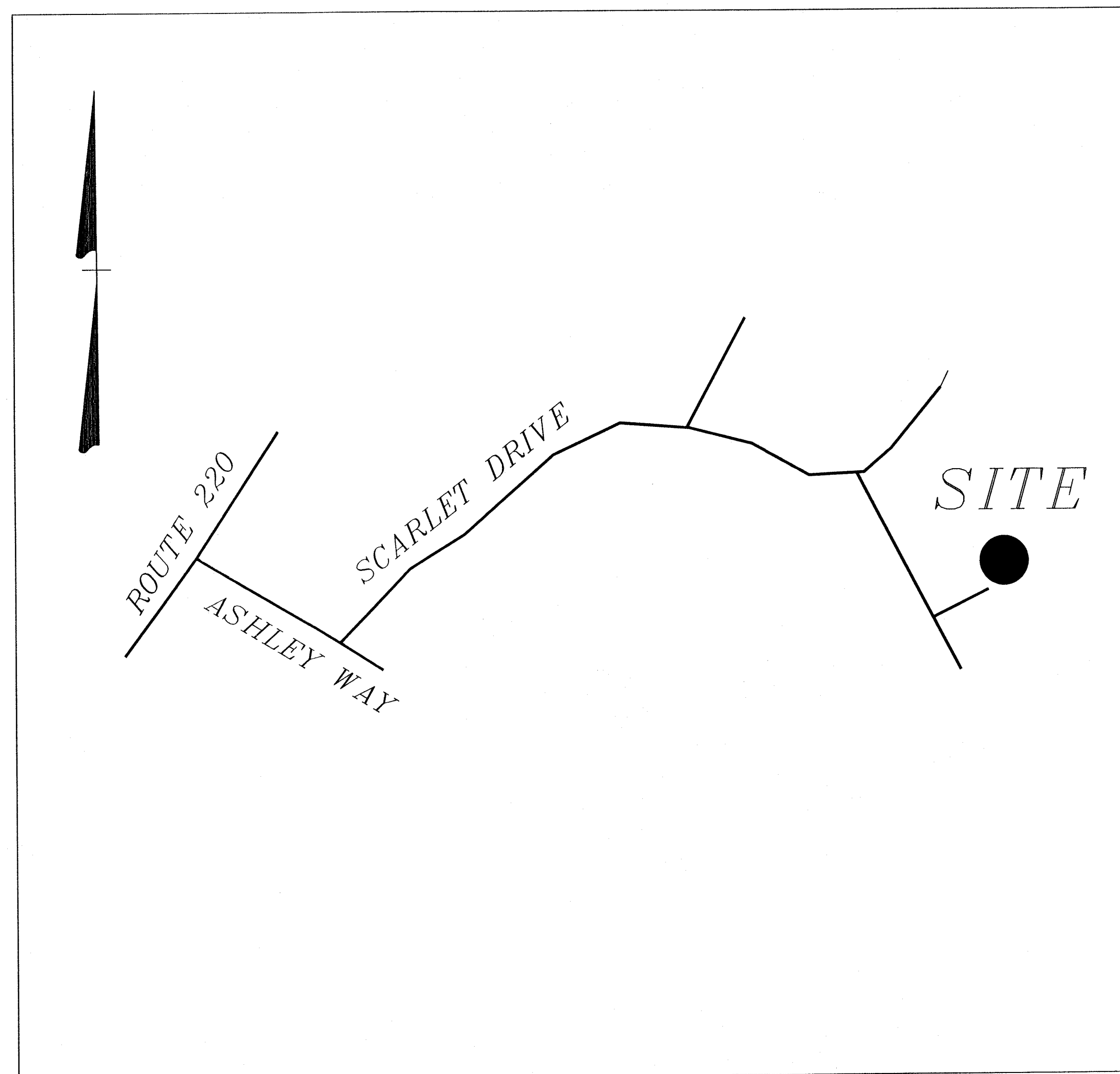


DEVELOPMENT PLANS THE MEADOWS OF ASHLEY – PHASE II AMSTERDAM MAGISTERIAL DISTRICT BOTETOURT COUNTY, VIRGINIA

ASHLEY
MEADOWS Phase II



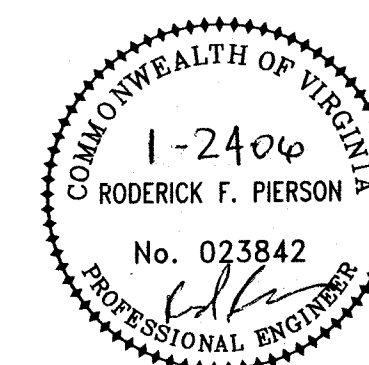
MR. A.R. OVERBAY
3705 WINESAP ROAD
ROANOKE, VIRGINIA 24019
PHONE: (540)992-6600

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10. SEWER DETAIL SHEET
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12. USGS OVERLAY

REV	DATE	DESCRIPTION
1	09/13/04	PER COUNTY COMMENTS
2	10/19/04	PER COUNTY COMMENTS
3	12/10/04	PER VDOT COMMENTS

PIERSON ENGINEERING & SURVEYING
RODERICK F. PIERSON, LLS, PE
P.O. BOX 311
DALEVILLE, VA 24083
540.966.3027
540.966.5906 fax



AS-BUILT

08/02/04

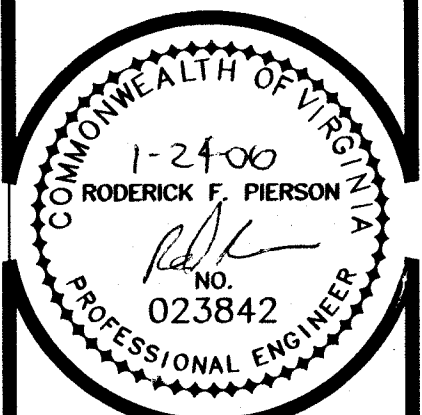
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1324 ROANOKE ROAD
DALEVILLE, VA 24083

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(540) 966-5906 FAX
e-mail: rplerson@rbnet.com

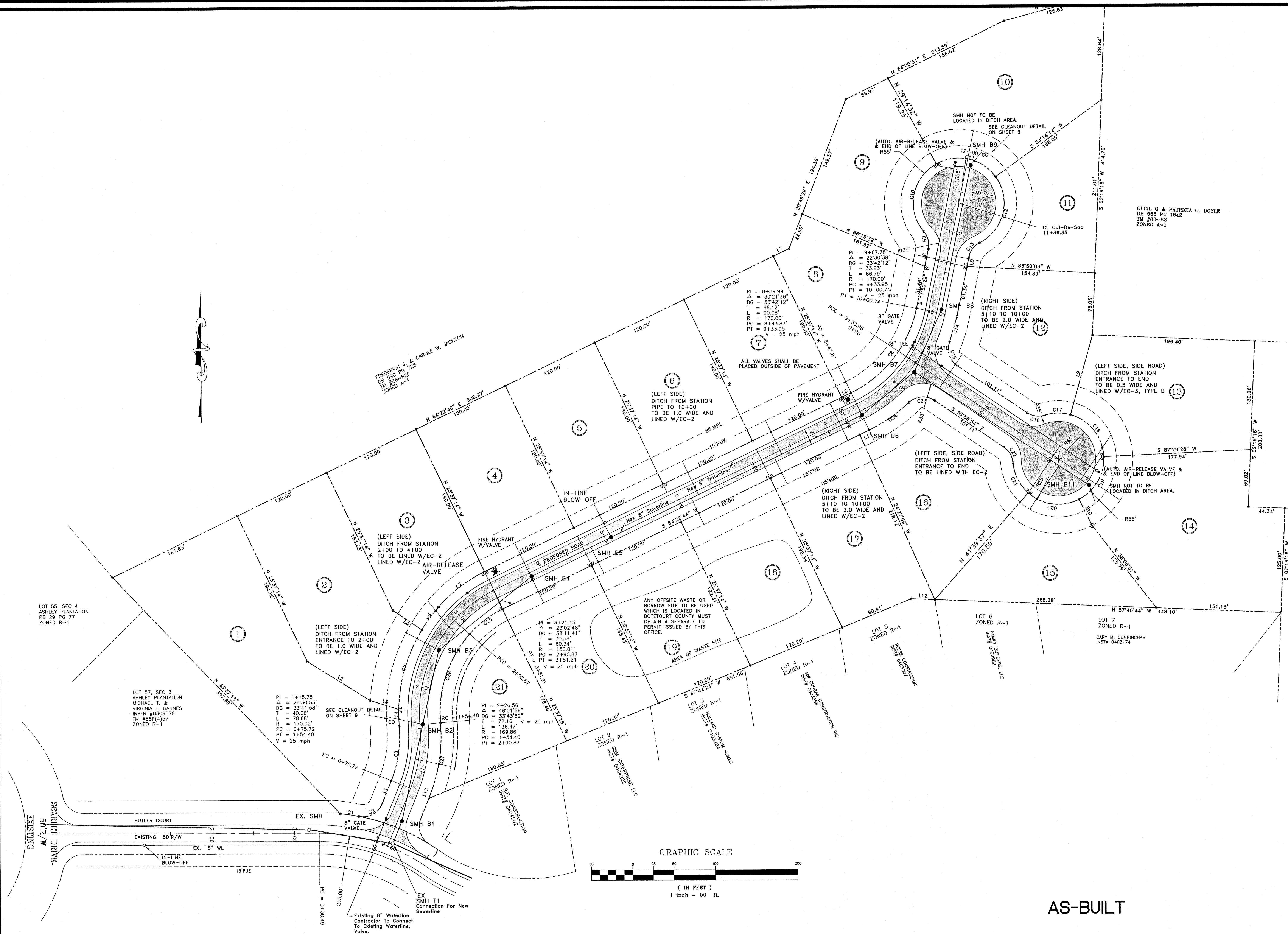
SUBDIVISION PLAN
FOR
THE MEADOWS OF ASHLEY – PHASE II
BOTETOURT COUNTY, VIRGINIA

PLAN SHEET



COMMISSION
R2004115

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2



DATE: 08/02/04
 REVISIONS
 09/13/04

**PIERSON
 ENGINEERING
 &
 SURVEYING**

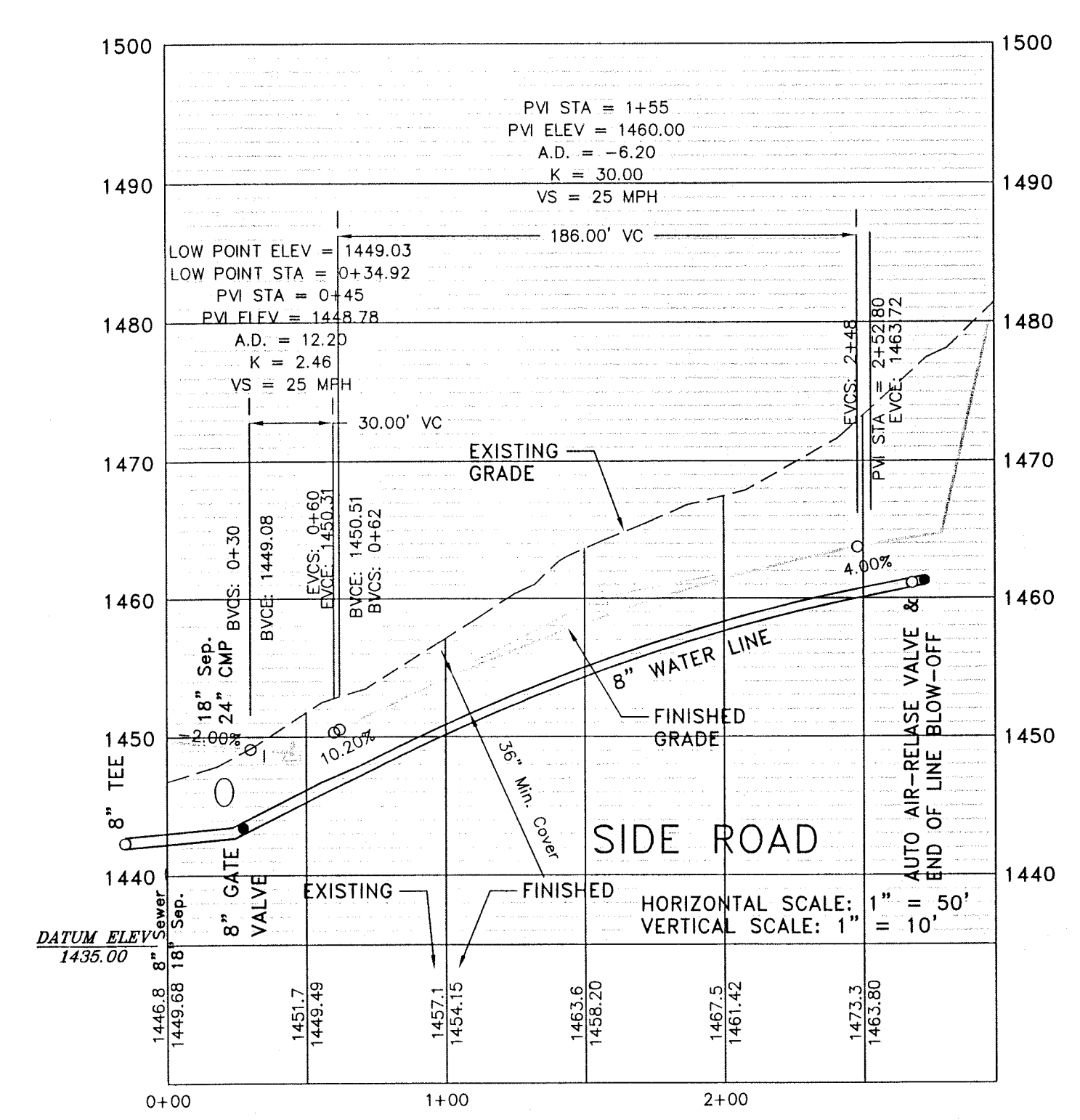
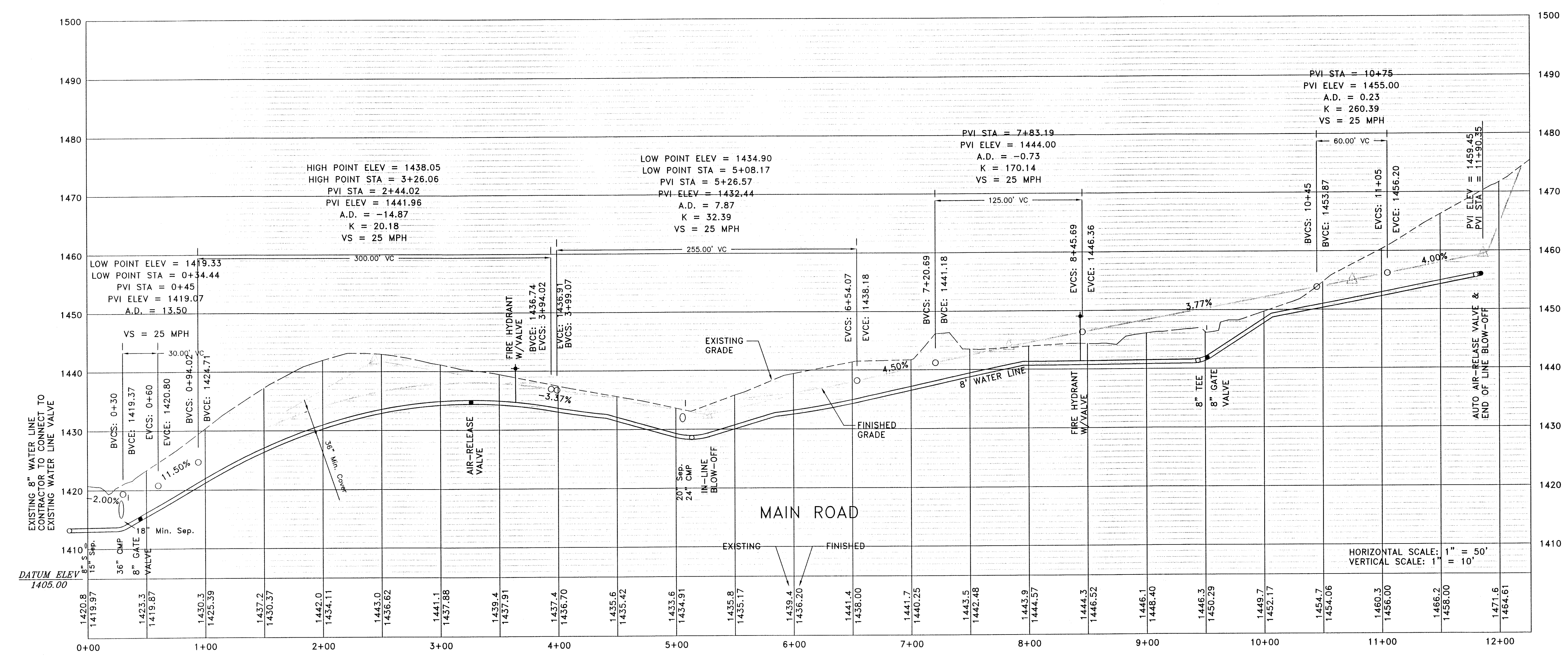
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 DALEVILLE, VA 24083

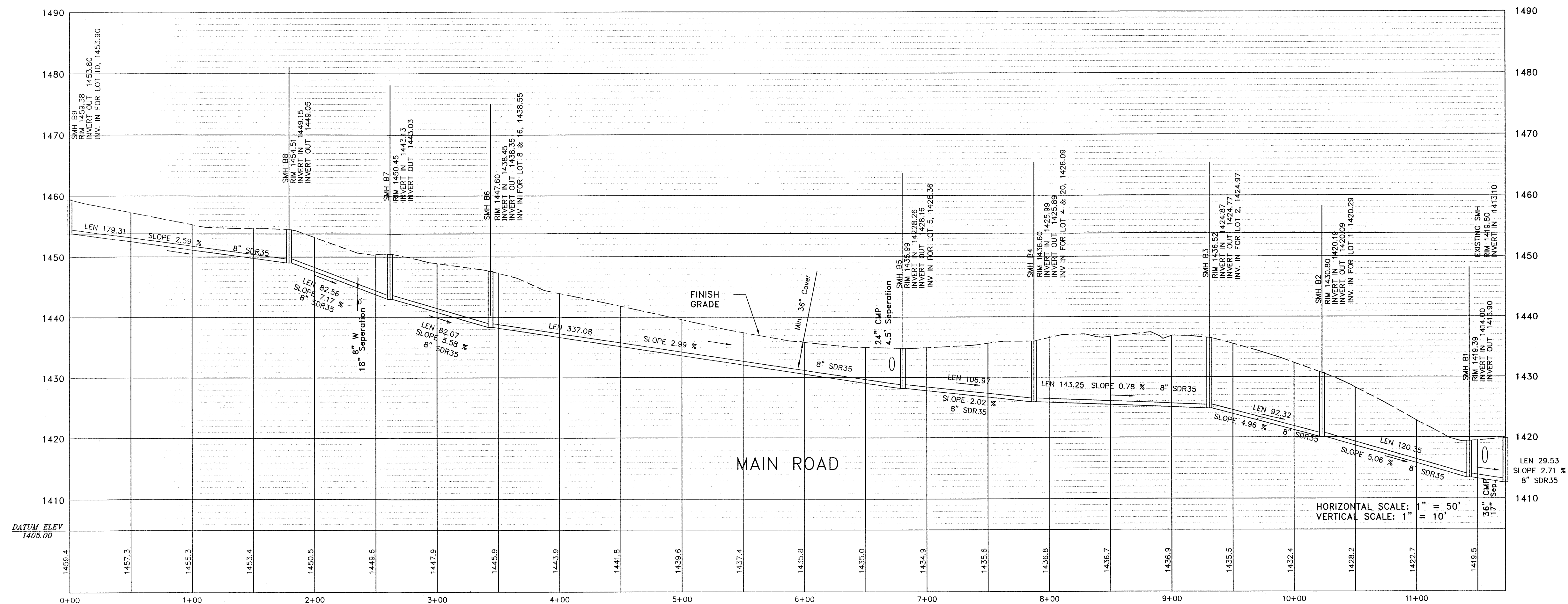
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SUBDIVISION PLAN
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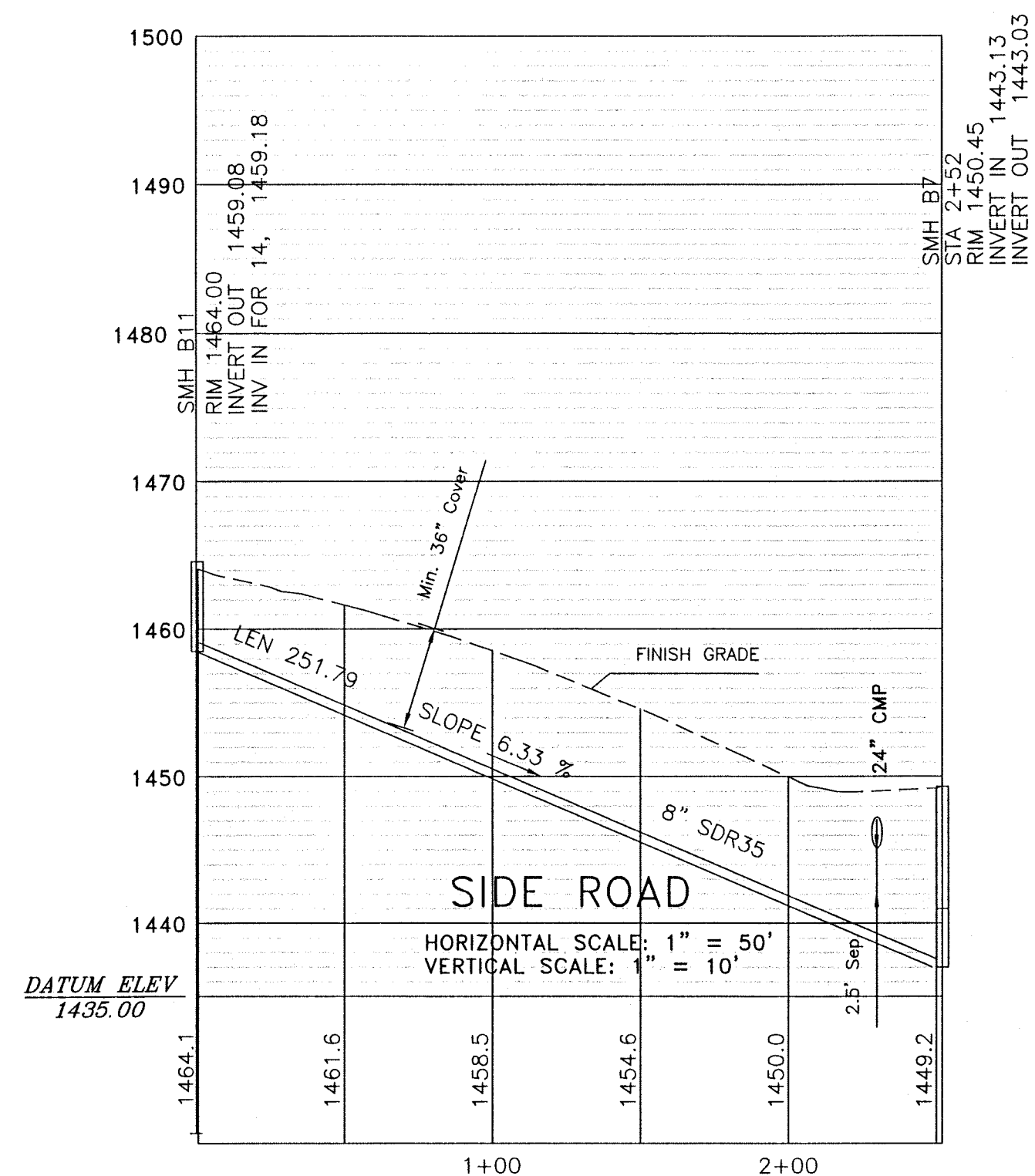
ROAD &
 WATER PROFILES

COMMONWEALTH OF VIRGINIA
 1-24-00
 RODERICK F. PIERSON
 No. 023842
 PROFESSIONAL ENGINEER
 COMMISSION
 R2004115
 SHEET
 3





STATIONING IS FOR SCALE PURPOSED ONLY.
 STATIONING DOES NOT MATCH ROADWAY STATIONING.
 SLOPE CALCULATIONS ARE FROM CENTER
 OF MANHOLE TO CENTER OF MANHOLE.
 CONTRACTOR TO VERIFY SLOPES FOR
 CONSTRUCTION PURPOSES.



