M.B. _____ PG. _____

KNOW ALL MEN BY THESE PRESENT, TO WIT:
BILDEL CORPORATION IS THE FEE SIMPLE OWNER AND PROPRIETOR OF THE LAND SHOWN HEREON TO BE SUBDIVIDED, KNOWN AS SECTION IV, BROOKFIELD, BOUNDED AS SHOWN HEREON IN DETAIL BY CORNERS THROUGH TO 1, INCLUSIVE, WHICH COMPRISES THE LAND CONVEYED TO SAID OWNER BY DEEDS FROM ELBERT H. WALDRON, KAREN H. WALDRON, JEAN M. WALDRON, MORGAN G. HOUGH, THE ESTATE OF HORACE G. FRALIN RECORDED IN THE CLERK'S OFFICE OF THE CIRCUIT COURT OF BOTETOURT CO. IN DEED BOOK ____, PAGE ____, RESPECTIVELY, WHICH LAND IS SUBJECT TO ONE DEED OF TRUST TO THE BANK OF FINCASTLE, RECORDED IN DEED BOOK ____, PAGE ____.

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 SECTION 15.1-465 THROUGH 15.1-485 OF THE VIRGINIA CODE OF 1950, AS AMENDED TO DATE, AND FURTHER PURSUANT TO AND THE COMPLIANCE WITH THE COUNTY OF BOTETOURT "LAND SUBDIVISION ORDINANCES". THE SAID OWNER DOES BY VIRTURE OF RECORDATION OF THIS PLAT, DEDICATE IN FEE SIMPLE TO THE COUNTY OF BOTETOURT ALL THE LAND EMBRACED WITHIN THE STREETS OF THIS SUBDIVISION AND ALL THE EASEMENTS ARE HEREBY 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 STREETS, SHOWN HEREON, BY THE BOARD OF SUPERVISORS OF BOTETOURT COUNTY, AND THE VIRGINIA DEPARTMENT OF TRANSPORTATION FROM ANY AND ALL CLAIM OR CLAIMS FOR DAMAGES WHICH SUCH OWNERS, THEIR HEIRS, SUCCESSORS, DEVISEES AND ASSIGNS MAY HAVE AGAINST THE COUNTY AND THE DEPARTMENT OF TRANSPORTATION BY REASON OF ESTABLISHING PROPER GRADE LINES ON AND ALONG SUCH STREETS AS SHOWN ON THIS PLAT OF THE LAND SUBDIVIDED (OR SUCH CHANGES IN STREET LINES AS MAY BE AGREED UPON IN THE FUTURE) AND BY REASON 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 STREETS AND PROPERTY LINES THEREOF.

IN WITNESS WHEROF ARE HEREBY PLACED IN THE FOLLOWING SIGNATURES SIGNATURES AND SEALS THIS_____DAY OF_____, 1997.

BY: BILDEL CORPORATION

_____

JOHN GRIFFIN, PRESIDENT DATE

TRUSTEE: THE BANK OF FINCASTLE

_____

JOHN F. KILBY PAUL A. TUCKER

(EITHER OF WHOM MAY SIGN)

STATE OF VIRGINIA AT LARGE

_____ OF _____

I, _____ A NOTARY PUBLIC IN AND FOR THE AFORESAID COUNTY AND STATE DO HEREBY CERTIFY THAT _____ OWNER, WHOSE NAME IS ___ SIGNED TO THE FOREGOING WRITING DATED _____, 19 . DID PERSONALLY APPEAR BEFORE ME IN MY AFORESAID ___ AND STATE AND ACKNOWLEDGED THE SAME ON _____, 19 .

MY COMMISION EXPIRES_____, 19___

_____

NOTARY PUBLIC

APPROVED:

_____

BOTETOURT COUNTY SUBDIVISION AGENT

IN THE CLERK'S OFFICE OF THE CIRCUIT COURT OF BOTETOURT COUNTY, VIRGINIA, THIS PLAT WAS PRESENTED ON THIS _____ DAY OF _____, 199 , AND WITH WITH THE CERTIFICATES OF DEDICATION AND ACKNOWLEDGEMENTS THERETO ATTACHED IS ADMITTED TO RECORD AT _____O'CLOCK _____M.

TESTE: _____
CLERK

_____
DEPUTY CLERK

## CURVE TABLE SECTION IV

| CURVE | RADIUS | LENGTH | TANGENT | CHORD | BEARING | DELTA |
|---|---|---|---|---|---|---|
| C-1 | 225.00' | 29.08' | 14.56' | 29.06' | S 37°52'40" E | 07°24'19" |
| C-2 | 225.00' | 103.63' | 52.75' | 102.71' | S 20°58'52" E | 26°23'17" |
| C-3 | 225.00' | 103.62' | 52.75' | 102.71' | S 05°24'25" W | 26°23'16" |
| C-4 | 225.00' | 100.16' | 50.93' | 99.34' | N 31°21'14" E | 25°30'23" |
| C-5 | 225.00' | 16.94' | 8.47' | 16.93' | N 46°15'48" E | 04°18'46" |
| C-6 | 175.00' | 237.10' | 140.77' | 219.37' | N 02°46'02" W | 77°37'35" |
| C-7 | 175.00' | 37.79' | 18.97' | 37.72' | S 42°13'58" W | 12°22'25" |
| C-8 | 35.00' | 54.98' | 35.00' | 49.50' | S 86°34'49" E | 90°00'00" |
| C-9 | 35.00' | 54.98' | 35.00' | 49.50' | N 03°25'11" E | 90°00'00" |
| C-10 | 175.00' | 37.20' | 18.67' | 37.13' | S 42°19'48" W | 12°10'45" |
| C-11 | 175.00' | 237.69' | 141.26' | 219.84' | S 02°40'12" E | 77°49'15" |
| C-12 | 225.00' | 102.76' | 52.29' | 101.87' | S 35°20'08" W | 26°10'06" |
| C-13 | 225.00' | 100.05' | 50.87' | 99.23' | S 09°30'45" W | 25°28'39" |
| C-14 | 225.00' | 150.62' | 78.25' | 147.82' | N 22°24'12" W | 38°21'15" |

# PLAT OF SURVEY SHOWING "BROOKFIELD"

***SECTION IV***

***APPROX 30.59 ACRES***

***FOR***

***BILDEL CORPORATION***

***LOCATED IN***

***BLUE RIDGE MAGISTERIAL DISTRICT***

***BOTETOURT COUNTY, VIRGINIA***

RECEIVED
JUL 02 1997
DEVELOPMENT SERVICES


LMW P.C.
ENGINEERING - SURVEYING

PHONE (540) 345-0675 1401 2nd STREET S.W.
FAX (540) 342-4456 ROANOKE, VIRGINIA 24016


DATE: _____

I HEREBY CERTIFY THIS PLAT OF SURVEY TO BE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF

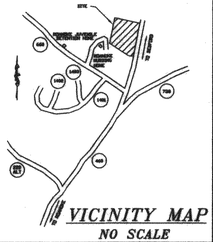
COMMONWEALTH OF VIRGINIA
DOUGLAS R. MEREDITH, JR.
No. 1450 B
LAND SURVEYOR

COMM. # 942G DWG. 942GPLAT DATE: 06-27-97 ***SHEET 1 OF 3***

D:\942G-IV\PLAT SHT 1 DWG\ 06-27-97 REH

M.B. _____ PG. _____

M.B. _____ PG. _____

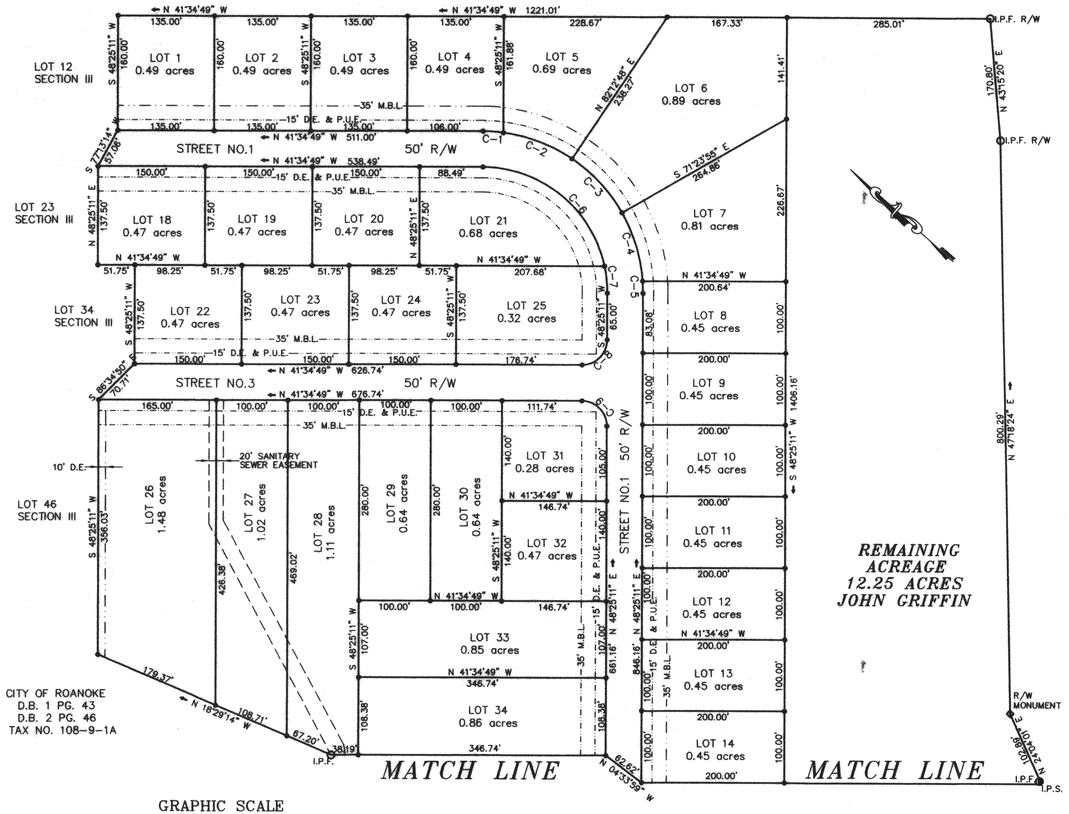


*VICINITY MAP*
*NO SCALE*

*NOTES:*

1. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE SEARCH AND THEREFORE MAY NOT SHOW ALL ENCUMBRANCES.
2. THIS PROPERTY AS PLATTED DOES FALL WITHIN THE 100 YEAR FLOOD ZONE.
3. THIS PLAT WAS PREPARED FROM AN ACTUAL AND CURRENT FIELD SURVEY.
4. FEMA FLOOD ZONE ___
5. LEGAL REFERENCE: P.B.___ P.G.___
   TAX MAP NO.___

GEORGE L. & SARAH R. TURPIN
D.B. 217 PG. 48
TAX NO. 108-A-132




LEGEND

- SURVEYED PROPERTY LINE
- DEED LINE
- SET REBAR
- EXISTING IRON FOUND
- MINIMUM BUILDING LINE
- DRAINAGE EASEMENT
- SLOPE/DRAINAGE EASEMENT
- SANITARY SEWER EASEMENT

GRAPHIC SCALE

100 0 50 100

( IN FEET )
1 inch = 100 ft.

# *PLAT OF SURVEY SHOWING "BROOKFIELD"*

*SECTION IV*
*APPROX 30.59 ACRES*
*FOR*
*BILDEL CORPORATION*
*LOCATED IN*
*BLUE RIDGE MAGISTERIAL DISTRICT*
*BOTETOURT COUNTY, VIRGINIA*

RECEIVED
JUL 02 1997
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ROANOKE, VIRGINIA 24016

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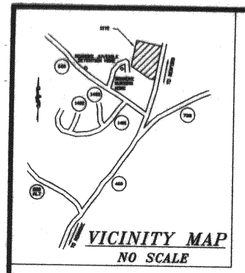
No. 1450 B
LAND SURVEYOR

COMM. # 942G DWG. 942GPLAT DATE: 06-27-97 ***SHEET 2 OF 3***

D:\942G-IV\PLAT SHT 2 DWG\ 06-27-97 REH

M.B. _____ PG. _____

M.B. _____ PG. _____



VICINITY MAP
NO SCALE

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4. FEMA FLOOD ZONE ___
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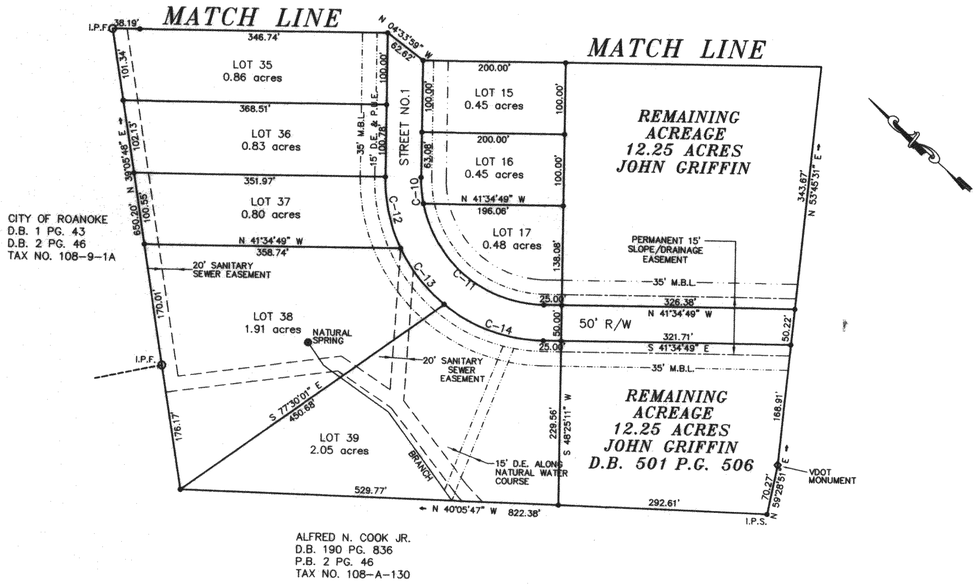
   TAX MAP NO.___




CITY OF ROANOKE
D.B. 1 PG. 43
D.B. 2 PG. 46
TAX NO. 108-9-1A

ALFRED N. COOK JR.
D.B. 190 PG. 836
P.B. 2 PG. 46
TAX NO. 108-A-130

LEGEND

- SURVEYED PROPERTY LINE
- DEED LINE
- SET REBAR
- EXISTING IRON FOUND
- MINIMUM BUILDING LINE
- DRAINAGE EASEMENT
- SLOPE/DRAINAGE EASEMENT
- SANITARY SEWER EASEMENT

GRAPHIC SCALE

100 0 50 100

( IN FEET )
1 inch = 100 ft.

# PLAT OF SURVEY SHOWING "BROOKFIELD"

SECTION IV
APPROX 30.59 ACRES
FOR
BILDEL CORPORATION
LOCATED IN
BLUE RIDGE MAGISTERIAL DISTRICT
BOTETOURT COUNTY, VIRGINIA

RECEIVED
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No. 1450 B
LAND SURVEYOR

COMM. # 942G DWG. 942GPLAT DATE: 06-27-97 ***SHEET 3 OF 3***

D:\942G-IV\PLAT SHT 3 DWG\ 06-27-97 REH

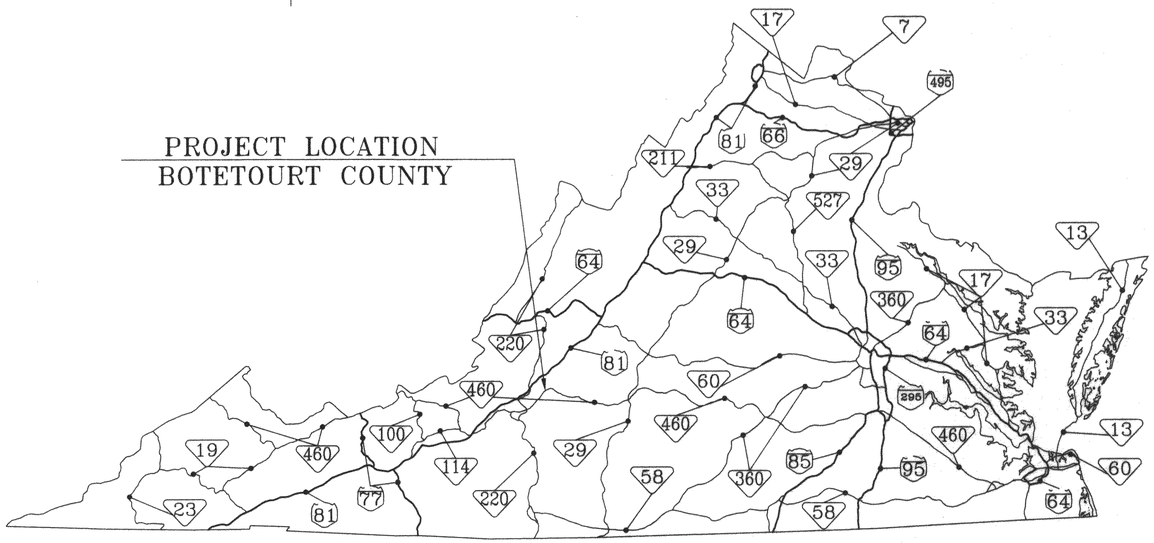
M.B. _____ PG. _____

# BROOKFIELD
# SECTION IV
# BOTETOURT COUNTY, VIRGINIA

OWNER

BILDEL CORPORATION
JOHN GRIFFIN
4053 LITTLE VALLEY DRIVE
TROUTVILLE, VIRGINIA 24175

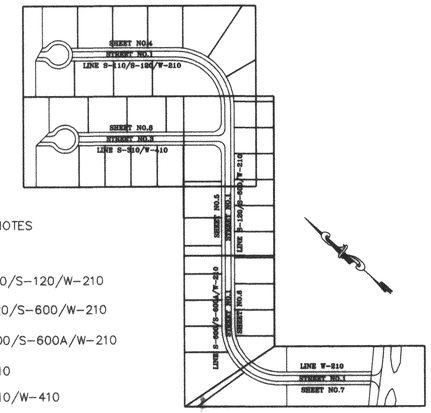
PROJECT LOCATION
BOTETOURT COUNTY

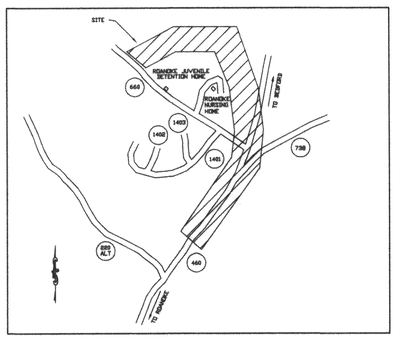



LOCATION MAP
NO SCALE

INDEX OF SHEETS
NO SCALE






VICINITY MAP
NO SCALE


LMW P.C.
ENGINEERING - SURVEYING
1401 2nd STREET
ROANOKE, VA. 24016
PHONE: (540) 345-0675
FAX (540) 342-4456


COMMONWEALTH OF VIRGINIA
RICHARD C. WHITE
No. 020021
6-27-97
PROFESSIONAL ENGINEER



COMM. NO. 942G-IV
SET NO.

