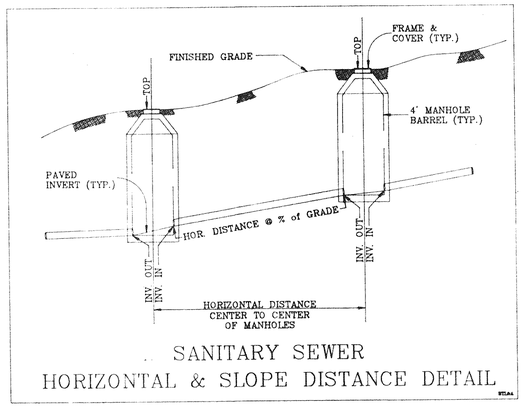




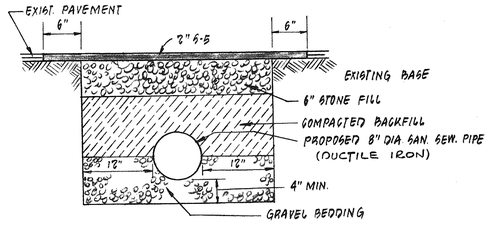


SADDLE MUST BE STEEL OR 4"x4"x5/16" TREATED TIMBER

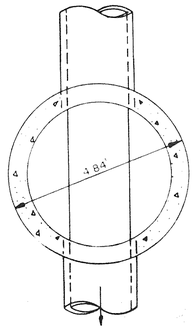
BORING AND CASING



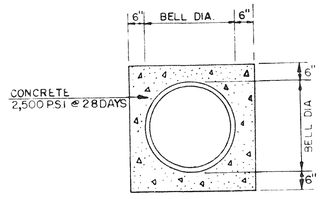
SANITARY SEWER HORIZONTAL & SLOPE DISTANCE DETAIL



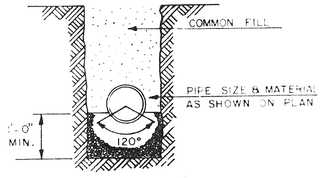
TYPICAL OPEN CUT SECTION HILLVIEW DRIVE



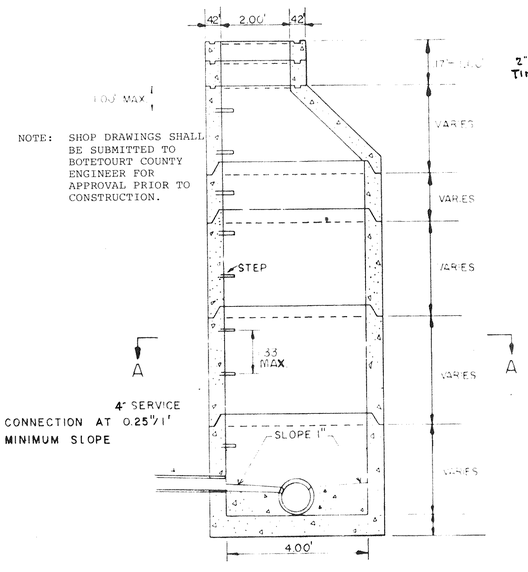
SECTION A-A STANDARD MANHOLE



CONCRETE ENCASED PIPE

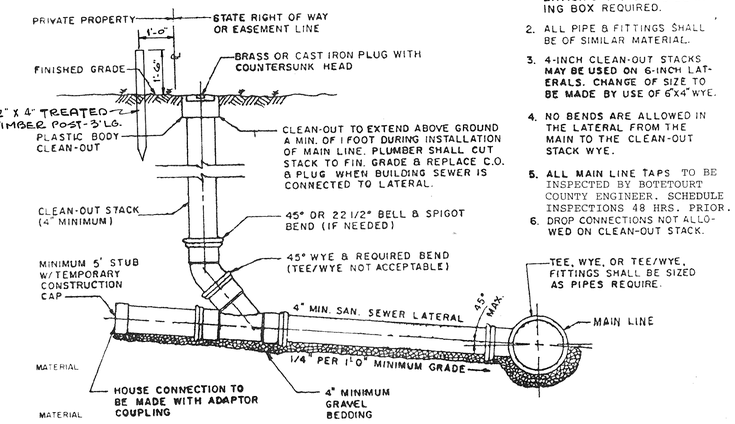


STONE CRADLE



NOTE: SHOP DRAWINGS SHALL BE SUBMITTED TO BOTETOURT COUNTY ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

STANDARD MANHOLE

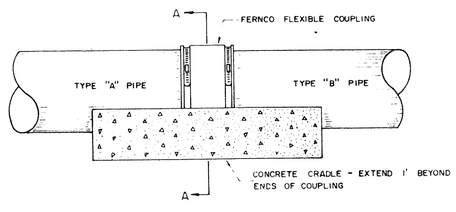


NOTES:

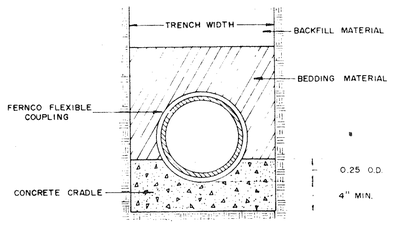
1. IN TRAFFIC AREAS INSTALLATION OF A TRAFFIC BEARING BOX REQUIRED.
2. ALL PIPE & FITTINGS SHALL BE OF SIMILAR MATERIAL.
3. 4-INCH CLEAN-OUT STACKS MAY BE USED ON 6-INCH LATERALS. CHANGE OF SIZE TO BE MADE BY USE OF 6"x4" WYE.
4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO THE CLEAN-OUT STACK WYE.
5. ALL MAIN LINE TAPS TO BE INSPECTED BY BOTETOURT COUNTY ENGINEER. SCHEDULE INSPECTIONS 48 HRS. PRIOR.
6. DROP CONNECTIONS NOT ALLOWED ON CLEAN-OUT STACK.

TEE, WYE, OR TEE/WYE, FITTINGS SHALL BE SIZED AS PIPES REQUIRE.

SANITARY SEWER LATERAL



SIDE VIEW



SECTION A-A

JOINING DISSIMILAR PIPE

GENERAL NOTES:

1) THE CONTRACTOR SHALL SCHEDULE A PRECONSTRUCTION MEETING WITH BOTETOURT COUNTY ENGINEER PRIOR TO CONSTRUCTION.
2) ALL DISTURBED AREAS SHALL BE REGRADED & RESEEDED.
3) ALL OPEN CUT DRIVEWAYS SHALL BE PATCHED AND REPAIRED WITH MATERIAL SIMILAR TO PRECONSTRUCTION UNLESS OTHERWISE AGREED UPON, IN WRITING, BY THE CONTRACTOR WITH THE HOMEOWNER.
4) THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTACT ALL UTILITIES PRIOR TO CONSTRUCTION.
5) THE CONTRACTOR SHALL PAY STRICT ATTENTION TO MUD AND DIRT ACCUMULATION ON ANY ROADWAY SURFACE AND SHALL REMOVE ANY ACCUMULATION IMMEDIATELY.

COMMONWEALTH OF VIRGINIA
GARY LEE ROBERTSON
No. 14508
PROFESSIONAL ENGINEER

REVISION	DATE	DESCRIPTION

DESIGNED GLR
DRAWN RAG
CHECKED GLR

NOTES & DETAILS
FOR
"SANITARY SEWER EXTENSION TO SERVE LOTS IN BOTETOURT EAST"
PREPARED FOR
F & W COMMUNITY DEVELOPMENT CORP.
VALLEY MAGISTERIAL DISTRICT
BOTETOURT COUNTY, VIRGINIA

LUMSDEN ASSOCIATES, P.C.
ENGINEERS-SURVEYORS-PLANNERS
ROANOKE, VIRGINIA

SCALE: AS SHOWN
COMM: *85-165
DATE: 3 JULY 1990
SHEET 5 of 7

NOTE: All distrubed areas shall be regraded and permanently seeded as soon as practical after backfilling of trenches.

ST SEDIMENT TRAP

EROSION CONTROL NOTES:

1. EROSION CONTROL DEVICES TO BE IN PLACE PRIOR TO ANY GRADING OPERATIONS.
2. REGULAR MAINTENANCE IS TO BE PERFORMED AS NEEDED FOLLOWING EACH RAINFALL.
3. ALL CUT AND FILL SLOPES TO BE SEEDED AND MULCHED AS SOON AS POSSIBLE AFTER GRADING OF LOTS.
4. EROSION CONTROL DEVICES TO REMAIN IN PLACE UNTIL ALL DISTURBED AREAS HAVE ADEQUATE GROUND COVER.
5. THIS PLAN TO BE APPROVED AND LAND DISTURBANCE PERMIT TO BE OBTAINED PRIOR TO GRADING OF LOTS.
6. UPON INSPECTION OF THE EROSION CONTROL DEVICES THE COUNTY ENGINEER MAY REQUIRE THAT FURTHER STEPS BE TAKEN TO CONTROL SILT.
7. REFERENCES TO STANDARD DRAWINGS REFER TO THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.

EROSION CONTROL NARRATIVE

EROSION AND SEDIMENT CONTROL MEASURES

Unless otherwise indicated, all vegetative and structural erosion and sediment control practices will be constructed and maintained according to minimum standards and specifications of the Virginia Erosion and Sediment Control Handbook.