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 09/13/04
 REVISIONS
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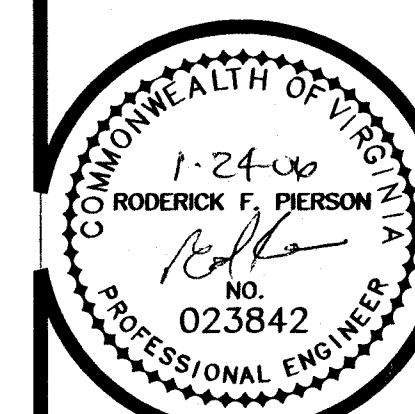
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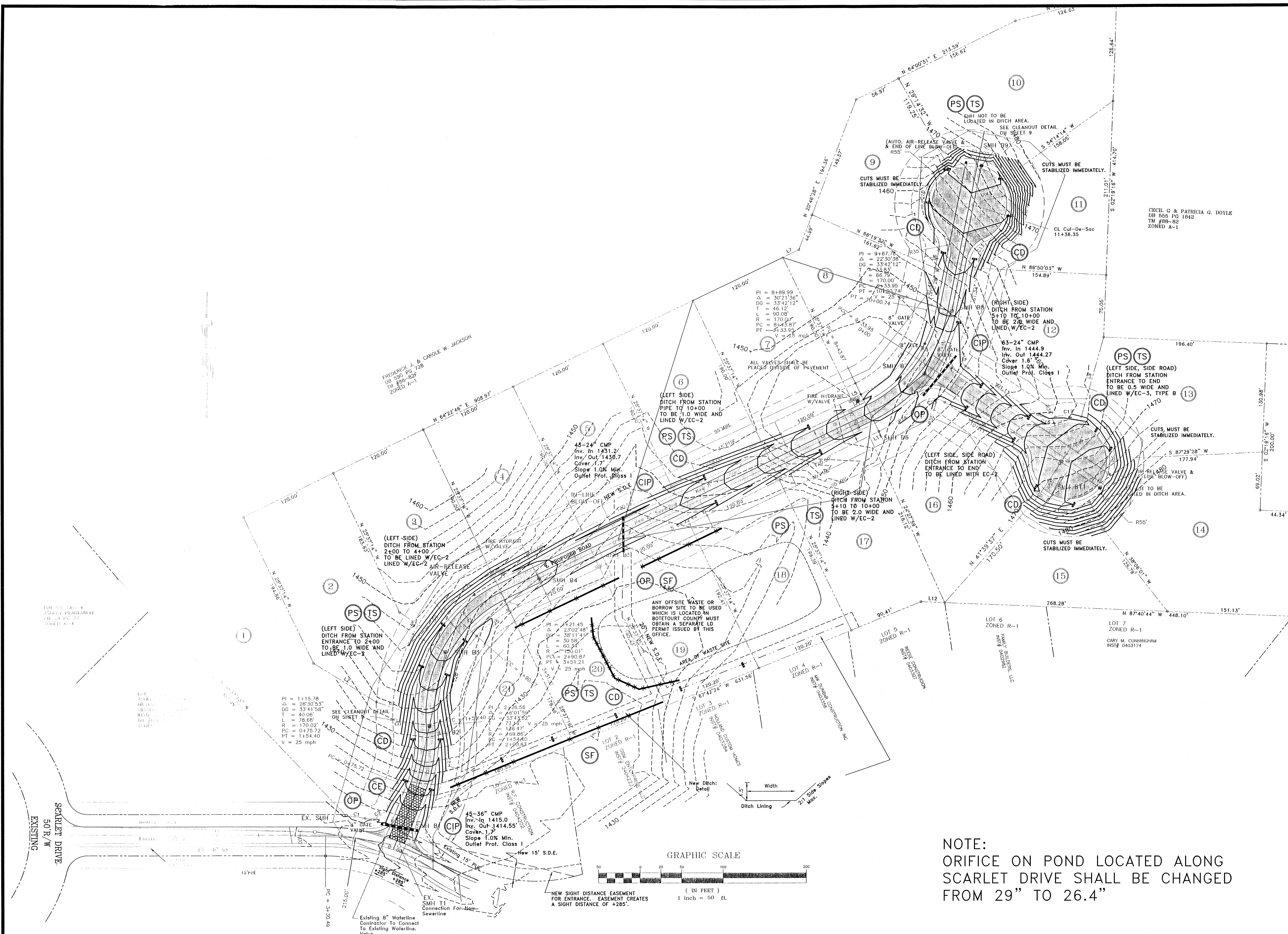
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SUBDIVISION PLAN
 FOR
 THE MEADOWS OF ASHLEY - PHASE II
 BOTETOURT COUNTY, VIRGINIA

E & S SHEET



COMMISSION
 R2004115
 SHEET
 5



Project Description

Existing Site Condition

Adjacent areas

Soils

Critical Areas

There are no critical erosion areas.

Erosion and Sediment Control Measures

Structural Practices

- After final grading, permanent seeding will be employed to reduce erosion and sediment.

Seeding Specifications:

All seeding, with required associated practices, will be in accordance with all applicable sections of the Virginia Erosion and Sediment Control Handbook.

- g. Mulching (Section 3.35)

h. Dust Control (Section 3.39)

If arid condition prevail, dust control practices will be employed as required.

- ### I. Construction Road Stabilization (Section 3.03)

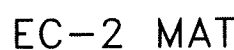
Temporary stabilization of roadways with stone immediately after grading.

Management

- a. Construction should be sequenced so that grading operations can begin and end as quickly as possible.
- b. Erosion and Sediment control devices shall be installed as the first step of construction.
- c. Areas which are not to be disturbed shall be clearly marked by flags, signs, etc.
- d. 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.

Maintenance

c. All graveled areas shall be checked for a uniform grade with no ruts or channels and top dressed with new gravel as required.



EC-2 TREATMENT ONE

Soil retention mats shall consist of a machine produced mat of wood fibers, coconut fibers, wood excelsior or manmade fiber that shall intertwine or interlock. Mats shall be of consistent thickness with fiber evenly distributed over its entire area and covered on the top and bottom side with netting having a web strength (not glued) but machine sewn. Staple and installation patterns shall be according to Bedford County Specifications

- d. All erosion and sediment control measures shall remain in place until their removal has been approved by the Botetourt County Erosion and Sediment Control Administrator.
- e. If, during construction, the Erosion and Sediment Control reviewing Officers considers the Erosion and Sediment items to be inadequate, he or she, at their discretion require the addition of other control measures.

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.

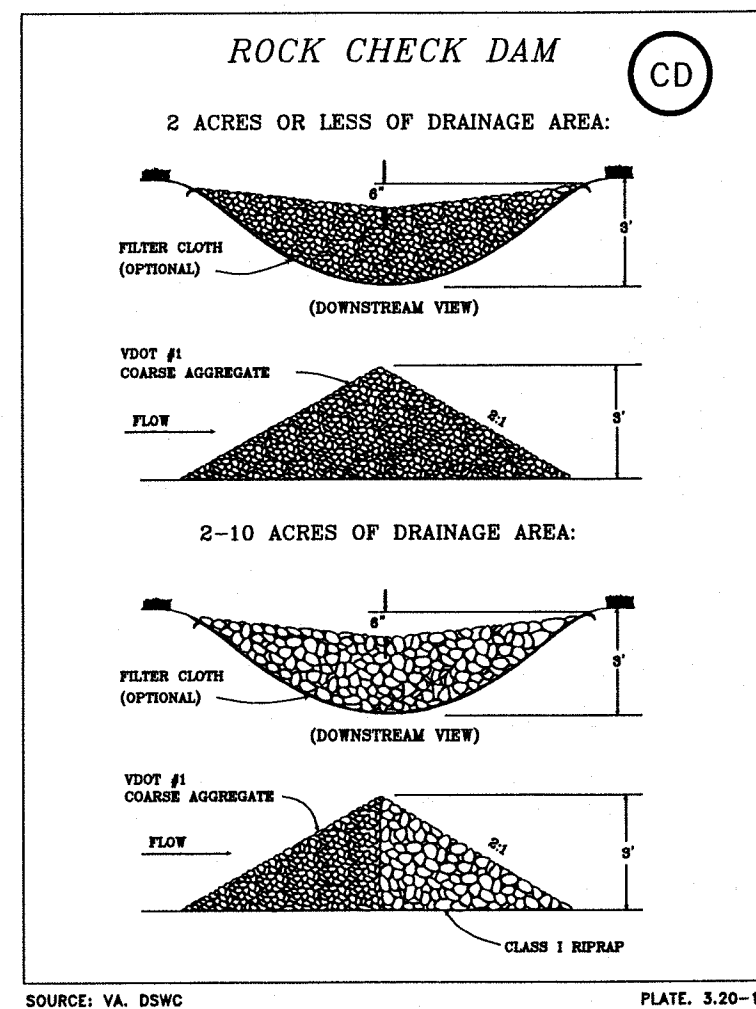
All materials and measures employed for erosion and sediment control will be in accordance with the Virginia Erosion and Sediment Control Handbook, latest edition.

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.

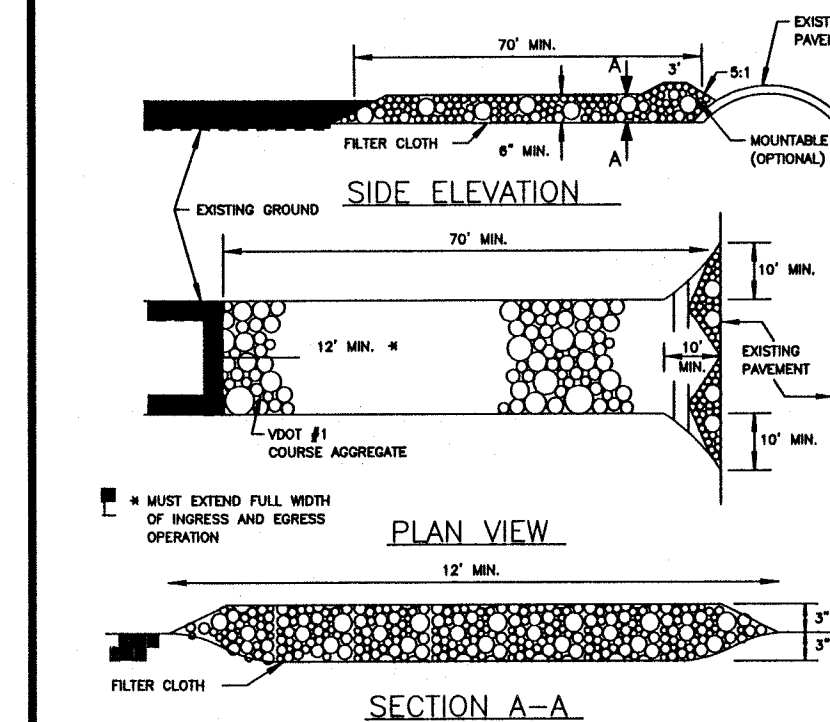
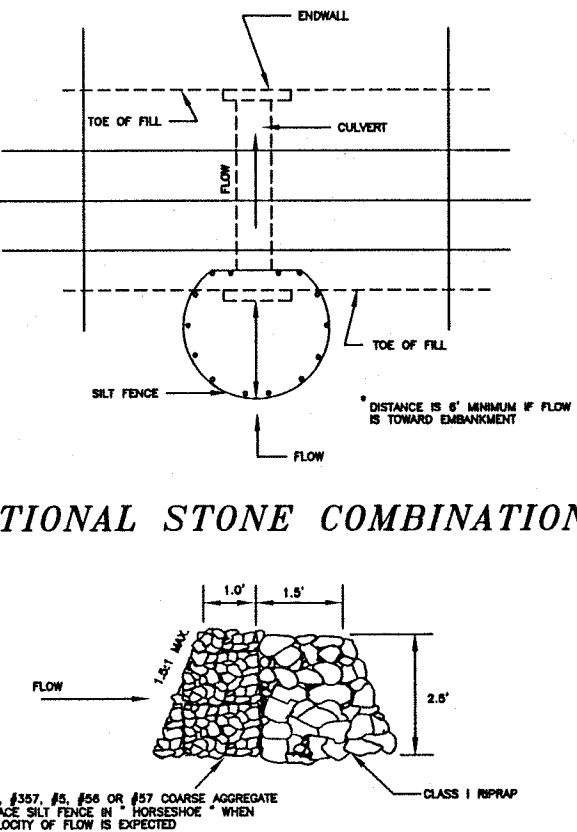
This project is to be constructed consistent with the Virginia Erosion and Sediment Control Regulations, (Latest Edition).

- GENERAL NOTES:
1. NO SEARCH OF UNDERGROUND UTILITIES WAS CONDUCTED.
 2. CONTRACTOR SHALL CONTACT THE COUNTY OF BOTETOURT AND MISS UTILITY PRIOR TO WORK FOR LOCATION OF UNDERGROUND UTILITIES.

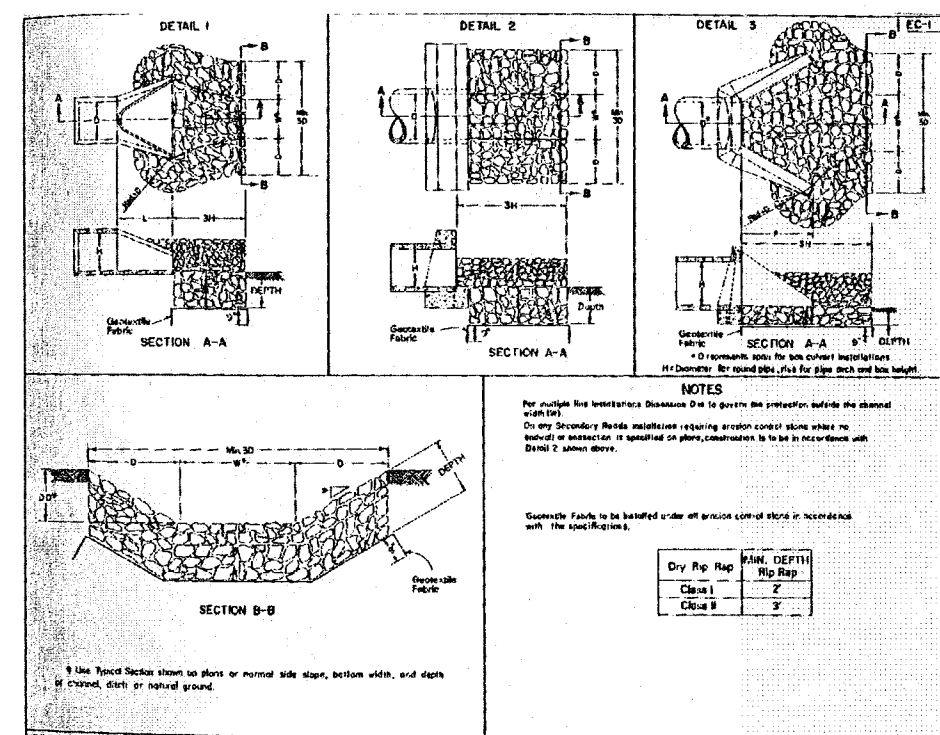
E & S QUANTITIES AND COST ESTIMATE			
ITEM	QUANTITY	UNIT PRICE	COST
CONSTRUCTION ENTRANCE	1	\$700.00	\$700
SILT FENCE	480 LF	\$1.75/LF	\$840
PERM. SEEDING	1.0 Ac.	\$2,100Ac.	\$2,100
OUTLET PROTECTION	3	\$100	\$300
INLET PROTECTION	3	\$100	\$300
RIP RAP	100/TN	\$15/TN	\$1500
EC-2 MAT	1850 LF	\$2.50/LF	\$4,625
EC-3 MAT	200 LF	\$4.00/LF	\$800
MULCHING	LS	LS	\$2,000
CONSTRUCTION ROAD STAB.	0.5Ac.	\$4,000Ac.	\$2,000
ROCK CHK. DAM	26	\$50EA	\$1300
TEMP. SEEDING	0.5Ac.	\$1,200Ac.	\$600
SUBTOTAL			\$17,065
20% CONTINGENCY			\$3,415
TOTAL COST			\$20,480



SILT FENCE CULVERT INLET PROTECTION



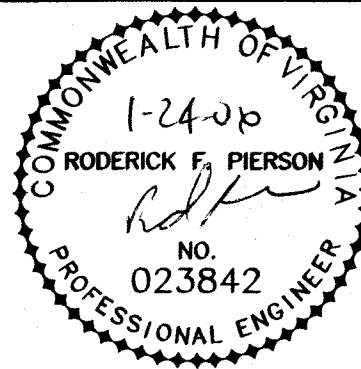
STONE CONSTRUCTION ENTRANCE (C)



OUTLET PROTECTION (C)

REV	DATE	DESCRIPTION	BY	APP
1	09/13/04	PER COUNTY COMMENTS		

E & S DETAIL SHEET
THE MEADOWS OF ASHLEY – PHASE II
BOTETOURT COUNTY, VIRGINIA



SCALE: -	
COMM. NO.	R2004115
DATE: 08/02/04	
SHEET	6

VIRGINIA DEPARTMENT OF TRANSPORTATION NOTE:

1. Quality Control

Streets to be graded and paved and all structural components erected within the proposed rights of way shall be constructed in accordance with the Virginia Department of Transportation Road and Bridge Specifications dated January 2001, Road and Bridge Standards dated January 1, 2002, and The Work Area Protection Manual dated January 1, 1996, Botetourt County. All materials used shall be tested in accordance with standard policies. The developer must contact the office of the Resident Engineer, prior to beginning of any construction at which time an Inspection and Testing Procedure Policy will be drawn. The developer will produce test reports from approved independent laboratories at the developer's expense.

The pavement designs shown are based on a subgrade CBR value 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 pavement 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 the 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 pressure 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 prior to 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, tracking 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.

This road will be reviewed during construction for the need of paved gutters. 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 form shoulder to shoulder prior to the conditioning (cutting and/or preparation) of the subgrade.

5. Intersection Pavement Radius

Minimum pavement radius of 25 feet is required at all street intersections.

If the proposed streets are to be traveled by school bus, the return radii must be increased to 50' minimum.

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 VDOT Resident Engineer. After completion of rough grading operations, the office of the Resident Engineer, Virginia Department of Transportation, 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 by the VDOT Resident Engineer 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 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 means necessary prior to subdivision acceptance.

