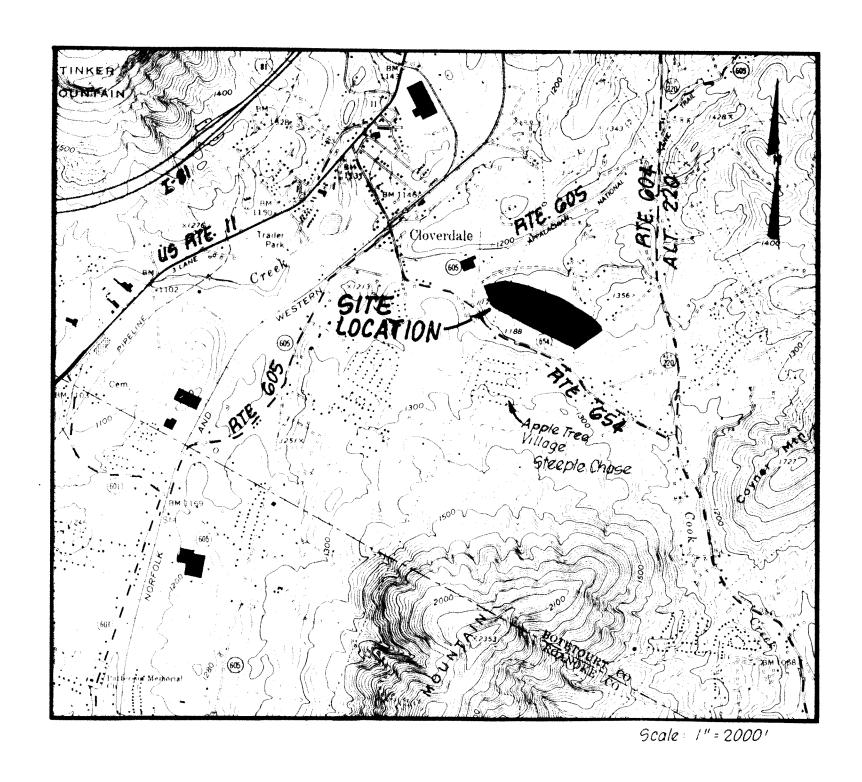


# HUNTER'S GREEN SECTION II



BOTETOURT COUNTY, VIRGINIA

owner

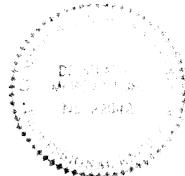
R. & R. JOINT VENTURE, INC.

C/O RON GEIGER

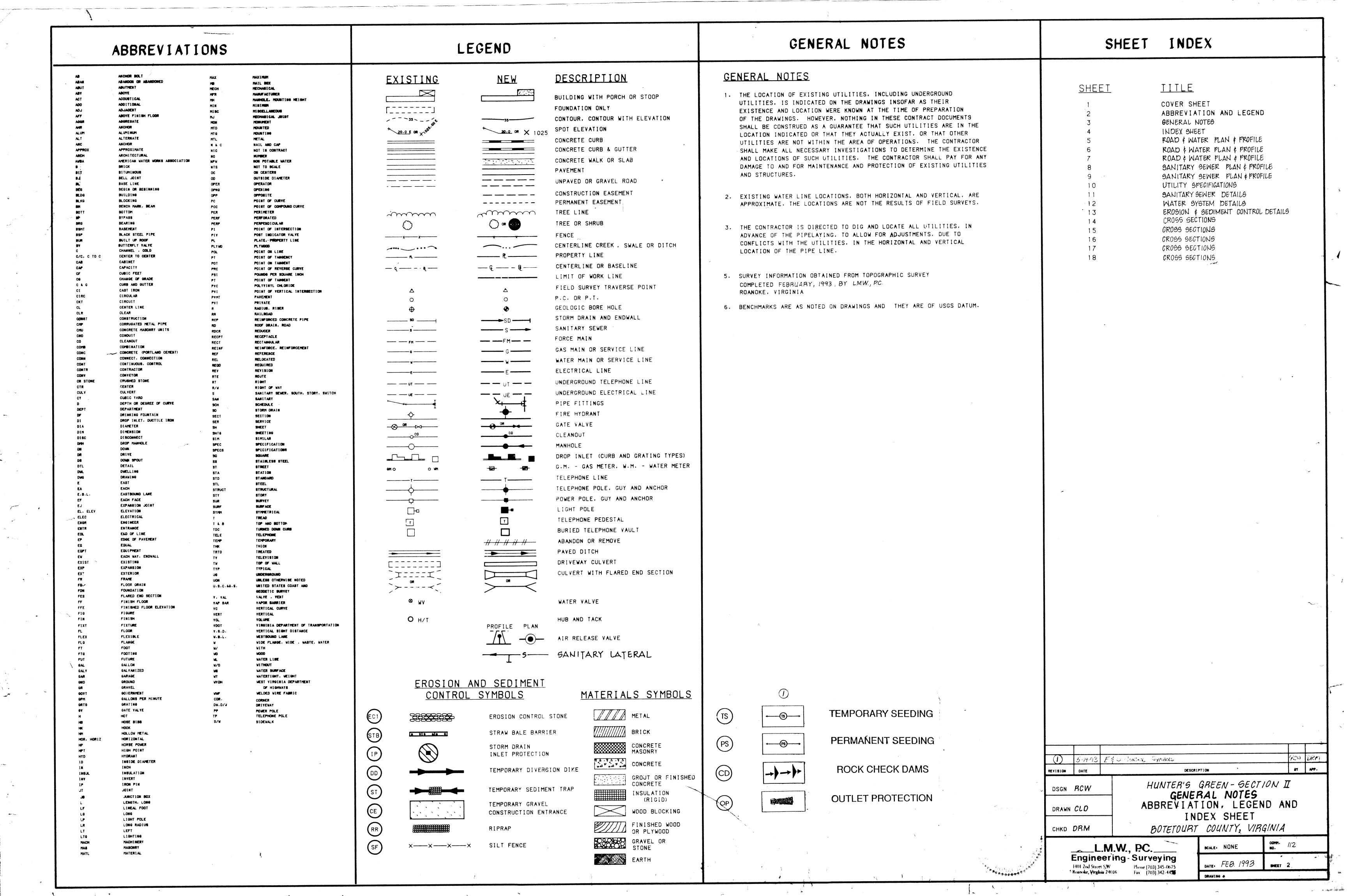
815 BLUE RIDGE BLVD.