Management strategies

1. Construction should be sequenced so that grading operations can begin and end as quickly as possible.
2. Sediment trapping measures shall be installed as a first step in grading and shall be seeded and mulched immediately following installation.
3. Temporary seeding or other stabilization shall follow immediately after grading.
4. Area which are not to be disturbed shall be clearly marked.
5. Field inspections during construction may require additional erosion and sediment control measures.
6. The developer shall be responsible for the installation and maintenance of all erosion and sediment control practices.

PERMANENT STABILIZATION

All areas disturbed by construction will be stabilized with permanent seeding immediately following finish grading. Seeding will be done according to standard and specification 1.66 of the Virginia Erosion and Sediment Control Handbook. Permanently seeded areas shall be protected during establishment with straw mulch.

MAINTENANCE

In general, all erosion and sediment control measures will be checked weekly and after each significant rainfall. The follwoing items will be checked in particular:

1. All sediment trappings will be checked regularly for necessary sediment removal.
2. All storm drain inlets and outlets will be checked regularly for sediment buildup.
3. All silt barriers will be checked regularly for undermining or deterioration.
4. All seeded areas will be checked regularly to see that good stabilization is maintained. Areas should be fertilized and reseed as needed.

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		SANITARY SEWER
		MANHOLE
		CLEANOUT
		SERVICE LATERAL
		LIMITS OF PROPOSED CONSTRUCTION-THIS CONTRACT

SF SILT FENCE

EROSION CONTROL LEGEND

NO.	TITLE	KEY	SYMBOL
1.06	SILT FENCE	SF	
1.25	TEMPORARY SEDIMENT TRAP	ST	
1.66	PERMANENT SEEDING	PS	PS

REVISION	DATE	DESCRIPTION
DESIGNED GLR		EROSION CONTROL PLAN FOR "SANITARY SEWER EXTENSION TO SERVE LOTS IN BOTETOURT EAST" PREPARED FOR F & W COMMUNITY DEVELOPMENT CORP. VALLEY MAGISTERIAL DISTRICT BOTETOURT COUNTY, VIRGINIA
DRAWN RAC		
CHECKED GLR		

COMMONWEALTH OF VIRGINIA — GARY LEE ROBERTSON — No. 14508 — PROFESSIONAL ENGINEER

LUMSDEN ASSOCIATES, P.C. ENGINEERS–SURVEYORS–PLANNERS ROANOKE, VIRGINIA	SCALE: 1" = 50'	COMM: # 85-166
	DATE: 16 MAY, 1990	SHEET 6 of 7

CONSTRUCTION SPECIFICATIONS

SPECIAL CONDITIONS

1. A minimum cover of three (3) feet over the proposed lines is required.
2. No work shall begin without notifying Botetourt County 24 hours in advance. The contractor is responsible for obtaining any and all necessary permits.
3. No work shall begin without written approval of construction plans.
4. Work shall be subject to inspection by the County inspectors and design engineer.
5. Contractor shall be responsible for locating and uncovering all valve boxes after surface treatment of roads and adjusting boxes to final road grades, if necessary.
6. All existing utilities may be shown or may not be shown in the exact location. The contractor shall comply with the State Water Works regulations, section 12.05.03 where lines cross.
7. The contractor shall notify the County of any field corrections to the approved plans prior to such construction.
8. All trenches within the existing or future Virginia State Department of Highways and Transportation right-of-way must be compacted in six inch layers.
9. All lines to be staked prior to construction.
10. Contractor to coordinate with the Engineer to provide as-built plans.
11. All construction shall be in accordance to approved construction practices of the applicable trades.
12. Unless noted otherwise herein all construction shall be in accordance to the latest edition of AWWA standards.

CONTRACTOR SHALL MAINTAIN A SET OF RED-LINE PLANS SHOWING AS-BUILT LOCATION OF ALL STRUCTURES. AS-BUILT INFORMATION TO BE SUBMITTED TO DESIGN ENGINEER FOR PREPARATION OF RECORD AS-BUILT PLANS. SUCH AS-BUILT PLANS SHALL BE SUBMITTED TO BOTETOURT COUNTY PRIOR TO COUNTY ACCEPTANCE.