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 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

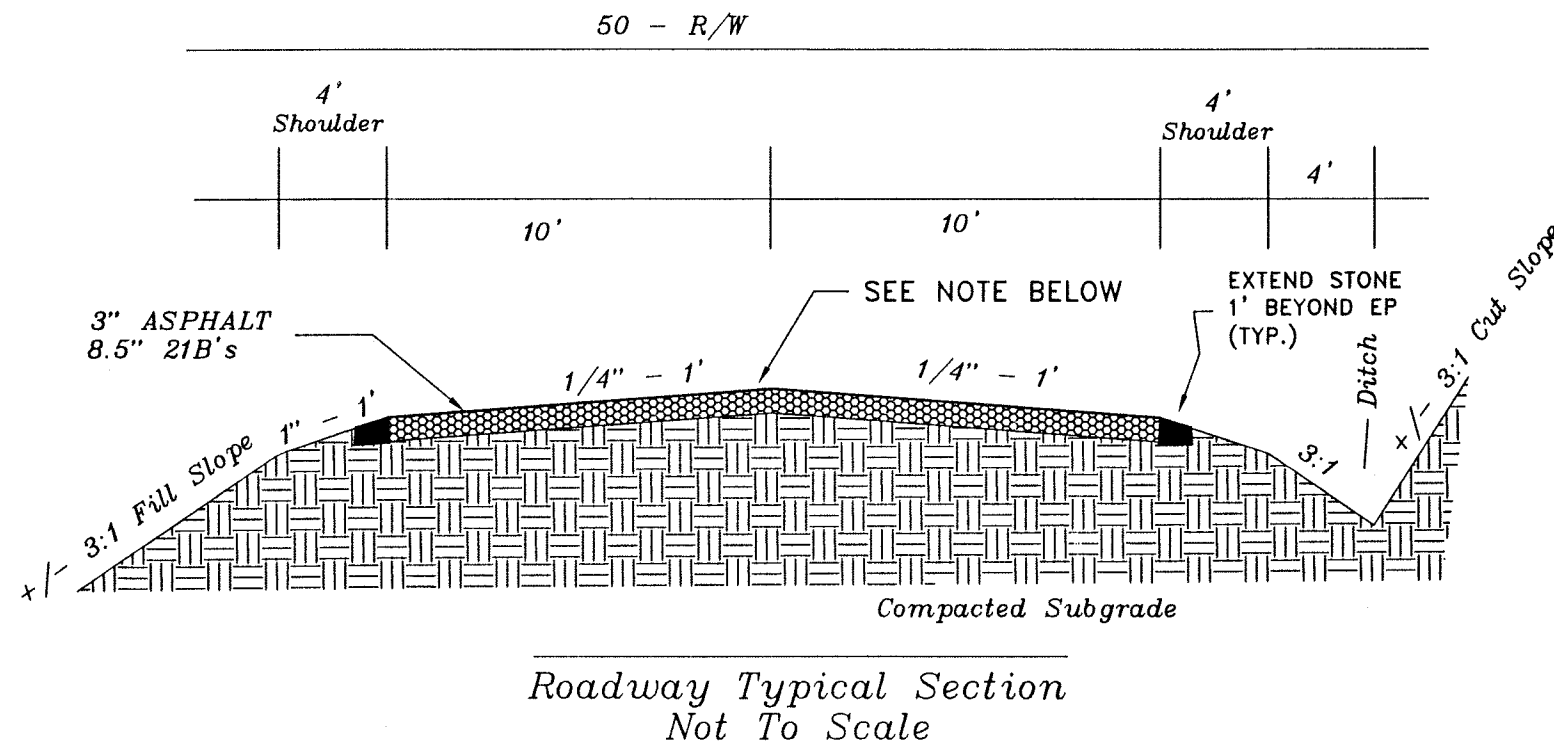
The streets must be properly maintained until acceptance. At such time as all requirements have been met for acceptance, another inspection will be made to determine that the street has been properly maintained.

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 the plans 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.



INSTALLATION OF ALL CULVERTS, DITCHES AND STORM-SEWER SYSTEMS LOCATED WITHIN VDOT RIGHT-OF-WAY AND EASEMENTS SHALL CONFORM TO THE 2001 VDOT ROAD AND BRIDGE STANDARDS.

A FIELD REVIEW WILL BE MADE DURING CONSTRUCTION TO DETERMINE THE NEED AND LIMITS OF PAVED DITCH, EC-2 AND/OR EC-3.

ALL ENTRANCE PIPES SHOULD BE A MINIMUM SIZE OF 15" UNLESS OTHERWISE NOTED.

IF SEDIMENT IS LOST FROM THE SITE AND COLLECTS WITHIN THE VDOT RIGHT-OF-WAY IT WILL BE THE DEVELOPERS RESPONSIBILITY TO REMOVE THE SEDIMENT AND/OR CLEAN OUT PIPES AS NECESSARY.

ALL DRAINAGE WAYS SHALL BE MADE TO FUNCTION.

THE DEVELOPER MUST SUBMIT A CBR TEST FOR BOTH SECTIONS 3 & 4 TO DETERMINE ACTUAL PAVEMENT STRUCTURE.

PAVEMENT DESIGN WILL BE REVISED AFTER THE RESULTS OF CBR TESTING ARE OBTAINED. ALL PAVEMENT ITEMS SHALL MEET VDOT 211F-SECTION 211 ASPHALT CONCRETE MIXTURES (SUPERPAVE)

CBR NOTE: SUB-BASE DEPTH FOR SUBGRADE BASED ON CBR VALUE OF 10. SOIL TEST OF SUBGRADE MUST BE TAKEN FOR ACTUAL DETERMINATION OF REQUIRED SUB-BASE THICKNESS PRIOR TO CONSTRUCTION.

ALL DITCHES, SWALES, NATURAL WATERCOURSES DOWNSTREAM OF THIS PROJECT NEED TO BE FIELD REVIEWED DURING AND AFTER CONSTRUCTION TO ENSURE COMPLIANCE TO DCR'S MS-19. IF EROSION OR SCOUR IS OCCURRING AND IF SUCH IS FOUND, TO DETERMINE APPROPRIATE REMEDIAL CORRECTIVE MEASURES. THE DEVELOPER SHALL BE RESPONSIBLE FOR ALL CORRECTIVE MEASURES.

A FIELD REVIEW WILL BE MADE OF THE DEVELOPMENT'S ROADWAY DITCH LINE DURING AND AFTER CONSTRUCTION TO ENSURE THAT NO CONCENTRATED RUNOFF IS BEING CONVEYED ACROSS FILL MATERIAL. IF IT IS FOUND THAT CONCENTRATED RUNOFF IS BEING CONVEYED ACROSS FILL MATERIAL, THE DITCH LINE MUST BE LINED WITH RIP RAP TO PREVENT FUTURE EROSION SCOUR PROBLEMS.

GENERAL NOTES FOR SUBDIVISION PLANS

VDOT General Notes

- All work on this project shall conform to the latest editions of the Virginia Department of Transportation (VDOT) Road and Bridge Specifications, and Standards, The Virginia Erosion and Sediment Control Regulations and any other state, federal or local regulations applicable. In the event of conflict between any of these standards, specifications or plans, the most stringent shall govern.
- All construction shall comply with the latest U.S. Department of Labor Occupational Safety & Health Administration and VOSH Rules & Regulations.
- When working on VDOT right of way, all traffic control, whether permanent or temporary, shall be in accordance with the current edition of VDOT's work area protection manual. Furthermore, all traffic control flaggers must be certified in accordance with VDOT's January, 1994 (or latest edition of) Road & Bridge Specifications, Section 104.04-C.
- Design features relating to construction or to regulation, control and safety of traffic may be subject to change as deemed necessary by VDOT.
- Prior to initiation of work, Contractor shall be responsible for acquiring all necessary VDOT land use permits for any work on VDOT right of way.
- If required by the local VDOT Residency Office, a preconstruction conference must be arranged and held by the engineer and/or developer with the attendance of the contractor, various County agencies, utility companies and VDOT prior to initiation of work.
- Contractor shall notify the local VDOT Residency office when work is to begin or cease for any undetermined length of time. VDOT will also require 48 hours notice for any inspection.
- The Contractor will be responsible for maintaining adequate access to the project from the adjacent public roadway through construction and maintenance of a construction entrance in accordance with the Virginia Erosion & Sediment Control Handbook, Sec. 3.02. Furthermore, access to other properties affected by this project shall be maintained through construction.
- Contractor shall ensure adequate drainage is achieved and maintained on the site during and at the end of construction.
- All water and sewer lines within existing or proposed VDOT right of way are to have minimum 36" cover and, to be installed under roadway drainage facilities.
- Any unusual subsurface conditions encountered during the course of construction shall be immediately brought to the attention of the engineer and VDOT. Work shall cease in that vicinity until an adequate design can be determined by the engineer and approved by VDOT.
- All undercut areas and borrow material shall be inspected and approved by VDOT inspection prior to placement of fill.
- All roadway fill, base, subsurface material and backfill of utility/storm sewer trenches shall be compacted in 6" lifts to 95% of theoretical maximum density as determined by ASSHTO T-99 Method A, within plus or minus 2% of optimum moisture for the full width of any dedicated street right-of-way. At the direction of VDOT inspector density tests performed by a qualified independent agency shall be conducted as required in the VDOT Road and Bridge Specifications. A copy of all tests shall be submitted to VDOT prior to final VDOT approval.
- VDOT Standard CD and UD underdrains shall be installed where indicated on these plans and further where determined necessary by VDOT Inspector.
- The installation of any entrances and mailboxes within any dedicated street right-of-way shall meet VDOT minimum design standards and is the developer's responsibility.
- If required by the local VDOT Residency Office, copies of all invoices for materials within any dedicated street right-of-way must be provided to the VDOT Inspector prior to acceptance of work. Unit and total prices may be obscured.
- Prior to acceptance by VDOT of any streets, any required street signage and/or pavement markings must be installed by the developer or, at VDOT's discretion, by VDOT on an account receivable basis.

DATE: 08-02-04

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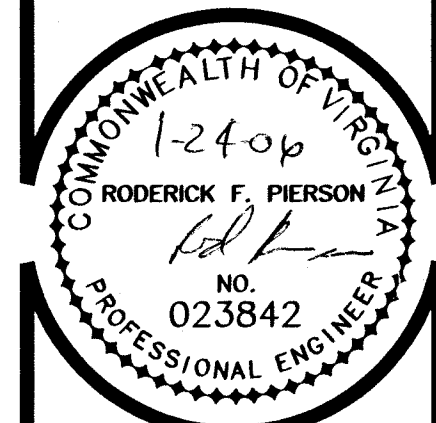
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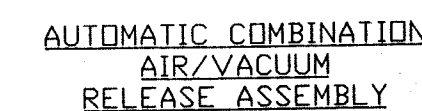
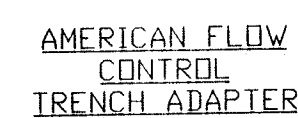
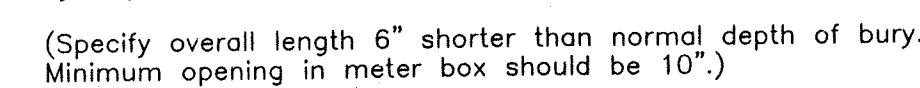
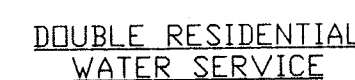
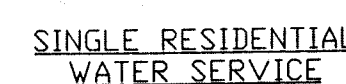
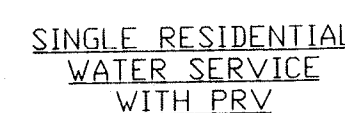
SUBDIVISION PLAT
FOR
THE MEADOWS OF ASHLEY - PHASE II
BOTETOURT COUNTY, VIRGINIA

ROADWAY
SPECIFICATIONS



COMMISSION
R2004115

SHEET
7



CONTRACTOR SHALL INSTALL PIPE LOCATOR TAPE
AND/OR OTHER MATERIALS REQUIRED BY COUNTY
TO LOCATE BURIED WATER PIPE.



NOTE: A 1" DRAIN WILL BE REQUIRED ON THE LOWER END OF THE CASING IF THE CASING ENDS ARE SEALED WITH MORTAR AND BRICK.

1. ALL JOINTS SHALL BE RESTRAINED ON BOTH SIDES OF THE FITTING FOR THE LENGTH SHOWN UNLESS OTHERWISE INDICATED.
2. REDUCER IS ONE SIZE SMALLER THAN PIPE LISTED. RESTRAINED LENGTH IS UPSTREAM ON THE LARGE SIDE OF THE REDUCER.

THRUST RESTRAINT OF PIPE JOINTS DESIGN LENGTHS



1. FOR VERT. BENDS DOWN IN EXCESS OF 11 1/4" BENDS, ANCHORAGE SHALL BE DESIGNED BY ENGINEER	4. ALL THRUST CING. SHALL BE CONG.
2. FOR VERT. BEND UPWARD, BLOCKING TO BE SIMILAR TO THAT FOR HORIZ. BENDS	5. THRUST BLOCK GREATER THAN RESTRAINED MINIMUM OF 4'
3. GLAND & BOLTS SHALL BE PROTECTED FROM COR. BY PLASTIC SHEETING WHEN POURING THRUST BLOCKS	FACTOR



GENERAL WATER AND SEWER CONDITIONS

All work shall be subject to inspection by Botetourt County inspectors. The Contractor shall notify the proper County officials prior to the start of the work.

All materials and construction shall comply with the most current version of the Water and Sewer Regulations of Botetourt County as adopted by the Botetourt County Board of Supervisors.

All existing utilities adjacent to the proposed work are not necessarily shown on the plans and where shown, are only approximately located. The contractor shall on his own initiative locate all underground lines and structures as necessary.

All materials and construction shall comply with the most current version of the Water and Sewer Regulations of Botetourt County as adopted by the Botetourt County Board of Supervisors.

All water and sewer pipes shall have a minimum of three (3.0) feet of cover measured from the top of the pipe, over the centerline of pipe. This includes all fire hydrant lines, service laterals, and water lines, etc.

Permanent twenty-five (25) foot wide easements for sewer and/or water lines, centered on the pipeline and appurtenances shall be dedicated to the County, except where the line is in a public road right-of-way or an access easement, in which case the access easement shall also be dedicated as an utility easement. Temporary easements should be sufficient width to allow contractor enough room to construct the utility while working safely and in compliance with OSHA Regulations.

All water and sewer appurtenances are to be located outside of roadside ditches.

Provide testing specifications on the plans for water and sewer in accordance with Botetourt County Water and Sewer Construction Standards and Specifications.

The contractor shall obtain a copy of the most current edition of Botetourt County Water and Sewer Construction Standards and Specifications and provide proof (a letter) that the contractor has and is familiar with the requirements therein.

A professional engineer registered in the State of Virginia shall document all testing.

All water shop drawings / cut sheets shall be submitted by the contractor to both the design engineer and Botetourt County for approval prior to installation / construction. Botetourt County will require (3) complete sets of shop drawings for review.

The contractor shall schedule a pre-construction meeting to be attended by the contractor's site superintendent, design engineer, the design engineer's field representative / inspector, Botetourt County Utility Department, Botetourt County Engineering Department and any materials suppliers the contractor feels necessary. The pre-construction meeting shall not be scheduled until all shop drawings have been approved by Botetourt County.

The contractor shall obtain a copy of the most current edition of Botetourt County Water and Sewer Construction Standards and Specifications and provide proof (a letter) that the contractor has and is familiar with the requirements therein.)

As built plan submittals – Bounty County will require the following as built / record drawing information to be submitted by the owner or developer:

- One (1) complete reproducible set of water as-built / record drawings sealed by a Professional Engineer registered in the Commonwealth of Virginia.
- One (1) complete digital (AutoCad 2000 version) set of water as-built / record drawings.

All as built / record drawings shall show actual field surveyed locations (horizontal and vertical) of structures (manholes, clean-outs, service stub-outs, fire hydrants, valve boxes, water meter boxes, air release valves, etc.) and show recomputed pipe lengths and slopes based upon actual field locations.

Prior to conveyance of the water and sewer system (main lines and associated structures) we will require the following information to be submitted:

- One (1) letter of documentation sealed by a Professional Engineer registered in the Commonwealth of Virginia, stating that the system has been built in accordance with the approved plans and specifications.
- Deed of conveyance from the owner to botetourt County.
- Plot showing all water and sewer easements.
- Warranty to Botetourt County for one (1) year following date of acceptance by the Botetourt County Board of Supervisors.
- Two (2) complete copies of documentation sealed by a Professional Engineer registered in the Commonwealth of Virginia, of all required sewer testing to include at least the follow items:
 - Main line sewer line air pressure testing up to and against the first clean-out on service lines.
 - Main line sewer deflection mandrel testing.
 - Sewer manhole vacuum testing up to and including the manhole frame.
 - Main line water line pressure testing.
 - Main line water line acceptable bacteriological testing results.

The process of conveyance is as follows:

- Submit all information as outlined above and provide written request that Botetourt County accept ownership and operation of the system.
- Schedule a pre-final inspection of the system.
- Address any inspection / punch list items.
- Schedule a final inspection of the system.
- Botetourt County Department of Public Works makes formal recommendation to Botetourt County Board of Supervisors that the system is complete and ready for ownership and operation by Botetourt County.
- Botetourt County Board of Supervisors takes official action to either accept or reject ownership and operation of the system.

The contractor shall be responsible for notifying "Miss Utility" and comply with Virginia's underground utility damage prevention act, (1-800-552-7001).

Waterline Testing

All new water mains shall be tested, after backfilling to a hydrostatic pressure of not less than 100 psi above design water pressure for the system or 150 psi, whichever is greater. Allowable leakage shall be calculated by the following formula:

$$L = \frac{SDP^{1/2}}{133,200}$$

Where: L = allowable leakage in gallons per hour
S = length of pipe tested in feet.
D = nominal diameter of pipe in inches.
P = average test pressure during leakage test in psi.

No water line shall be placed in service until the leakage is less than the allowable leakage as indicated above. Testing of water mains shall only be done after installation of all valves, taps and service laterals are complete. All portions of the water system, including hydrants and service lines, shall be subject to the hydrostatic pressure during the leakage test. Testing of water mains shall be observed and documented by a County Utility or Engineering Inspector.

All high points and service lines in the portion of the system under test shall be vented and all air shall be expelled from the system prior to beginning the test.

All fittings and hydrants shall be properly broced or blocked before applying pressure. Where concrete thrust blocks are used, they shall have attained their set prior to testing.

After the portion of the system under the test has reached the required pressure as stated herein, said pressure shall be maintained for two (2) hours. At the conclusion of the pressure test, the volume of makeup water required to refill the pipeline shall be determined by measurement with a displacement meter or by pumping from a vessel of known volume.

All joints or fittings at which leakage occurs shall be re-worked to insure tightness. All visible leaks shall be repaired regardless of amount of leakage. If the measured amount of leakage exceeds the values for the appropriate size as found in AWWA Specifications C600, Hydrostatic Testing (Table 6), the pipe-line shall be repaired prior to re-testing will be done the Utility or Engineering Departments approval and inspection. Repairs of new construction will be by adjustment or replacement of replacement of material only. The use of repairs clamps or bell clamps will not be acceptable.

SANITARY SEWER TESTING

Manhole Acceptance Tests (Vacuum Testing)

Manholes, including frame, shall be tested by vacuum testing from the top of the frame. Inflatable stoppers shall be used to plug all lines into and out of the manhole being tested including any vent line. The stoppers shall be positioned in the lines far enough from the manhole to insure testing to those portions of the lines not air tested. Vacuum tests shall be made with a vacuum of 10" Hg. The time for the vacuum to drop from 10" to 9" of Hg must be greater than 60 seconds.

Contractor shall furnish weirs, stand pipes, pipe plugs, water, pressure gauges, stop watches, air compressor, vacuum pump, hose and such materials and assistance as required to perform these tests. All acceptance tests shall be conducted by Contractor in the presence of a County Inspector.

Acceptance tests shall not be made until sanitary sewer, manholes and proposed sewer service connections, as shown on the approved sewer plans, have been installed, the sewer trenches (including manholes and cleanout stacks) backfilled and compacted to finish sub-grade.

Contractor shall schedule all acceptance tests with the project inspector at least forty-eight (48) hours in advance. Each section of completed sewer shall be tested from manhole to manhole. No sewers or sewer service connections are to be excluded from this testing procedure.

Sewer Pipe Testing Procedure

Whenever it is necessary to construct underdrains or place gravel under pipe lines in order to dewater trench during construction of sewers, acceptance test will not be made until any pumps, which have been used in dewatering process, have been disconnected of drains have been taken out of service.

Contractor shall schedule all acceptance tests with the Engineering/Utility Department at least forty-eight (48) hours in advance. Each section of completed sewer shall be tested. Generally, sewers will be tested from manhole to manhole. No sewer or sewer service connection is to be excluded from this testing procedure.