BLUE RIDGE, VA. 24064

RECORD DRAWINGS



SET NO.



#### ROAD CONSTRUCTION NOTES

#### QUALITY CONTROL

Streets shall be graded, paved and all structural components erected in accordance with the Virginia Department of Transportation Road and Bridge Specifications and the Latest edition of Road Design Standards. 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 test reports from approved independent laboratories at the developer's expense.

The pavement designs shown are based on a subgrade rating of CBR 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 GBR 10, then additional base material shall 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.

#### UTILITIES

All necessary utility laterals shall be placed prior to pavement base and conduit provisions made for the same (i.e. water, sewer, gas, and telephone).

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 in conformity with ASA B 31.8 Specifications and Safety Regulations. Distribution lines with pressures less than 120 lbs. are unaffected by the above.

Fermits 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.

#### PRIVATE ENTRANCES

Standard CG-8 gutter will be provided at all entrances to private lots where standard CG-6 curb gutter is approved for use.

Fermits will be required for all private entrances constructed on street rights of way prior to acceptance into the secondary highway system.

#### 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 back of curbs and or pavement shall be backfilled and seeded together with ditches and channels, 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 shall be removed from shoulder to shoulder prior to the conditioning (cutting and /or preparation) of the subgrade.

### GENERAL

1-800-552-7001

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

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.

Standard guardrail with safety end sections may be required on fills as deemed necessary by the VDOT 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.

Field review will be made during construction to determine the need and limits of paved gutter and/or ditch stabilization treatments, 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 means necessary prior to subdivision acceptance.

The Contractor shall obtain an entrance permit to existing Virginia Department of Transportation right of way from the Resident Engineer prior to road construction.

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

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 if the street has been properly maintained.

In order to meet public service requirements, all streets must serve a minimum of three occupied dwellings prior to acceptance.

The Contractor shall verify location and elevation of all underground utilities shown on the plans in areas of construction prior to starting work. Contact Engineer immediately if location or elevation is different from that shown on the plan. 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

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.

#### CONSTRUCTION NOTES

- 1. The Contractor shall secure all permits prior to commencing
- 2. The County Engineer shall be notified by the contractor 48 hours prior to commencing work.
- 3. The locations of all underground utilities are approximate and shall be verified prior to any construction.
- 4. The Contractor shall be responsible for locating and uncovering all manholes and valve boxes after surface treatment of roads and to adjust them to final road grades.
- 5. The minimum cover above water lines shall be 42 inches (3.5)
- 6. FVC plastic sewer pipe shall be ASTM D-3034 SDR 35(minimum)
- 7. Ductile Iron sewer pipe shall be ANSI/AWWA C-151, Class 52
- 8. FVC plastic water line shall be AWWA C-900, Table 2, Class
- 9. Ductile Iron water line shall be ANSI/AWWA C-151, Class 52 up to 12" and Class 51 for larger pipe.
- 10. An Erosion and Sediment Control Plan has been approved and is hereby made part of these plans. The contractor shall be responsible for obtaining and adhering to the provisions therein, which shall include inspections and repairs, if necessary, periodically and after every significant rainfall.
- 11. An approved Erosion and Sediment Control Plan may be amended by the plan approving authority if on-site inspection indicates that the approved control measures are not effective in controlling erosion and sedimentation, or if, because of changed circumstances, the approved plan cannot be carried out.
- 12. All erosion and sediment control practices shall be in accordance with the "Virginia Erosion and Sediment Control Handbook, Latest Edition." (VESCH)

#### MINIMUM STANDARDS FOR CONTROLLING EROSION AND SEDIMENTATION

#### 1. Stabilization of Denuded Areas

Fermanent or temporary soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant (undisturbed) for longer than 30 days. Permanent stabilization shall be applied to areas that are to be left dormant for more than one year.

Soil stabilization refers to measures which protect soil from the erosive forces of raindrop impact and flowing water. Applicable practices include vegetative establishment, mulching, and the early application of gravel base on areas to be paved.

### 2. Stabilization of Soil Stockplies

During construction of the project, soil stock plies shall be stabilized or protected with sediment trapping measures. The applicant is responsible for the temporary protection and permanent stabilization of all stockpiles on site as well as soil intentionally transported from the project

### 3. Permanent Vegetation

A permanent vegetative cover shall be estabilished on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be considered estabilished until a ground cover is achieved that, in the opinion of the local program administrator or his designated agent, is uniform, mature enough to survive and will inhibit erosion.

### 4. Timing and Stabilization of Sediment Trapping Measures

Sediment basins and traps, perimeter dikes, sediment barriers and other measures intended to trap sediment shall be constructed as a first step in any land-disturbing activity and shall be made functional before upslope land disturbance takes place.

### Stabilization of Earthen Structures

Stabilization measures shall be applied to earthen structures such as dams, dikes and diversions immediately after installation.

### 6. Sediment Basins

Surface runoff from disturbed areas that is comprised of flow from drainage areas greater than or equal to three acres shall be controlled by a sediment basin. The sediment basin shall be constructed to accommodate the anticipated sediment loading from the land-disturbing activity.

### 7. Cut and Fill Slopes

Cut and fill slopes shall be constructed in a manner that will minimize erosion. Slopes that are found to be eroding excessively within one year of permanent stabilization shall be provided with additional slope stabilizing measures until the problem is corrected.

- Roughened soil surfaces are generally preferred to smooth surfaces on slopes (see SURFACE ROUGHENING, E & S Handbook).
- B. DIVERSIONS should be constructed at the top of long steep slopes which have significant drainage areas above the slopes. Diversions or terraces may also be used to reduce slope lengths.