EXCAVATION, STABILIZATION AND BEDDING

A. TRENCHING

1. Excavation for trenches shall include the removal of all material encountered regardless of classification in accordance with the elevations and grades at the locations and stations indicated on the plans or specified herein.
2. Excavation, unless otherwise specified, shall be open cut. The Contractor shall open no more than two hundred (200) feet of trench at one time during the laying of pipe, unless approved by the Engineer.
3. Trenches shall be excavated in straight lines and shall be accurately graded in order to establish a true elevation for the invert of the pipe.
4. The width of trenches, from existing grade to one (1) foot above the top of the pipe shall be of sufficient width to permit the proper installation of bracing, shoring or sheeting.
5. The sides of the trenches shall be as vertical as practical.
6. Excavation for structures shall allow a minimum of twelve (12) inches clear between the structure and the sides of the trench or any required bracing, shoring or sheeting.
7. Excavated materials suitable for backfill shall be stockpiled in an orderly manner at a sufficient distance from the sides of the trench in order to avoid overloading the banks of the trench and to prevent slides or cave-ins.
8. Excavated materials which are not required or approved for backfill shall be removed from the site and disposed of by the Contractor, at his expense.

9. CONTRACTOR TO ADHERE TO ALL LOCAL, STATE AND FEDERAL CONSTRUCTION LAWS, INCLUDING OSHA TRENCH SAFETY REGULATIONS.

B. TRENCH STABILIZATION

1. Trench stabilization material shall be coarse aggregate size Number 2 and shall conform with VDOT Section 203 and/or ASTM C 33.
2. Whenever excessively wet or unstable material is encountered in the bottom of the trench, which in the opinion of the Engineer is incapable of properly supporting the pipe or structures, such material shall be removed and backfilled with trench stabilization material and shall be graded to allow for the compacted bedding material.
3. All unauthorized overdepths of excavation shall be backfilled with trench stabilization material and shall be graded to allow for the compacted bedding material.

C. COMPACTED BEDDING MATERIAL

1. Bedding material shall be coarse aggregate size Number 57 and shall conform with VDOT Section 203 and/or ASTM C 33.
2. The bottom of the pipe trench shall be excavated to a minimum overdepth of four (4) inches below the bottom of the pipe, to provide for the compacted bedding material. Bedding material shall be placed, shaped and compacted.
3. Bell holes and depressions required for the jointing of the pipe shall be dug after the compacted bedding material has been graded and shaped and shall be only of the length, depth and width required to make the joint properly.

PIPE, JOINTS AND FITTINGS

A. SCOPE OF WORK

1. All materials and appurtenances required for the work shall be new, of first class quality and shall be furnished, delivered, erected, connected and finished in every detail as specified or indicated. All materials found defective, regardless of the circumstances, shall be replaced with new material at the expense of the Contractor.
2. The materials specified for the construction shall comply with the latest revisions of the applicable American Society for Testing Materials (ASTM), American National Standards Institute (ANSI) and/or the Virginia Department of Transportation (VDOT) standards.

B. OPTIONAL PIPE SELECTIONS

1. ~~The Contractor shall install only one (1) type of pipe between structures except where ductile iron pipe is specified or indicated. Where existing pipe is to be replaced or extended the same type of pipe shall be installed, unless specified or indicated otherwise.~~ DELETE
2. Water line shall be either PVC or ductile iron.
3. Sanitary sewers with an inside diameter less than or equal to twelve (12) inches shall be either polyvinyl chloride or ductile iron pipe, at the Contractor's option, unless specified or indicated otherwise.
4. Service laterals shall be either ductile iron or polyvinyl chloride pipe, at the Contractor's option, unless specified or indicated otherwise.

CONTRACTOR SHALL OBTAIN APPROVAL OF PIPE MATERIAL BY BOTETOURT COUNTY ENGINEER PRIOR TO BEGINNING CONSTRUCTION.

C. TYPES OF PIPE (*)

1. ~~Polyvinyl chloride (PVC) water pipe shall be AWWA C900 DR 18 minimum, unless specified or indicated otherwise.~~
2. ~~Ductile iron pipe shall conform with AWWA C 151/ANSI 21.51 and fittings shall conform with AWWA C 110/ANSI 21.10. The pipe and fittings shall be bituminous coated and cement lined in accordance with AWWA C 104/ANSI 21.40. The pipe thickness shall conform with AWWA C 150/ANSI 21.50 and shall be Class 51, as a minimum, unless specified or indicated otherwise.~~ DELETE
3. PVC sewer pipe and fittings shall be SDR 35 (ASTM D 3034).

D. JOINTS COUPLINGS,AND APPURTENANCES

1. PVC pipe and fittings shall be bell and spigot type joints. The bell and spigot joint shall be sealed with elastomeric gaskets conforming to ASTM D 3212. The joints shall be made in strict accordance with the recommendation of the pipe manufacturer.
2. Ductile iron pipe and fittings shall be either mechanical or bell and spigot type joints as specified or indicated. Joints shall be made with a single watertight rubber gasket manufactured in accordance with AWWA C 111/ANSI 21.11. The joints shall be made in strict accordance with the recommendations of the pipe manufacturer.
3. Gate Valves shall be iron-body, bronze-mounted, double-disc, parallel-seal, O-ring sealed, inside-screw, non-rising stem, fitting with 2 inch square operating nut for valve vault service, all in accordance with AWWA Standard C500 (latest revision). Connections shall be suitable for the pipe with which it is used. The valves shall be suitable for 200 p.s.i. water working pressure and shall be tested at twice the rated working pressure. All gate valves shall be installed in the valve vaults and equipped with a 2-inch square operating nut. The nut shall be marked with an arrow and the word "OPEN" and shall open by turning to the right (clockwise).
4. All other materials and appurtences to be in acordance with details shown on plans.