Low Pressure Air Testing Procedure – The test procedure shall be conducted in the following manner: (Vacuum test of manholes is generally inverse of low pressure air test of sewer lines)

- Contractor shall thoroughly clean and remove all debris, silt, earth or other materials from the sewer prior to acceptance testing.
- Proper test plugs shall be supplied and installed by Contractor. Test gauges used in air test procedure shall have a range of 0–10 psi and shall be calibrated in divisions of 0.10 psi with an accuracy of +/- one percent. Test gauges shall be calibrated at least once a year and the date and results displayed on the equipment including date of calibration. Calibrations shall be certified by an independent testing lab. Test gauges shall be located outside of manhole during testing.
- If pipe to be tested is expected to be below ground water table, Contractor shall either:
 - Install a small diameter perforated vertical pipe from invert elevation of the sewer to the surface prior to backfilling; or
 - Insert a pipe probe by boring or driving into the backfilling material adjacent to the invert elevation of the pipe, and determine the depth of the ground water level above the pipe invert immediately prior to acceptance testing the sewer.
 - All gauge pressures for test shall be increased by the amount of this back pressure due to ground water over the invert of the pipe.
 - In lieu of the above water depth determination, Contractor may add three (3) psi to the gauge pressure in the test.
- Contractor shall add air slowly to the portion of the pipe under test until the internal air pressure is raised to 4.0 psi gauge plus the ground water pressure.
- As a safety precaution, no one shall be allowed in manhole after air pressure is increased in the sewer line. If the inspector suspects that the test plug may be leaking, pressure shall first be relieved before any adjustments are made to eliminate air leakage at the plug.
- Contractor shall allow air temperature to stabilize for at least two (2) minutes with the pipe subjected to an internal pressure of 4.0 psi by adding only the amount of air required to maintain the pressure.
- After temperature stabilization, the test will begin. If the internal air pressure decreases, the time required for the pressure to drop from 3.5 to 2.5 psi gauge will be observed and recorded. The time interval shall be compared with the standards in accordance with the DD-30 or DD-31 for time and length of test section for various diameters of the sewer. All pipes 15 inches or less shall be tested for a pressure drop of 1.0 psi gauge.
- Pipe which fails to maintain the stipulated pressure for a period equal to or greater than the holding time shown in Table I shall be deemed to have failed the low pressure air test and is unsatisfactory for acceptance by the County. Any sewer the fails to pass this test shall be replaced by the Contractor at his expense.

Sewer Force Main Testing Procedure – Sewer force mains shall be hydrostatically tested at 150% of the design operating pressure of (60 psi) for 30 minutes. Allowable leakage shall be the same as established for water pipe lines in the Botetourt County Water and Sewer Stabdard and Specifications.

Mandrel Testing

The Contractor shall deflection test the entire length of pipe by means of a go-no-go mandrel to assure that a 5.0% deflection has not been exceeded. The testing shall be performed completely at the expense of the Contractor and shall be performed in the presence of Engineer. Mandrel and proving ring details shall be approved by the Engineer and shall be sized at 5% less than ASTM dimensions for the sewer pipe (in accordance with ASTM D-3034 and F-679). The mandrel test shall be performed no sooner than three (3) months after backfill of the pipe is completed. All pipe that fails the deflection test shall be removed and replaced at the Contractor's expense. The "rerounder" technique shall not be allowed. The Contractor shall use approved nine (9) arm mandrels and proving rings for each size of mainline pipe. The contract length "L" of the mandrel arms and the actual mandrel diameter "D" (ID of the ring) shall equal the dimensions in Table I below. Critical mandrel dimensions shall carry a tolerance of +/- .01.

TABLE 9 Arm Mandrel D Dimension			
	(MIN)	ASTM D3034	ASTM D2751 (6" only)*
Nom. Dia.	L	SDR 35	ASTM D2680
6"	6"	5.65"	5.65" (SDR 35) 5.49" (SDR 23.5)
8"	8"	7.56"	7.40"
10"	10"	9.45"	9.31"
12"	12"	11.26"	11.22"
15"	15"	13.78"	14.09"
18"	18"	16.69"	
21"	18"	19.67"	
24"	18"	22.13"	
27"	18"	24.95"	

Mandrel and proving ring may be obtained from Worico, Inc., 220 High Street, Franklin, Ohio 45005 (1-513-746-6439), or Hurco Enterprises (1-800-843-1300), or Cherne Industries (1-800-843-7584).

All tests are to be performed in the presence of the design engineer and properly documented by the design engineer for submittal with record drawings to Botetourt County prior to conveyance to Botetourt County. Tests submittals documented by anyone other than the design engineer (i.e. the contractor) will not be acceptable as proof of compliance.

Developer to provide video camera inspection documentation prior to conclusion 1-year warranty period. Video camera inspection work to be performed no sooner the 6 months after the date of system acceptance by Botetourt County and no later than 8 months after the date of system acceptance by Botetourt County. One (1) copy of the videotape to be provided to Botetourt County. Video camera inspection work to be coordinated with Botetourt County such that County personnel can be present during video inspection operations.

The contractor shall schedule a pre-construction meeting to be attended by no less than the following: Botetourt County representatives, contractor representative including the proposed sewer contractor site superintendent, design engineer, any material suppliers or subcontractors that the sewer contractor feels necessary to attend.

All sewer and water pipes (mains and service lines) shall have both magnetically locatable detection wire and or tape AND warning tape. Magnetically locatable detection wire and or tape shall be installed at same elevation of spring line of pipe. Warning tape (Caution!! Buried Sewer / Water Pipe Below) to be installed no more than 18 inches above top of the pipe.

All water and sewer shop drawings / cut sheets shall be submitted by the contractor to both the design engineer and Botetourt County for approval prior to installation. Botetourt County will require three (3) complete sets of shop drawings for review.

DATE: 08/02/04

09/13/04

REVISIONS
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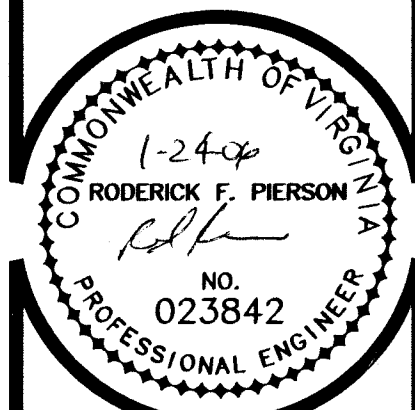
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SUBDIVISION PLAN
FOR
THE MEADOWS OF ASHLEY – PHASE II
BOTETOURT COUNTY, VIRGINIA