D:\942G-IV\COVER.DWG 06-20-97

## ABBREVIATIONS

| | | | |
|---|---|---|---|
| AB | ANCHOR BOLT | JT | JOINT |
| ABAN | ABANDON OR ABANDONED | JB | JUNCTION BOX |
| ABUT | ABUTMENT | L | LENGTH, LONG |
| ABV | ABOVE | LF | LINEAL FOOT |
| ACT | ACOUSTICAL | LG | LONG |
| ADD | ADDITIONAL | LP | LIGHT POLE |
| ADJ | ADJACENT | LR | LONG RADIUS |
| AFF | ABOVE FINISH FLOOR | LT | LEFT |
| AGGR | AGGREGATE | LTG | LIGHTING |
| AHR | ANCHOR | MACH | MACHINERY |
| ALUM | ALUMINUM | MAS | MASONRY |
| ALT | ALTERNATE | MATL | MATERIAL |
| ANC | ANCHOR | MAX | MAXIMUM |
| APPROX | APPROXIMATE | MB | MAIL BOX |
| AARCH | ARCHITECTURAL | MECH | MECHANICAL |
| AWWA | AMERICAN WATER WORKS ASSOCIATION | MFR | MANUFACTURER |
| B | BRICK | MH | MANHOLE, MOUNTING HEIGHT |
| BIT | BITUMINOUS | MIN | MINIMUM |
| BJ | BELL JOINT | MISC | MISCELLANEOUS |
| BL | BASE LINE | MJ | MECHANICAL JOINT |
| BEG | BEGIN OR BEGINNING | MON | MONUMENT |
| BLDG | BUILDING | MTD | MOUNTED |
| BLKG | BLOCKING | MTG | MOUNTING |
| BM | BENCH MARK, BEAM | MTL | METAL |
| BOTT | BOTTOM | N & C | NAIL AND CAP |
| BP | BYPASS | NIC | NOT IN CONTRACT |
| BRG | BEARING | NO | NUMBER |
| BSMT | BASEMENT | NPW | NON POTABLE WATER |
| BSP | BLACK STEEL PIPE | NTS | NOT TO SCALE |
| BUR | BUILT UP ROOF | OC | ON CENTERS |
| BV | BUTTERFLY VALVE | OD | OUTSIDE DIAMETER |
| C | CHANNEL, COLD | OPER | OPERATOR |
| C/C, C TO C | CENTER TO CENTER | OPNG | OPENING |
| CAB | CABINET | OPP | OPPOSITE |
| CAP | CAPACITY | PC | POINT OF CURVE |
| CF | CUBIC FEET | PCC | POINT OF COMPOUND CURVE |
| CG | CHANGE OF GRADE | PER | PERIMETER |
| C & G | CURB AND GUTTER | PERF | PERFORATED |
| CI | CAST IRON | PERP | PERPENDICULAR |
| CIRC | CIRCULAR | PI | POINT OF INTERSECTION |
| CKT | CIRCUIT | PIV | POST INDICATOR VALVE |
| CL | CENTER LINE | PL | PLATE, PROPERTY LINE |
| CLR | CLEAR | PLYWD | PLYWOOD |
| CONST | CONSTRUCTION | POL | POINT ON LINE |
| CMP | CORRUGATED METAL PIPE | PT | POINT OF TANGENCY |
| CMU | CONCRETE MASONRY UNITS | POT | POINT ON TANGENT |
| CND | CONDUIT | PRC | POINT OF REVERSE CURVE |
| CO | CLEANOUT | PSI | POUNDS PER SQUARE INCH |
| COMB | COMBINATION | PT | POINT OF TANGENT |
| CONC | CONCRETE (PORTLAND CEMENT) | PVC | POLYVINYL CHLORIDE |
| CONN | CONNECT, CONNECTION | PVI | POINT OF VERTICAL INTERSECTION |
| CONT | CONTINUOUS, CONTROL | PVMT | PAVEMENT |
| CONTR | CONTRACTOR | PVT | PRIVATE |
| CONV | CONVEYOR | R | RADIUS, RISER |
| CR STONE | CRUSHED STONE | RR | RAILROAD |
| CTR | CENTER | RCP | REINFORCED CONCRETE PIPE |
| CULV | CULVERT | RD | ROOF DRAIN, ROAD |
| CY | CUBIC YARD | RDCR | REDUCER |
| D | DEPTH OR DEGREE OF CURVE | RECPT | RECEPTACLE |
| DEPT | DEPARTMENT | RECT | RECTANGULAR |
| DF | DRINKING FOUNTAIN | REINF | REINFORCE, REINFORCEMENT |
| DI | DROP INLET, DUCTILE IRON | REF | REFERENCE |
| DIA | DIAMETER | REL | RELOCATED |
| DIM | DIMENSION | REQD | REQUIRED |
| DISC | DISCONNECT | REV | REVISION |
| DMH | DROP MANHOLE | RTE | ROUTE |
| DN | DOWN | RT | RIGHT |
| DR | DRIVE | R/W | RIGHT OF WAY |
| DS | DOWN SPOUT | S | SANITARY SEWER, SOUTH, STORY, SWITCH |
| DTL | DETAIL | SAN | SANITARY |
| DWL | DWELLING | SCH | SCHEDULE |
| DWG | DRAWING | SD | STORM DRAIN |
| E | EAST | SECT | SECTION |
| EA | EACH | SER | SERVICE |
| E.B.L. | EASTBOUND LANE | SH | SHEET |
| EF | EACH FACE | SHTG | SHEETING |
| EJ | EXPANSION JOINT | SIM | SIMILAR |
| EL. ELEV | ELEVATION | SPEC | SPECIFICATION |
| ELEC | ELECTRICAL | SPECS | SPECIFICATIONS |
| ENGR | ENGINEER | SQ | SQUARE |
| ENTR | ENTRANCE | SS | STAINLESS STEEL |
| EOL | END OF LINE | ST | STREET |
| EP | EDGE OF PAVEMENT | STA | STATION |
| EQ | EQUAL | STD | STANDARD |
| EQPT | EQUIPMENT | STL | STEEL |
| EW | EACH WAY, ENDWALL | STRUCT | STRUCTURAL |
| EXIST | EXISTING | STY | STORY |
| EXP | EXPANSION | SUR | SURVEY |
| EXT | EXTERIOR | SURF | SURFACE |
| FR | FRAME | SYMM | SYMMETRICAL |
| FD | FLOOR DRAIN | T | TREAD |
| FDN | FOUNDATION | T & B | TOP AND BOTTOM |
| FES | FLARED END SECTION | TDC | TURNED DOWN CURB |
| FF | FINISH FLOOR | TELE | TELEPHONE |
| FFE | FINISHED FLOOR ELEVATION | TEMP | TEMPORARY |
| FIG | FIGURE | THK | THICK |
| FIN | FINISH | TRTD | TREATED |
| FIXT | FIXTURE | TV | TELEVISION |
| FL | FLOOR | TW | TOP OF WALL |
| FLEX | FLEXIBLE | TYP | TYPICAL |
| FLG | FLANGE | UG | UNDERGROUND |
| FT | FOOT | UON | UNLESS OTHERWISE NOTED |
| FTG | FOOTING | U.S.C.&G.S | UNITED STATES COAST AND GEODETIC SURVEY |
| FUT | FUTURE | | |
| GAL | GALLON | V. VAL | VALVE, VENT |
| GALV | GALVANIZED | VAP BAR | VAPOR BARRIER |
| GAR | GARAGE | VC | VERTICAL CURVE |
| GND | GROUND | VERT | VERTICAL |
| GR | GRAVEL | VOL | VOLUME |
| GOVT | GOVERNMENT | VDOT | VIRGINIA DEPARTMENT OF TRANSPORTATION |
| GPM | GALLONS PER MINUTE | V.S.D. | VERTICAL SIGHT DISTANCE |
| GRTG | GRATING | W.B.L. | WESTBOUND LANE |
| GV | GATE VALVE | W | WIDE FLANGE, WIDE, WASTE, WATER |
| H | HOT | W/ | WITH |
| HB | HOSE BIBB | WD | WOOD |
| HK | HOOK | WL | WATER LINE |
| HM | HOLLOW METAL | W/O | WITHOUT |
| HOR, HORIZ | HORIZONTAL | WS | WATER SURFACE |
| HP | HORSE POWER | WT | WATERTIGHT, WEIGHT |
| HPT | HIGH POINT | WVDH | WEST VIRGINIA DEPARTMENT OF HIGHWAYS |
| HYD | HYDRANT | | |
| ID | INSIDE DIAMETER | WWF | WELDED WIRE FABRIC |
| IN | INCH | COR | CORNER |
| INSUL | INSULATION | DW, D/W | DRIVEWAY |
| INV | INVERT | PP | POWER POLE |
| IP | IRON PIN | TP | TELEPHONE POLE |
| | | S/W | SIDEWALK |

## LEGEND

| EXISTING | NEW | DESCRIPTION |
|---|---|---|
| | | BUILDING WITH PORCH OR STOOP |
| | | FOUNDATION ONLY |
| 35 | 35 | CONTOUR, CONTOUR WITH ELEVATION |
| 20.0 E OR +1025.00 E | 20.0 E OR X 1025 | SPOT ELEVATION |
| | | CONCRETE CURB |
| | | CONCRETE CURB & GUTTER |
| | | CONCRETE WALK OR SLAB |
| | | PAVEMENT |
| | | UNPAVED OR GRAVEL ROAD |
| | | CONSTRUCTION EASEMENT |
| | | PERMANENT EASEMENT |
| | | TREE LINE |
| | OR | TREE OR SHRUB |
| x x | x x | FENCE |
| | | CENTERLINE CREEK, SWALE, DITCH |
| ℄ | ℄ | PROPERTY LINE |
| ℄ ℄ | ℄ ℄ | CENTERLINE OR BASELINE |
| | | LIMIT OF WORK LINE |
| △ | △ | FIELD SURVEY TRAVERSE POINT |
| ○ | ○ | P.O. OR P.T. |
| ⊕ | ◆ | GEOLOGIC BORE HOLE |
| SD | SD | STORM DRAIN AND ENDWALL |
| S | S | SANITARY SEWER |
| FM | FM | FORCE MAIN |
| G | G | GAS MAIN OR SERVICE LINE |
| W | W | WATER MAIN OR SERVICE LINE |
| E | E | ELECTRICAL LINE |
| UT | UT | UNDERGROUND TELEPHONE LINE |
| UE | UE | UNDERGROUND ELECTRICAL LINE |
| | | PIPE FITTINGS |
| | | FIRE HYDRANT |
| OR | OR | GATE VALVE |
| CO | CO | CLEANOUT |
| | | MANHOLE |
| | | DROP INLET (CURB AND GRATING TYPES) |
| GM WM | GM WM | G.M. – GAS METER, W.M. – WATER METER |
| T | T | TELEPHONE LINE |
| | | TELEPHONE POLE, GUY AND ANCHOR |
| | | POWER POLE, GUY AND ANCHOR |
| | | LIGHT POLE |
| T | T | TELEPHONE PEDESTAL |
| | | BURIED TELEPHONE VAULT |
| | | ABANDON OR REMOVE |
| | | PAVED DITCH |
| | | DRIVEWAY CULVERT |
| | | CULVERT WITH FLARED END SECTION |
| WV | | WATER VALVE |
| HT | | HUB AND TACK |
| PROFILE PLAN | | AIR RELEASE VALVE |

## EROSION AND SEDIMENT CONTROL SYMBOLS

| | | |
|---|---|---|
| EC1 | | EROSION CONTROL STONE |
| STB | | STRAW BALE BARRIER |
| IP | | STORM DRAIN INLET PROTECTION |
| DD | | TEMPORARY DIVERSION DIKE |
| ST | | TEMPORARY SEDIMENT TRAP |
| CE | | TEMPORARY GRAVEL CONSTRUCTION ENTRANCE |
| RR | | RIPRAP |
| SF | x x | SILT FENCE |
| PS | PS | PREMANENT SEEDING |
| TS | TS | TEMPORARY SEEDING |
| CD | | ROCK CHECK DAMS |
| OP | | OUTLET PROTECTION |
| CE | CE | TEMPORARY GRAVEL CONSTRUCTION ENTRANCE |
| CRS | CRS | CONSTRUCTION ROAD STABILIZATION |

## MATERIALS SYMBOLS

| | |
|---|---|
| | METAL |
| | BRICK |
| | CONCRETE MASONRY |
| | CONCRETE |
| | GROUT OR FINISHED CONCRETE |
| | INSULATION (RIGID) |
| | WOOD BLOCKING |
| | FINISHED WOOD OR PLYWOOD |
| | GRAVEL OR STONE |
| | EARTH |

## GENERAL NOTES

THE LOCATION OF EXISTING UTILITIES, INCLUDING UNDERGROUND UTILITIES, IS INDICATED ON THE DRAWINGS IN SO FAR AS THEIR EXISTENCE AND LOCATION WERE KNOWN AT THE TIME OF PREPARATION OF THESE DRAWINGS, HOWEVER, NOTHING IN THESE CONTRACT DOCUMENTS SHALL BE CONSTRUED AS A GUARANTEE THAT SUCH UTILITIES ARE IN THE LOCATION INDICATED OR THAT THEY ACTUALLY EXIST OR THAT OTHER UTILITIES ARE NOT WITHIN THE AREA OF OPERATIONS. THE CONTRACTOR SHALL MAKE ALL NECESSARY INVESTIGATIONS TO DETERMINE THE EXISTENCE AND LOCATIONS OF SUCH UTILITIES. THE CONTRACTOR SHALL PAY FOR ANY DAMAGE TO AND FOR MAINTENANCE AND PROTECTION OF EXISTING UTILITIES AND STRUCTURES.

EXISTING WATER LINE LOCATIONS BOTH HORIZONTAL AND VERTICAL ARE APPROXIMATE. THE LOCATION IS NOT THE RESULT OF A FIELD SURVEY.

THE CONTRACTOR IS DIRECTED TO DIG AND LOCATE ALL UTILITIES IN ADVANCE OF PIPELAYING TO ALLOW FOR ADJUSTMENTS DUE TO CONFLICTS WITH EXISTING UTILITIES. SHOULD A CONFLICT ARISE THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY.

THE CONTRACTOR IS REQUIRED TO NOTIFY "MISS UTILITY" AT 1-800-552-7001 AT LEAST TWO, BUT NOT MORE THAN TEN, WORKING DAYS IN ADVANCE OF CONSTRUCTION.

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COMMONWEALTH OF VIRGINIA
RICHARD C. WHITE
No. 020021
6-27-97
PROFESSIONAL ENGINEER

ENGINEER'S SEAL

| REVISION | DATE | DESCRIPTION | BY | APP. |
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| DESIGNED | RCW |
| DRAWN | MLL/REH |
| CHECKED | DRM |
| APPROVED | RCW |
| SUBMITTED | RCW |

BROOKFIELD – SECTION IV

# ABBREVIATIONS, LEGEND, GENERAL NOTES, & INDEX

BOTETOURT COUNTY, VIRGINIA

IMW P.C. ENGINEERING – SURVEYING
PHONE (540) 345-0675 1401 2nd STREET S.W.
FAX (540) 342-4456 ROANOKE, VIRGINIA 24016

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| SCALE: | NONE | COMM. NO. | 942G-IV |
| DATE: | 06-20-97 | SHEET | 2 |

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VIRGINIA DEPARTMENT OF TRANSPORTATION NOTES:

1. QUALITY CONTROL

STREETS TO BE GRADED, PAVED AND ALL STRUCTURAL COMPONENTS ERECTED IN ACCORDANCE WITH CURRENT VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS AND ROAD DESIGN STANDARDS, ROANOKE COUNTY, VIRGINIA DESIGN STANDARDS SPECIFICATIONS. ALL MATERIALS USED SHALL BE TESTED IN ACCORDANCE WITH STANDARD POLICIES. THE DEVELOPER MUST CONTACT THE OFFICE OF THE RESIDENT ENGINEER PRIOR TO BEGINNING ANY CONSTRUCTION AT WHICH TIME AN INSPECTION AND TESTING PROCEDURE POLICY WILL BE DRAWN. THE DEVELOPER WILL PRODUCE TEXT REPORTS FROM APPROVED INDEPENDENT LABORATORIES AT THE DEVELOPER'S EXPENSE.

THE PAVEMENT DESIGNS SHOWN ARE BASED ON A SUBGRADE CBR VALUE OF 10 OR GREATER. THE SUBGRADE SOIL IS TO BE TESTED BY AN INDEPENDENT LABORATORY AND THE RESULTS SUBMITTED TO THE VIRGINIA DEPARTMENT OF TRANSPORTATION PRIOR TO BASE CONSTRUCTION. SHOULD THE SUBGRADE CBR VALUES BE LESS THAN 10, THEN ADDITIONAL BASE MATERIAL WILL BE REQUIRED IN ACCORDANCE WITH DEPARTMENTAL SPECIFICATIONS.

THE SUBGRADE MUST BE APPROVED BY VIRGINIA DEPARTMENT OF TRANSPORTATION PRIOR TO PLACEMENT OF THE BASE. BASE MUST BE APPROVED BY VIRGINIA DEPARTMENT OF TRANSPORTATION FOR DEPTH, TEMPLATE AND COMPACTION BEFORE SURFACE IS APPLIED.

2. UTILITIES

ALL NECESSARY UTILITY LATERALS ALONG WITH PROVISIONS FOR CONDUITS (I.E. WATER, SEWER, STORM, GAS, AND TELEPHONE) WILL BE CONSTRUCTED PRIOR TO PLACEMENT OF BASE MATERIAL.

GAS OR PETROLEUM TRANSMISSION LINES WILL NOT BE PERMITTED WITHIN THE PAVEMENT OR SHOULDER ELEMENT (BACK OF CURB TO BACK OF CURB) OF THIS DEVELOPMENT. SERVICE LATERALS CROSSING AND PIPE LINES LOCATED OUTSIDE THE PAVEMENT BUT INSIDE THE RIGHT OF WAY WILL BE CONSTRUCTED IN CONFORMITY WITH ASA B 31.8 SPECIFICATIONS AND SAFETY REGULATIONS. DISTRIBUTION LINES WITH PRESSURES LESS THAN 120 LBS. ARE UNAFFECTED BY THE ABOVE.