PIPE INSTALLATION

A. GENERAL

1. The Contractor shall not lay pipe or place manholes until all water has been removed from the trench, or when in the opinion of the Engineer, the trench or the weather conditions are unsuitable for work.
2. Pipe that may require field cutting shall be done so in a neat and workmanlike manner, so as to leave a smooth end at right angles to the axis of the pipe. Care shall be taken to avoid damaging the pipe and any coatings or linings. Ductile iron pipe shall not be cut with an acetylene torch.
3. The materials shall be visually inspected for defects before lowering the pipe or placing the manholes into the trench. During the laying operation no tools, clothing or other material shall be placed in the pipe or manhole. The interior of the pipe shall be clear of all soil, debris and superfluous materials prior to and during the installation.
4. The Contractor shall exercise every precaution to prevent foreign material from entering the pipe while it is being placed in the trench. Failure by the contractor to take such precautions may result in the Engineer requiring a heavy, tightly woven canvas bag of suitable size be placed over each end of the pipe and removed only when the joint can be made properly.
5. The pipe and manholes shall be lowered carefully into the trench by suitable means and handled with care at all times to avoid damage. Under no circumstances shall the materials be dropped or dumped into the trenches.
6. When work is not in progress, the Contractor shall plug the open ends of the pipe to prevent trench water or other substances from entering the pipe. The plug shall be watertight and shall remain in place until any required dewatering has been completed.
7. Water pipe shall not be laid closer horizontally than ten (10) feet from a sewer line except where the bottom of the water pipe will be at least 18 inches above the top of the sewer line and will be in a separate trench. Gravity sewer lines that will cross above the water pipe shall for a distance of at least ten (10) feet each side of the crossing be fully encased in concrete or be replaced with ductile iron or other approved pressure pipe with no joint closer than eight (8) feet from the crossing. Water pipe shall not be allowed to pass through a sewer manhole.
8. Before joints are made the pipe shall be well bedded on a firm foundation and no pipe shall be brought into position until the preceding length has been thoroughly embedded and secured in place. Any defects due to settlement shall be made god by the Contractor at his expense. Bell holes shall be dug sufficiently large to insure the making of proper joints.
9. Pipe shall be jointed in full accordance with manufacturer's recommendations. Push-on joints shall be thoroughly cleaned, the rubber gasket inserted in the bell socket, a thin film of approved gasket lubricant applied, the spigot end of the pipe centered into the socket and the joint completed by forcing the spigot end to the bottom of the socket by a jack-type tool or other device approved by the Engineer. Mechanical joints shall be thoroughly cleaned, the gland slipped over the spigot end of the pipe, the rubber gasket painted with soap solution and placed on the spigot end, the spigot end of the pipe seated in the bell, the gasket pressed into place within the bell, the gland moved into position, and bolts and nuts assembled by hand and tightened with an approved torque-limiting wrench.

B. INSTALLING WATER MAINS

DELETE

1. The water main shall be laid and maintained at the required lines and grads with fittings and valves at the required locations.
2. Deflection of the line of pipe, in either, the vertical or horizontal plane to avoid obstructions, or in locations where long-radius curves are required, the amount of deflection shall not exceed approved AWWA standards. Alignment that may require deflections in excess of the recommended limitations, special bends, or a sufficient number of shorter lengths of pipe to provide the angular deflection within the limits as set forth, shall be approved by the Engineer.
3. All plugs, except mechanical joint plugs at connections for future lines, all tees, and all bends in water mains under pressure shall be provided with reaction backing consisting of concrete thrust blocks. Valves for connections to future lines and fire hydrants shall be anchored to the water main with the rods.

C. DISINFECTION OF WATER MAINS

DELETE

1. All pipe shall be disinfected, tested and flushed in accordance with AWWA Standard C601 (latest revision).
2. Contractor shall provide all materials, equipment, necessary taps and perform all work required for the sterilization, testing and flushing of the water main.
3. No tested section of water line shall be approved to deliver water service until a favorable laboratory report has been achieved. Any tested section of water line failing to meet the requirements specified shall be repaired by the Contractor and retested until the results are within the limits specified.
4. The water main or valved off section that has been completed shall be filled, tested and flushed. Test locations shall be subject to the discretion of the Engineer and as valves and blow-offs permit.
5. After testing and before final inspection of the completed systems, water mains and service laterals shall be flushed and disinfected in accordance with AWWA Specification C601 latest revision. Flushing shall be accomplished at a flow velocity of not less than 2.5 feet per second.