WATER DETAILS



COMMISSION
R2004115

SHEET

8A

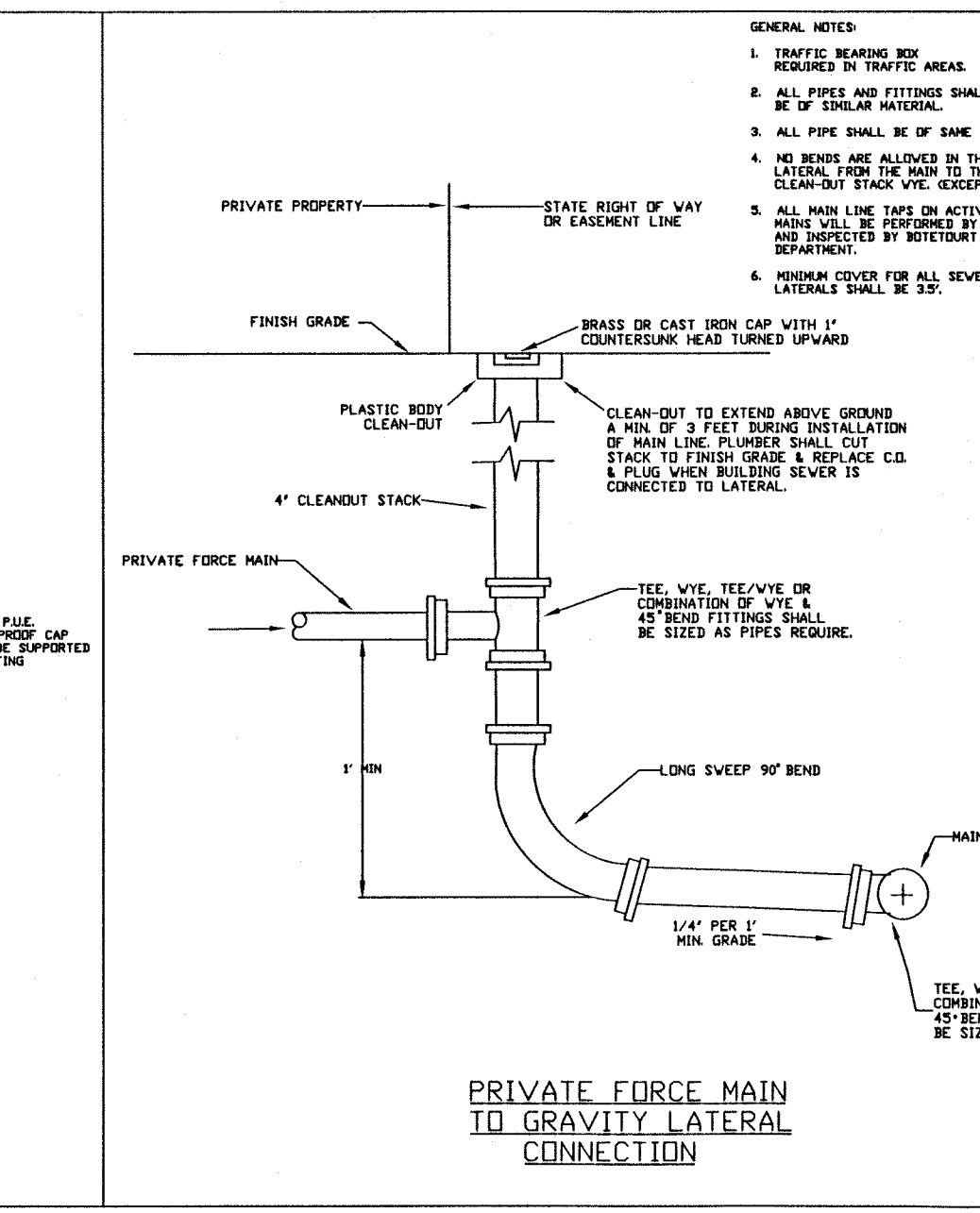
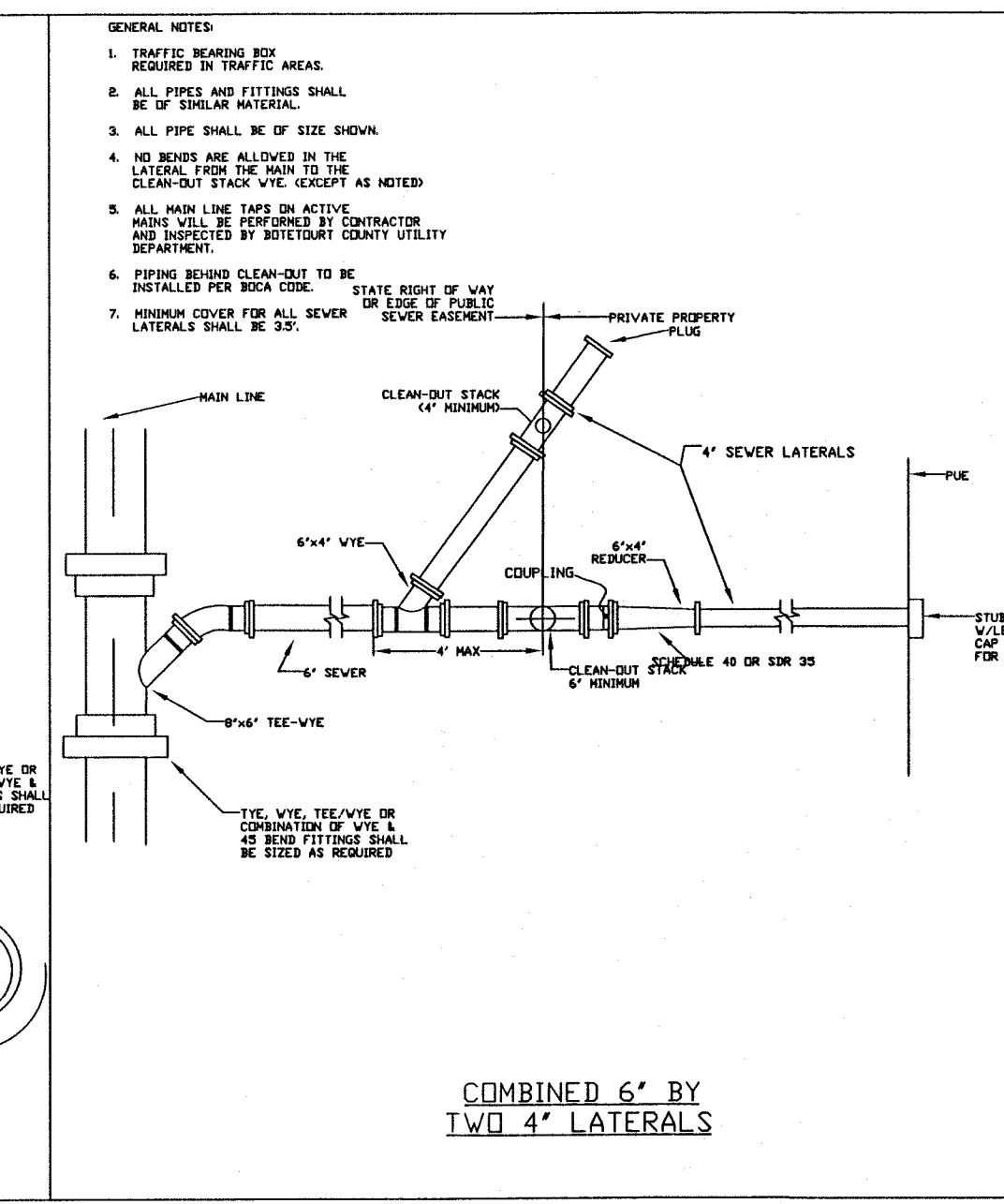
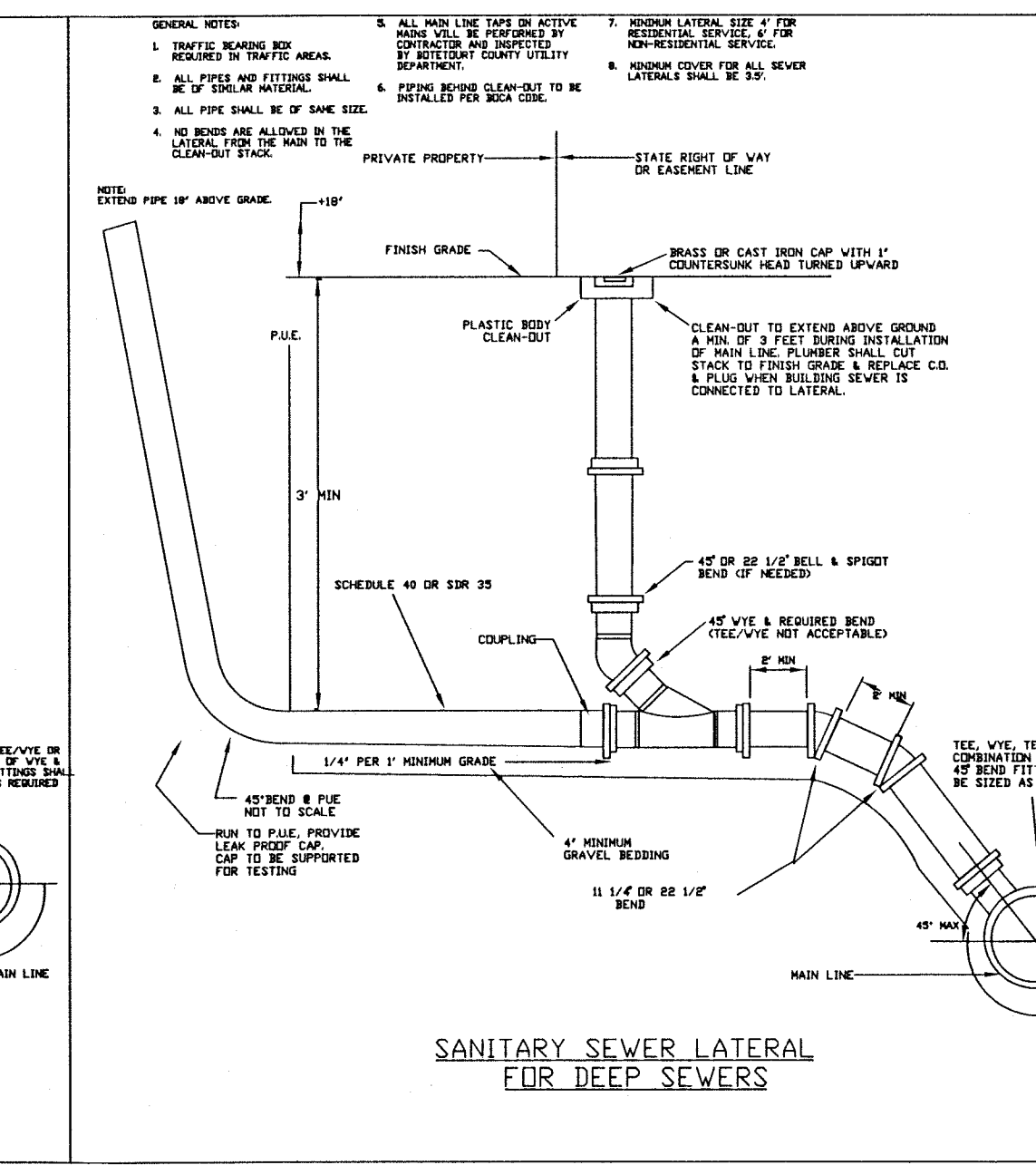
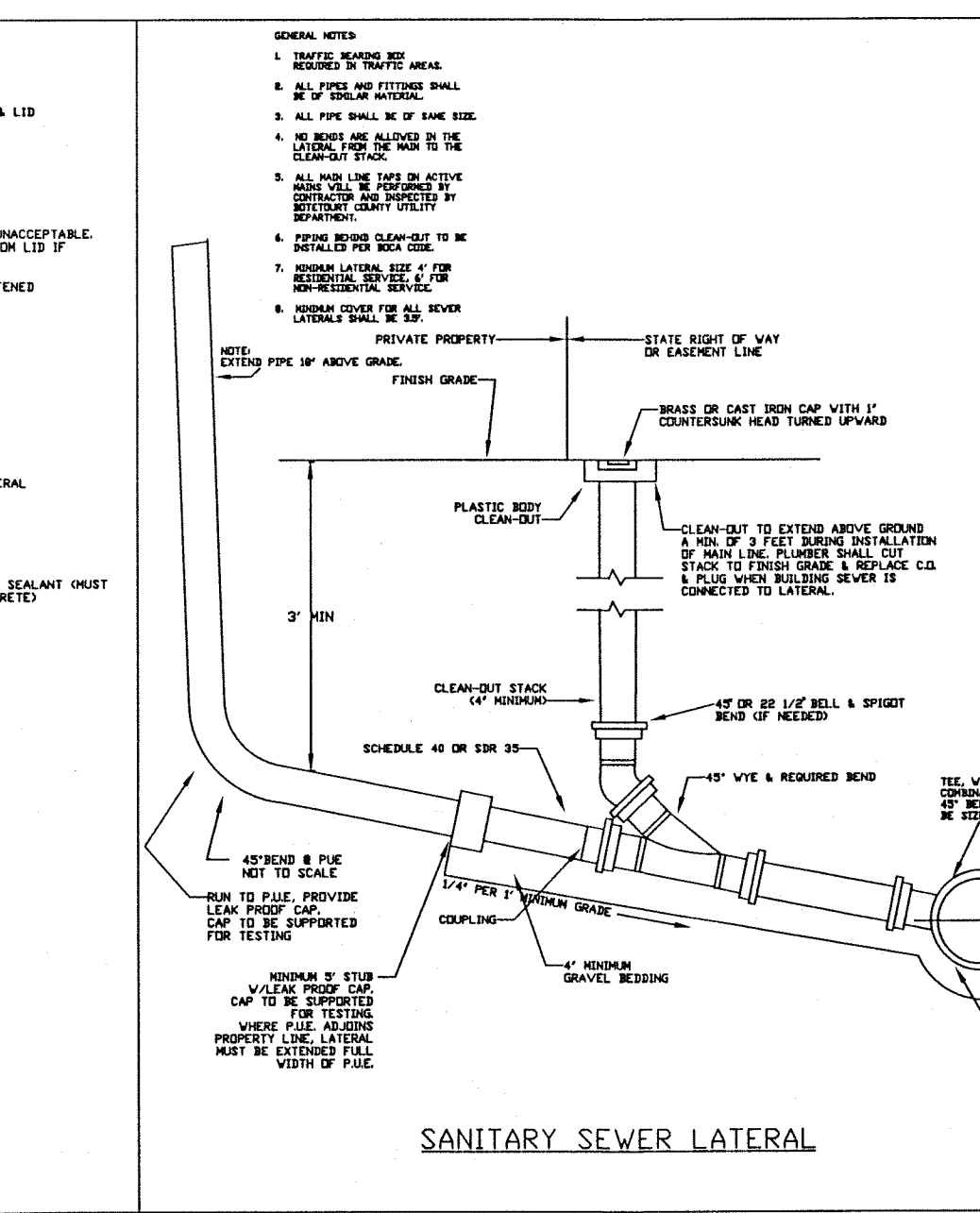
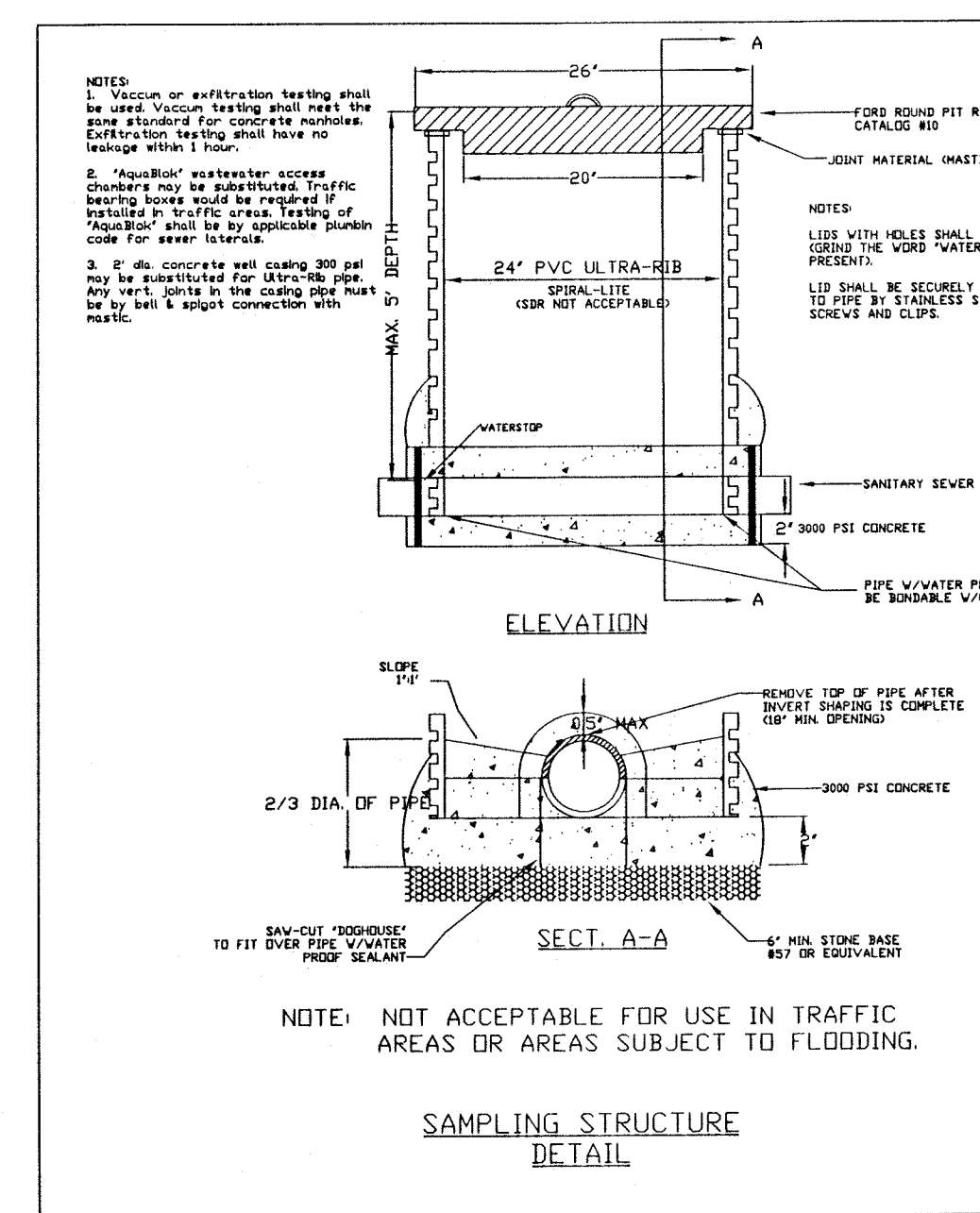
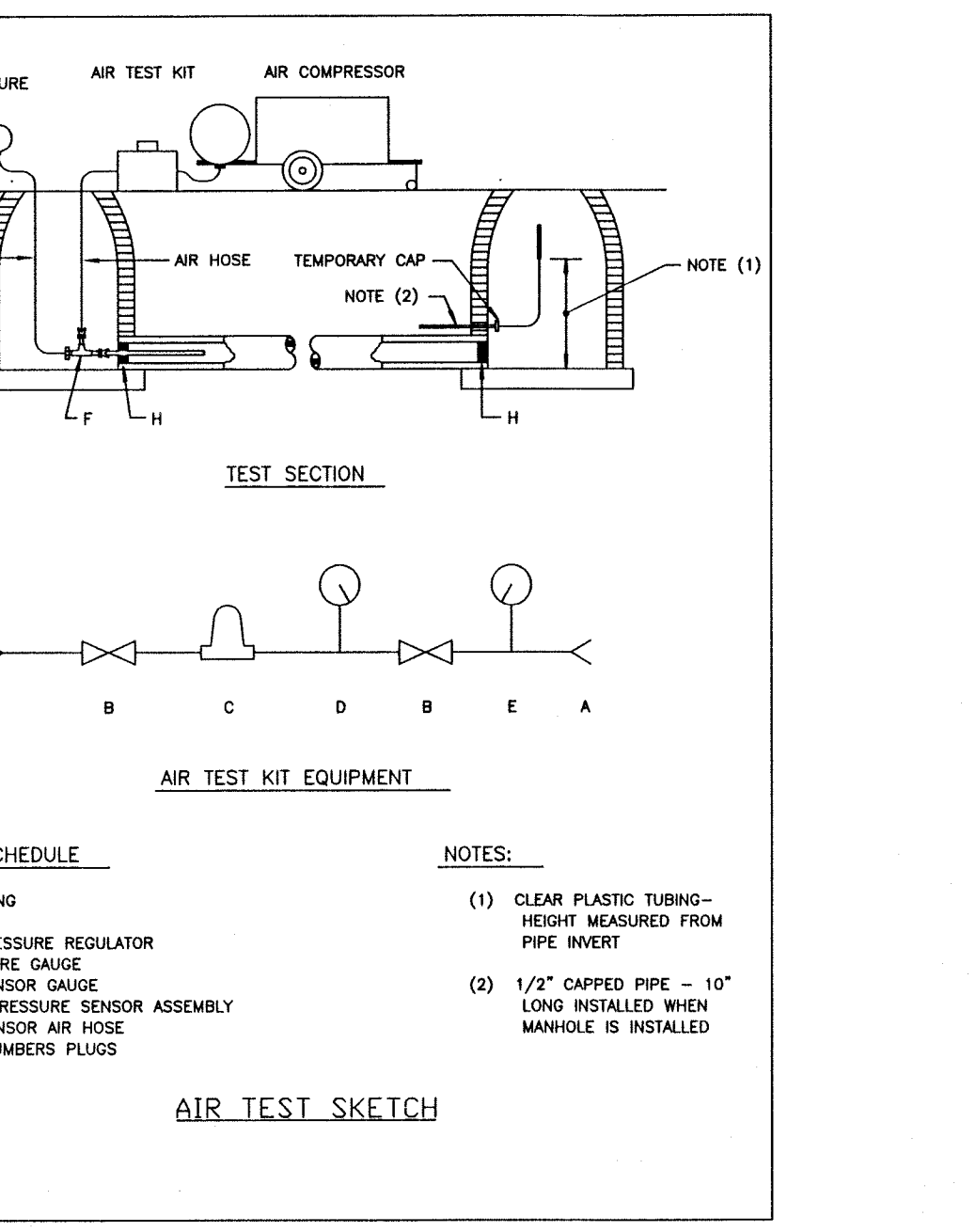
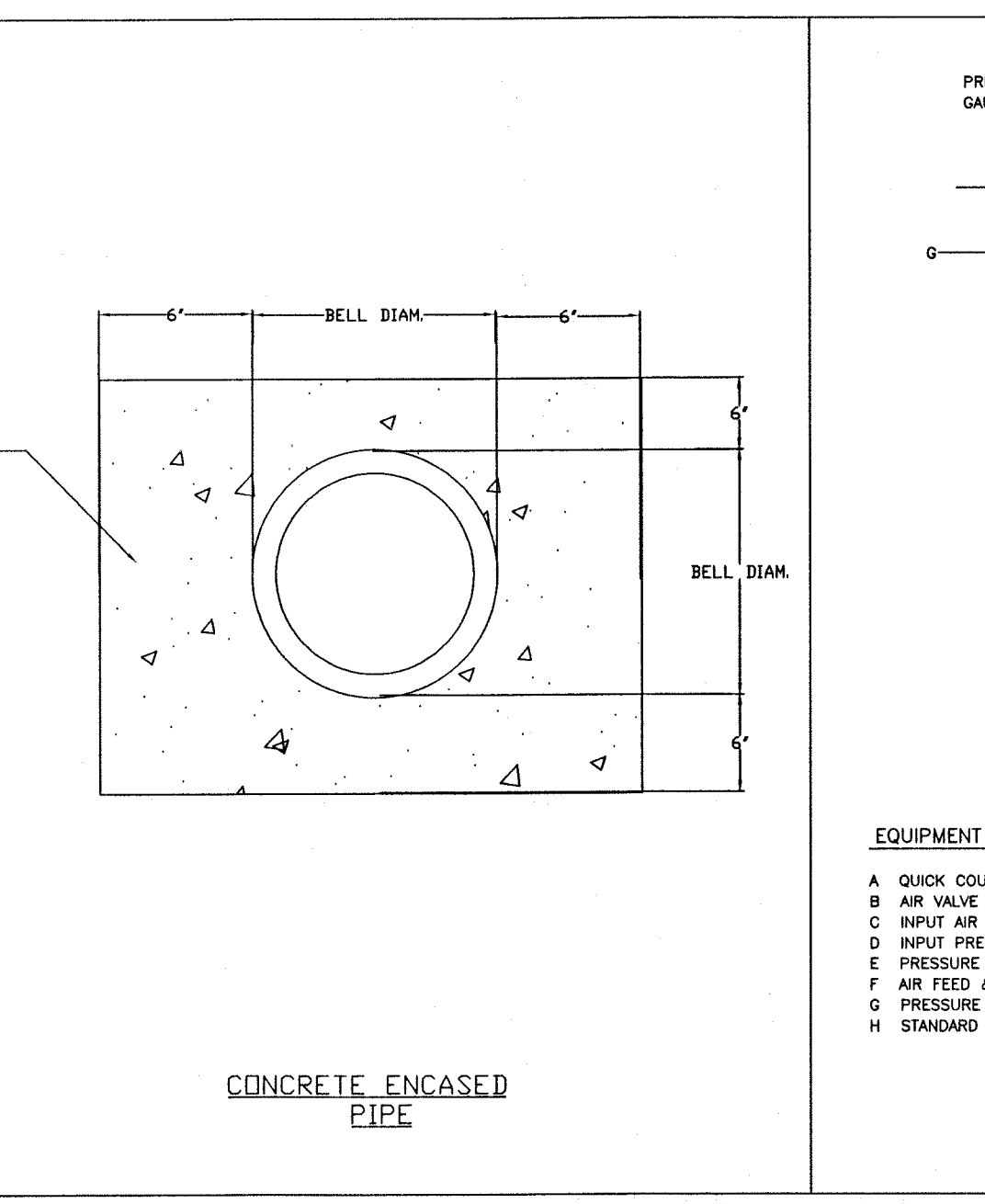
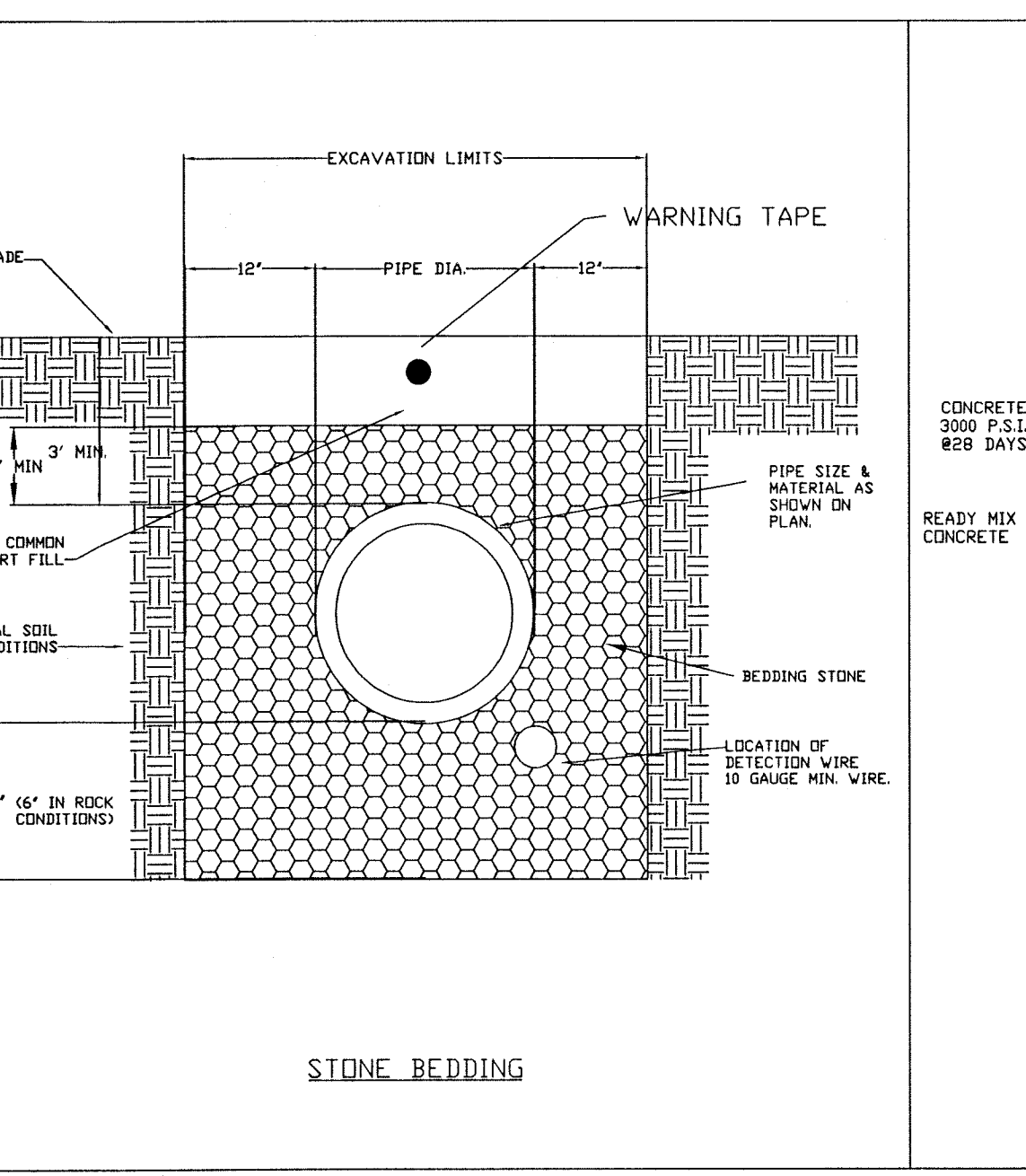
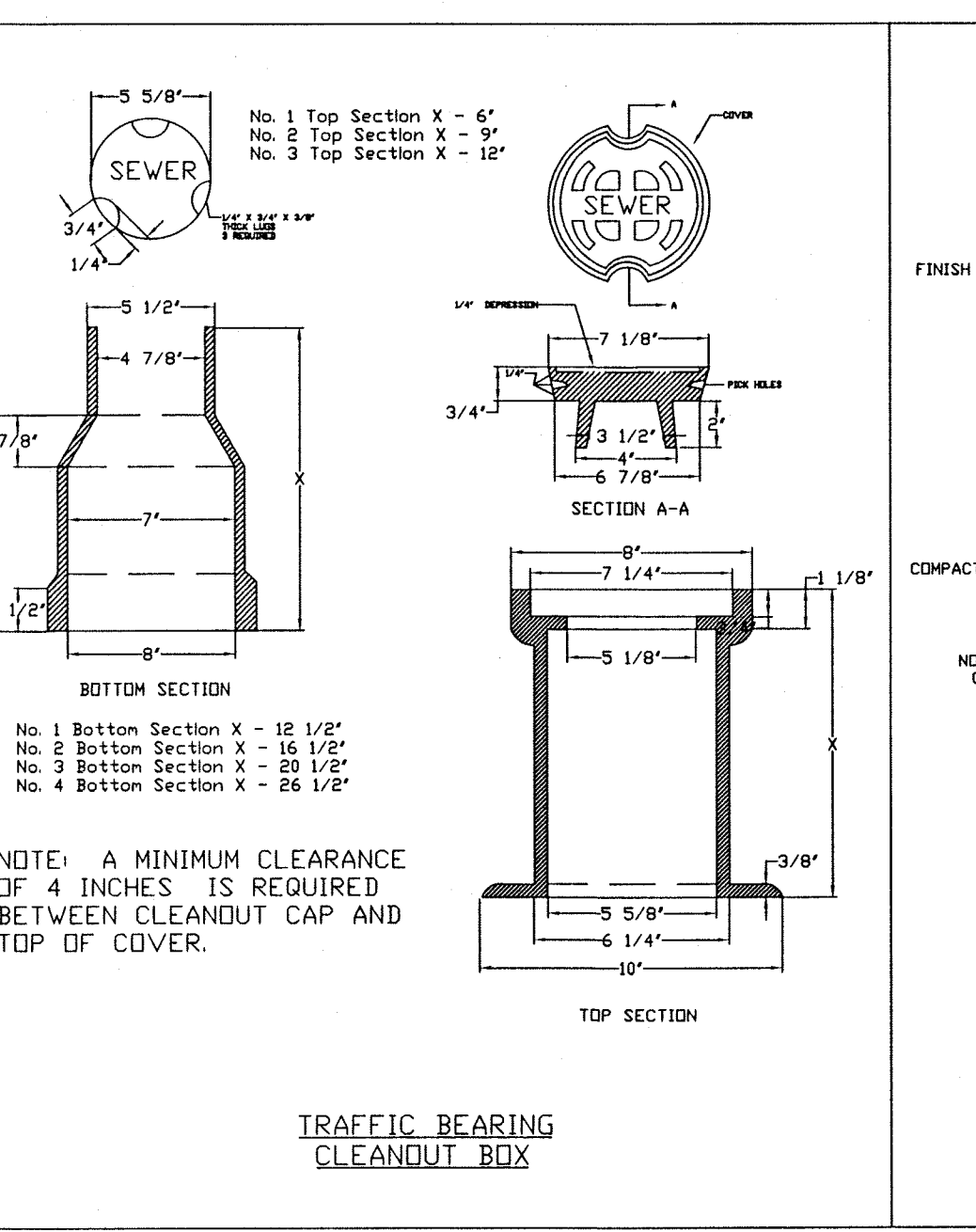
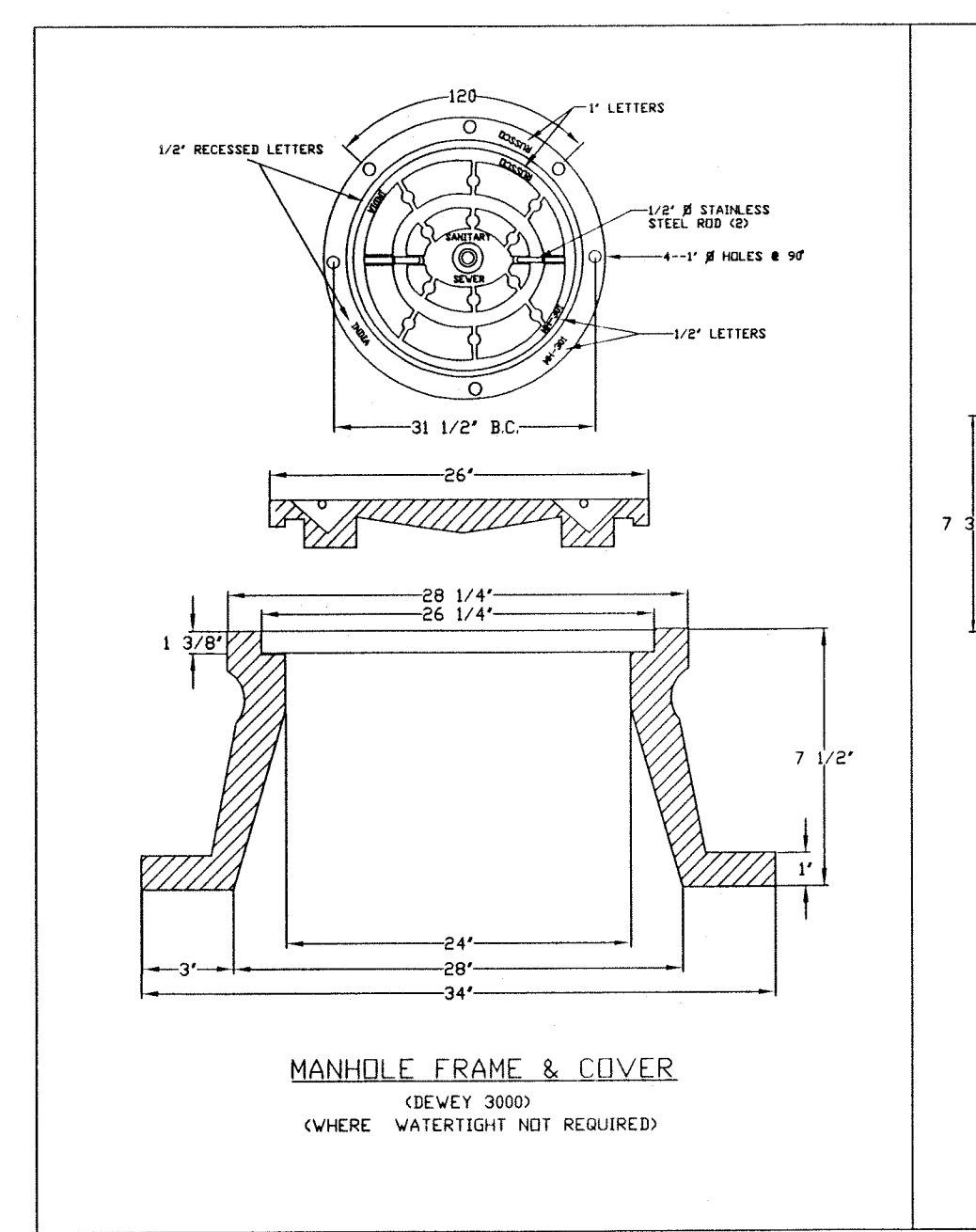
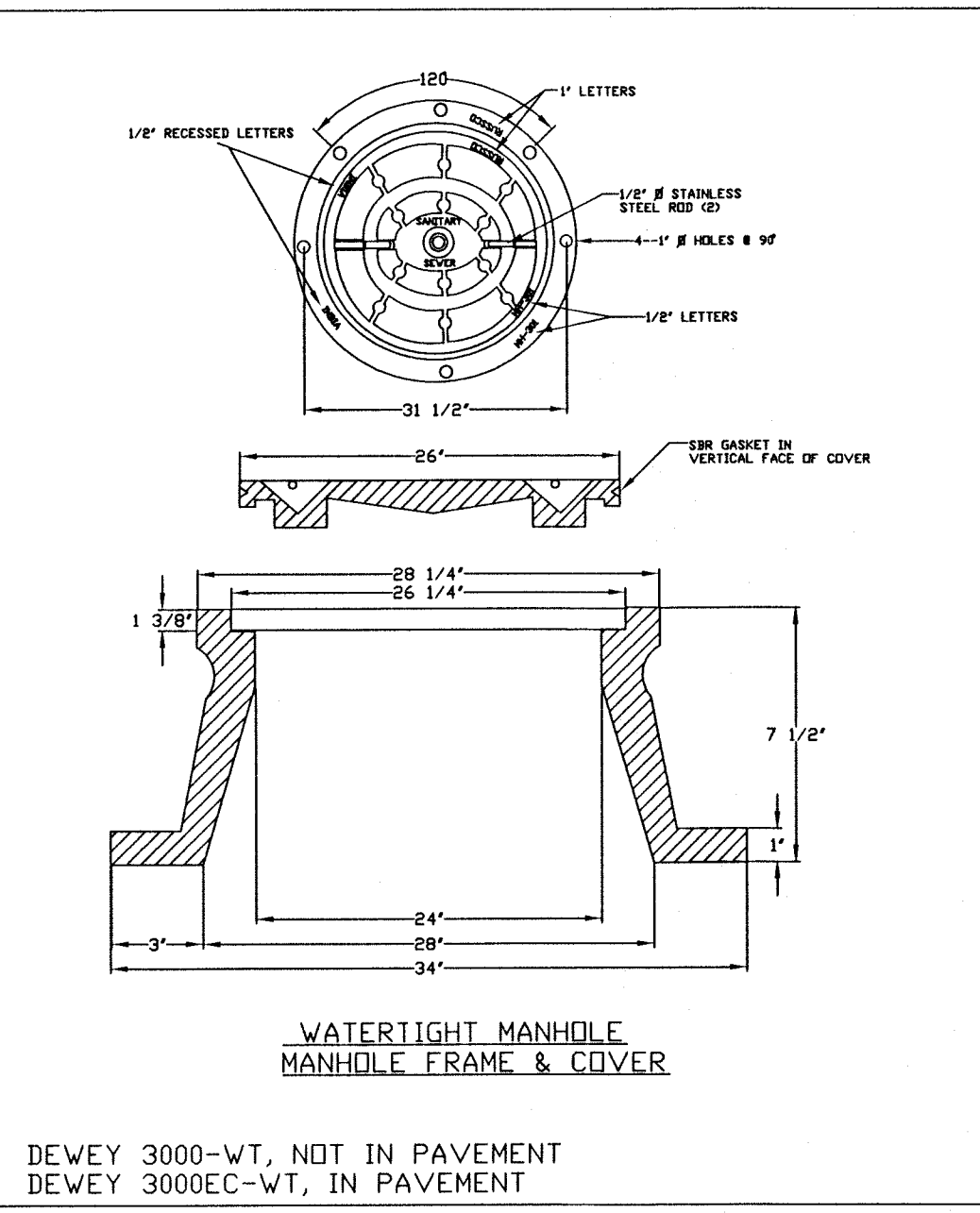
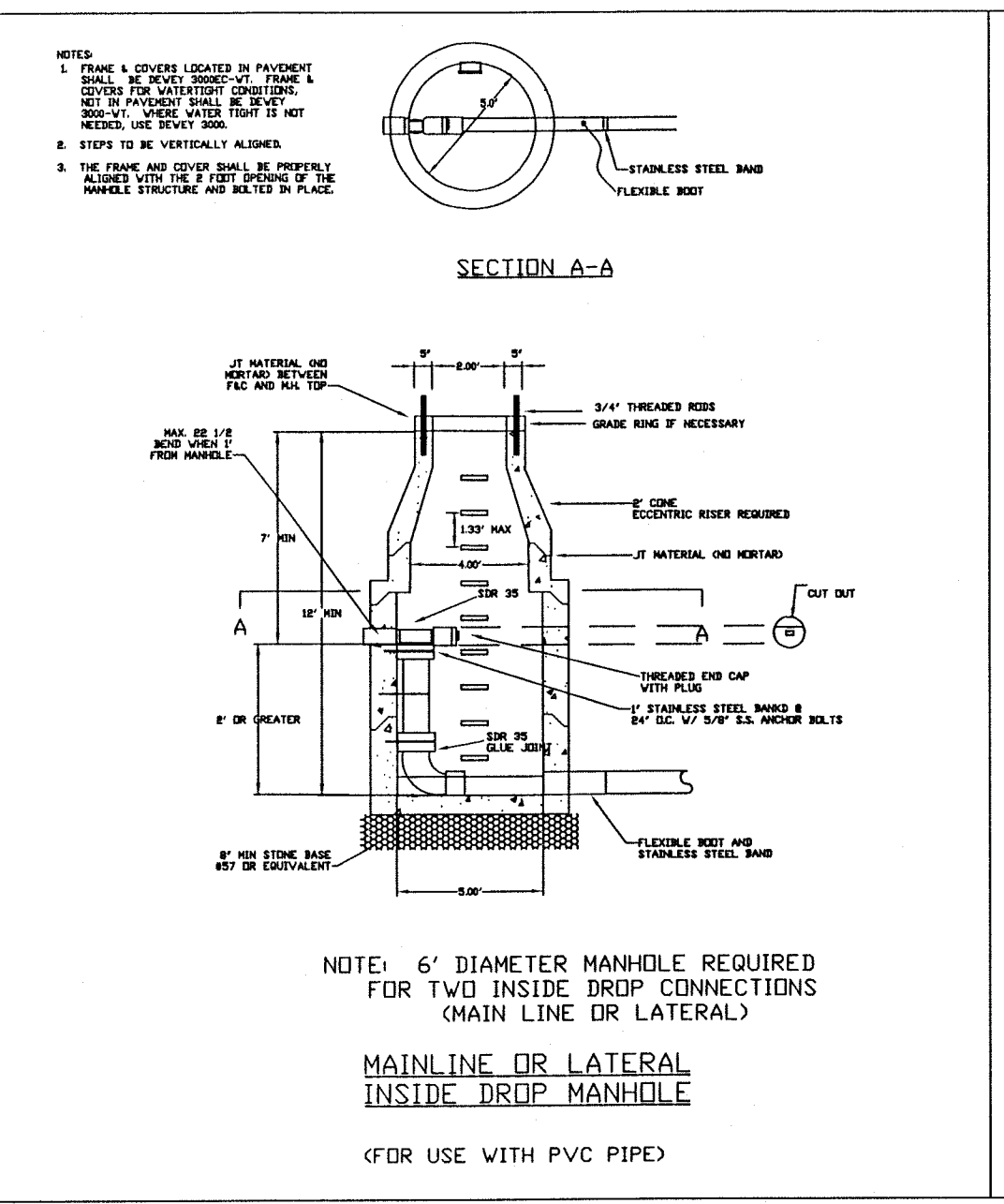
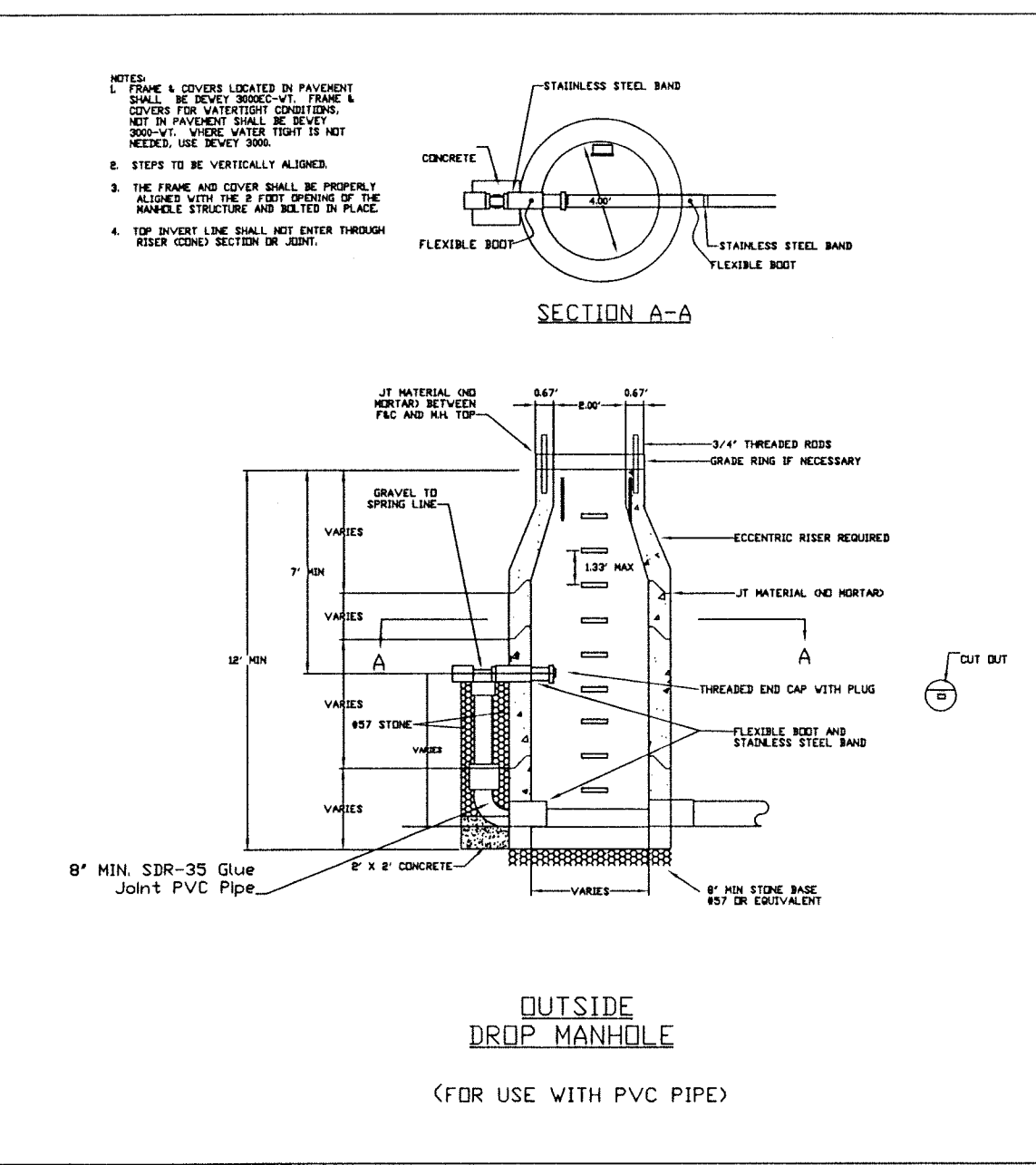
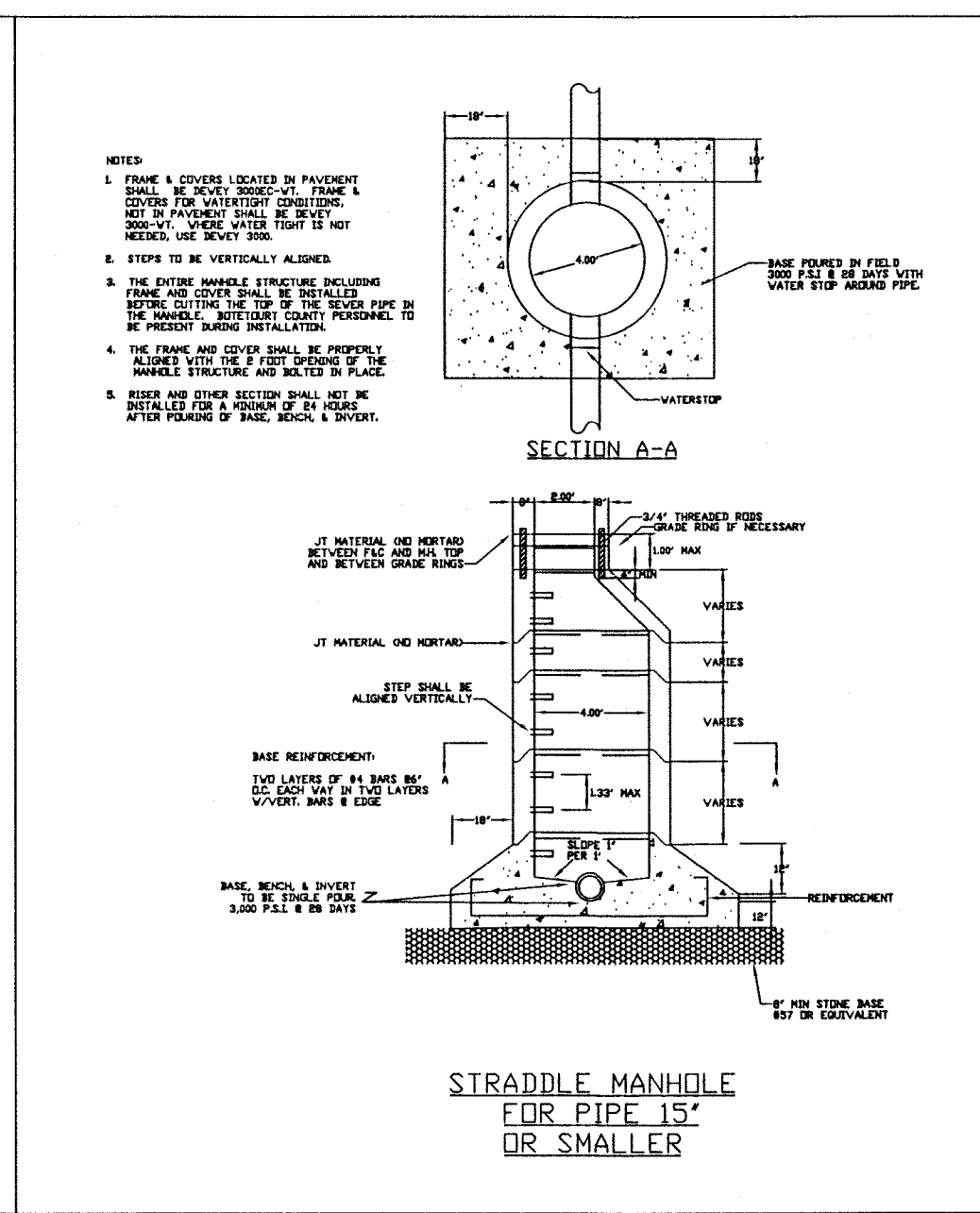
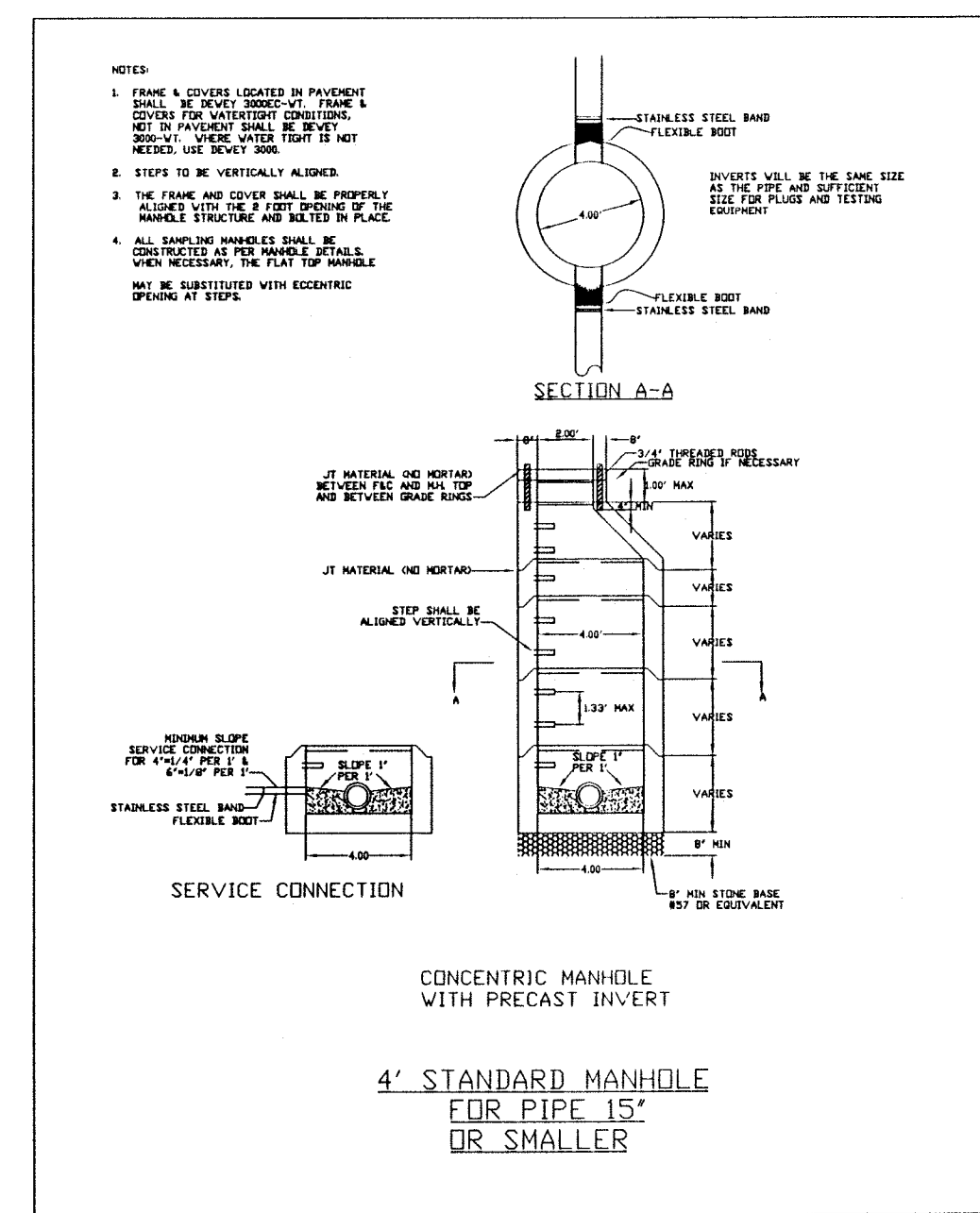
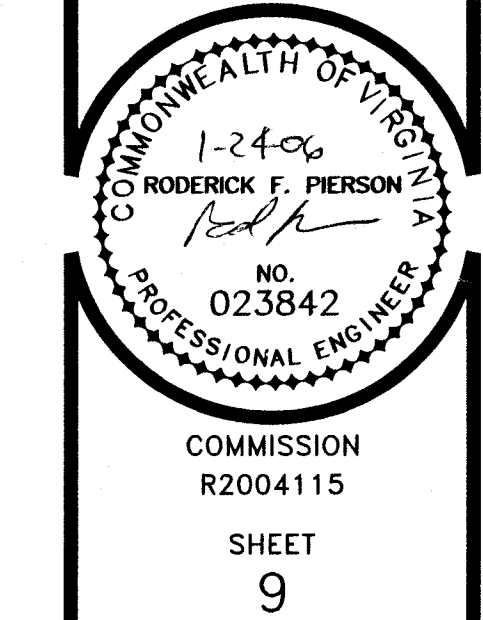
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SUBDIVISION PLAT
FOR
THE MEADOWS OF ASHLEY - PHASE II
BOTETOURT COUNTY, VIRGINIA