3. Concentrated Runoff Flow Down Cut or Fill Slopes

Concentrated runoff shall not flow down cut or fill slopes unless contained within an adequate temporary or permanent channel, flume or slope drain structure.

Whenever water seeps from a slope face, adequate drainage or other protection shall be provided.

10. Storm Sewer Inlet Protection

9. Water Seeps From a Slope Face

All storm sewer inlets that are made operable during construction shall be protected so that sediment-laden water cannot enter the conveyance system without first being filtered or otherwise treated to remove sediment.

11. Stabilization of Outlets

Before newly constructed stormwater conveyance channels are made operational, adequate outlet protection and any required temporary of permanent channel lining shall be installed in both the conveyance channel and receiving channel.

12. Work in Live Watercourses

When work in a live watercourse is performed, precautions shall be taken to minimize encroachment, control sediment transport, and stabilize the work area to the greatest extent possible during construction. Nonerodible material shall be used for the construction of causeways and cofferdams. Earthen fill may be used for these structures if armored by nonerodible cover materials.

13. Crossing a Live Watercourse

When a live watercourse must be crossed by construction vehicles more than twice in any six-month period, a temporary stream crossing constructed of nonerodible material shall be provided.

14. Applicable Regulations

All applicable federal, state and local regulations pertaining to working in or crossing live watercourses shall be met.

#### 15. Stabilization of Bed and Banks

The bed and banks of a watercourse shall be stabilized immediately after work in the watercourse is completed.

16. Underground Utility Construction

Underground utility lines shall be installed in accordance with the following standards in addition to other applicable

- a. No more than 500 linear feet of trench may be opened at one time.
- Excavated material shall be placed on the uphill side of trenches.
- c. Effluent from dewatering operations shall be filtered or passed through an approved sediment trapping device, or both, and discharged in a manner that does not adversely affect flowing streams or off-site property.
- 17. Construction Access Routes

Where construction vehicle access routes intersect paved public roads, provisions shall be made to minimize the transport of sediment by vehicular tracking onto a public road surface, the road shall be cleaned thoroughly at the end of each day. Sediment shall be removed from the roads by shoveling or sweeping and transported to a sediment control disposal area. Street washing shall be allowed only after sediment is removed in this manner. This provision shall apply to individual subdivision lots as well as to larger land-disturbing activities.

18. Temporary Erosion & Sediment Control Measure Removal

All temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization or after temporary measures are no longer needed, unless otherwise authorized by the local program administrater.

19. Properties and waterways downstream from development sites shall be protected from sediment deposition, erosion and damage due to increases in volume, velocity and peak flow rate of stormwater runoff. Contractor shall be responsible for obtaining copy of approved Erosion and Sediment Control Plan and adhere to same. The Virginia Erosion and Sediment Control Handbook shall be used in addition to the approved narrative a plan.

SECTION 2F - INSPECTIONS AND TESTS

2F-01 SCOPE OF WORK

A. The work shall include providing all necessary equipment, material, abor and services required to properly test and inspect all work

A. The Engineer shall inspect the work in any part, or as a whole, and shall make or request all tests deemed necessary to insure that the work has been completed in accordance with the plans and

- B. The Contractor shall repair or replace, at his expense, any length of pipe, pavement, and any material that is found or tested to be defective or deficient during the work or within one (1) year after the work has been completed and accepted by the Owne
- Any unfaithful or imperfect work that may be discovered before the final acceptance of the work shall be corrected immediately on the requirement of the Engineer, notwithstanding that it may have been overlooked or approved by the proper inspector. The inspection of the work shall not relieve the Contractor of any of his obliquious to perform sound and reliable work as herein described. And all the work, of whatever kind, which during its progress, and before it is finally accepted may become damaged for any cause, shall be properly taken up or removed so much of its as may be objectionable and be

replaced by good and sound work satisfactory to the Engineer.

All pipe shall be tested by the Contractor in the presence of the Engineer before being incorporated into the work. When laid, pipe shall not be covered unless and until inspected by the Engineer and permission granted. The necessary facilities for proper inspection shall be provided by the Contractor when requested by the Engineer.

Manufacturer's certificates will be accepted in lieu of tests for materials. If independent laboratory tests are desired by the Engineer, they will be secured by the Contractor, but the Contractor will be reimbursed by the Owner for the actual costs of such tests.

#### 2F-03 Not Used

2F-04 TESTING OF WATER LINES

- After placing all harnessing and all valve support concrete, sufficient backfill shall be placed prior to filling the pipe with water and field testing to prevent lifting of the pipe. When local onditions require that the trenches be backfilled immediately after the nine has been laid, the testing shall be carried out after backfilling has been completed but prior to placement of the permanent surface. At least seven (7) days shall elapse after the last valve support or hydrant block has been cast (Type I Portland III) is used, in which case three (3) days shall elapse.
- B. All testing will be performed in accordance with the AWWA C600-82 or
- C. Pressure Test: After the pipe has been laid, all newly laid pipe or pressure of at least 1.5 times the working pressure at the point of

1. Test pressure restrictions. Test pressures shall:

- a. not be less than 1.25 times the working pressure at the highest
- b. not exceed pipe or thrust restraint design pressures;
- c. be of at least 2-hour duration;
- d. not vary by more than + 5 psi:
- not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants;
- f. not exceed the rated pressure of the valve. 2. Each valved section of pipe shall be filled with properly disinfected
- water slowly and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the
- Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants.
- 4 All exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and test shall be repeated until it is satisfactory to the Engineer
- D. A leakage test shall be conducted concurrently with the pressure test. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

### L = SD(P)1/2

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

> (2) . 4-27-93 VDH COMMENTS REVISION DATE DESCRIPTION DESIGNED RCW HUNTER'S GREEN- SECTION II DRAWH CLD GENERAL NOTES CHECKED DRM APPROVED BOTETOURT COUNTY, VIRGINIA SUBMITTED \_L.M.W., P.C.\_\_\_\_ COMM. //2 SCALE: NONE