Disinfection as described in AWWA C651 - "Placing of calcium hypochlorite tablets" shall be used. 5 gram calcium hypochlorite tablets with 3.25 g available chlorine per tablet shall be attached at the inside top of the pipe by an adhesive such as Permatex No. 1 or equal. The following number of tablets for the given pipe size shall be used for an initial dose of 25 mg/1 (ppm) chlorine:

DELETE

Pipe Diameter	Number Tablets Per 18–20 Ft. Pipe Section
6"	1
8"	2
10"	3
12"	4
16"	7

or the number of tablets equal to 0.0012d L rounded to the next higher integer, where d is the inside diameter, in inches and L is the length of the pipe section, in feet. Use of the continuous feed or slug method of disinfecting may only be used to re-chlorinate a water pipe after the initial disinfection or in other specific cases approved by the Design Engineer. When filling the pipeline for disinfection, the rate of filling must result in a velocity of less than 1 ft./sec.

The disinfection solution shall remain in the pipe line for not less than twenty-four (24) hours, after which time a chlorine residual of 10 ppm at all parts of the line shall be required.

Following chlorination, the piping shall be thoroughly flushed. The Virginia Waterworks Regulations require at least two consecutive satisfactory bacteriological samples at 24 hour intervals from the distribution system at maximum spacing of 2000 feet before the system can be placed in service. If the initial testing is not satisfactory the new lines will be retested until satisfactory results are achieved. Samples will be collected in accordance with the Virginia Waterworks Regulations.

D. INSTALLING SEWER PIPE & MANHOLES

1. The installation of the sanitary sewer system shall begin at the downstream manhole and proceed upstream. ALL sections shall be completed, tested and approved prior to allowing sanitary sewage to enter the system.
2. The pipe shall be installed in accordance with the pipe manufacturer's recommendations and as directed by the Engineer. The pipe shall be laid in true straight lines with the bell ends upstream and with the invert of the pipe being the true elevation and grade of the system.
3. The Contractor shall be responsible for establishing and maintaining the horizontal alignment and vertical elevation and grade of the system in accordance with the survey information indicated on the plans.
4. The horizontal alignment of the pipe shall be maintained by a transit or theodolite plumbed over the center of the downstream manhole. The vertical elevation and grade shall be maintained by not less than three (3) batter boards placed between manholes or by an adjustable laser level mounted at the invert of the downstream manhole with target(s) placed in the bell and of the pipe being laid.
5. Sewer pipe shall be installed in 4 inch gravel bedding and to springline of pipe and in accordance with manufactures recommendations.
6. The sanitary sewer system shall be laid and joined complete-in-place in order that each length and section of pipe between the manholes shall have a smooth and uniform invert.
7. The pipe shall be connected to manholes through precast openings and joined with either a flexible boot adapter or a pipe seal gasket.

E. CONNECTION TO EXISTING SYSTEMS

1. The new pipe connection to be made to an existing manhole, where no stub or opening exists, shall be made through an opening of maximum diameter cut into the manhole wall at the required location and elevation.
2. The existing invert channels and benches shall be reworked as required to form a new flow channel from the new connection to the existing flow channel.
3. The new pipe connected to an existing manhole shall be secured in position and the remaining opening shall be filled and sealed with brick and mortar. The outer surface of the connection shall be given a coat of heavy bitumastic waterproofing compound.

F. SERVICE CONNECTIONS

1. The Contractor shall make all service connections to the sewer pipe and from manholes where shown on the plans and/or where located in the field. The service connections to the sewer pipe shall be made with either a wye or tee branch fitting or saddle tap, at the Contractor's option.
2. The wye and tee branch fittings for service connections shall be commercially manufactured and installed in strict accordance with the recommendations of the pipe manufacturer.
3. All service connections shall be made with four (4) inch pipe as a minimum, unless the size of an existing service connection dictates otherwise, and shall be installed on a minimum grade of one-quarter (1/4) inch per one (1) foot from the sewer pipe or manhole to the property or easement line.
4. Future service connections shall extend to the property or easement line with cleanout and be properly capped with a watertight fitting to prevent infiltration into the sewerage system. The fitting shall be installed in strict accordance with the recommendations of the pipe manufacturer.
5. Future service connections shall be field marked by a treated, solid wooden (2 x 4) marker three (3) feet long set vertically plumb with the end of the capped extension. The tops of the markers shall be painted yellow and set flush with the finished grade. The location and invert depth of the service connection shall be shown on the as-built plans.