SEWER DETAILS



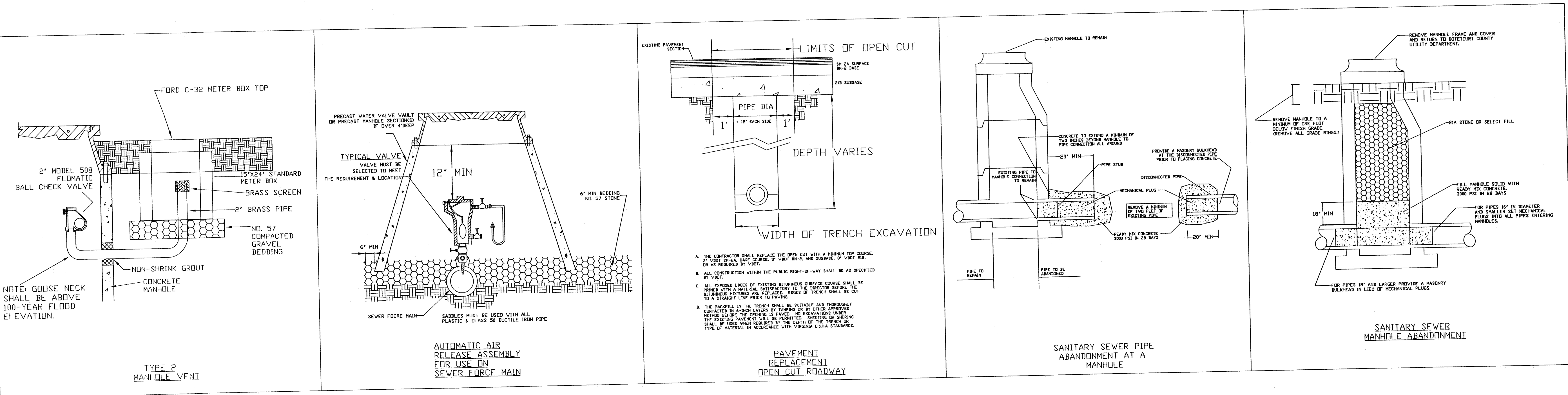
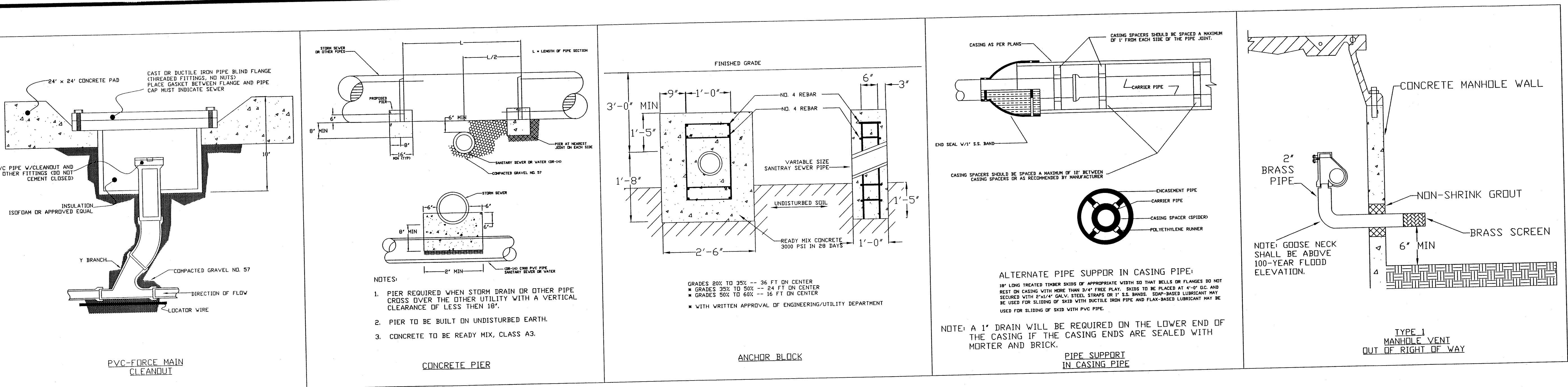