> > DATE: FEB. 1993

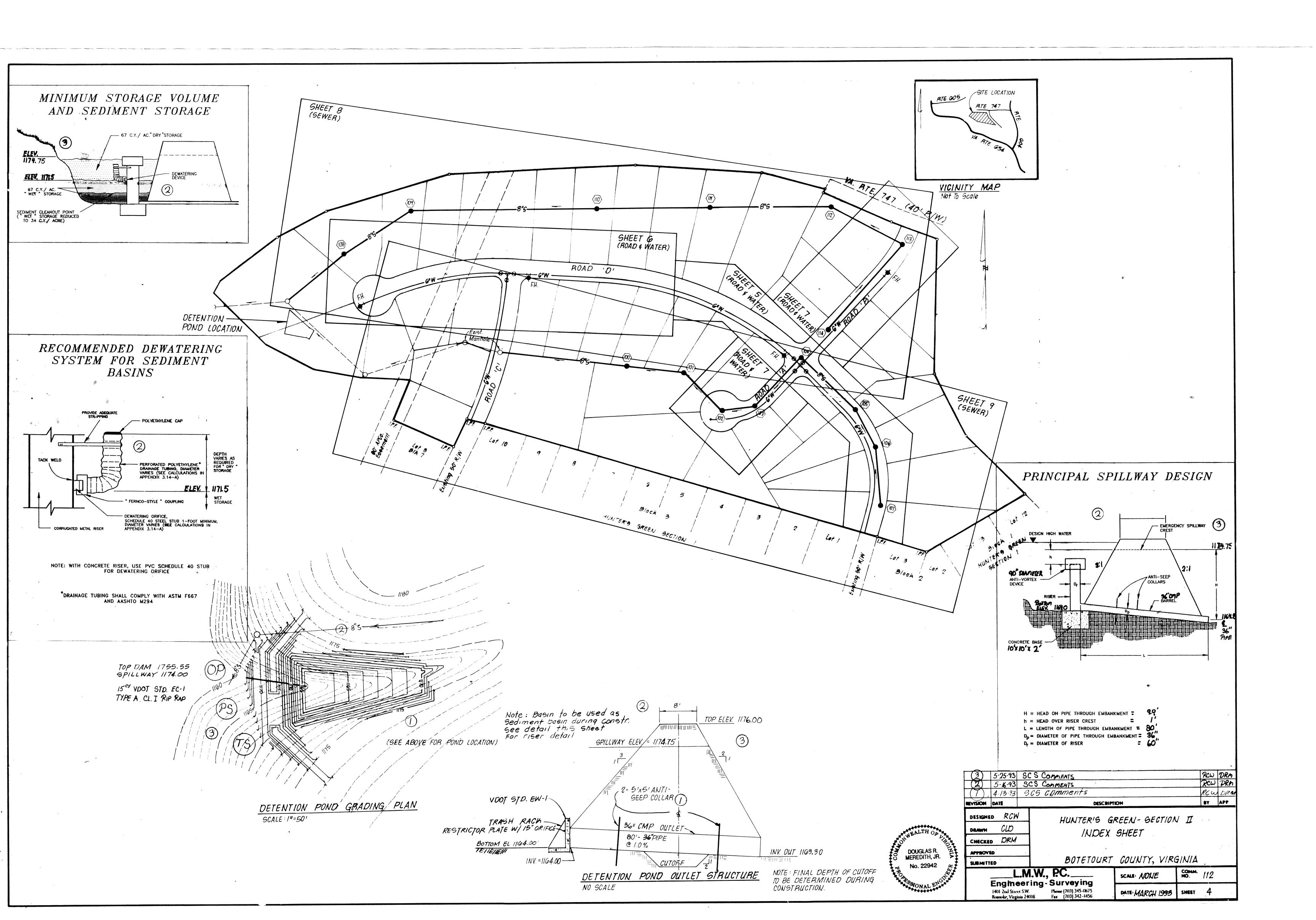
SHEET 3

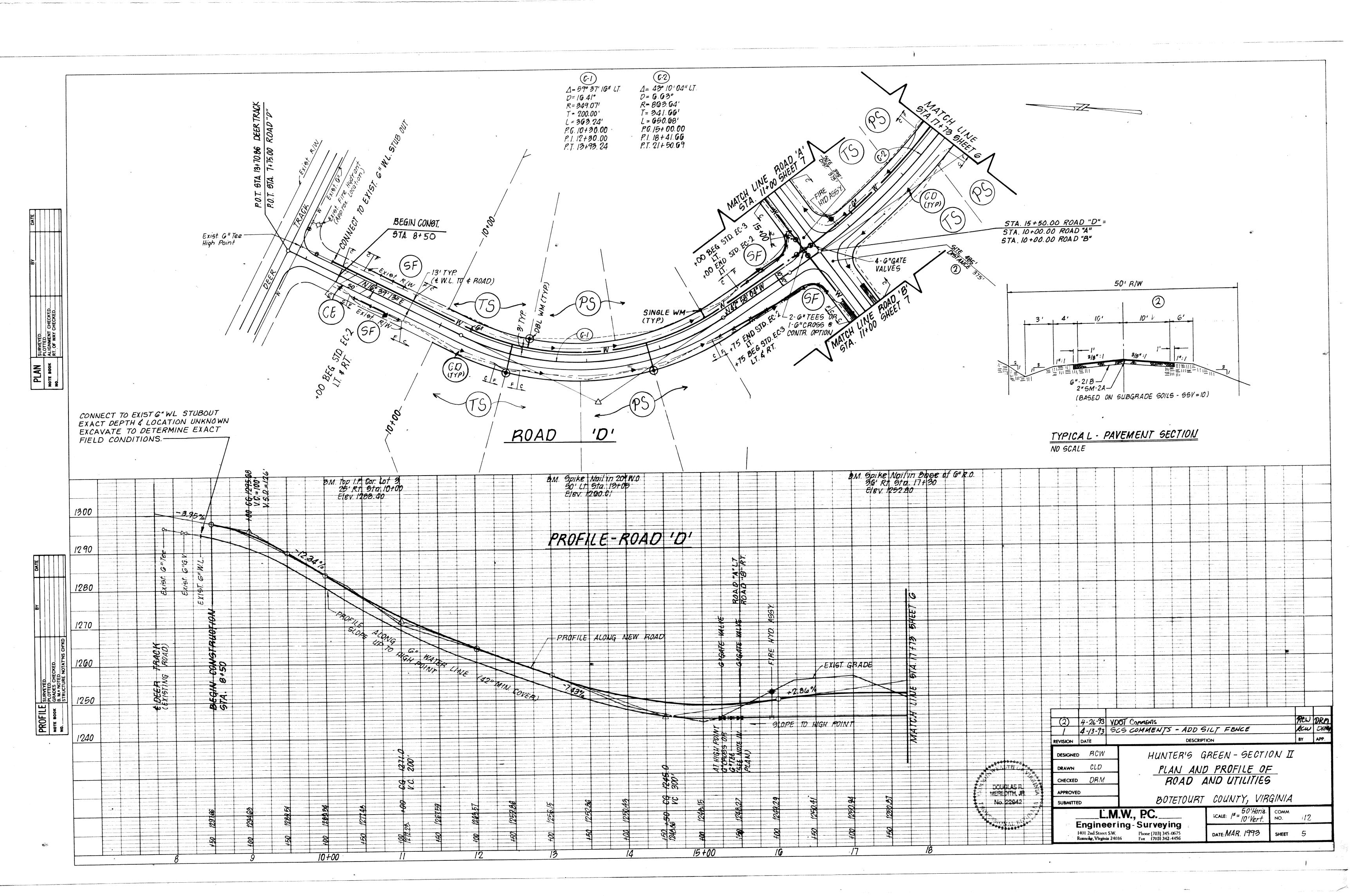