BACKFILLING

A. JOB CONDITIONS

1. Prior to placing backfill, all organic, rubbish, debris or other unsuitable or objectionable material within the trench shall be removed. All concrete forms shall be removed. All shoring or sheeting shall be removed or cut off at the depth stipulated by the Engineer.
2. Prior to placing backfill, the trench, shall be removed. All concrete forms shall be removed. All shoring or sheeting shall be removed or cut off at the depth stipulated by the Engineer.
3. Backfill material shall be placed in uniform horizontal layers and thoroughly compacted with proper mechanical or hand operated tampers or other equipment as approved by the Engineer to perform such work.
4. Backfill material shall be placed and compacted so as to not unevenly support, damage or displace the alignment of the pipe or structures.
5. Backfill shall not be placed or compacted against cast in place concrete until it has obtained sufficient strength to withstand the backfilled pressure placed upon it.
6. Upon the completion of backfilling, all excess soil, stones and debris shall be removed from the site and disposed of by the Contractor.

B. BACKFILL MATERIAL

1. Materials for backfill shall be approved excavated material or approved suitable material obtained from other sources. All material shall be approved by Soil Engineer.
2. Material shall consist of durable natural granular material or granular aggregates free from organic material, loam, debris, or other objectionable material which cannot be thoroughly compacted.
3. Material shall not contain stones larger in diameter than those specified herein, granite, broken concrete, masonry rubble or other material which in the opinion of the Engineer is unsuitable for backfill.
4. Excessively wet excavated material shall not be used as backfill. Frozen material shall not be placed in the trench, nor shall approved backfill be placed upon frozen material. However, backfilling may be allowed in freezing weather with prior approval of the Engineer.

C. BACKFILL BELOW UNPAVED AREAS

1. Backfill from the top of the pipe bedding of bottom of the pipe trench to one (1) foot above the top of the pipe shall be free of stones larger than two (2) inches in diameter and shall be placed in layers not to exceed six (6) inches and compacted with hand operated tampers.
2. Backfill from one (1) foot above the top of the pipe to the topsoil subgrade shall be free to stones larger than six (6) inches in diameter and shall be placed in layers not to exceed twelve (12) inches and compacted with mechanical tampers.
3. Drainage channels to be constructed of fill material shall be graded and shaped to the topsoil subgrade with material free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical tampers.

D. BACKFILL BELOW EXISTING OR NEW PAVED AREAS AND SIDEWALKS

1. Backfill from the top of the pipe bedding or bottom of the pipe trench to one (1) foot above the top of the pipe shall be free of stones larger than two (2) inches in diameter and shall be placed in layers not to exceed six (6) inches and compacted with hand tampers.
2. Backfill from one (1) foot above the top of the pipe to the pavement subgrade shall be free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical tampers.

INSPECTION AND TESTS

A. TESTING OF SANITARY SEWER

The Contractor shall prove the watertightness of the sewer system or portions thereof by one of the following tests, at such times as the Engineer may direct. Tests shall be made only in the presence of the Engineer. The Contractor shall furnish all labor and equipment required for the test and shall make repairs necessary until test results are satisfactory.

BOTETOURT COUNTY ENGINEER SHALL BE NOTIFIED OF ALL TESTS 48 HOURS PRIOR TO CONDUCTING SUCH TESTS. ALL TESTS SHALL BE COORDINATED WITH BOTETOURT COUNTY ENGINEER FOR HIS ATTENDANCE AND OBSERVATION.

B. AIR TEST

The testing equipment, procedure, and results will all be subject to the strict approval of the Engineer. Results of the air test will be reviewed for compliance with ASTM designation C-828, current revision. The air test is to be conducted between two (2) consecutive manholes. The test equipment shall consist of two (2) plugs (one tapped and equipped for air inlet connection), a shut-off valve, a pressure regulating valve, a pressure reduction valve, and a monitoring pressure gauge having a pressure range from 0 to 5 psi, graduated in 0.10 psi with an accuracy of plus/minus .04 psi. The test equipment shall be set up outside the manhole for easy access and reading. Air shall be supplied to the test slowly and shall be regulated to prevent the pressure inside the pipe from exceeding 5.0 psig. The pipeline shall be filled until a constant internal pressure of 3.5 psig is maintained. The internal pressure shall be maintained at 3.5 psig or slightly above for a five (5) minute stabilization period, after which time the internal pressure will be adjusted to 3.5 psig, the air supply shut off and the test begun. No person shall remain in the manhole while pipe is being pressurized or throughout the test for safety purposes. A pressure drop of 1.0 psi from 3.5 to 2.5 psig shall be allowed for the test times specified in the following table, based upon the designated pipe size and test segment length.