PERMITS WILL BE REQUIRED FOR ALL UTILITIES WITHIN STREET RIGHT OF WAY PRIOR TO ACCEPTANCE INTO THE SECONDARY HIGHWAY SYSTEM.

ANY EASEMENTS GRANTED TO A UTILITY COMPANY FOR PLACEMENT OF POWER, TELEPHONE, ETC. MUST BE RELEASED PRIOR TO ACCEPTANCE.

3. PRIVATE ENTRANCES

MODIFIED CG-9D GUTTER WILL BE PROVIDED AT ALL ENTRANCES TO PRIVATE LOTS WHERE STANDARD CG-6 CURB AND GUTTER IS APPROVED FOR USE.
DRIVEWAYS CONNECTING TO ROADS WITHOUT CURB & GUTTER SHALL CONFORM TO THE PAVEMENT, SHOULDER & SLOPE.
PERMITS WILL BE REQUIRED FOR ALL PRIVATE ENTRANCES CONSTRUCTED ON STREET RIGHTS OF WAY AFTER ACCEPTANCE INTO THE SECONDARY HIGHWAY SYSTEM.

4. EROSION CONTROL AND LANDSCAPING

CARE MUST BE TAKEN DURING CONSTRUCTION TO PREVENT EROSION, DUST AND MUD FROM DAMAGING ADJACENT PROPERTY, CLOGGING DITCHES, STREAKING PUBLIC STREETS AND OTHERWISE CREATING A PUBLIC OR PRIVATE NUISANCE TO SURROUNDING AREAS.
THE ENTIRE CONSTRUCTION AREA INCLUDING DITCHES, CHANNELS, BACK OF CURBS AND OR PAVEMENT ARE TO BE BACKFILLED AND SEEDED AT THE EARLIEST POSSIBLE TIME AFTER FINAL GRADING.
DRAINAGE EASEMENTS MUST BE DEFINED BY EXCAVATED DITCHES OR CHANNELS FOR THEIR FULL LENGTH TO WELL DEFINED EXISTING NATURAL WATERCOURSES.
THE ROAD WILL BE REVIEWED DURING CONSTRUCTION FOR THE NEED OF PAVED DITCHES. IF EROSION IS ENCOUNTERED IN ANY DRAINAGE EASEMENT, IT WILL BE THE RESPONSIBILITY OF THE DEVELOPER TO SOD, RIP RAP, GROUT PAVE OR TO DO WHATEVER IS NECESSARY TO CORRECT THE PROBLEM.
ALL VEGETATION AND OVERBURDEN TO BE REMOVED FROM SHOULDER TO SHOULDER PRIOR TO THE CONDITIONING (CUTTING AND/OR PREPARATION) OF THE SUBGRADE.

5. INTERSECTION PAVEMENT RADIUS

MINIMUM PAVEMENT RADIUS OF 35 FEET IS REQUIRED AT ALL STREET INTERSECTIONS.

6. CONNECTIONS TO STATE-MAINTAINED ROADS

WHILE THESE PLANS HAVE BEEN APPROVED, SUCH APPROVAL DOES NOT EXEMPT CONNECTIONS WITH EXISTING STATE-MAINTAINED ROADS FROM CRITICAL REVIEW AT THE TIME PERMIT APPLICATIONS ARE MADE. THIS IS NECESSARY IN ORDER THAT THE PREVAILING CONDITIONS BE TAKEN INTO CONSIDERATION REGARDING SAFETY ACCOMPANIMENTS SUCH AS TURNING LANES.

7. GUARDRAILS

STANDARD GUARDRAIL WITH SAFETY END SECTIONS MAY BE REQUIRED ON FILLS AS DEEMED NECESSARY BY THE RESIDENT ENGINEER. AFTER COMPLETION OF ROUGH GRADING OPERATIONS, THE OFFICE OF THE RESIDENT ENGINEER, SHALL BE NOTIFIED SO THAT A FIELD REVIEW MAY BE MADE OF THE PROPOSED LOCATIONS.
WHERE GUARDRAILS ARE TO BE INSTALLED THE SHOULDER WIDTH SHALL BE INCREASED IN ACCORDANCE WITH VDOT ROAD AND BRIDGE STANDARDS.

8. STORM DRAINAGE

FIELD REVIEW WILL BE MADE DURING CONSTRUCTION TO DETERMINE THE NEED AND LIMITS OF PAVED DITCHES AND/OR DITCH STABILIZATION TREATMENTS, AND TO DETERMINE THE NEED AND LIMITS OF ADDITIONAL DRAINAGE EASEMENTS. ALL DRAINAGE EASEMENTS MUST BE CUT AND MADE TO FUNCTION TO A NATURAL WATERCOURSE. ANY EROSION PROBLEMS ENCOUNTERED IN AN EASEMENT MUST BE CORRECTED BY WHATEVER DITCH SLOPES ARE TO BE FOUR TO ONE (4:1) FOR SHOULDER WIDTHS OF SIX FEET (6') OR GREATER AND THREE TO ONE (3:1) FOR SHOULDER WIDTHS OF FOUR FEET (4') OR FIVE FEET (5'), UNLESS OTHERWISE SPECIFIED IN THE PLANS.

9. ENTRANCE PERMIT

CONTRACTOR SHALL OBTAIN ENTRANCE PERMIT TO THE EXISTING VIRGINIA DEPARTMENT OF TRANSPORTATION RIGHT OF WAY FROM RESIDENT ENGINEER PRIOR TO ROAD CONSTRUCTION.

10. INSPECTION

AN INSPECTOR WILL NOT BE FURNISHED EXCEPT FOR PERIODIC PROGRESS INSPECTION, THE ABOVE MENTIONED FIELD REVIEWS AND CHECKING FOR REQUIRED STONE DEPTHS. THE DEVELOPER WILL BE REQUIRED TO POST A SURETY TO GUARANTEE THE ROAD FREE OF DEFECTS FOR ONE YEAR AFTER ACCEPTANCE BY THE DEPARTMENT OF TRANSPORTATION.

11. STREET MAINTENANCE

THE STREETS MUST BE PROPERLY MAINTAINED UNTIL ACCEPTANCE. AT SUCH TIME AS ALL REQUIREMENTS HAVE BEEN MET FOR ACCEPTANCE, ANOTHER INSPECTION WILL BE MADE TO DETERMINE THAT THE STREET HAS BEEN PROPERLY MAINTAINED.

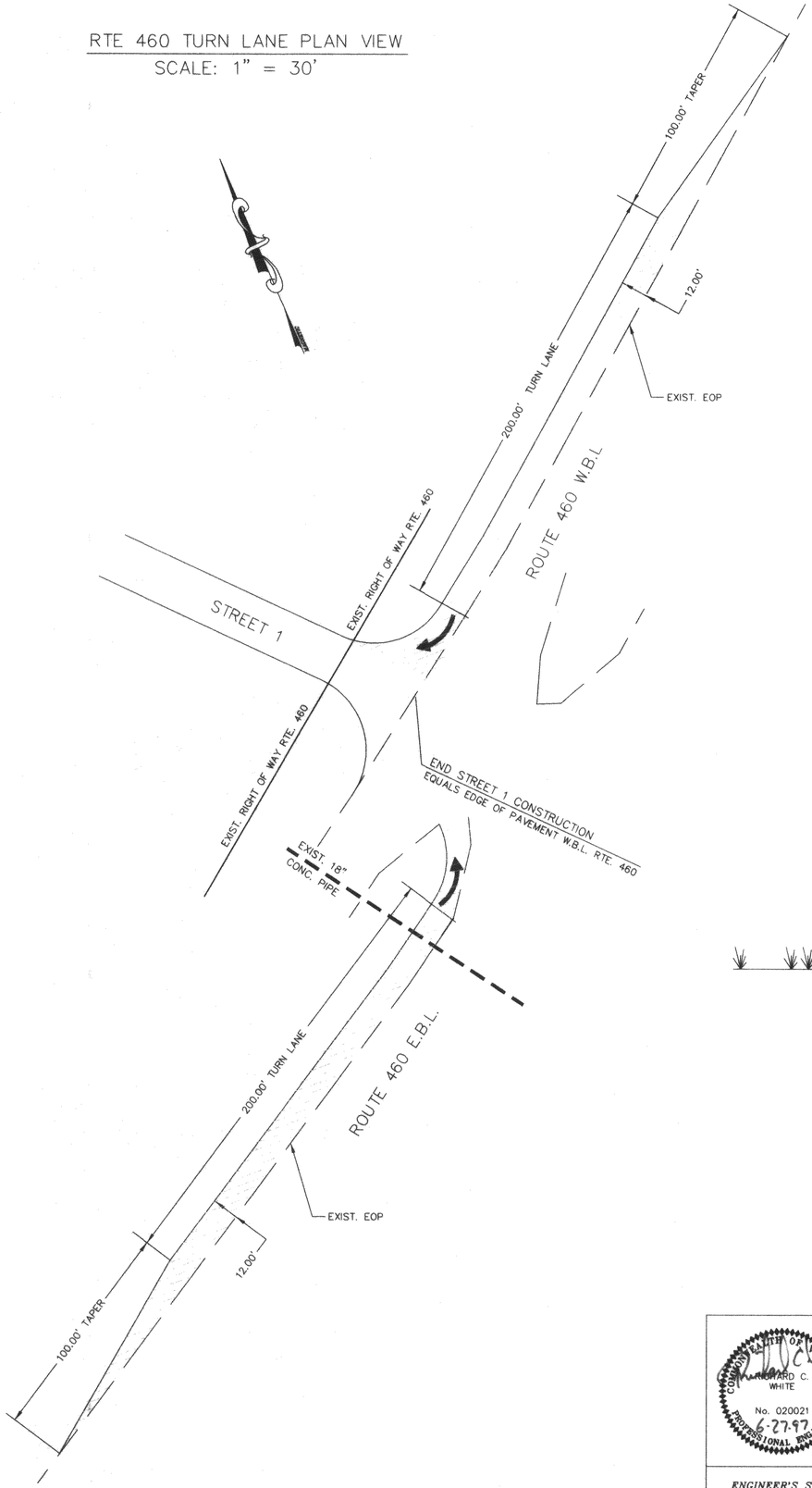
12. UNDERGROUND UTILITIES

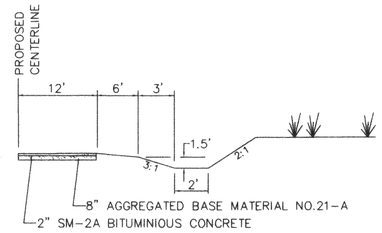
CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF ALL UNDERGROUND UTILITIES SHOWN ON THE PLANS IN AREAS OF CONSTRUCTION PRIOR TO STARTING WORK BY CONTACTING MISS UTILITY. CONTACT SITE ENGINEER IMMEDIATELY IF LOCATION OR ELEVATION IS DIFFERENT FROM THAT SHOWN ON THE PLANS. IF THERE APPEARS TO BE A CONFLICT AND UPON DISCOVERY OF ANY UTILITY NOT SHOWN ON THIS PLAN, CALL "MISS UTILITY" OF CENTRAL VIRGINIA AT 1-800-552-7001.

13. REVISIONS OF SPECIFICATIONS AND STANDARDS

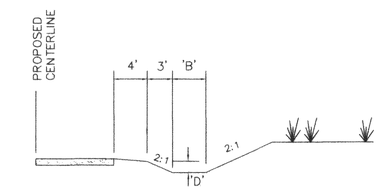
APPROVAL OF THESE PLANS WILL BE BASED ON SPECIFICATIONS AND STANDARDS IN EFFECT AT THE TIME OF APPROVAL AND WILL BE SUBJECT, UNTIL COMPLETION OF THE ROADWAY AND ACCEPTANCE BY THE DEPARTMENT, TO FUTURE REVISIONS OF THE SPECIFICATIONS AND STANDARDS.

## RTE 460 TURN LANE PLAN VIEW
SCALE: 1" = 30'



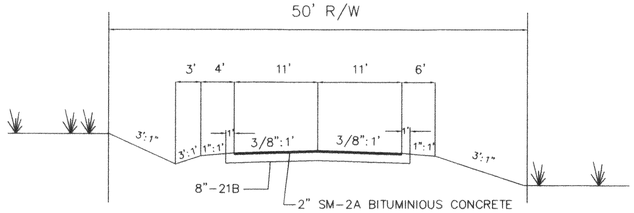

TYPICAL SECTION
RTE 460 TURN LANE PAVEMENT DETAIL
NO SCALE




DETAIL 'A'

MODIFIED ROADSIDE DITCH
NO SCALE

| BASELINE | STA | TO | STA | 'B' | 'D' |
|---|---|---|---|---|---|
| STREET '1' | 27+00 | | 38+00 | 2' | 1.5' |
| STREET '3' | 19+50 | | 22+00 | 2' | 1.5' |




CATEGORY II
TYPICAL PAVEMENT SECTION
NO SCALE

STA. 28+49.03 TO STA. 52+13.83 - STREET '1'
STA. 20+16.50 TO STA. 26+96.20 - STREET '3'

| REVISION | DATE | DESCRIPTION | BY | APP. |
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COMMONWEALTH OF VIRGINIA — RICHARD C. WHITE — No. 020021 — 6-27-97 — PROFESSIONAL ENGINEER

ENGINEER'S SEAL

| | |
|---|---|
| DESIGNED | DME |
| DRAWN | DME |
| CHECKED | RCW |
| APPROVED | RCW |
| SUBMITTED | DRM |

BROOKFIELD - SECTION IV

ROADWAY CONSTRUCTION AND GENERAL NOTES

ROANOKE COUNTY, VIRGINIA

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SCALE: NONE
COMM. NO. 942G-IV
DATE: 06-23-97
SHEET 3

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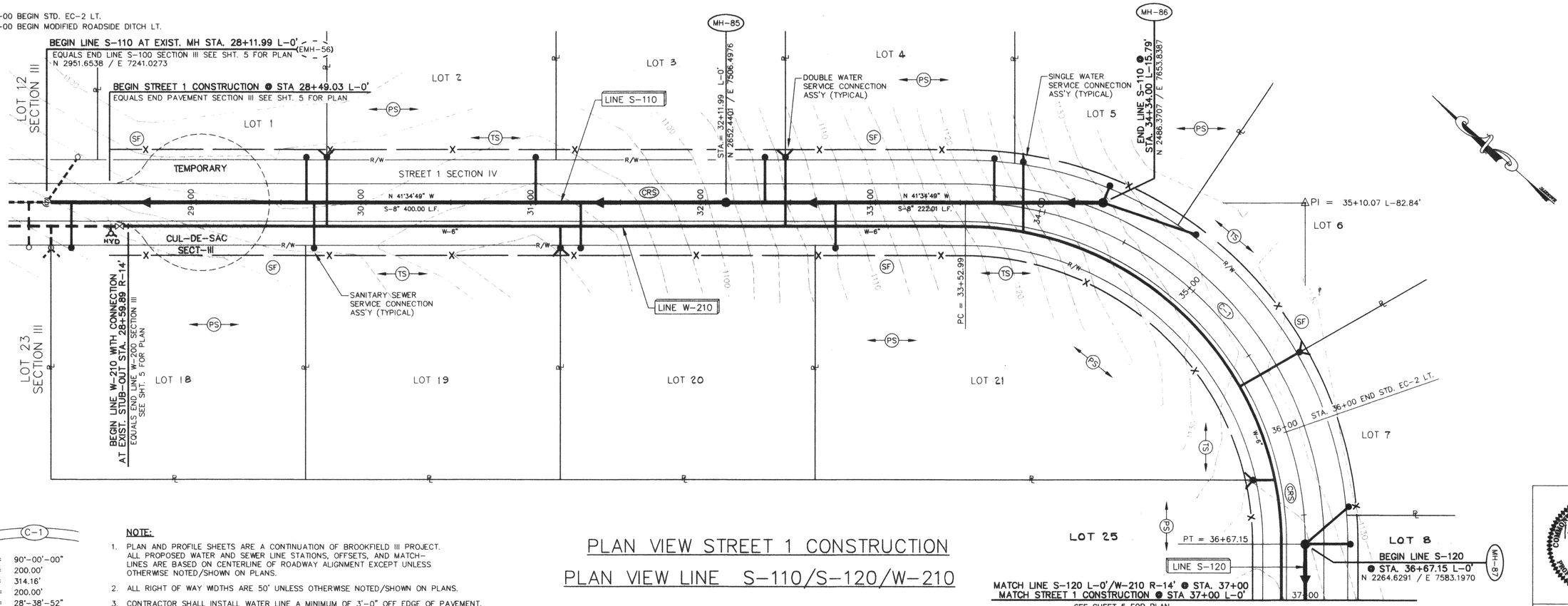
NOTE:
STA. 27+00 BEGIN STD. EC-2 LT.
STA. 27+00 BEGIN MODIFIED ROADSIDE DITCH LT.