Engineering-Surveying

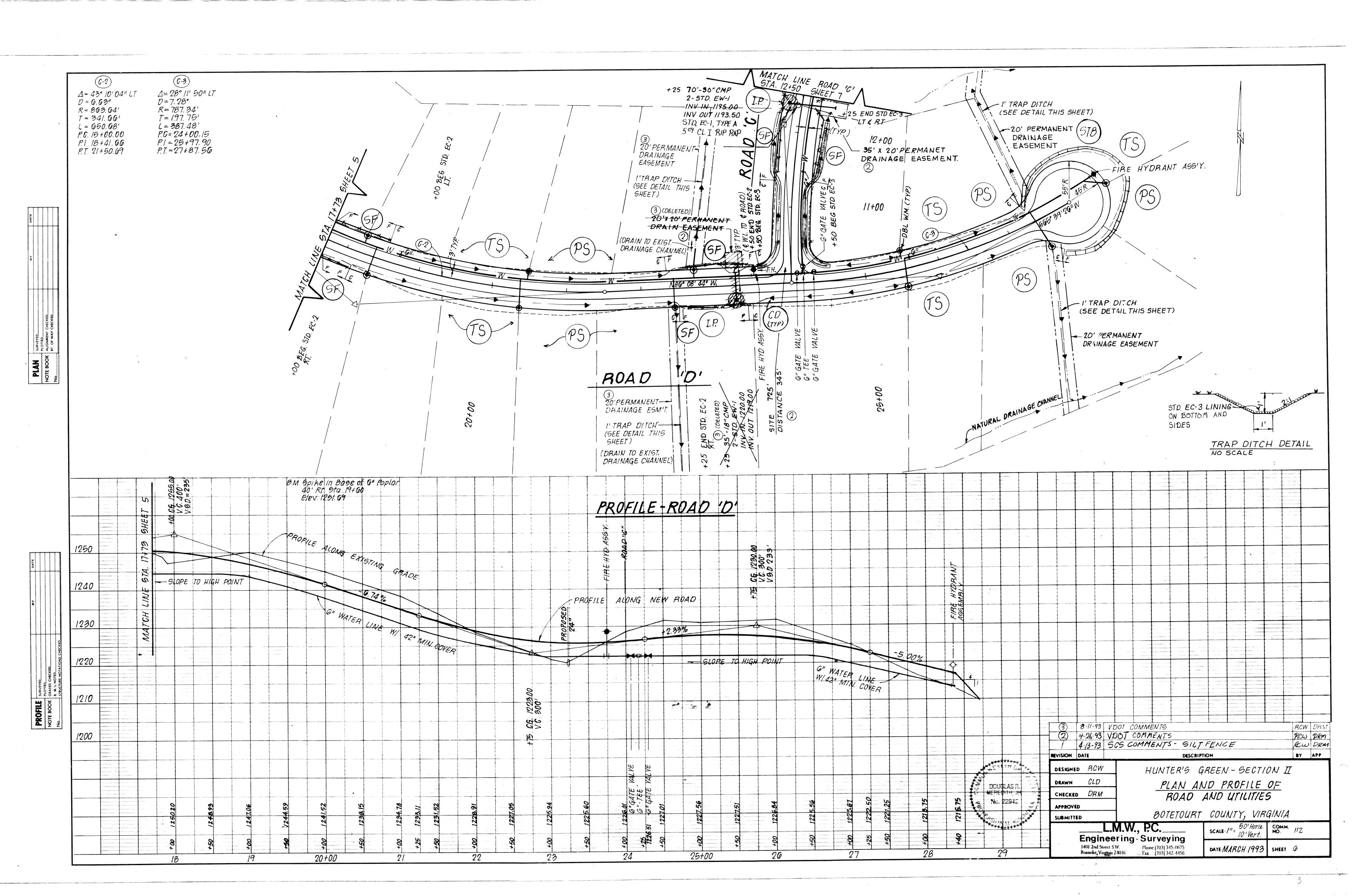
Phone (703) 345-0675

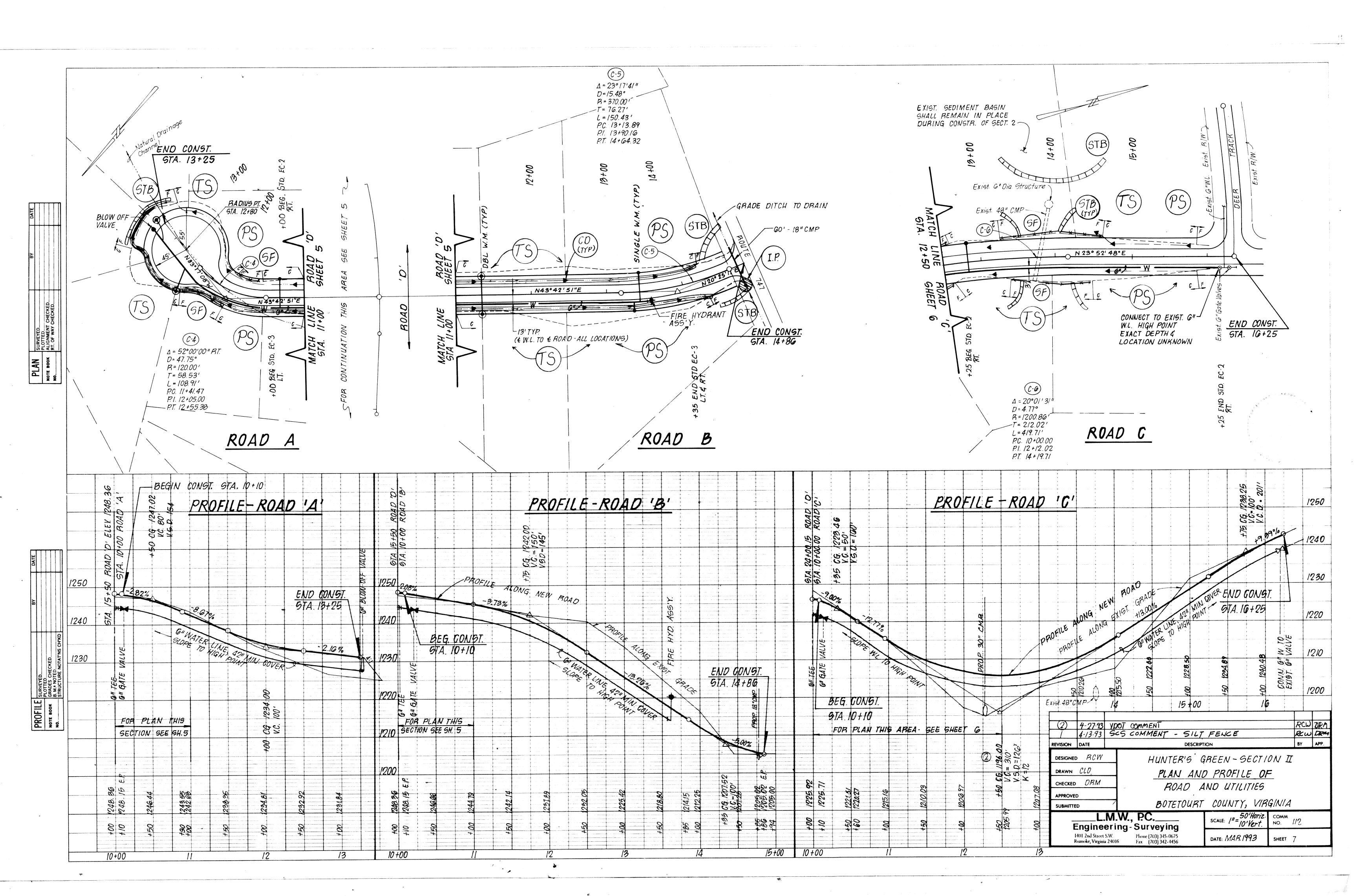