AIR TEST TABLE

BASED ON EQUATIONS FROM ASTM C-828-80 SPECIFICATIONS TIME (MIN:SEC) REQUIRED FOR PRESSURE DROP FROM 3.5 TO 2.5 PSI WHEN TESTING ONE PIPE DIAMETER ONLY.

PIPE DIAMETER, INCHES

LENGTH OF TEST SEGMENT	4	6	8	10	12	15	18
25	0:04	0:10	0:18	0:28	0:40	1:02	1:29
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27
100	0:181	0:40	1:10	1:50	2:28	4:08	5:56
125	0:22	0:50	1:28	2:18	3:18	5:09	7:26
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30
175	0:31	1:09	2:03	3:13	4:37	7:05	
200	0:35	1:19	2:21	3:40	5:17		
225	0:40	1:29	2:38	4:08	5:40		
250	0:44	1:39	2:56	4:35			8:31
275	0:48	1:49	3:14	4:43			9:21
300	0:53	1:59	3:31				10:12
350	1:02	2:19	3:47			8:16	11:54
400	1:10	2:38			6:03	9:27	13.36
450	1:19	2:50			6:48	10:38	15:19
500	1:28			5:14	7:34	11:49	17:01

Should the 1.0 psi drop occur in less time than that specified in the table the sewer segment shall have failed. If the time required for the pressure to drop 1.0 psi is greater than that shown in the table, the sewer segment shall have passed. For a more detailed description of the air test method refer to ASTM designation C-828, current revision. An air pressure correction shall be required when the prevailing ground water is above the sewer line being tested and shall be calculated as follows:

$$\frac{\text{Ground Water Depth (ft)}}{2.31} + 3.5 = \text{Starting Test Pressure}$$

Ending Test Pressure = Starting Pressure − 1.0 psi

There is no change from time requirements established for the basic air test.

6. Manholes shall be tested by exfiltration by plugging lines with inflatable stoppers and filling the manhole with water for 12 hour soak period. Leakage shall not exceed one-half (1/2) gallon per hour in the TWO hour test period following the soak period. An approved air test for manholes will also be considered.

EX-FILTRATION TESTS PERFORMED BY APPROVED VACUUM TESTS PROCUDURES SHALL BE ACCEPTABLE.

C. TESTING OF WATER LINES

DELETE

1. After placing all harnessing and all valve support concrete, sufficient backfill shall be placed prior to filling the pipe with water and field testing to prevent lifting of the pipe. When local conditions require that the trenches be backfilled immediately after the pipe has been laid, the testing shall be carried out after backfilling has been completed but prior to placement of the permanent surface. At least fourteen (14) days shall elapse after the last valve support or hydrant block has been cast (Type I Portland Cement) prior to testing, unless high early strength concrete (Type III) is used, in which case three (3) days shall elapse.
2. All testing will be performed in accordance with the AWWA C600-82 or current revision.
3. Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing.

   Test pressure restrictions. Test pressures shall:

   a. not be less than 1.50 times the working pressure at the highest point along the test section;
   b. not exceed pipe or thrust restraint design pressures;
   c. be of at least 2-hour duration;
   d. not vary by more than + 5 psi;
   e. not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants;
   f. not exceed the rated pressure of the valve.

   Each valved section of pipe shall be filled with properly disinfected water slowly and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer.

   Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants.

   All exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repeated until it is satisfactory to the Engineer.
4. A leakage test shall be conducted concurrently with the pressure test. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{S D \sqrt{(P)}}{133,200}$$

in which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested in feet; D is the nominal diameter of the pipe, in inches: and P is the average test pressure during the leakage test, in pounds per square inch gauge. When testing against closed metal-seated valves, an additional leakage per enclosed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than the allowable amount, the Contractor shall, at his own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.

COMMONWEALTH OF VIRGINIA
GARY LEE ROBERTSON
No. 14508
PROFESSIONAL ENGINEER

REVISION	DATE	DESCRIPTION

DESIGNED GLR, KLR
DRAWN RAG
CHECKED GLR

CONSTRUCTION SPECIFICATIONS
FOR
"SANITARY SEWER EXTENSION
TO SERVE LOTS IN BOTETOURT EAST"
PREPARED FOR
F & W COMMUNITY DEVELOPMENT CORP.
VALLEY MAGISTERIAL DISTRICT
BOTETOURT COUNTY, VIRGINIA

LUMSDEN ASSOCIATES, P.C.
ENGINEERS-SURVEYORS-PLANNERS
ROANOKE, VIRGINIA

SCALE: NONE
COMM: #85-166
DATE: 16 MAY,1990
SHEET 7 of 7