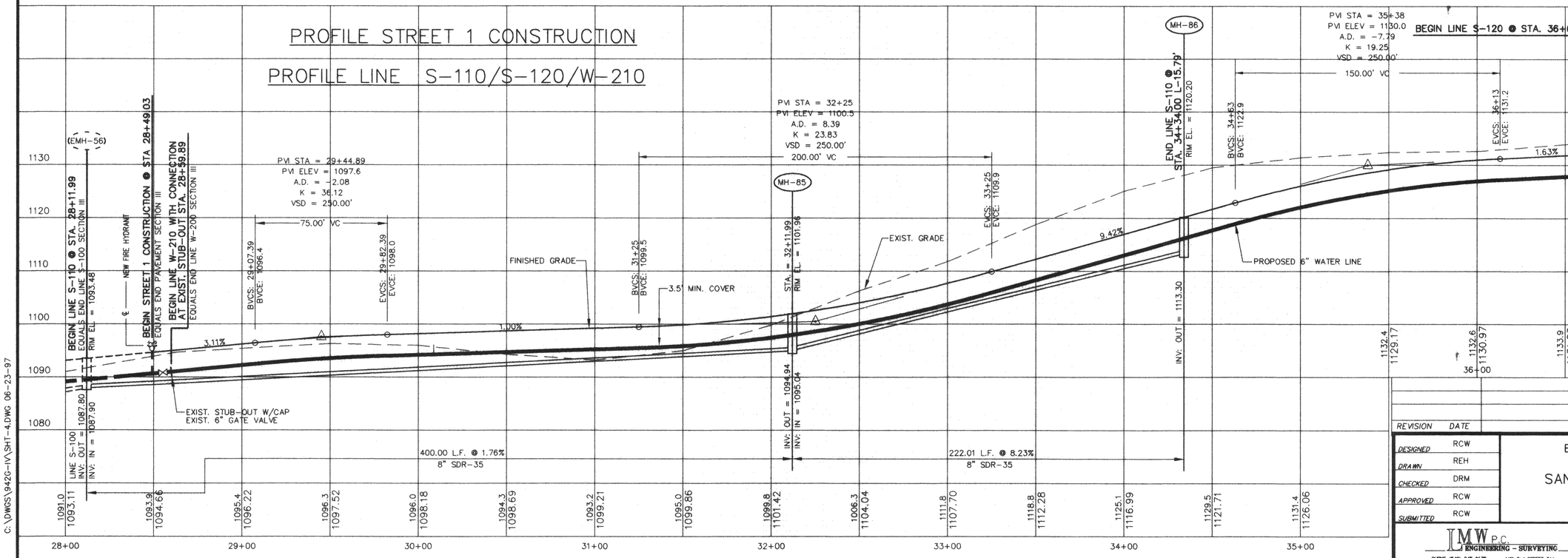



C-1
Δ = 90°-00'-00"
T = 200.00'
L = 314.16'
R = 200.00'
D = 28°-38'-52"

NOTE:
1. PLAN AND PROFILE SHEETS ARE A CONTINUATION OF BROOKFIELD III PROJECT. ALL PROPOSED WATER AND SEWER LINE STATIONS, OFFSETS, AND MATCH-LINES ARE BASED ON CENTERLINE OF ROADWAY ALIGNMENT EXCEPT UNLESS OTHERWISE NOTED/SHOWN ON PLANS.
2. ALL RIGHT OF WAY WIDTHS ARE 50' UNLESS OTHERWISE NOTED/SHOWN ON PLANS.
3. CONTRACTOR SHALL INSTALL WATER LINE A MINIMUM OF 3'-0" OFF EDGE OF PAVEMENT.

## PLAN VIEW STREET 1 CONSTRUCTION
## PLAN VIEW LINE S-110/S-120/W-210

## PROFILE STREET 1 CONSTRUCTION
## PROFILE LINE S-110/S-120/W-210

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| DESIGNED | RCW |
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| APPROVED | RCW |
| SUBMITTED | RCW |

BROOKFIELD SECTION IV
ROAD DESIGN
SANITARY SEWER & WATER
PLAN & PROFILE
BOTETOURT COUNTY, VIRGINIA

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1408 2nd STREET S.W.
ROANOKE, VIRGINIA 24016


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| SCALE: | 1"=30'HORZ 1"=10' VERT |
| COMM. NO. | 942-G |
| DATE: | 06-23-97 |
| SHEET | 4 |

COMMONWEALTH OF VIRGINIA
RICHARD C. WHITE
No. 020021
6-27-97
PROFESSIONAL ENGINEER
ENGINEER'S SEAL

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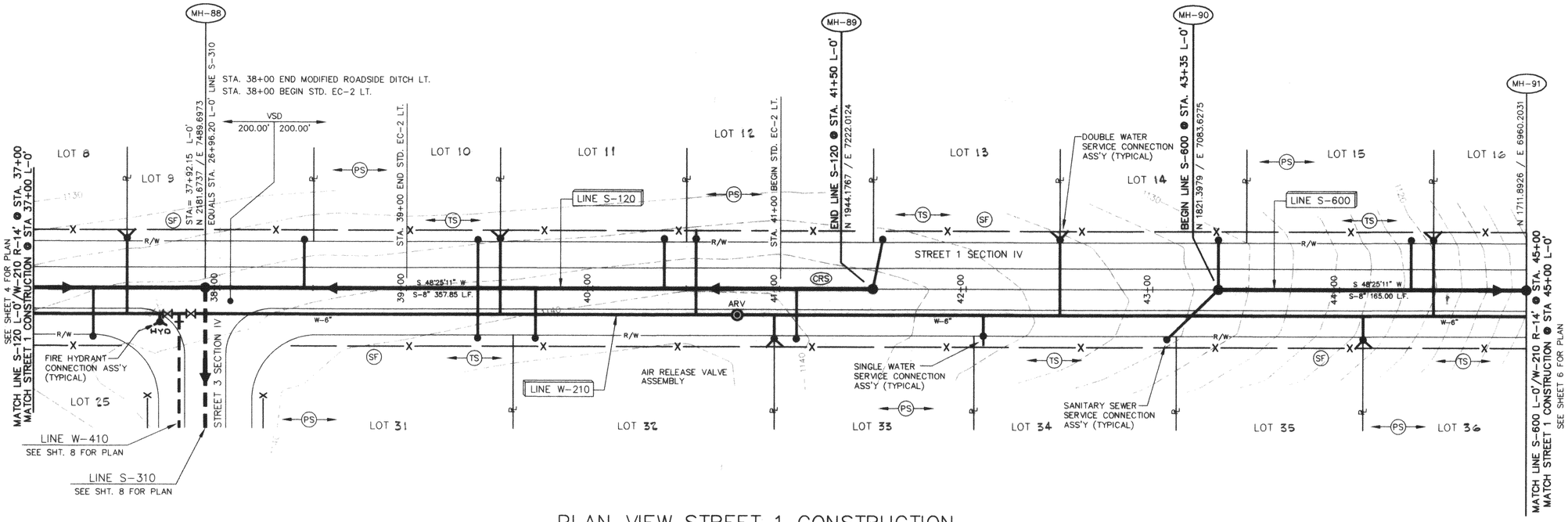


## PLAN VIEW STREET 1 CONSTRUCTION

## PLAN VIEW LINE S-120/W-210/W-600

**NOTE:**

1. PLAN AND PROFILE SHEETS ARE A CONTINUATION OF BROOKFIELD III PROJECT. ALL PROPOSED WATER AND SEWER LINE STATIONS, OFFSETS, AND MATCH-LINES ARE BASED ON CENTERLINE OF ROADWAY ALIGNMENT EXCEPT UNLESS OTHERWISE NOTED/SHOWN ON PLANS.
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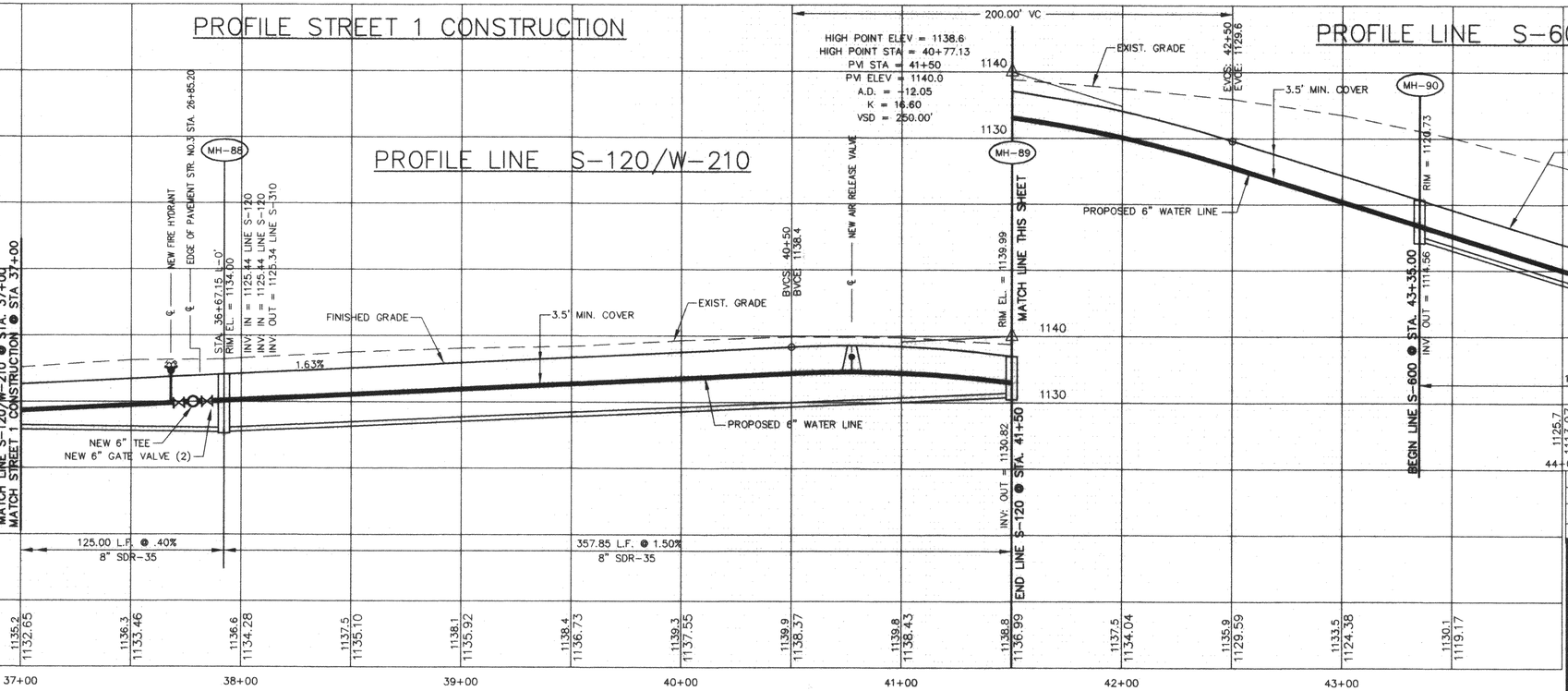
COMMONWEALTH OF VIRGINIA
RICHARD C. WHITE
No. 020021
6-27-97
PROFESSIONAL ENGINEER

ENGINEER'S SEAL

## PROFILE STREET 1 CONSTRUCTION

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| SUBMITTED | RCW |

BROOKFIELD SECTION IV
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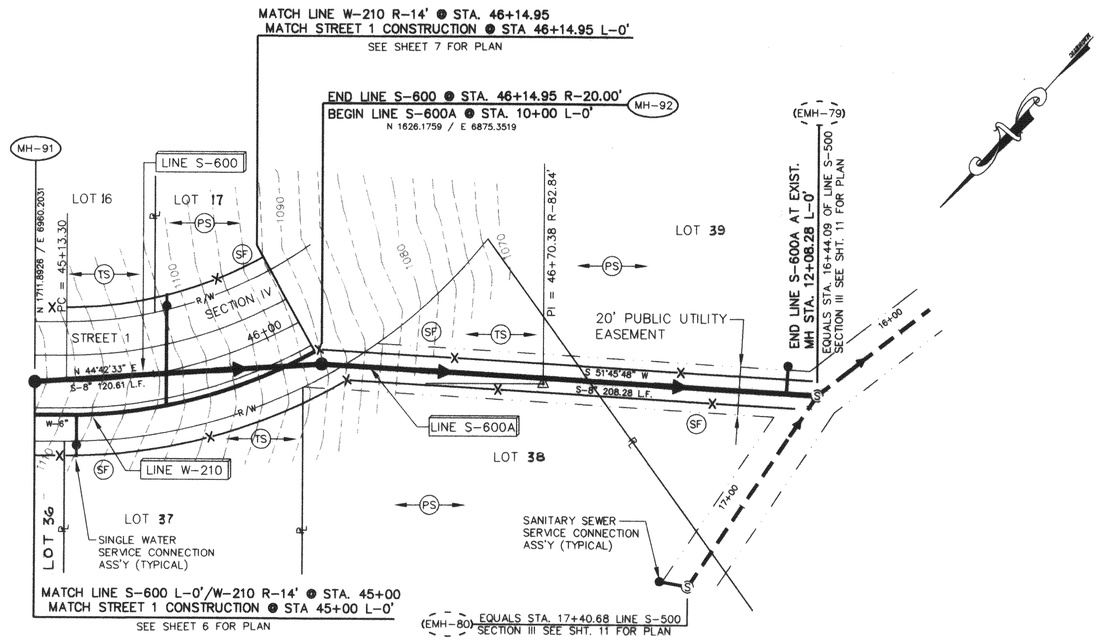


## PLAN VIEW STREET 1 CONSTRUCTION
## PLAN VIEW LINE S-600/S-600A/W-210

**NOTE:**

1. PLAN AND PROFILE SHEETS ARE A CONTINUATION OF BROOKFIELD III PROJECT. ALL PROPOSED WATER AND SEWER LINE STATIONS, OFFSETS, AND MATCH-LINES ARE BASED ON CENTERLINE OF ROADWAY ALIGNMENT EXCEPT UNLESS OTHERWISE NOTED/SHOWN ON PLANS.
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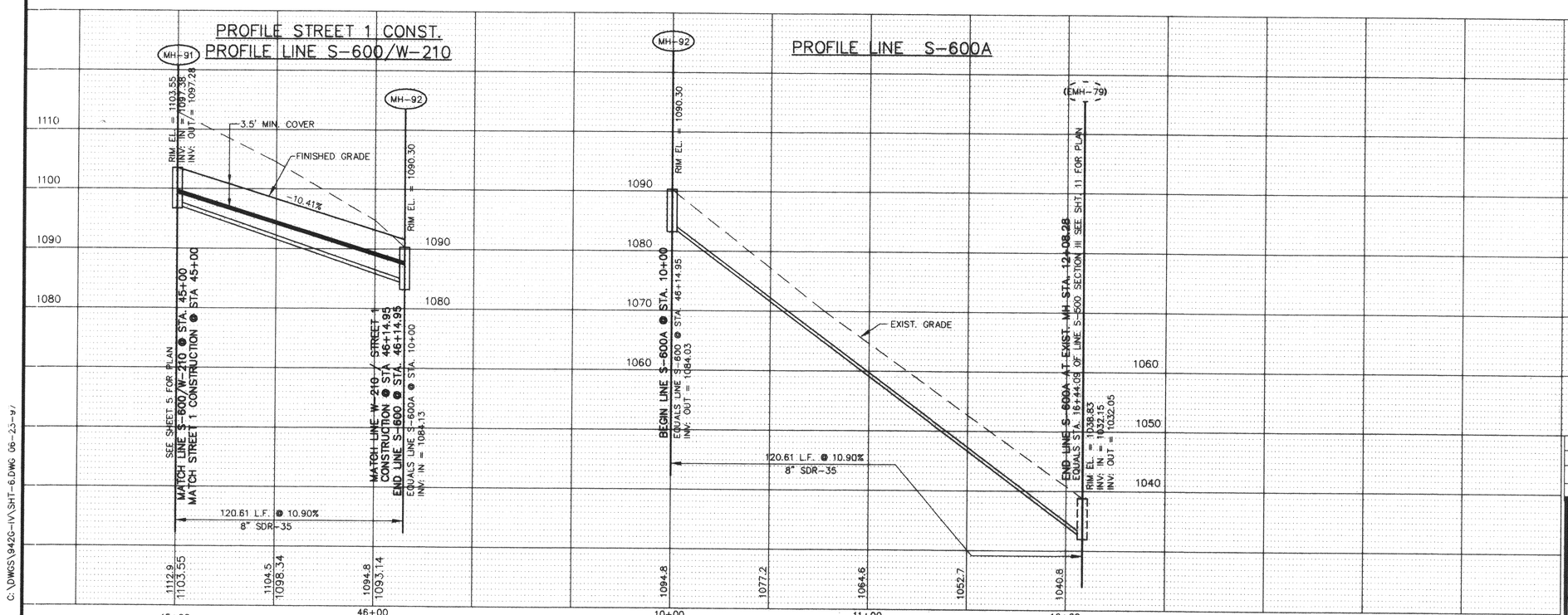
COMMONWEALTH OF VIRGINIA
RICHARD C. WHITE
No. 020021
6-27-97
PROFESSIONAL ENGINEER

ENGINEER'S SEAL

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| APPROVED | RCW |
| SUBMITTED | RCW |

BROOKFIELD SECTION IV
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**NOTE:**