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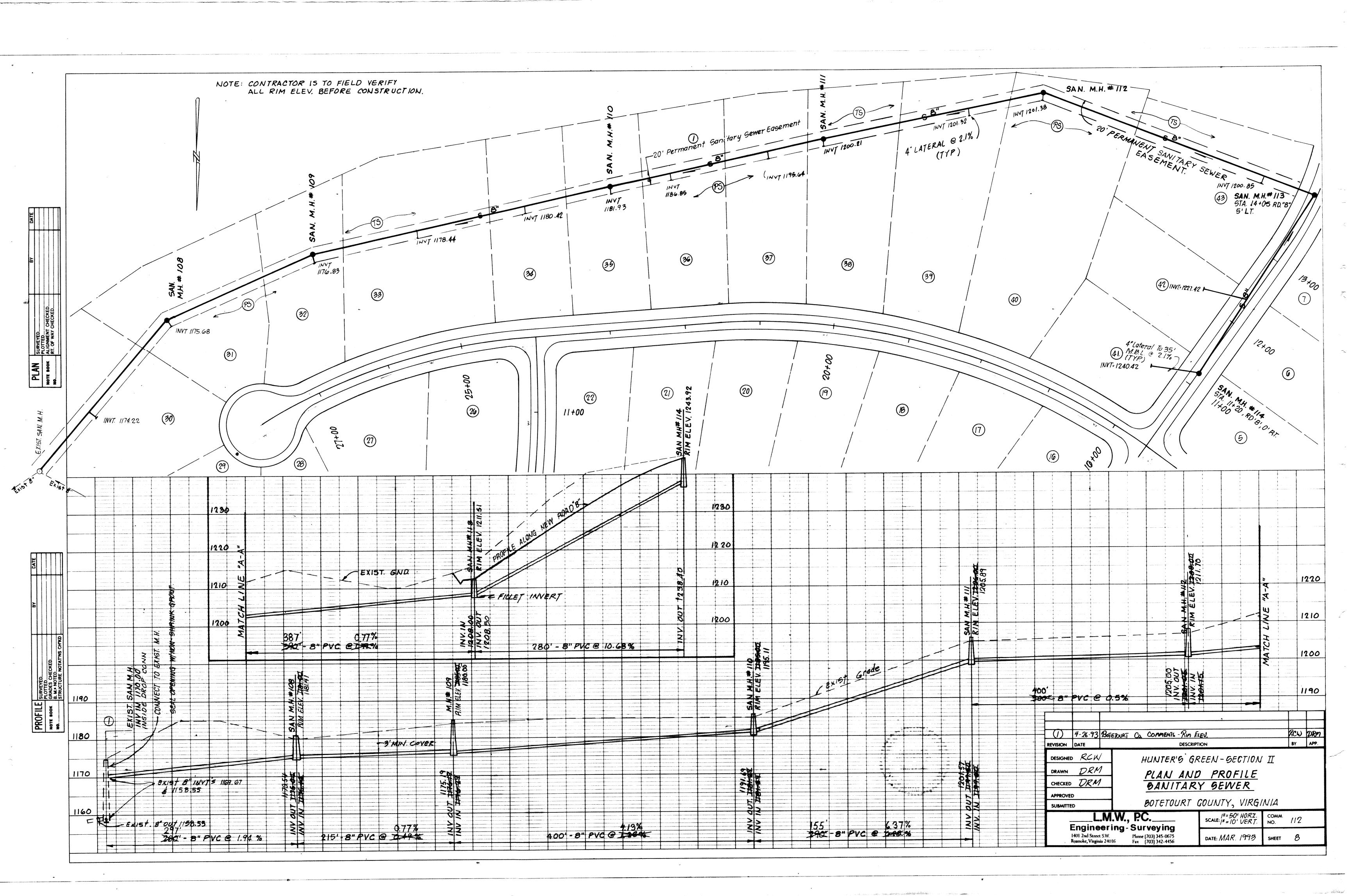