TABLE II-1
FINE AGGREGATE

AMOUNTS FINER THAN EACH LABORATORY SIEVE (SQUARE OPENINGS), PERCENTAGE BY WEIGHT							
GRADING	3/8	NO. 4	NO. 8	NO. 16	NO. 30	NO. 50	NO. 100
A	MIN 100	97+/-3	90+/-10	67+/-18	42+/-17	17+/-	MAX 10
B	MIN 100	97+/-3					MAX 10
C		MIN 100	97+/-				MAX 25

* In inches, except where otherwise indicated. Numbered sieves are those of the U.S. Standard Sieve Series

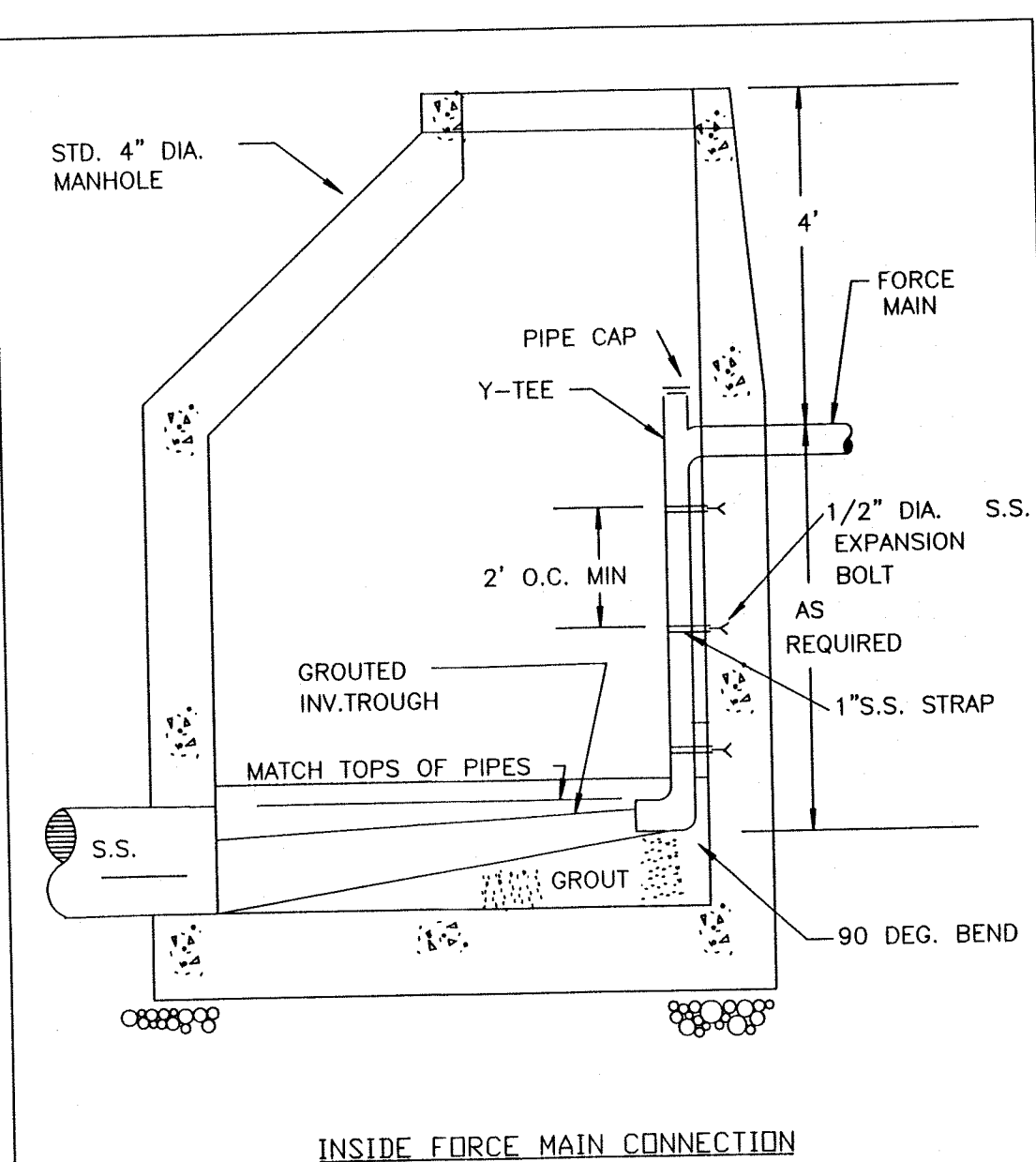
FINE AGGREGATE

EQUIVALENT PSI	HEIGHT OF GROUND WATER ABOVE PIPE INV. (FT.)
0.43	1
0.87	2
1.30	3
1.73	4
2.17	5
2.60	6
3.03	7
3.47	8
3.90	9
4.34	10
4.77	11
4.98	11.5
For anything above 11.5 VF, allow maximum 5.0 PSI.	

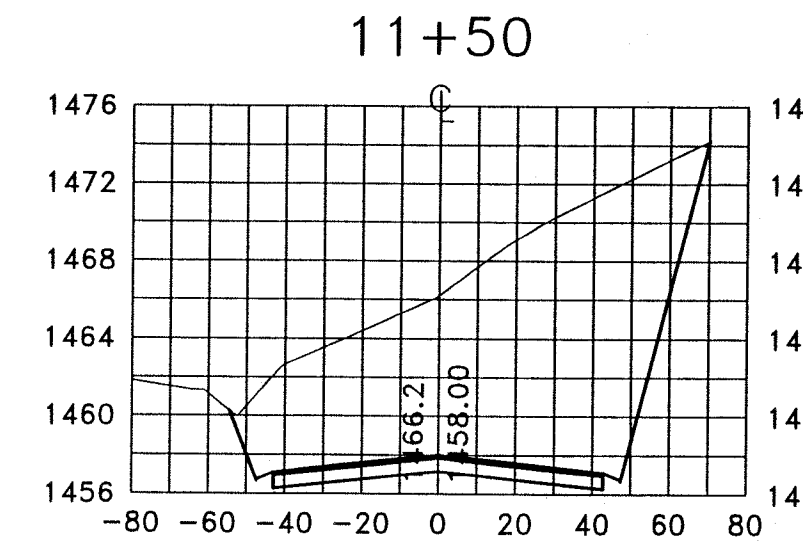
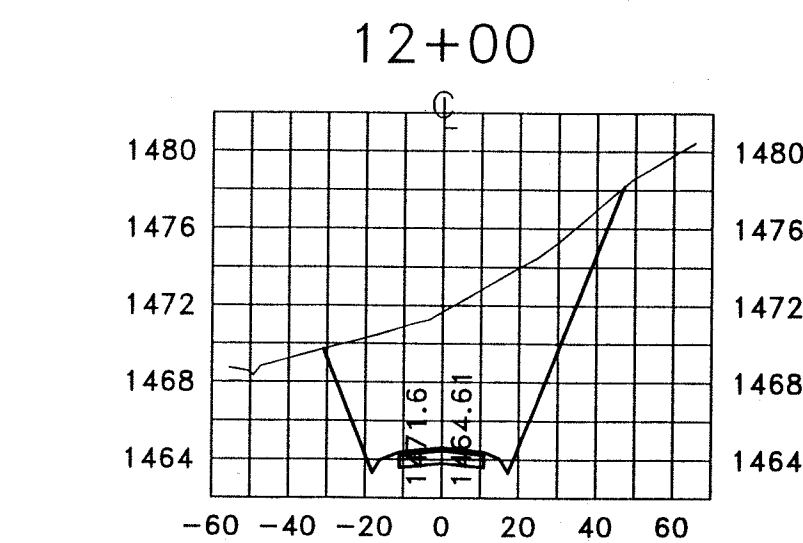
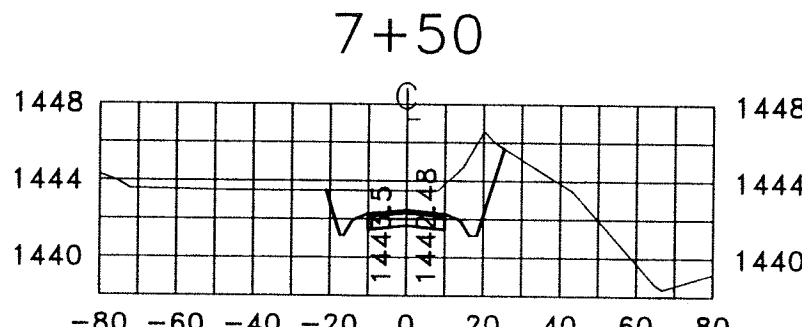
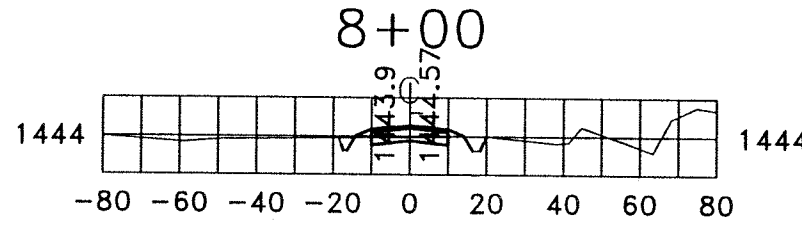
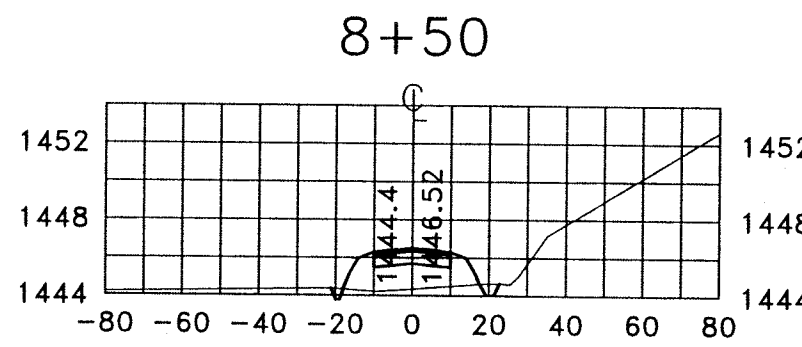
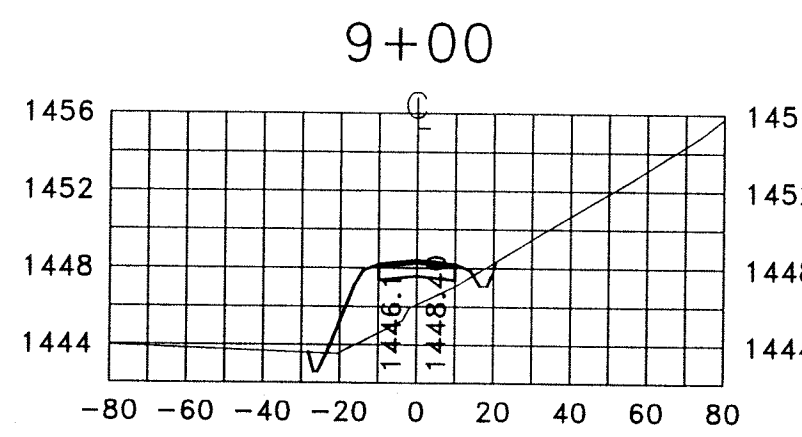
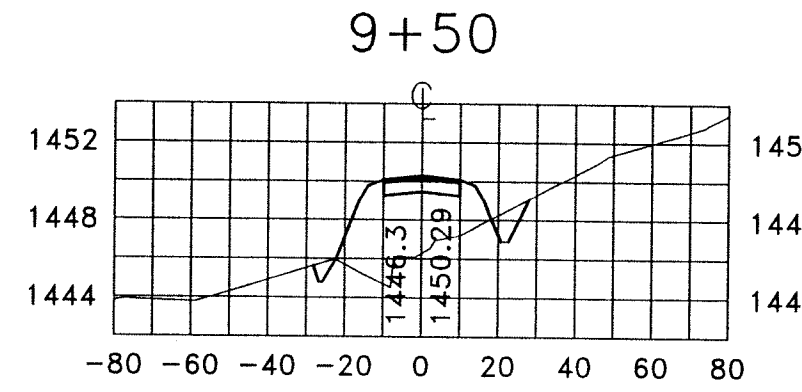
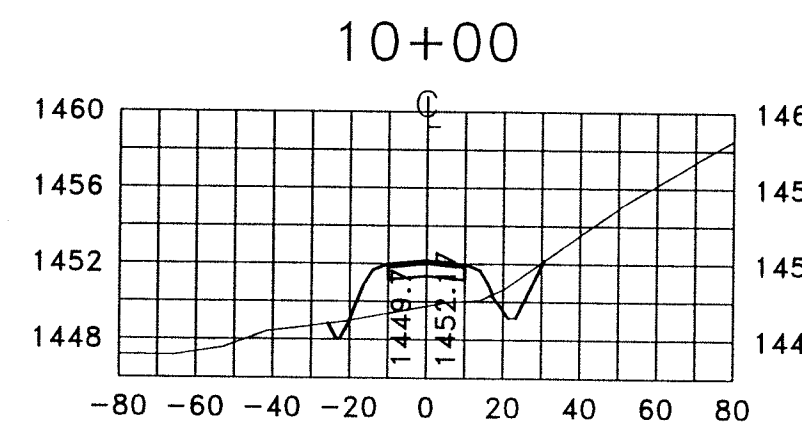
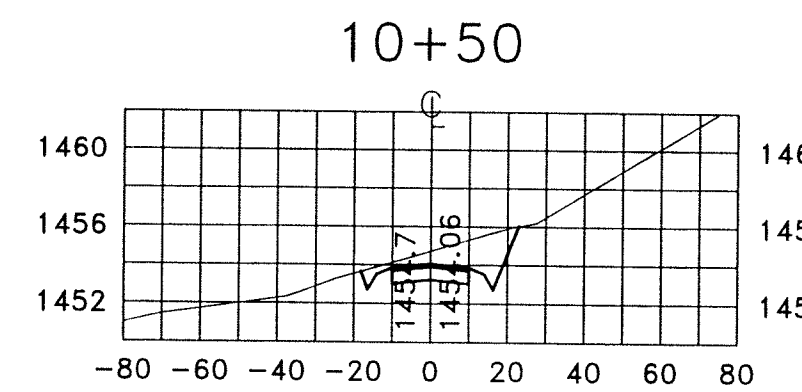
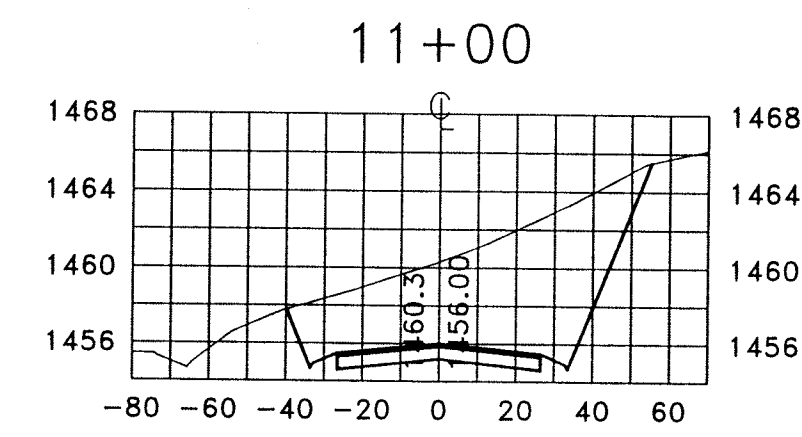
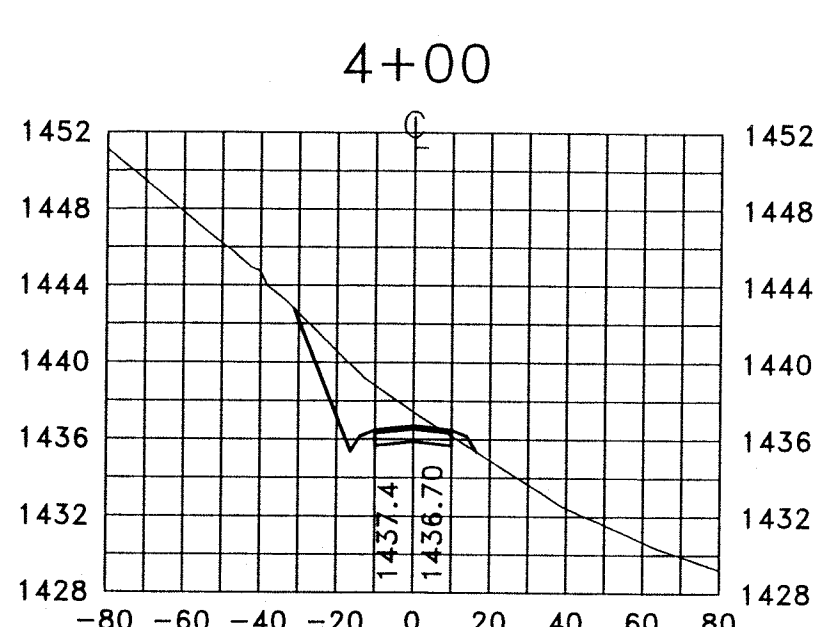
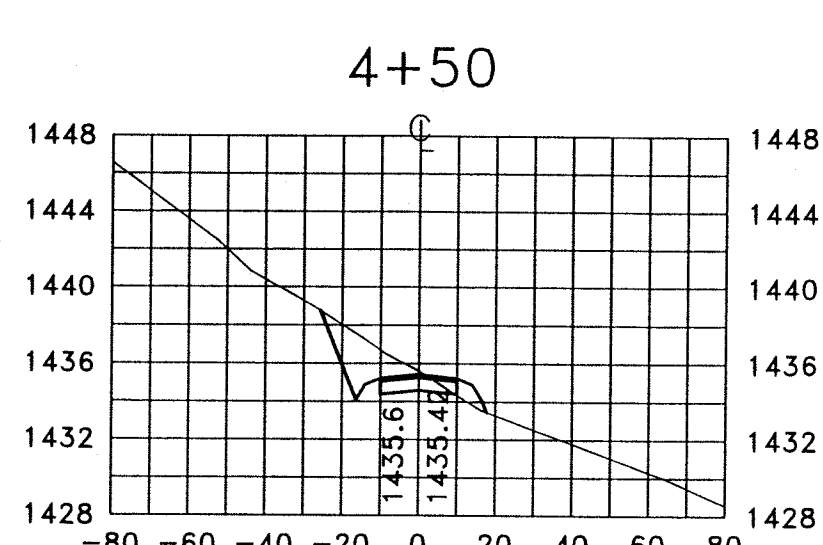
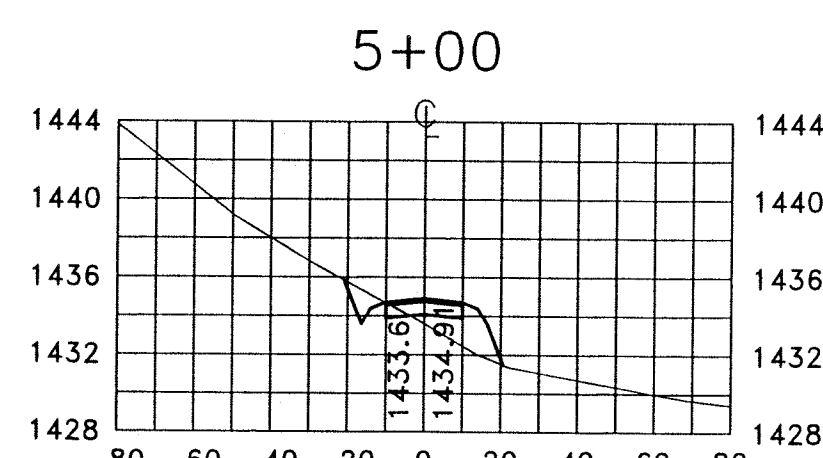
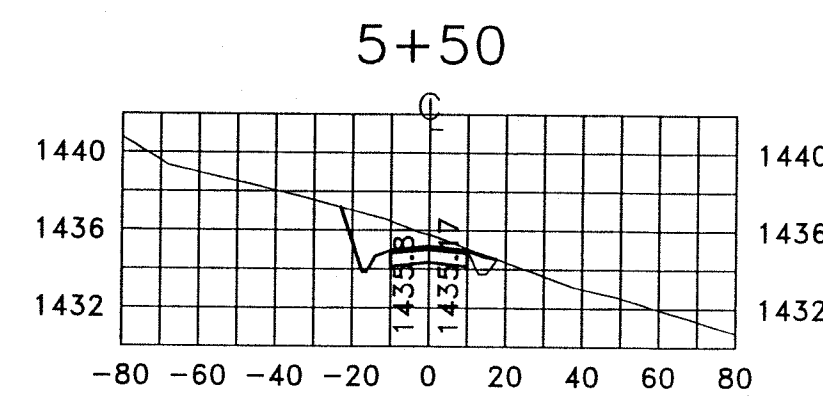
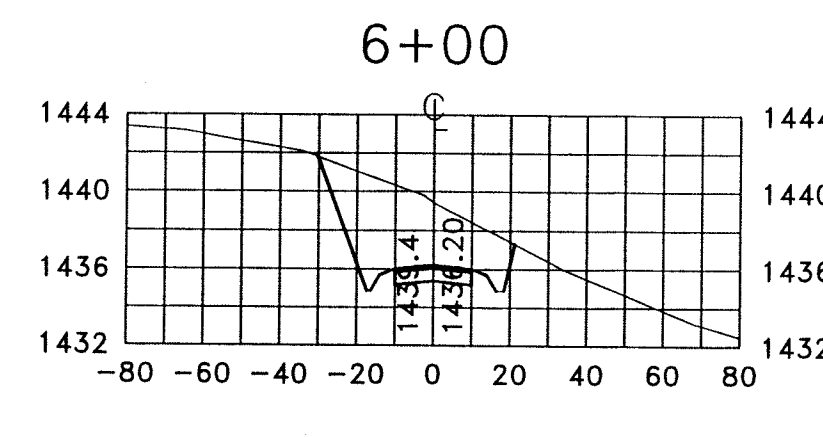
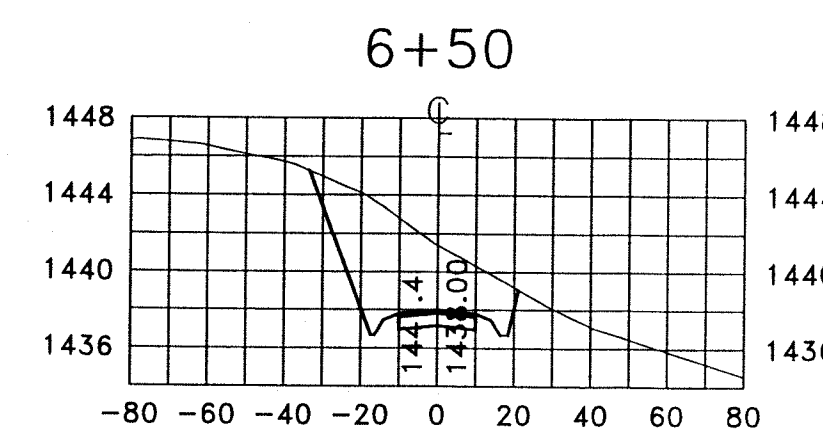
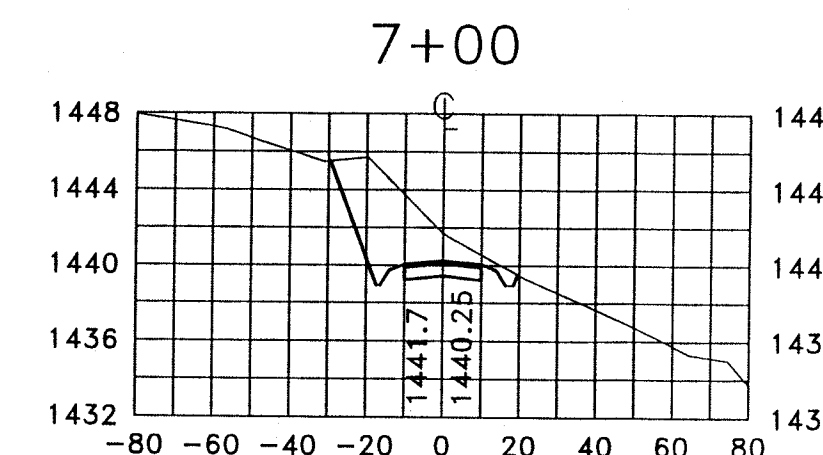
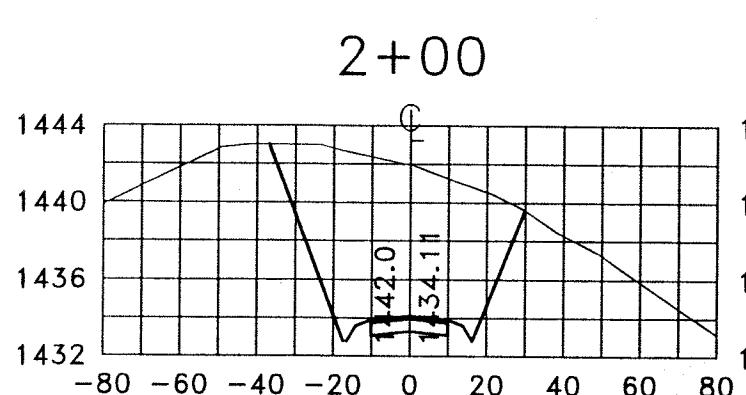
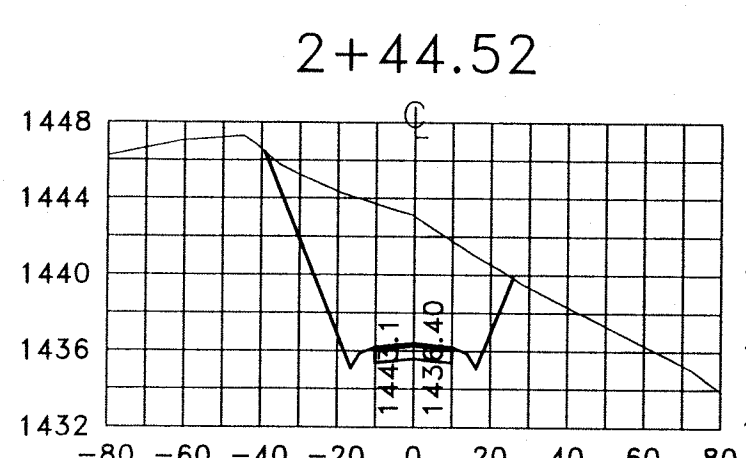
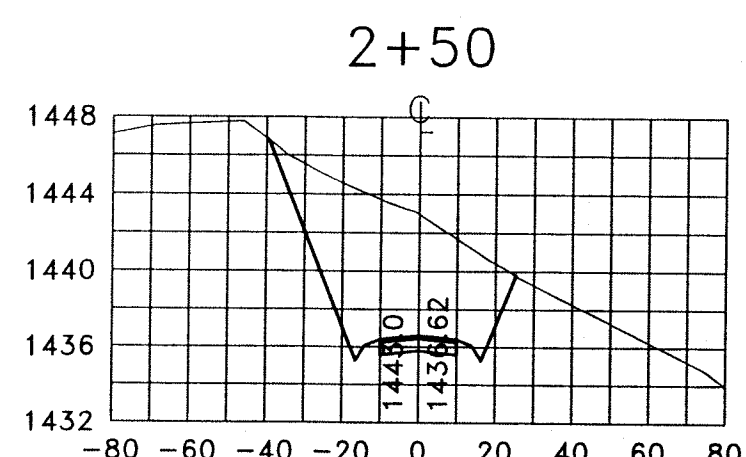
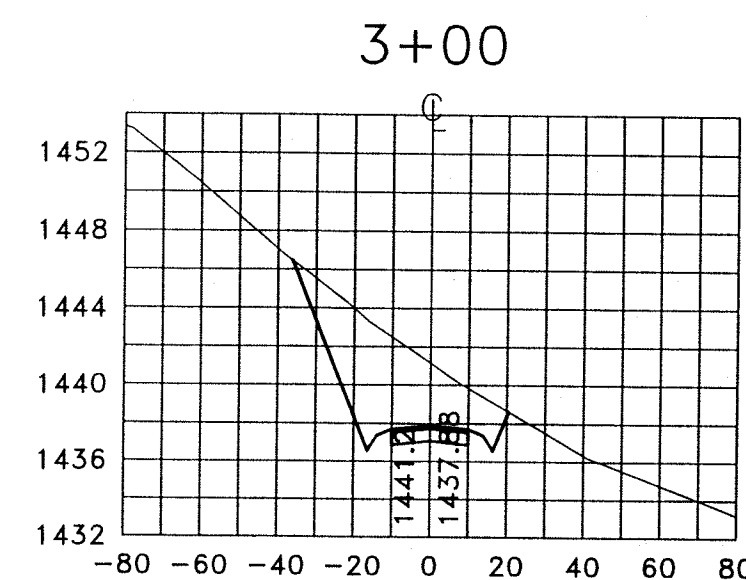
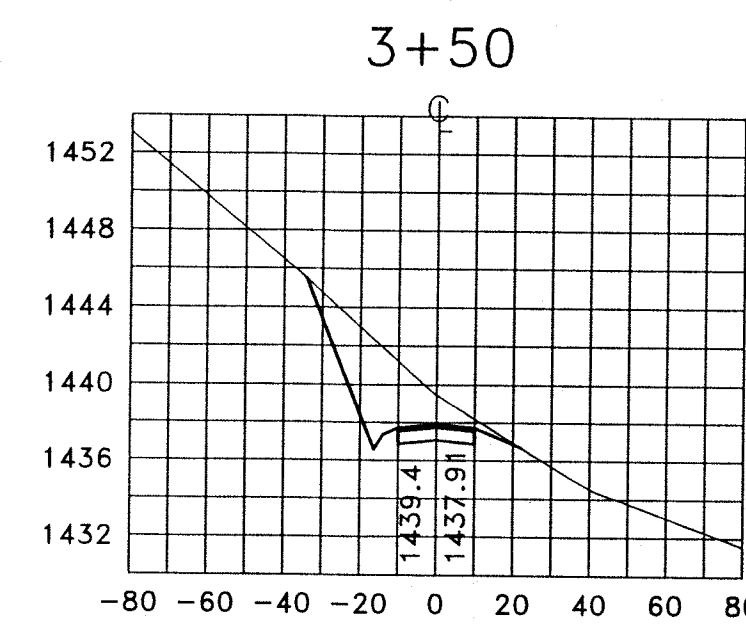
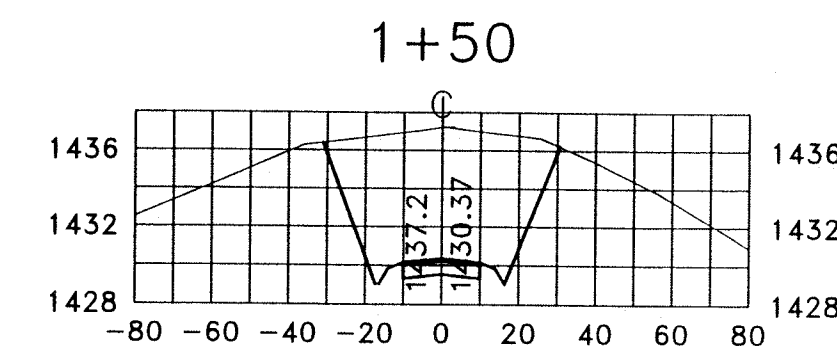
NOTES:

- Table based on 1.0 v.f. of water = 0.4335 PSI.
- The appropriate PSI allowance for average vertical foot of ground water shall be added to the base starting pressure of 4.0 PSI, but in no case shall the resulting pressure be more than 9.0 PSI.
- Interpolate for fractions of a foot of water.

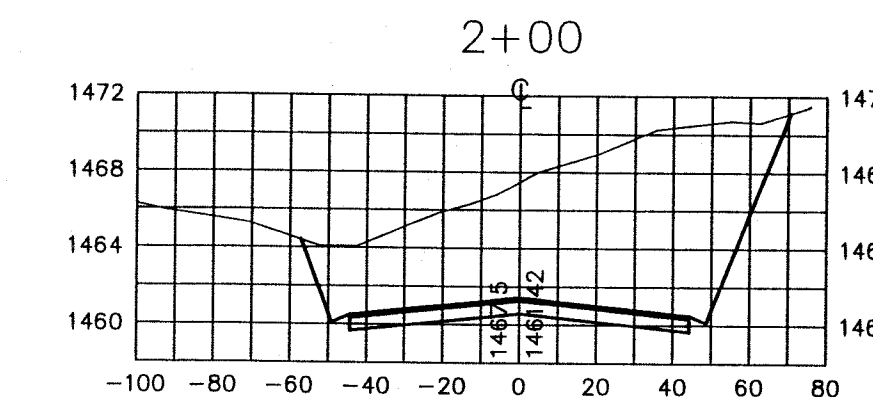
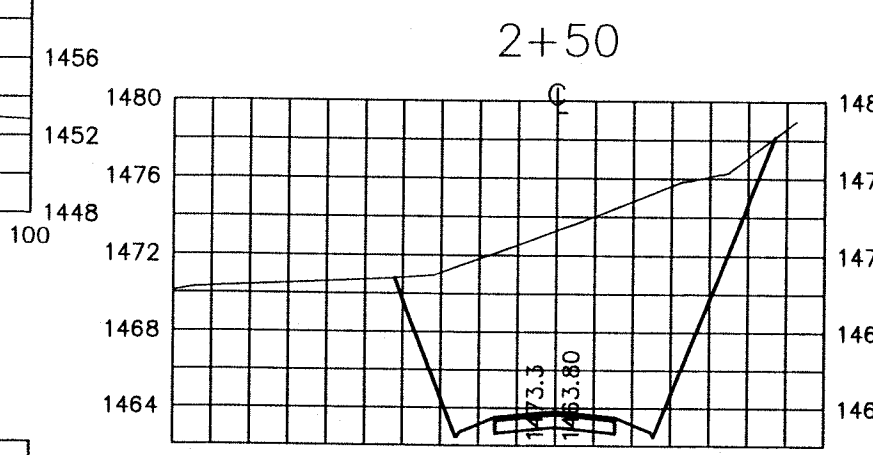
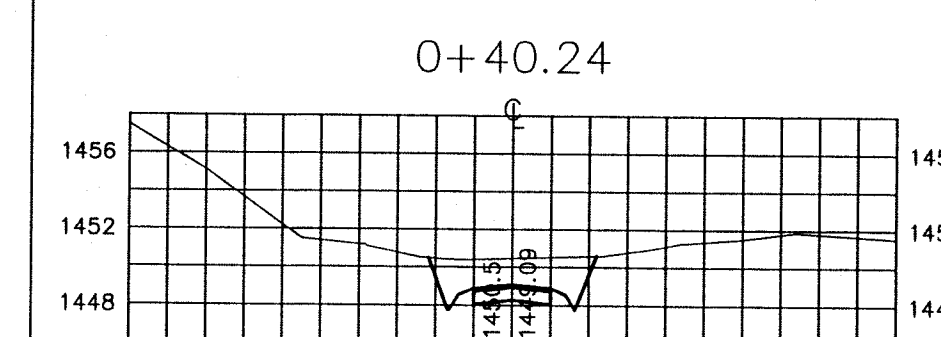
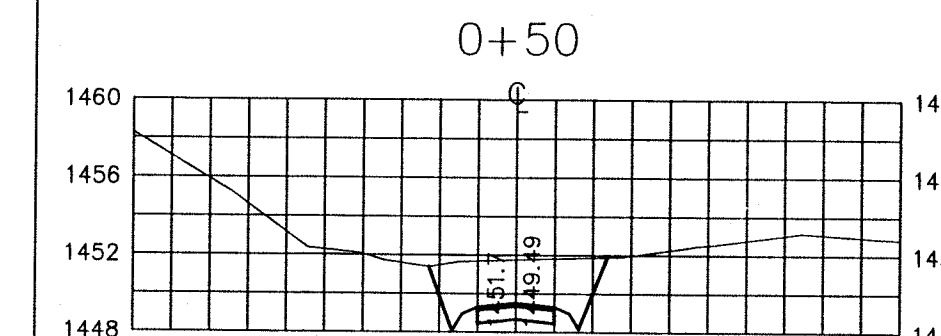
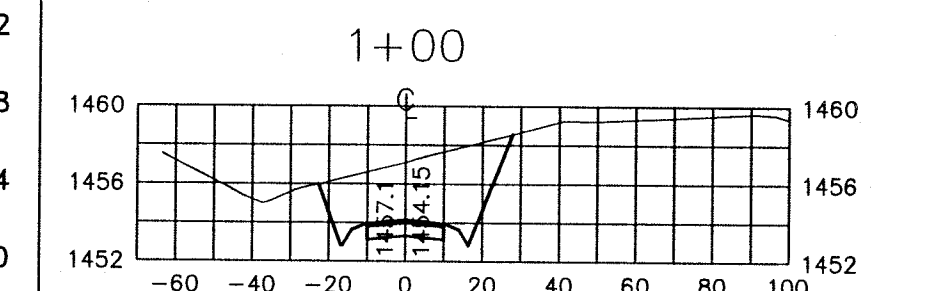
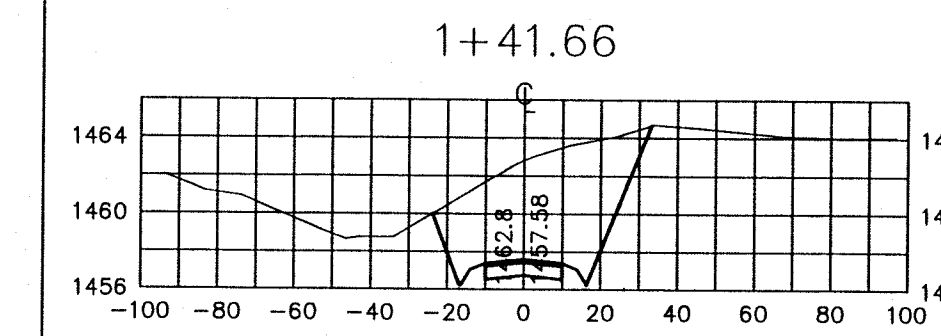
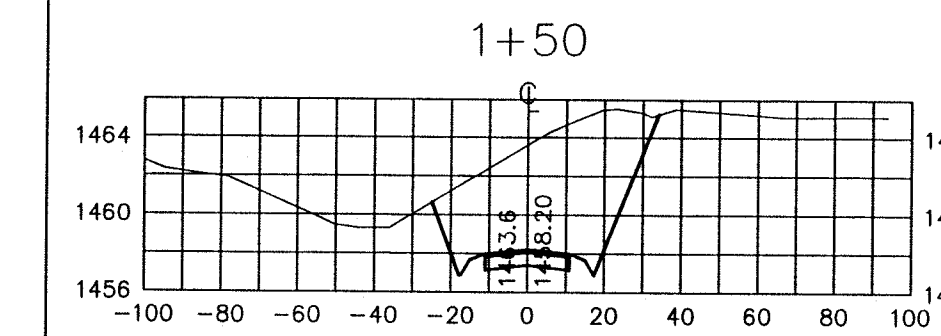
AIR TESTING
BACK PRESSURE
EQUIVALENCY
TABLE



MAIN ROAD



SIDE ROAD



HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 08/02/04
12/10/04
REVISIONS
△
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SUBDIVISION PLAN
FOR
THE MEADOWS OF ASHLEY - PHASE II
BOTETOURT COUNTY, VIRGINIA

CROSS-SECTIONS

COMMONWEALTH OF VIRGINIA
1-24-06
RODERICK F. PIERSON
NO. 023842
PROFESSIONAL ENGINEER

COMMISSION
R2004115

SHEET
11