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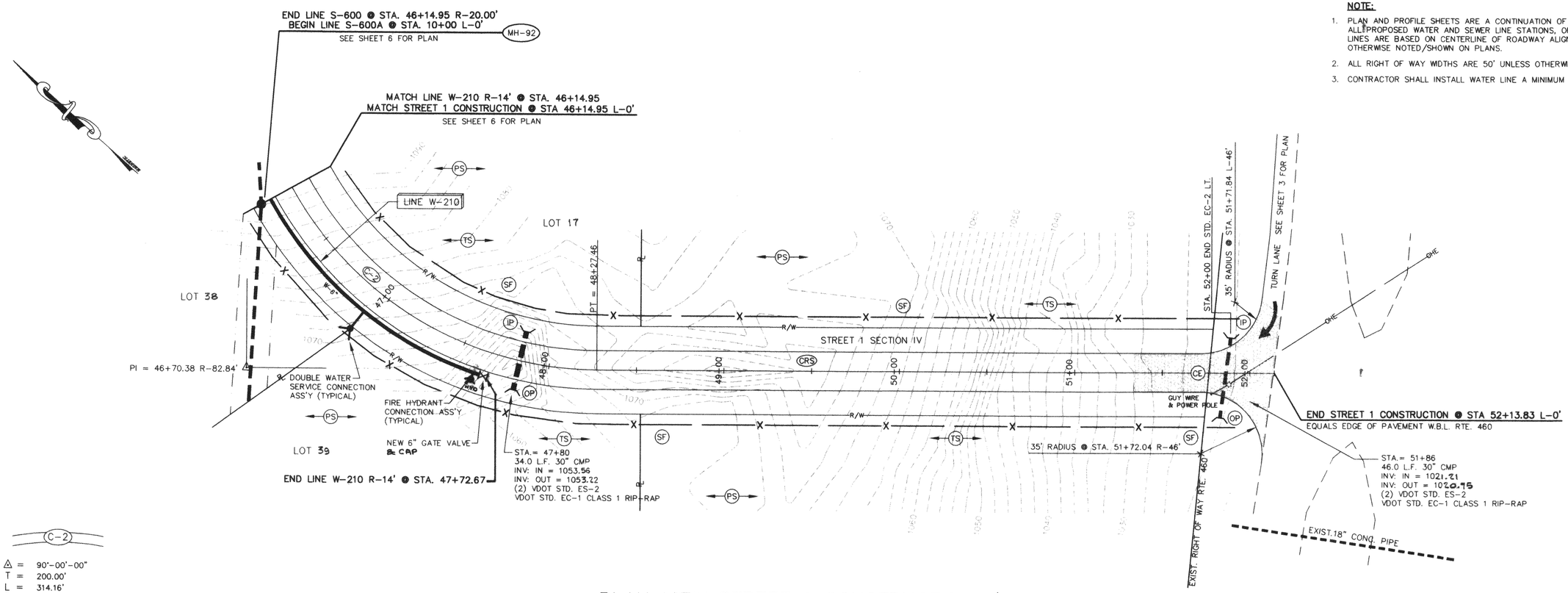
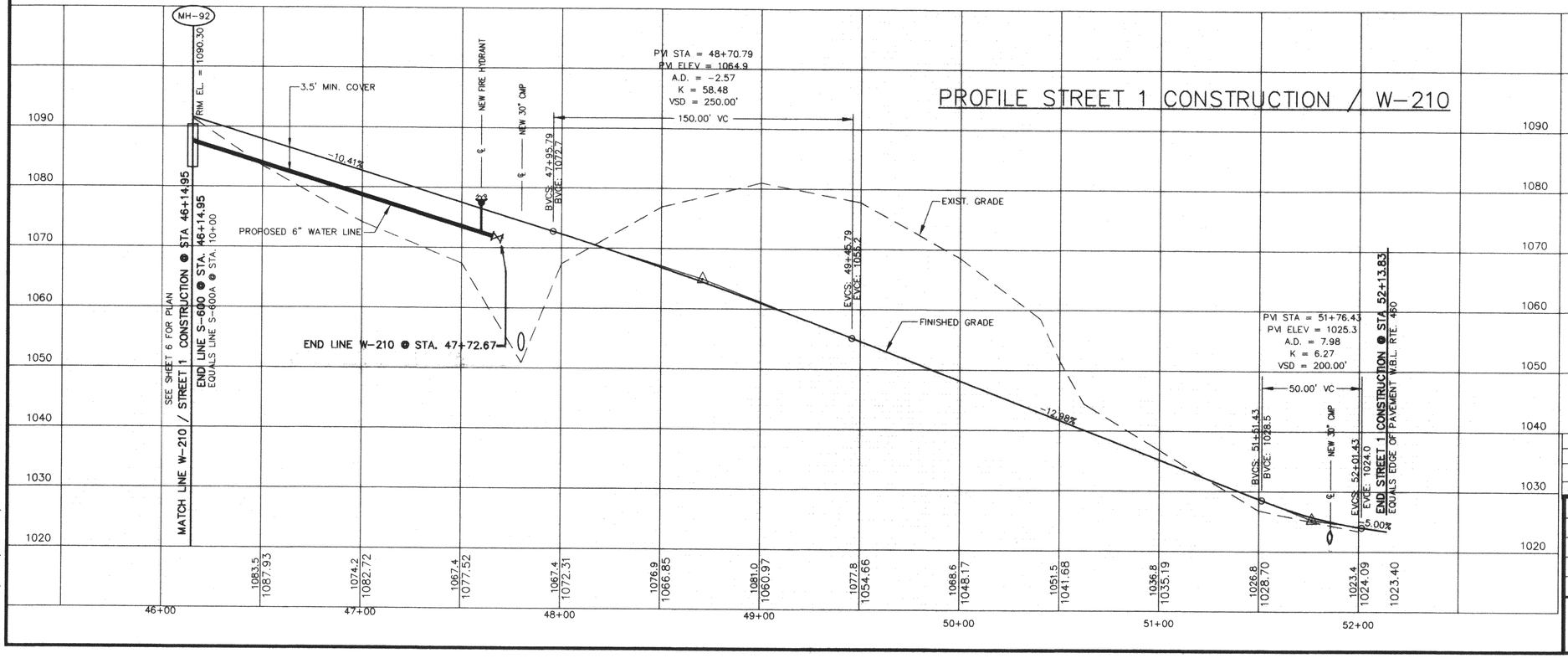



C-2

Δ = 90°-00'-00"
T = 200.00'
L = 314.16'
R = 200.00'
D = 28°-38'-52"

## PLAN VIEW STREET 1 CONSTRUCTION / W-210

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| CHECKED | DRM |
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| SUBMITTED | RCW |

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BOTETOURT COUNTY, VIRGINIA

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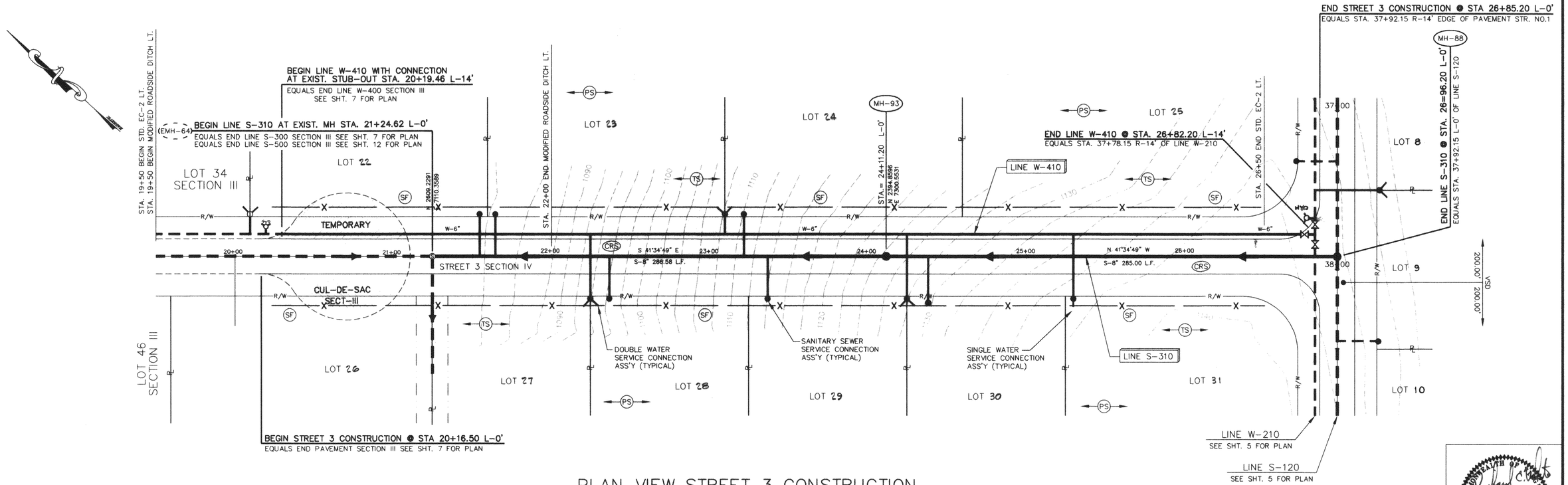
| SCALE: | 1"=30' HORZ, 1"=10' VERT |
| COMM. NO. | 942-G |
| DATE: | 06-01-97 |
| SHEET | 7 |

COMMONWEALTH OF VIRGINIA
RICHARD C. WHITE
No. 020021
6-27-97
PROFESSIONAL ENGINEER

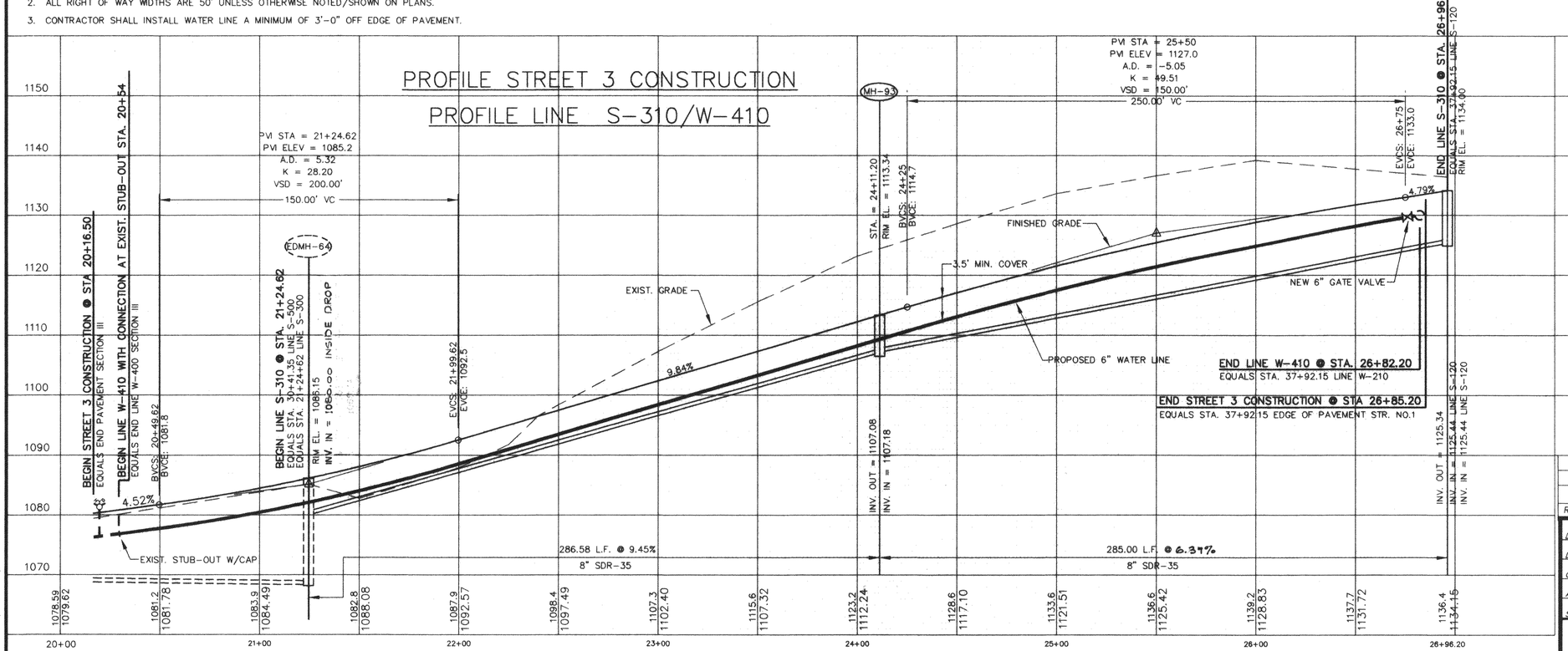
ENGINEER'S SEAL




## PLAN VIEW STREET 3 CONSTRUCTION
## PLAN VIEW LINE S-310/W-410

**NOTE:**

1. PLAN AND PROFILE SHEETS ARE A CONTINUATION OF BROOKFIELD III PROJECT. ALL PROPOSED WATER AND SEWER LINE STATIONS, OFFSETS, AND MATCH-LINES ARE BASED ON CENTERLINE OF ROADWAY ALIGNMENT EXCEPT UNLESS OTHERWISE NOTED/SHOWN ON PLANS.
2. ALL RIGHT OF WAY WIDTHS ARE 50' UNLESS OTHERWISE NOTED/SHOWN ON PLANS.
3. CONTRACTOR SHALL INSTALL WATER LINE A MINIMUM OF 3'-0" OFF EDGE OF PAVEMENT.





COMMONWEALTH OF VIRGINIA
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| APPROVED | RCW |
| SUBMITTED | RCW |

BROOKFIELD SECTION IV
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ROANOKE, VIRGINIA 24016


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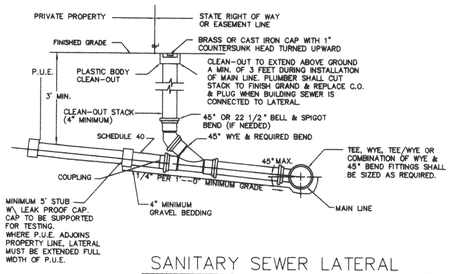
|---|---|
| SCALE: | 1"=30' HORZ, 1"=10' VERT |
| DATE: | 06-23-97 |
| COMM. NO. | 942-G |
| SHEET | 8 |

D:\942G-IV\SHT-8.DWG 06-23-97

| Pipe Diameter (in.) | Min. Time (min: sec) | Length for Min. Time (ft) | Time for Longer Length (sec) | Specified Time for Length (L) Shown (min:sec) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 100 ft | 150 ft | 200 ft | 250 ft | 300 ft | 350 ft | 400 ft | 450 ft |
| 4 | 3:46 | 597 | .380 L | 3:46 | 3:46 | 3:46 | 3:46 | 3:46 | 3:46 | 3:46 | 3:46 |
| 6 | 5:40 | 398 | .854 L | 5:40 | 5:40 | 5:40 | 5:40 | 5:40 | 5:40 | 5:42 | 6:24 |
| 8 | 7:34 | 298 | 1.520 L | 7:34 | 7:34 | 7:34 | 7:34 | 7:36 | 8:52 | 10:08 | 11:24 |
| 10 | 9:26 | 239 | 2.374 L | 9:26 | 9:26 | 9:26 | 9:53 | 11:52 | 13:51 | 15:49 | 17:48 |
| 12 | 11:20 | 199 | 3.418 L | 11:20 | 11:20 | 11:24 | 14:15 | 17:05 | 19:56 | 22:47 | 25:38 |
| 15 | 14:10 | 159 | 5.342 L | 14:10 | 14:10 | 17:48 | 22:15 | 26:42 | 31:09 | 35:36 | 40:04 |
| 18 | 17:00 | 133 | 7.692 L | 17:00 | 19:13 | 25:38 | 32:03 | 38:27 | 44:52 | 51:16 | 57:41 |
| 21 | 19:50 | 114 | 10.470 L | 19:50 | 26:10 | 34:54 | 43:37 | 52:21 | 61:00 | 69:48 | 78:31 |
| 24 | 22:40 | 99 | 13.674 L | 22:47 | 34:11 | 45:34 | 56:58 | 68:22 | 79:46 | 91:10 | 102:33 |
| 27 | 25:30 | 88 | 17.306 L | 28:51 | 43:16 | 57:41 | 72:07 | 86:32 | 100:57 | 115:22 | 129:48 |
| 30 | 28:20 | 80 | 21.366 L | 35:37 | 53:25 | 71:13 | 89:02 | 106:50 | 124:38 | 142:26 | 160:15 |
| 33 | 31:10 | 72 | 25.852 L | 43:05 | 64:38 | 86:10 | 107:43 | 129:16 | 150:43 | 172:21 | 193:53 |
| 36 | 34:00 | 66 | 30.768 L | 51:17 | 76:55 | 102:34 | 128:12 | 153:50 | 179:29 | 205:07 | 230:46 |

MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015



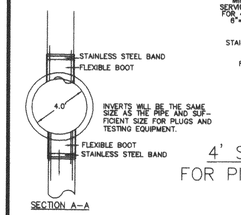

SANITARY SEWER LATERAL

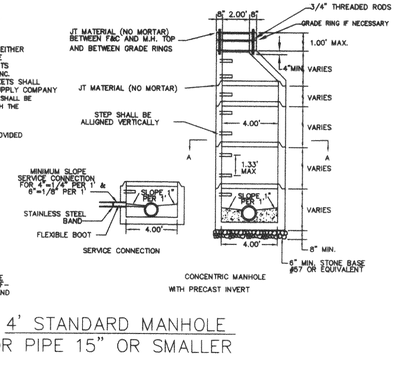
GENERAL NOTES:

1. TRAFFIC BEARING BOX REQUIRED IN TRAFFIC AREAS.
2. ALL PIPE AND FITTINGS SHALL BE OF SIMILAR MATERIAL.
3. ALL PIPE SHALL BE OF SAME SIZE.
4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO THE CLEAN-OUT STACK WYE. (EXCEPT AS NOTED)
5. ALL MAIN LINE TAPS ON ACTIVE MAINS WILL BE PERFORMED BY ROANOKE COUNTY UTILITY DEPT.
6. PIPING BEHIND CLEANOUT TO BE INSTALLED PER BOCA CODE.
7. MINIMUM LATERAL SIZE:
   4" FOR RESIDENTIAL SERVICE
   6" FOR NON-RESIDENTIAL SERVICE
8. MINIMUM COVER FOR ALL SEWER LATERALS SHALL BE THREE (3') FEET

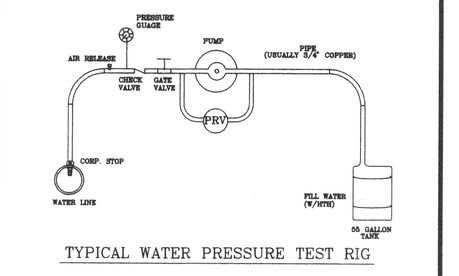
NOTES:

1. ALL MANHOLE FRAMES AND COVERS SHALL BE DEWEY BROTHERS, INC. MH-RCR-3000W IN NON-PAVED AREAS REQUIRING WATERTIGHT FRAME & COVERS AND MH-RCR-3000EC-WT IN PAVED AREAS, OR APPROVED EQUAL.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2 FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.
4. MANHOLE UNIT JOINTS SHALL BE MADE WITH EITHER FLEXIBLE BUTYL SEALANTS OR GASKETS, AT THE CONTRACTOR'S OPTION. FLEXIBLE BUTYL SEALANTS SHALL BE MANUFACTURED BY CONCRETE SEALANTS, INC. (CS-302) OR EQUAL AND FLEXIBLE BUTYL GASKETS SHALL BE MANUFACTURED BY CONCRETE PRODUCTS SUPPLY COMPANY (C-Z STOK) OR EQUAL. THE GASKETS OR SEALANTS SHALL BE INSTALLED AND THE JOINT MADE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER(S).
5. ALL MANHOLES DEEPER THAN 10' SHALL BE PROVIDED WITH A SAFETY SLAB.

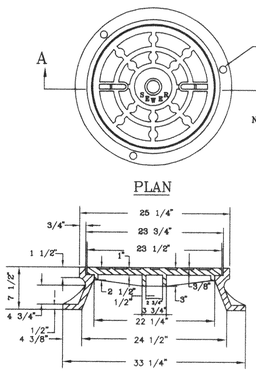


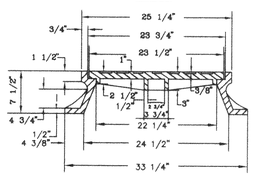

4' STANDARD MANHOLE FOR PIPE 15" OR SMALLER




TYPICAL WATER PRESSURE TEST RIG




PLAN

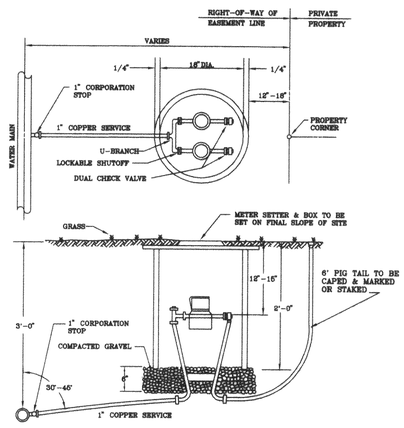



SECTION A-A

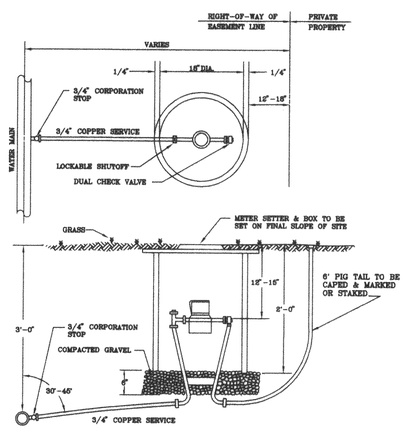
NOTE:
USE DEWEY BROTHERS INC. MH-RCR-2000 OR 2001 WATERTIGHT FRAME & COVER IN PAVED AREAS.