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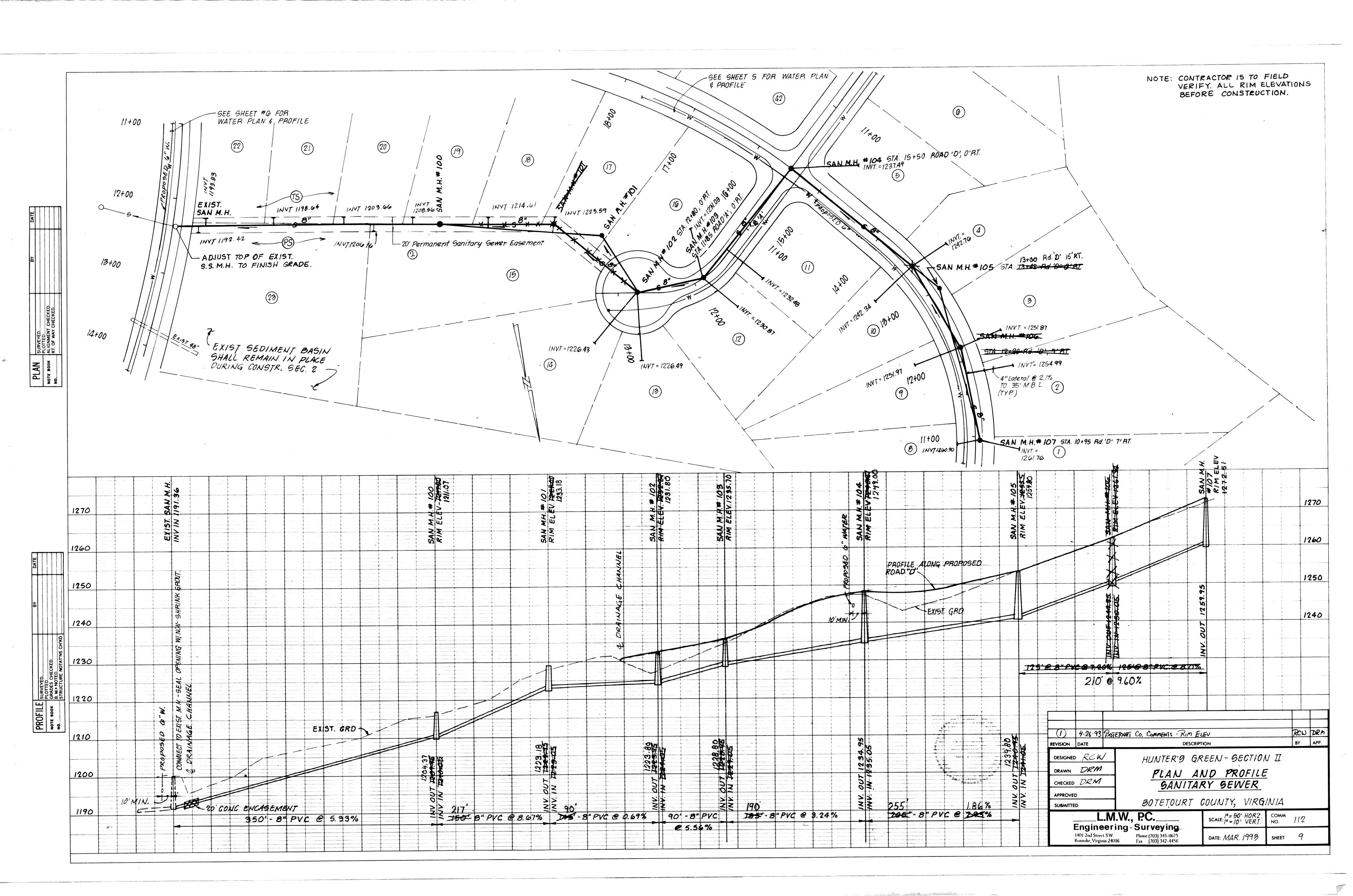