MANHOLE FRAME AND COVER

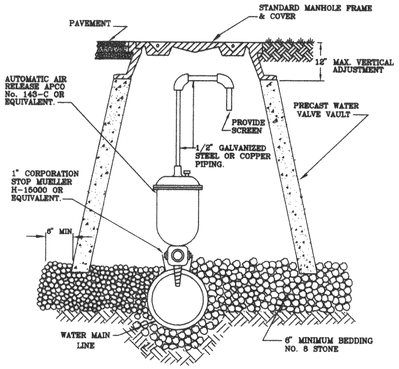
PAVED 2001EC
UNPAVED 2001(ABOVE)



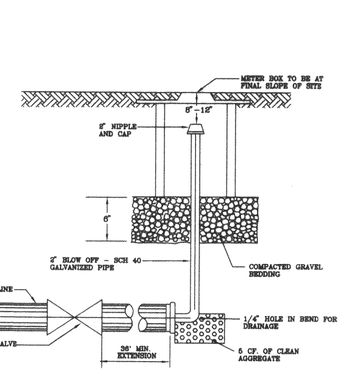

DOUBLE RESIDENTIAL WATER SYSTEM



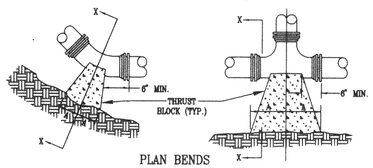

SINGLE RESIDENTIAL WATER SERVICE



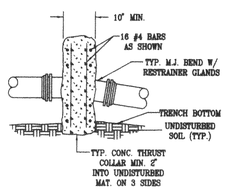

AUTOMATIC AIR RELEASE ASSEMBLY



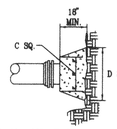

BLOW OFF ASSEMBLY FOR MAIN LINE



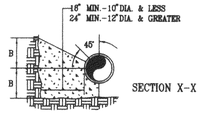

PLAN BENDS




SECTION OF VERTICAL BEND




PLAN AND ELEVATION PLUGS




BENDS AND TEES

| PIPE SIZE | 90° BEND | | 45° BEND | | 22 1/2° BEND | | 11 1/4° BEND | | TEE | | PLUG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | A | B | A | B | A | B | A | B | C | D |
| 4" | 8" | 12" | 8" | 8" | 6" | 6" | 6" | 6" | 11" | 9" | 10" | 6" |
| 6" | 18" | 12" | 8" | 10" | 8" | 8" | 8" | 8" | 11" | 10" | 12" | 18" |
| 8" | 18" | 13" | 10" | 10" | 8" | 8" | 8" | 8" | 11" | 12" | 12" | 24" |
| 10" | 20" | 16" | 12" | 14" | 8" | 12" | 8" | 12" | 14" | 16" | 16" | 30" |
| 12" | 20" | 16" | 12" | 14" | 8" | 12" | 8" | 12" | 14" | 16" | 16" | 30" |
| 16" | 26" | 20" | 16" | 18" | 11" | 13" | 11" | 13" | 18" | 20" | 20" | 36" |
| 24" | 82" | 42" | 62" | 30" | 44" | 22" | 22" | 16" | 82" | 42" | 82" | 42" |
| 30" | 185" | 42" | 100" | 42" | 52" | 42" | 40" | 30" | 185" | 42" | 185" | 42" |

THRUST BLOCK CONSTRUCTION

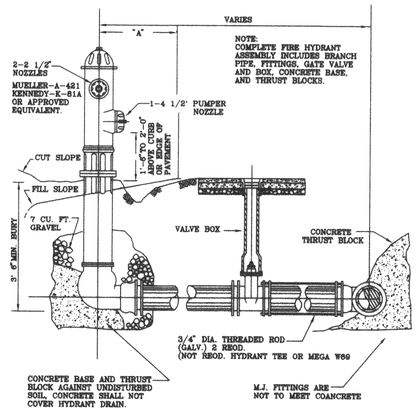
NO SCALE

NOTES:

1. FOR VERT. BEND DOWN IN EXCESS OF 11 1/4° BEND, ANCHORAGE SHALL BE DESIGNED BY ENGINEER.
2. FOR VERT. BEND UPWARD, BLOCKING TO BE SIMILAR TO THAT FOR HORIZ. BEND.
3. GLANDS & BOLTS SHALL BE PROTECTED FROM CONC. BY PLASTIC SHEETING WHEN POURING THRUST BLOCKS.
4. ALL THRUST BLOCK & SUPPORT CONC. SHALL BE 3000 PSI READY MIX CONC.
5. THRUST BLOCKS WITH "H" DIMENSION GREATER THAN 30" SHALL HAVE THE RESTRAINED PIPE INSTALLED WITH A MINIMUM OF 4' OF COVER.

PRESSURE = 200 psi
BEARING = 2000 psf
FACTOR OF SAFETY = 1.5

NOTES:
(1) MAIN BODY OF HYDRANT MUST BE SILVER AND HAVE RED CAPS AND BONNET.
(2) DISTANCE "A" WITH CURB AND GUTTER, 2' MIN., 4' MAX. FROM BACK OF CURB.
(3) DISTANCE "A" WITHOUT CURB AND CUTTER, 6' MIN., 12' MAX. FROM EDGE OF PAVEMENT.
(4) AREA AROUND HYDRANT AT A RADIUS OF 4' TO BE APPROXIMATELY LEVEL AND UNOBSTRUCTED.




FIRE HYDRANT ASSEMBLY

| REVISION | DATE | DESCRIPTION | BY | APP. |
|---|---|---|---|---|
| | | | | |

| | |
|---|---|
| DESIGNED | DME |
| DRAWN | DME/REH |
| CHECKED | RCW |
| APPROVED | RCW |
| SUBMITTED | RDW |

BROOKFIELD SECTION IV

WATER AND SEWER DETAILS

BOTETOURT COUNTY, VIRGINIA

RECEIVED JUL 02 1997 DEVELOPMENT SERVICES

COMMONWEALTH OF VIRGINIA RICHARD C. WHITE No. 020021 6-27-97 PROFESSIONAL ENGINEER

ENGINEER'S SEAL

LMW P.C. ENGINEERING - SURVEYING
PHONE (540) 345-0675 1401 2nd STREET S.W.
FAX (540) 342-4458 ROANOKE, VIRGINIA 24016

SCALE: NONE
DATE: 06-23-97
COMM. NO. 942G-IV
SHEET 9

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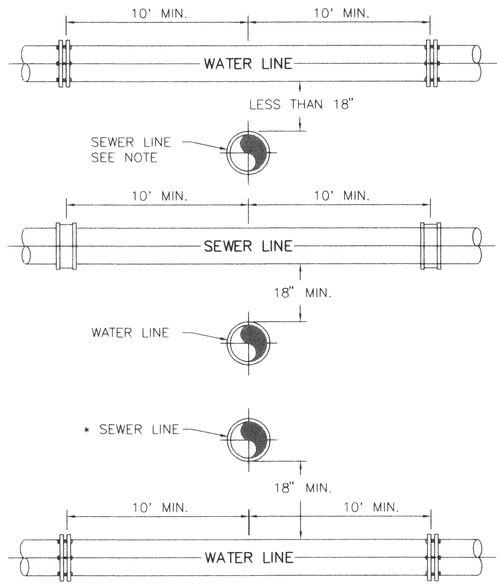
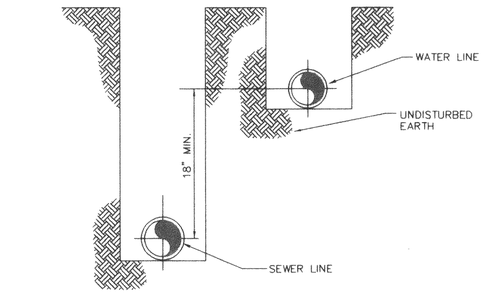


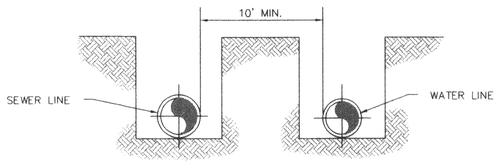

NOTE:
* SEWER LINE ABOVE WATERLINE TO BE CONSTRUCTED OF AWWA WATER LINE MATERIAL & PRESSURE TESTED (SEE SPEC.) AT NO ADDITIONAL COST (SEE SEWER LINE COUPLING DETAIL).

## WATER and SEWER CROSSING DETAIL

NTS



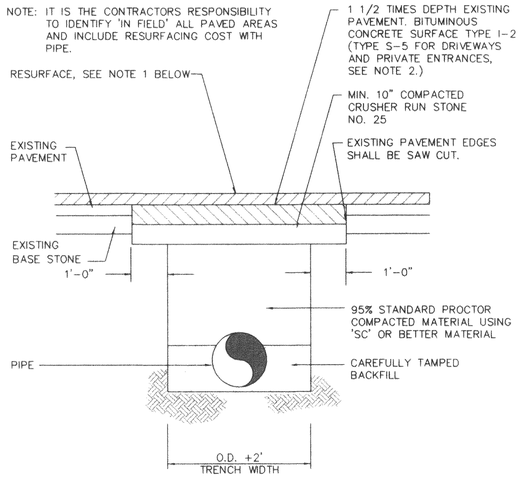

VERTICAL SEPARTION




HORIZONTAL SEPARATION

## WATER and SEWER SEPARATION DETAIL

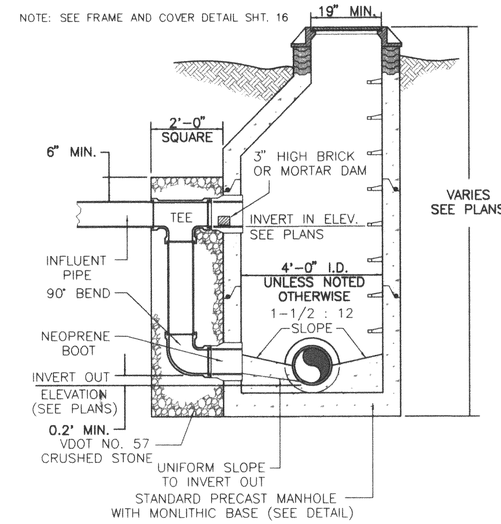
NTS




## OPEN CUT ROAD and CROSSING DETAIL

NTS

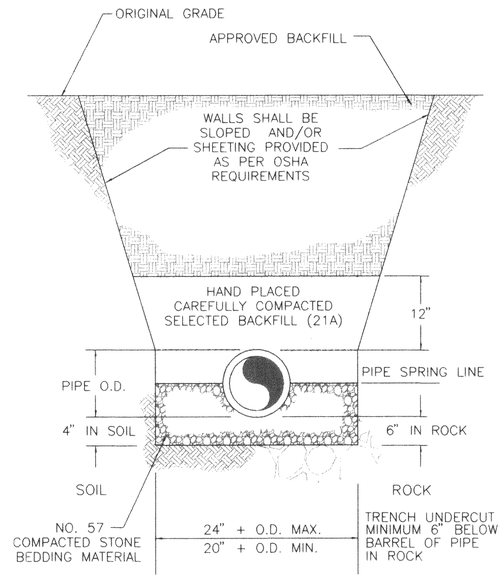
NOTES:
1) ALLPAVED SURFACES OWNED BY THE STATE SHALL BE RESURFACED 25' EACH SIDE OF CUT, AS PER V.D.O.T. SPECIFICATIONS.
2) THIS DETAIL ALSO APPLIES TO ALL PAVED DRIVEWAYS AND ENTRANCES- EXCLUDING 25' RESURFACING EACH WAY.
3) WHERE EXISTING SURFACE IS GRAVEL, REPLACEMENT SURFACE TO BE CRUSHER RUN STONE NO. 25.




## TYPICAL OUTSIDE DROP MANHOLE

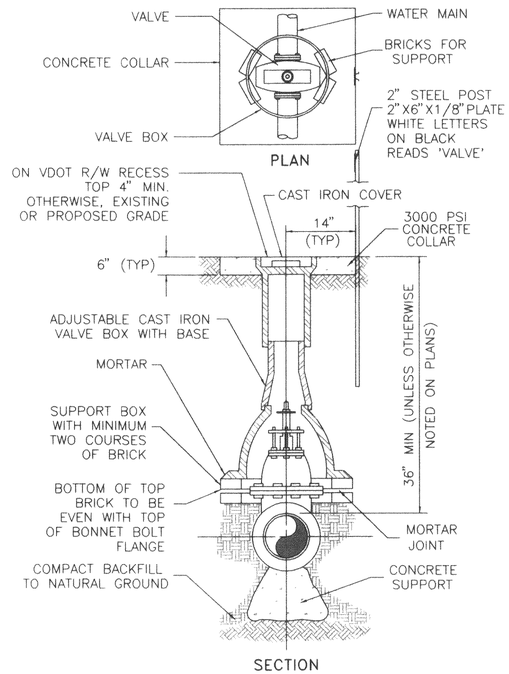
NTS

1. MANHOLE UNIT JOINTS SHALL BE MADE WITH EITHER FLEXIBLE BUTYL SEALANTS OR GASKETS, AT THE CONTRACTOR'S OPTION. FLEXIBLE BUTYL SEALANTS SHALL BE MANUFACTURED BY CONCRETE SEALANTS, INC. (CS-302) OR EQUAL AND FLEXIBLE BUTYL GASKETS SHALL BE MANUFACTURED BY CONCRETE PRODUCTS SUPPLY COMPANY (E-Z STICK) OR EQUAL. THE GASKETS OR SEALANTS SHALL BE INSTALLED AND THE JOINT MADE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER(S).
2. ALL MANHOLES DEEPER THAN 10' SHALL BE PROVIDED WITH A SAFETY SLAB.
3. TEE, BEND, AND ALL PIPING SHALL BE SAME SIZE AS INFLUENT PIPE (SEE PLANS)




## PIPE LAYING CONDITION for GRAVITY SEWER

NTS




## TYPICAL VALVE SETTING DETAIL

NTS

| REVISION | DATE | DESCRIPTION | BY | APP. |
|---|---|---|---|---|
| | | | | |

| | |
|---|---|
| DESIGNED | DME |
| DRAWN | DME/REH |
| CHECKED | RCW |
| APPROVED | RCW |
| SUBMITTED | RDW |

BROOKFIELD SECTION IV

WATER AND SEWER DETAILS

BOTETOURT COUNTY, VIRGINIA

RECEIVED JUL 02 1997 DEVELOPMENT SERVICES

COMMONWEALTH OF VIRGINIA RICHARD C. WHITE No. 020021 6-27-97 PROFESSIONAL ENGINEER

ENGINEER'S SEAL

LMW P.C. ENGINEERING - SURVEYING

PHONE (540) 345-0675 FAX (540) 342-4456 1401 2nd STREET S.W. ROANOKE, VIRGINIA 24016

SCALE: NONE | COMM. NO. 942G-IV

DATE: 06-23-97 | SHEET 10

D:\LMW\IV\SH1-10.DWG 06-23-97

## SPECIAL CONDITIONS

1. A MINIMUM COVER OF THREE AND ONE HALF (3.5) FEET OVER THE PROPOSED LINES IS REQUIRED.

1A. A PRECONSTRUCTION CONFERENCE SHALL BE SCHEDULED WITH BOTETOURT COUNTY PRIOR TO COMMENCING WITH CONSTRUCTION.

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. SANITARY SEWER CUT SHEETS SHALL BE SUBMITTED TO THE BOTETOURT COUNTY 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 AND OBTAIN COUNTY APPROVAL OF ANY FIELD CORRECTION 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 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.

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.

## 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, AT THE CONTRACTOR'S EXPENSE, 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 SIX (6) 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, OR 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.

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

4. SERVICE LATERALS SHALL BE SCHEDULE 40 POLYVINYL CHLORIDE.

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 50, AS A MINIMUM, UNLESS SPECIFIED OR INDICATED OTHERWISE.

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 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 ACCORDANCE 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 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 OXYACETYLENE 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 WHIL 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. PARALLEL INSTALLATION -- WATER LINES SHALL BE LAID AT LEAST TEN FEET HORIZONTALLY FROM A SEWER OR SEWER MANHOLE WHENEVER POSSIBLE. WHEN LOCAL CONDITIONS PREVENT A HORIZONTAL SEPARATION OF TEN FEET, THE WATER LINE MAY BE LAID CLOSER TO A SEWER OR SEWER MANHOLE PROVIDED THAT:

   I. THE INVERT OF THE WATER MAIN SHALL BE AT LEAST 18 INCHES ABOVE THE CROWN OF THE SEWER.

   II. WHERE THIS VERTICAL SEPARATION CANNOT BE OBTAINED, THE SEWER SHALL BE CONSTRUCTED OF AWWA APPROVED WATER PIPE, PRESSURE TESTED IN PLACE WITHOUT LEAKAGE PRIOR TO BACKFILLING.

   III. THE SEWER MANHOLE SHALL BE OF WATER-TIGHT CONSTRUCTIN AND TESTED IN PLACE.

   CROSSING -- WATER LINES CROSSING SEWERS SHALL BE LAID TO PROVIDE A SEPARATION OF AT LEAST 18 INCHES BETWEEN THE BOTTOM OF THE WATER LINE AND THE TOP OF THE SEWER WHENEVER POSSIBLE. WHEN LOCAL CONDITIONS PREVENT THIS VERTICAL SEPARATION, THE FOLLOWING CONSTRUCTION SHALL BE USED:

   I. SEWERS PASSING OVER OR UNDER WATER LINES SHALL BE CONSTRUCTED OF AWWA APPROVED WATER PIPE, PRESSURE TESTED IN PLACE WITHOUT LEAKAGE PRIOR TO BACKFILLING.

   II. WATER LINES PASSING UNDER SEWERS SHALL, IN ADDITION, BE PROTECTED BY PROVIDING:

   (A) A VERTICAL SEPARATION OF AT LEAST 18 INCHES BETWEEN THE BOTTOM OF THE SEWER AND THE TOP OF THE WATER LINE.

   (B) ADEQUATE STRUCTURAL SUPPORT FOR THE SEWERS TO PREVENT EXCESSIVE DEFLECTION OF THE JOINTS AND THE SETTLING ON AND BREAKING OF THE WATERLINE, AND

   (C) THAT THE LENGTH OF THE WATER LINE BE CENTERED AT THE PONT OF THE CROSSING SO THAT JOINTS SHALL BE EQUAL DISTANCE AND AS FAR AS POSSIBLE FROM THE SEWER.

   NO WATER PIPES SHALL PASS THROUGH OR COME IN CONTACT WITH ANY PART OF A SANITARY SEWER MANHOLE. ALL SANITARY SEWER MANHOLES SHALL BE PLACED A MINIMUM OF 10 FEET HORIZONTALLY FROM ALL WATER MAINS WHENEVER POSSIBLE. WHEN THIS HORIZONTAL SEPERATION CAN NOT BE MAINTAINED, THE MANHOLE SHALL BE OF WATERTIGHT CONSTRUCTION AND TESTED IN PLACE.

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 GOOD 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 THOUROUGHLY 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 SPLIPPED 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 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

1. THE WATER MAIN SHALL BE LAID AND MAINTAINED AT THE REQUIRED LINES AND GRADES 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 REFLECTIONS IN EXCESS OF THE RECOMMENDED LIMITATIONS, SPECIAL BENDS, OR A SUFFICIENT NUMBER OF SHORTER LENGTHS OF PIPE TO PROVIDE THE ANGULAR DEFLECTIONS 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.

4. DETECTION TAPE TO BE INSTALLED 12"-18" ABOVE ALL NEW PVC WATER LINES.

C. DISINFECTION OF WATER MAINS

1. ALL PIPE SHALL BE DISINFECTED, TESTED AND FLUSHED IN ACCORDANCE WITH AWWA STANDARD C601 (LATES 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 REPQIRED 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 SPECIFICATIONS C601(LATEST REVISION). FLUSHING SHALL BE ACCOMPLISHED AT A FLOW VELOCITY OF NOT LESS THAT 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 GRAM 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:

| 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 0.00120/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. THE CONTRACTOR SHALL PAY ALL COSTS ASSOCIATED WITH DISINFECTION AND TESTING OF INSTALLED FACILITIES INCLUDING ANY BACTERIOLOGICAL SAMPLES AND RETESTING IF REQUIRED. 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. THE DOWNSTREAM 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 END OF THE PIPE BEING LAID.

5. SEWER PIPE SHALL BE INSTALLED IN 4 INCH GRAVEL BEDDING EXTENDING TO THE SPRINGLINE OF PIPE AND IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

6. THE SANITARY SEWER SYSTEM SHALL BE LAID AND JOINED COMPLETE-IN-PLACE SO 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.

8. DETECTION TAPE TO BE INSTALLED 12" TO 18" ABOVE ALL NEW SEWER PIPE MAINS AND SEWER SERVICE LATERALS.

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 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 THE DESIGN ENGINEER FOR HIS ATTENDANCE AND OBSERVATION.

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 A WYE OR TEE WYE BRANCH FITTING.

2. THE WYE AND TEE WYE BRANCH FITTINGS FOR SERVICE CONNECTIONS SHALL BE COMMERCIALLY MANUFACTURED AND INSTALLED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE PIPE MANUFACTURER.

3. THE SEWER PIPE SHALL NOT BE CUT OR TAPPED FOR SERVICE CONNECTIONS EXCEPT WHEN AND WHERE PERMITTED BY THE ENGINEER.

4. 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.

5. 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.

6. 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 24" ABOVE 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 BOX 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 A SOILS ENGINEER.

2. MATERIAL SHALL CONSIST OF DURABLE NATURAL GRANULAR MATERIAL OR GRANULAR AGGREGATES FREE OF 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.
ZOOM

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 OR BOTTOM OF THE PIPE TRENCH TO ONE (1) FOOT ABOVE THE TOP OF THE PIPE SHALL BE FREE OF STONES LARGER THAN ONE (1) INCH 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 OF STONES LARGER THAN FIVE (5) 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 ONE (1) INCH IN DIAMETER AND SHALL BE PLACED IN LAYERS NOT TO EXCEED SIX (6) INC

# EROSION & SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION

The purpose of this project is to construct section IV of a four section single family subdivision. Section IV of this project will include 39 lots with an average lot size of 20,000 SF. There will be approximately 3,034.0 LF of new roadway having a typical pavement width of 27 feet. The total acreage of Section IV is approximately 27 acres.

EXISTING SITE CONDITIONS

The proposed development is located along Route 660, in the Blue Ridge District of Botetourt County. The existing site is a hay field, that is at this time still in operation. 80% of the property is open field with the remaining 20% wooded areas.

ADJACENT AREAS

The site is bordered on the east and west by undeveloped land, that is mostly open pastures and fields. It is bordering to the north by Route 660 and U.S. Route 460 on the south.

SOILS

Soils found at this site are common to the area. None of these soils have high erosion tendencies.

CRITICAL EROSION AREAS

The potential critical erosion areas are:
1. Steep roadside ditch slopes along proposed roads.
2. The outlet of all culverts.

EROSION AND SEDIMENT CONTROL MEASURES

Unless otherwise indicated, all vegetative and structural erosion and sediment control practices shall be constructed and maintained according to minimum standards and specifications of the handbook. The minimum standards of the VESCR shall be adhered to unless otherwise waived or approved by a variance.

STRUCTURAL PRACTICES

1. Temporary Construction Entrance (Section 3.02)
   One temporary construction entrance will be installed. Vehicles will be washed to limit tracking onto public roads. Should tracking occur the road will be immediately cleaned.? Temporary straw bale barriers will be placed and entrenched and anchored as indicated on the site plan.
2. Straw Bale Barrier (Section 3.04)
3. Silt Fence (Section 3.05)
   Temporary silt fences will be installed as indicated on the site plan.
4. Storm Drain Inlet Protection (Section 3.07)
   All storm sewer inlets shall be protected during construction. Sediment–laden water shall be filtered before entering the storm sewer inlets.
5. Outlet Protection (Section 3.18)
   Outlet protection will be placed at all discharge points from controlled flow to open flow. All outlet protection will be permanently designed and installed.
6. Surface Roughening (Section 3.29)
   Surface roughening will be employed on all slopes exceeding 2:1.
7. Temporary Seeding (Section 3.31)
   Temporary seeding will be placed on all disturbed areas that will not be brought to final grade within one year or less. Temporary seeding will aid in the reduction of dust and sediment. Temporary seeding will be Annual Ryegrass (100 #/ac), Feb 16 – April 30, German Millet (60 #/ac), May 1 – Aug. 31.
8. Permanent Seeding ( Section 3.32)
   After final grading permanent seeding will be employed to reduce erosion and sediment yield.

   Seeding Specifications:

   Permanent seeding will be Kentucky Bluegrass, blended to contain 4 or more varieties, with no one variety exceeding 30%. The seeding will be applied at 140 lb. per acre. On slopes 2:1 or greater a mixture of Crown Vetch (50%), Perennial Ryegrass (40%), and Redtop (10%) will be used.

   All seeding, with required associated practices, will be in accordance with all applicable sections of the Virginia Erosion and Sediment Control
9. Dust Control (Section 3.39)
   If arid conditions prevail dust control practices will be employed as required.
10. Construction Road Stabilization (Section 3.03)
    All roads and parking areas on the site shall be stabilized with gravel immediately after grading. Traffic is prohibited from entering drainage swales or streams unless absolutely necessary.
11. Temporary Sediment Basin (Section 3.14)
12. Stormwater Conveyance Channel (Section 3.17)
    Shall be installed as indicated on the plans. This includes all roadside ditches and outfall ditches.
13. Riprap (Section 3.19)
    Riprap shall be placed at the outlet of all pipes in accordance with VDOT standard EC–2 as indicated on the plans. Riprap along the ditches shall be VDOT Class 1 riprap installed over a six inch filter consisting of #57 stone.
14. Check Dams (Section 3.20)
    To be placed where indicated.
15. Topsoil Stockpile (Section 3.30)
    Topsoil stockpiles shall be located in areas approved by the engineer and shall be located such that natural drainage is not obscured and no offsite sediment damage shall result. A perimeter dike with gravel outlet, silt fence, or strawbale barrier shall surround all topsoil stockpiles. Temporary seeding of all stockpiles shall be completed within 7 days of the formation of the stockpile, in accordance with TEMPORARY SEEDING (Std. Spec. 3.31).

MANAGEMENT

1. Construction should be sequenced so that grading operations can begin and end as quickly as possible.
2. Erosion and Sediment control devices shall be installed as the first step of construction.
3. Areas which are not to be disturbed shall be clearly marked by flags, signs, etc.
4. The grading contractor shall be responsible for the installation and maintenance of all erosion and sediment control practices. Inspections are to be made periodically and after every significant rainfall.
5. After achieving adequate stabilization, the temporary E&S controls will be cleaned up and removed, and the sediment basins will be cleaned out and converted to permanent stormwater management basins.

PERMANENT STABILIZATION

All areas disturbed by construction shall be stabilized with permanent seeding immediately following finish grading. Seeding shall be done with Kentucky 31 Tall Fescue according to Std. & Spec. 3.32, PERMANENT SEEDING, of the handbook. Erosion control blankets will be installed over fill slopes which have been brought to final grade and have been seeded to protect the slopes from rill and gully erosion and to allow seed to germinate properly. Mulch (straw or fiber) will be used on relatively flat areas. In all seeding operations, seed, fertilizer and lime will be applied prior to mulching.

MAINTENANCE OF DENTENTION FACILITIES

The applicant shall obtain approval from the locality of a plan for maintenance of the dentention facilities. The plan shall set forth the maintenance requirements of the facility and the person responsible for performing the maintenance.

STORMWATER MANAGEMENT

Calculation of runoff before and after development indicates that there will be a net increase in peak runoff as a result of project development. Consequently, stormwater management basins have been designed to detain and release the runoff at the 2–year pre–developed rate. (See attached calculations)

MAINTENANCE

In general, all erosion and sediment control measures will be checked daily and after each significant rainfall. Any items not found in accordance with the Virginia Erosion and Sediment Control Handbook will be immediately replaced and/or repaired. The following items will be checked in particular:

1. The sediment basin will be cleaned out when the level of sediment buildup reaches the cleanout point indicated on the riser pipe.
2. The sediment traps will be checked regularly for sediment cleanout.
3. The gravel outlets will be checked regularly for sediment buildup whiich will prevent drainage. If the gravel is clogged by sediment, it shall be removed and cleaned or replaced.
4. The silt fence barrier will be checked regularly for undermining or deterioration of the fabric. Sediment shall be removed when the level of sediment deposition reaches half way to the top of the barrier.
5. The seeded areas will be checked regularly to ensure that a good stand is maintained. Areas should be fertilized and re–seeded as needed.

GENERAL

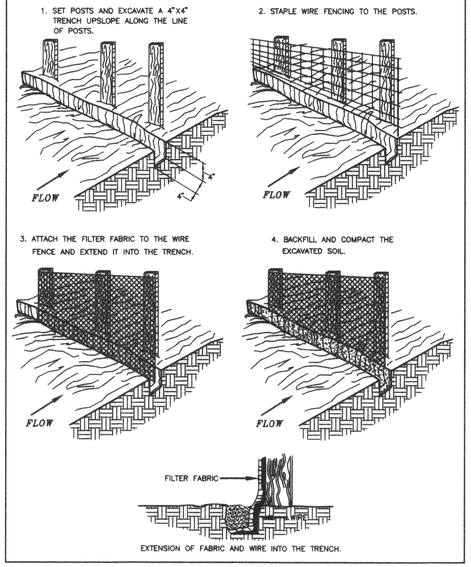
The erosion and sediment control measures shown on the construction plans are the minimum measures required. Due to construction phasing and other considerations all measures can not be shown. The owner, through his contractor will employ whatever measures which may be required to assure that sediment laden runoff does not leave the site.

All materials and measures employed for erosion and sediment control will be in accordance with the Virginia Erosion and Sediment Control Handbook, latest edition.

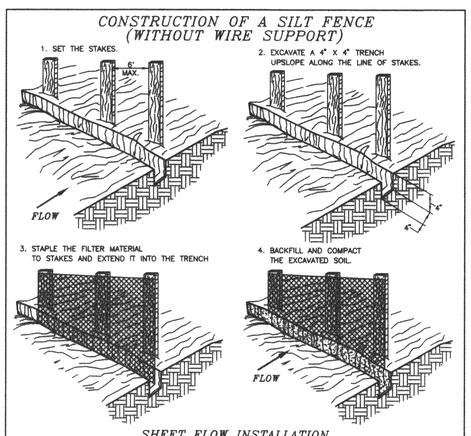
If during construction, additional Erosion and Sediment Control measures are deemed necessary, they shall be installed as directed by the Owner, Engineer or County agent.

This project is to be constructed consistent with the 1992 Virginia Erosion And Sediment Control Regulations.

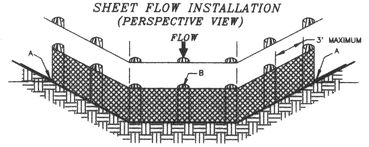
## CONSTRUCTION OF A SILT FENCE (WITH WIRE SUPPORT)




## CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)

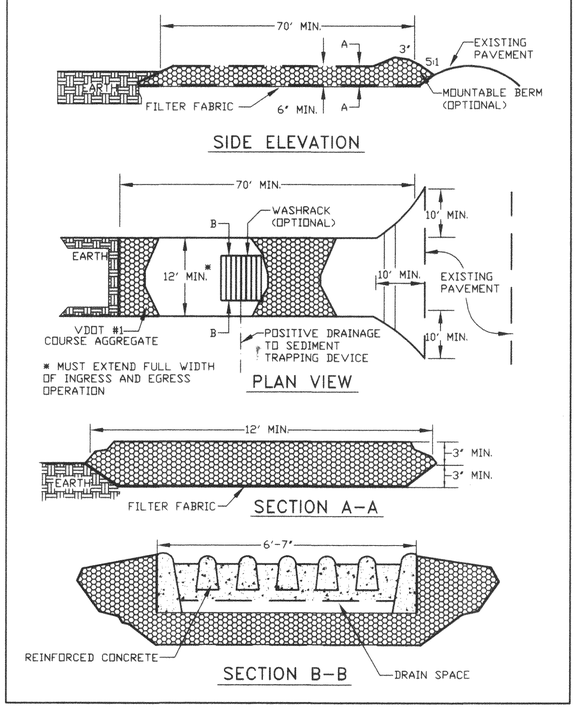



## SHEET FLOW INSTALLATION (PERSPECTIVE VIEW)




POINTS 'A' SHOULD BE HIGHER THAN POINT 'B' DRAINAGEWAY INSTALLATION (FRONT ELEVATION)

## STONE CONSTRUCTION ENTRANCE




| REVISION | DATE | DESCRIPTION | BY | APP. |
|---|---|---|---|---|
| | | | | |

DESIGNED DME
DRAWN REH
CHECKED RCW
APPROVED DRM
SUBMITTED DRM

COMMONWEALTH OF VIRGINIA — RICHARD C. WHITE — No. 020021 — 6-27-97 — PROFESSIONAL ENGINEER

ENGINEER'S SEAL

BROOKFIELD – SECTION IV

EROSION & SEDIMENT CONTROL STANDARD DETAILS

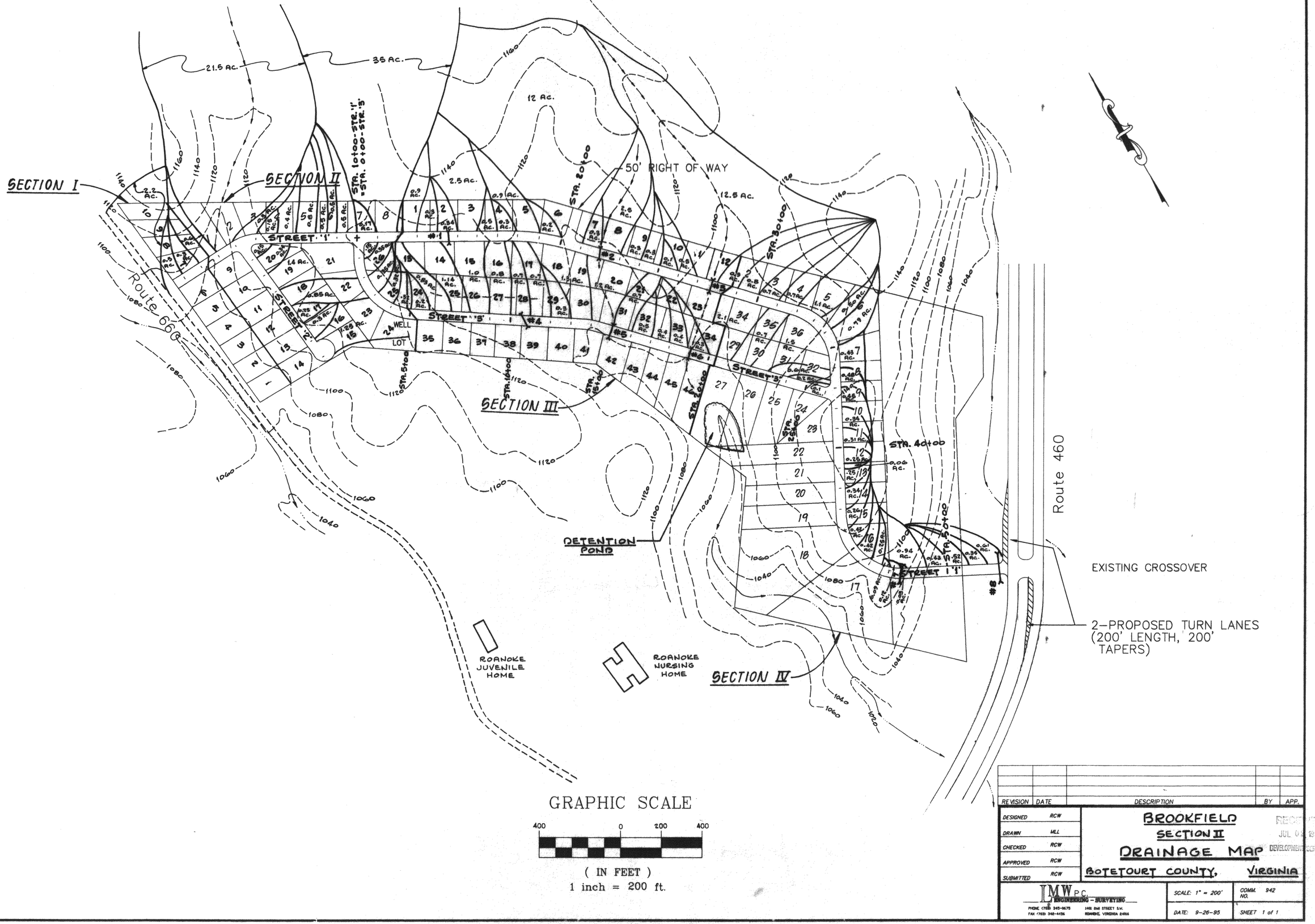
BOTETOURT COUNTY, VIRGINIA

RECEIVED JUL 02 1997 DEVELOPMENT SERVICES

LMW P.C. ENGINEERING – SURVEYING
PHONE (540) 345-0675 FAX (540) 342-4456
1401 2nd STREET S.W. ROANOKE, VIRGINIA 24016

SCALE: NONE
DATE: 06–23–97
COMM. NO. 942G–IV
SHEET 12

D:\942G–IV\EROSION.DWG 06–23–97




GRAPHIC SCALE

400 0 200 400

( IN FEET )

1 inch = 200 ft.

| REVISION | DATE | DESCRIPTION | BY | APP. |
|---|---|---|---|---|
| | | | | |

| | |
|---|---|
| DESIGNED | RCW |
| DRAWN | MLL |
| CHECKED | RCW |
| APPROVED | RCW |
| SUBMITTED | RCW |

# BROOKFIELD
## SECTION II
## DRAINAGE MAP
BOTETOURT COUNTY, VIRGINIA

RECEIVED JUL 02 1997 DEVELOPMENT SERVICES

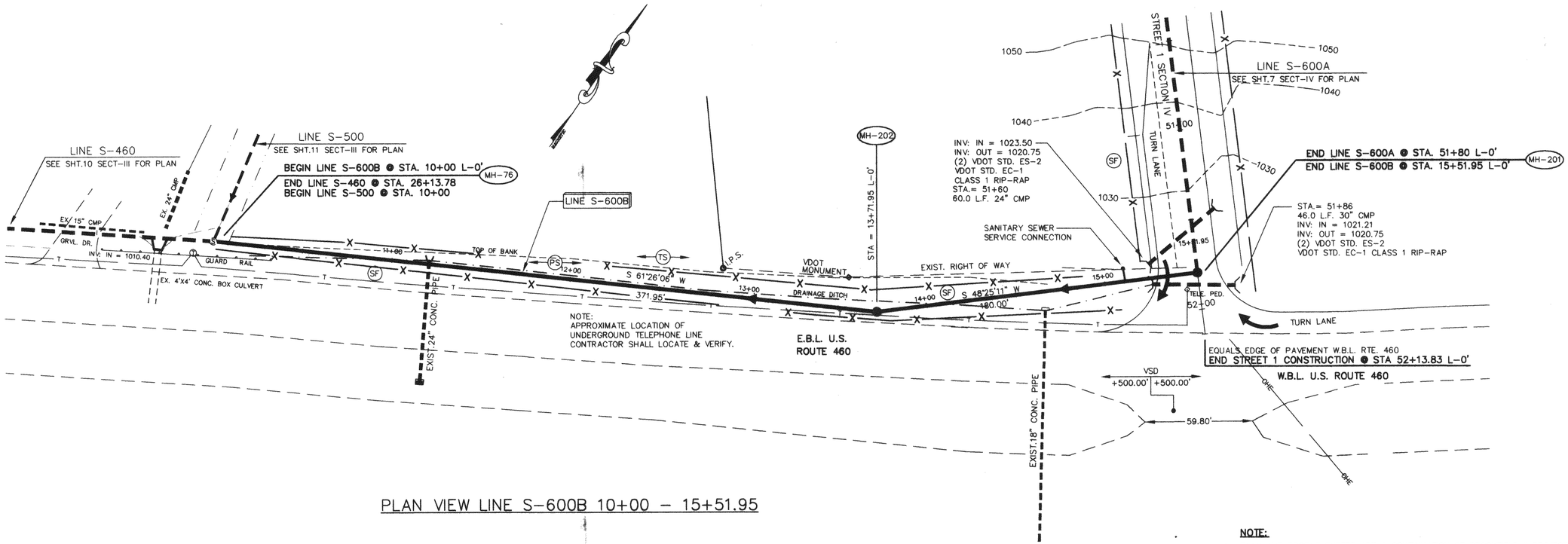
IMW P.C.
ENGINEERING - SURVEYING
PHONE (703) 345-0675
FAX (703) 342-4126
1401 2nd STREET S.W.
ROANOKE, VIRGINIA 24016

SCALE: 1" = 200'

DATE: 9-26-95

COMM. NO. 942

SHEET 1 of 1




PLAN VIEW LINE S-600B 10+00 – 15+51.95

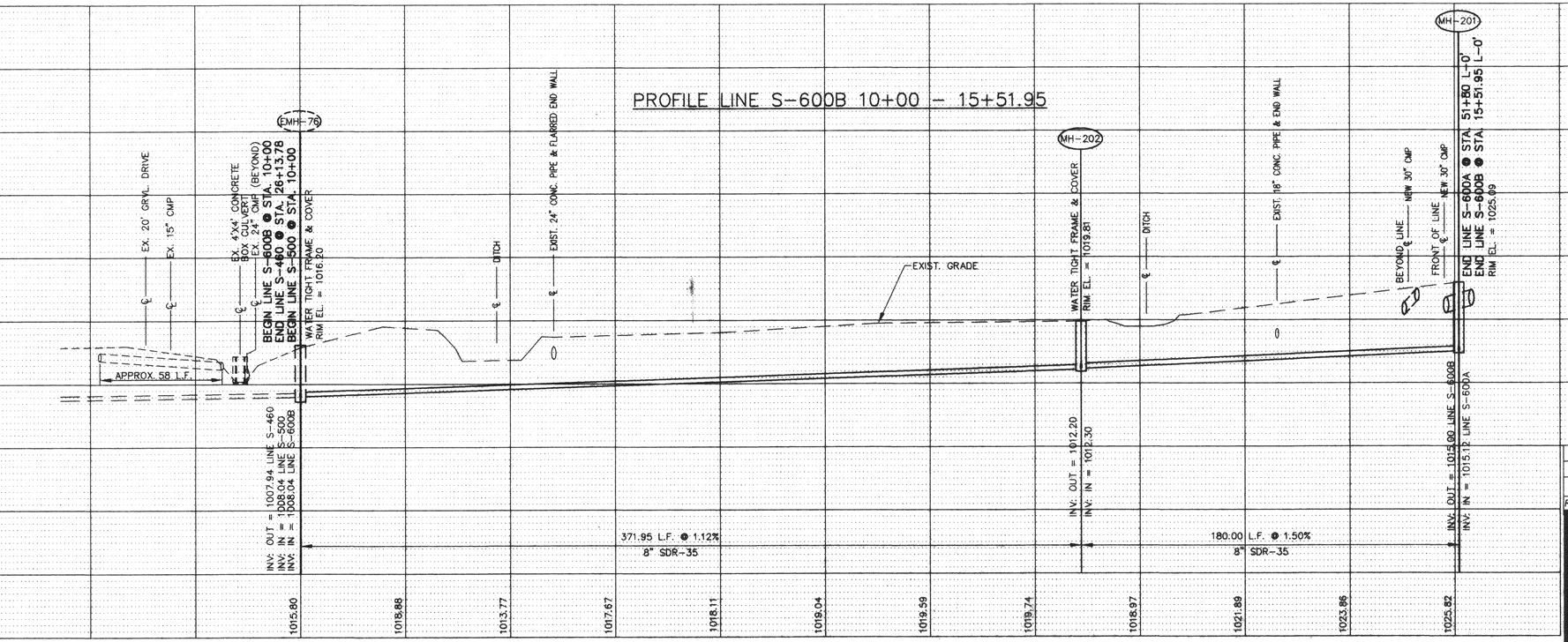
**NOTE:**

1. PLAN AND PROFILE SHEETS ARE A CONTINUATION OF BROOKFIELD II PROJECT. ALL PROPOSED WATER AND SEWER LINE STATIONS, OFFSETS, AND MATCH-LINES ARE BASED ON CENTERLINE OF ROADWAY ALIGNMENT EXCEPT WHERE OTHERWISE MAY BE NOTED ON PLANS.
2. ALL RIGHT OF WAY WIDTHS ARE 50' UNLESS OTHERWISE NOTED ON PLANS.
3. CONTRACTOR SHALL INSTALL WATER LINE A MINIMUM OF 3'-0" OFF EDGE OF PAVEMENT.

RECEIVED
APR 30 1998
DEVELOPMENT SERVICES

COMMONWEALTH OF VIRGINIA
RICHARD C. WHITE
No. 020021
4-27-98
PROFESSIONAL ENGINEER

*ENGINEER'S SEAL*




| REVISION | DATE | DESCRIPTION | BY | APP. |
|---|---|---|---|---|
| "B" | 04/22/98 | REVISED SHT.6 PLAN/PROFILE LINE S-600A/B | REH | RCW |

| | |
|---|---|
| DESIGNED | RCW |
| DRAWN | REH |
| CHECKED | DRM |
| APPROVED | RCW |
| SUBMITTED | RCW |

BROOKFIELD SECTION IV
ROAD DESIGN
SANITARY SEWER & WATER
PLAN & PROFILE
BOTETOURT COUNTY, VIRGINIA

LMW P.C.
ENGINEERING – SURVEYING
PHONE (540) 345-0675
FAX (540) 342-4426
1401 2nd STREET S.W.
ROANOKE, VIRGINIA 24016

SCALE: 1"=30'HORZ 1"=10' VERT
COMM. NO. 942J
DATE: 04/27/98
SHEET 6

C:\942J\SHT-6.DWG 04/27/98

**NOTE:**

1. PLAN AND PROFILE SHEETS ARE A CONTINUATION OF BROOKFIELD III PROJECT. ALL PROPOSED WATER AND SEWER LINE STATIONS, OFFSETS, AND MATCH-LINES ARE BASED ON CENTERLINE OF ROADWAY ALIGNMENT EXCEPT UNLESS OTHERWISE NOTED/SHOWN ON PLANS.
2. ALL RIGHT OF WAY WIDTHS ARE 50' UNLESS OTHERWISE NOTED/SHOWN ON PLANS.
3. CONTRACTOR SHALL INSTALL WATER LINE A MINIMUM OF 3'-0" OFF EDGE OF PAVEMENT.

MATCH LINE W-210 R-14' @ STA. 45+00
MATCH STREET 1 CONSTRUCTION @ STA 45+00 L-0'
SEE SHEET 5 FOR PLAN

MATCH LINE S-600 @ STA. 45+00 L-0'
PC = 45+13.30 SEE SHEET 5 FOR PLAN

LOT 36 · LOT 16 · LOT 37 · LOT 38 · LOT 39 · LOT 17

B REVISION

STREET 1

SINGLE WATER SERVICE CONNECTION ASS'Y (TYPICAL)

LINE S-600

END LINE S-600 @ STA. 46+53.60 L-0'
BEGIN LINE S-600A @ STA. 46+53.60 L-0'

MH-92 N 1582.0799 / E 6885.0454

MH-200

LINE W-210

LINE S-600A

STA. = 46+00 L-0'
N 1442.4518
E 6996.6221

PT = 484+27.46

PI = 46+70.38 R-82.84'

Δ = 90°-00'-00"
T = 200.00'
L = 314.16'
R = 200.00'
D = 28°-38'-52"

C-2

DOUBLE WATER SERVICE CONNECTION ASS'Y (TYPICAL)

FIRE HYDRANT CONNECTION ASS'Y (TYPICAL)

NEW 6" GATE VALVE W/CAP

STA. = 47+80
34.0 L.F. 30" CMP
INV: IN = 1053.56
INV: OUT = 1053.22
(2) VDOT STD. ES-2
VDOT STD. EC-1 CLASS 1 RIP-RAP

END LINE W-210 R-14' @ STA. 47+72.67

STREET 1 SECTION IV

SANITARY SEWER SERVICE CONNECTION

STA. = 51+86
46.0 L.F. 30" CMP
INV: IN = 1021.21
INV: OUT = 1020.75
(2) VDOT STD. ES-2
VDOT STD. EC-1
CLASS 1 RIP-RAP

END LINE S-600A @ STA. 51+80 L-0'
BEGIN LINE S-600B @ STA. 15+51.95 L-0'
SEE SHT. 6 FOR PLAN

MH-201

STA. 52+00 END STD. EC-2 LT.
35' RADIUS @ STA. 51+71.64 L=46'

EXIST.18" CONC. PIPE

12' MIN.

NOTE:
CONTRACTOR SHALL EXTEND EXISTING 18" CONCRETE PIPE A MIN. OF 12' FROM IT'S ORIGINAL END OF PIPE. THE CONTRACTOR SHALL REGRAGE/REDIRECT THE EXISTING DITCH AS TO MAINTAIN A POSITIVE FLOW.

TURN LANE SEE SHEET 3 FOR PLAN

W.B.L. U.S. ROUTE 460

END STREET 1 CONSTRUCTION @ STA 52+13.83 L-0'
EQUALS EDGE OF PAVEMENT W.B.L. RTE. 460

UNDERGROUND TELE. PED. TO BE RELOCATED

TURN LANE

TURN LANE SEE SHT. 3 FOR DETAIL

BEGIN TURN LANE @ STA. 50+50 R-15'

END TAPER @ STA. 51+00 R-21'

STA. = 51+460
60.0 L.F. 24" CMP
INV: IN = 1023.50
INV: OUT = 1020.75
(2) VDOT STD. ES-2
VDOT STD. EC-1
CLASS 1 RIP-RAP

35' RADIUS @ STA. 51+76.46 R-35'

EXIST. RIGHT OF WAY

LINE S-600B
SEE SHT.6 FOR PLAN

EXIST.18" CONC. PIPE

E.B.L. U.S. ROUTE 460

VSD +500.00' +500.00'

## PLAN VIEW STREET 1 CONSTRUCTION
## LINE W-210 / S-600 / S-600A

COMMONWEALTH OF VIRGINIA
RICHARD C. WHITE
No. 020021
4-27-98
PROFESSIONAL ENGINEER

ENGINEER'S SEAL

## PROFILE STREET 1 CONSTRUCTION
## LINE W-210 / S-600 / S-600A

MH-91 RIM EL. = 1103.55 INV: IN = 1097.38 INV: OUT = 1097.28

MH-92 RIM EL. = 1091.6 INV: IN = 1087.45 INV: OUT = 1081.00

MH-200 RIM EL. = 1070.8 INV: IN = 1064.35 INV: OUT = 1064.25

MH-201 RIM EL. = 1035.09 INV: IN = 1015.59 INV: OUT = 1015.00

MATCH LINE W-210 @ STA. 45+00
MATCH STREET 1 CONSTRUCTION @ STA 45+00 L-0'
MATCH LINE S-600 @ STA. 45+00 L-0'
SEE SHEET 5 FOR PLAN

B REVISION

-10.41%

BVCS: 46+14.95 BVCE: 1091.6

100.00' VC
PVI STA = 46+64.95
PVI ELEV = 1086.4
A.D. = -1.46
K = 68.62
VSD = 300.00'

3.5' MIN. COVER

EVCS: 47+14.95 EVCE: 1080.4

NEW FIRE HYDRANT

NEW 30" CMP

-11.87%

BVCS: 47+95.79 BVCE: 1070.8

PVI STA = 48+70.79
PVI ELEV = 1061.9
A.D. = -1.11
K = 135.41
VSD = 250.00'
150.00' VC

EXIST. GRADE

PROPOSED 6" WATER LINE

END LINE W-210 @ STA. 47+72.67

END LINE S-600 @ STA. 46+53.60
BEGIN LINE S-600A @ STA. 46+53.60

A REVISION

EVCS: 49+45.79 EVCE: 1052.7

FINISHED GRADE

-72.98%

PVI STA = 51+38.83
PVI ELEV = 1027.2
A.D. = 7.98
K = 6.27
VSD = 225.00'
50.00' VC

BVCS: 51+13.83 BVCE: 1030.4

NEW 24" CMP

EVCS: 51+63.83 EVCE: 1025.9

END LINE S-600A @ STA. 51+80 L-0'
END LINE S-600B @ STA. 15+51.95 L-0'
SEE SHT. 6 FOR PLAN
LINE S-600A STA. 51+71.64 L=46'
LINE S-600B STA. 52+00 L=46'

NEW 30" CMP

END STREET 1 CONSTRUCTION @ STA 52+13.83
EQUALS EDGE OF PAVEMENT W.B.L. RTE. 460

150.00 L.F. @ 10.85%
8" SDR-35

143.15 L.F. @ 11.56%
8" SDR-35

380.00 L.F. @ 12.93%
8" SDR-35

-5.00%

1112.9 1103.55 · 1104.5 1098.34 · 1094.8 1093.14 · 1083.5 1087.84 · 1074.2 1082.20 · 1067.4 1076.28 · 1067.4 1070.34 · 1076.9 1064.30 · 1081.0 1058.07 · 1077.8 1051.66 · 1051.6 1038.68 · 1068.6 1045.17 · 1036.8 1032.19 · 1026.8 1026.74 · 1023.4 1024.09 · 1023.40

45+00 46+00 47+00 48+00 49+00 50+00 51+00 52+00

| REVISION | DATE | DESCRIPTION | BY | APP. |
|---|---|---|---|---|
| B | 04/22/98 | REVISED SHT.6 LINE S-600 ADDED LINE S-600A | REH | RCW |
| A | 10-14-97 | PER VDOT COMMENTS DATED 09-11-97 | REH | RCW |

| | |
|---|---|
| DESIGNED | RCW |
| DRAWN | REH |
| CHECKED | DRM |
| APPROVED | RCW |
| SUBMITTED | RCW |

BROOKFIELD SECTION IV
ROAD DESIGN
SANITARY SEWER & WATER
PLAN & PROFILE
BOTETOURT COUNTY, VIRGINIA

IMW P.C. ENGINEERING - SURVEYING
PHONE (540) 345-0675 FAX (540) 342-4496
1401 2nd STREET S.W. ROANOKE, VIRGINIA 24016

SCALE: 1"=30' HORZ 1"=10' VERT
COMM. NO. 942-G/J
DATE: 04/27/98
SHEET 7

C:\DWGS\9420-IV\SHT-7.DWG 04/27/98