MANHOLE AND VAULT STARDARDS

- 1. Vaults, manhole bases, risers, tapers and grade rings shall be precast reinforced concrete manufactured in accordance with Virginia Department of Transportation, Road and Bridge Specifications, Section 503.
- Manhole base and riser sections construction shall be
- vertical 3. A maximum of 2 construction grade rings or maximum of 1' in
- 4. Final adjustment of frame and cover shall be in accordance to Frame and Cover Adjustment Detail using non shrink concrete with maximum of 4 bricks or concrete blocks for grade control. Frame and cover's are to be set at finish grade or 1/4" above finish grade in pavement and yard areas and minimum 6" above finish grade in other areas. Manhole frames and covers are not to be set in drainage swales,
- 5. Joints in manhole units shall be made watertight by using butyl sealants, "O" ring gaskets or mastic. The concrete surface shall be cleaned prior to use of sealant.
- a) Dewey Brothers Inc. MH RCR 3000 b) Approved equal

adjustments are allowable.

- All lift holes, openings around pipe, etc. shall be filled. from inside and outside to thickness of structure with nonshrink
- All units used in manhole and vault construction shall be securely connected by interlocking between units, concrete collars or other approved methods.
- grade and unobstructed except for road contruction.
- 10. Connections to sanitary manholes shall be made with "Flexible Boots" Approved by VDH.
- APPROVED MATERIALS FOR WATER 1. Meter Boxes a) Ford Ironcrete meter box with No. 2 ironcrete top or a

9. Area around meter box at a radius of 4 to be on finish

- approved equal. Southeastern Distributor Model MB-S Plastic box with Ford or Charlotte Model C-32 cast iron base and cover (Not Approved for roadway area). c) Approved equal
- 2. Meter Setter (including inlet riser valve and double check valve on outlet)
- Ford VBHH 72 15-WD b) Approved equal
- 3. Meter Setter Extender or Riser a) Not allowed unless approved by the Utiliey Director.
- 4. Corporation Stop Muelier Model H-1500 Ford Model F-600.
- c) Approved equal. 5. U-Branch
- a) Ford Model U28-43. b) Mueller Model H-15362. c) Approved equal.
- 6. Service Saddles (for PVC Pipe) a) Ford model FS-202 and FC-202 with stainless steel band
- and bolts. b) Approved equal

#### GENERAL CONDITIONS

The Contractor shall be responsible for notifying Botetourt County at least 48 hours prior to starting any work on this project. All work shall be subject to Inspection by the county inspectors and engineer. The Contractor shall obtain and pay for all necessary permits.

The Contractor shall include in applicable bid price the cost f locating and uncovering all sewer manholes and all valve boxes after surface treatment of roads and adjusting them to final road grades. The Contractor shall be responsible for cleaning out sewer mains for final inspection. The location of existing utilitles across or along the line of

proposed work is not necessarlly shown in the plans and where shown, approximate. The Contractor shall, on his own expense locate all underground lines and structures as necessary. The Contractor shall be responsible for any damage to underground lines and structures. The Contractor shall comply with the State Water Works Regulations, Section 12.05.03 where lines cross.

Contractor shall contact "Miss Utility" at 1-800-552-7001 prior to construction.

Power lines and poles, telephone lines and poles, and gas lines shall be protected from damage in accordance with the utility owners's instructions. The Contractor is responsible for contacting the utility owners, obtaining the proper protective measures for each individual construction location and for protecting utilities from damage. Any damage caused by the contractor or the contractor's construction operations shall be corrected by the Contractor at his expense.

Existing roads, shoulders, and ditches shall be protected from damage. Damage resulting from operation under this contract shall be repaired or replaced by the Contractor at his own

All trenches within existing or future Virginia Department of Transportation right-of-way shall be compacted in six inch lifts. The Contractor shall notifiy the County of any field revisions

to the approved plans prior to such construction. Contractor shall coordinate with the design engineer and provide

All construction shall be in accordance with approved construction practices of the applicable trades.

Unless otherwise specified herein, all construction shall be in accordance with the latest edition of AWWA standards.

FROSION CONTROL

Utility construction shall be subject to all provisions setforth in the approved Erosion and Sediment Control Plan. Throughout construction, temporary measures shall control erosion

and minimize slitation of adjacent properties, streets, and drainage ways

Construction and personal vehicles shall be cleaned of mud and debris prior to leaving the site.

Failure of the Contractor to control erosion and siltation shall cause the owner to take actions necessary to accommadate the requirements of the County. The cost of such action, including engineering fees, will be deducted from monies due the Contractor for other work.

#### EXCAVTION, STABILIZATION & BEDDING TRENCHING

The Contractor shall comply with the latest provisions of the Virginia Occupational Safety and Health Standards for the Construction industry as adopted by the Safety and Health Codes Commission of Virginia.

The materials and methods of construction required for trench stablization and pipe bedding shall be in accordance with the latest revisions of the applicable Virginia Department of Transportation and American Society for Testing Materials

The Contractor shall excavate all materials encountered to the lines and grades indicated and the trenches and ditches detailed on the drawings along the alignments shown.

Excavation, unless otherwise specified, shall be open cut. The Contractor shall open no more than two hundred (200) feet of trench in advance of the laying of pipe unless approved by the Engineer. Any water that accumulates in the trenches shall be promptly removed.

Trenches shall be excavated in straight lines and true grades in order to establish a true elevation for the invert of the

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. The sides of the trenches shall be excavated as vertical as

Excavation for structure shall be sufficient to leave at least twelve (12) inches clearance between the structure and the sides of the trench or any required bracing, shoring, or sheeting.

The trench bottom shall be excavated to provide a firm, stable. and uniform support for the full length of pipe. Any part of the trench bottom excavated below the required grade shall be backfilled to grade and compacted to provide firm pipe support. Large rock, boulders, and large stones (6" diameter) shall be removed to provide six (6) inches of improved bedding on all sides of the pipe, including the bottom, and on all sides of accessories. When an unacceptable subgrade material is encourtered which will provide inadequate pipe support, additional trench depth shall be excavated and refilled with trench stabilization material.

The bottom of trenches for gravity pipelines shall be excavated a minimum overdepth of four (4) inches below the bottom of the pipe to provide for improved pipe bedding material for the entire length of the pipeline, including service connections, except in rock, where the improved bedding shall be six inches deep. The bedding shall be shaped to that the bottom quadrant of the pipe lies on the bedding.

in on orderly manner at a sufficient distance from the sides of the trench in order to avoid overloading the banks of the trench. Excavated materials suitable for backfill shall be stockpiled and to prevent slides.

Unless otherwise directed by the owner or engineer, surplus excavated material shall be removed from the site and disposed of by the Contractor, at his own expense

TRENCH STABILIZATION Trench stabilization material shall be VDOT #2 coarse aggregate. Wherever excessively wet or unsuitable material is encountered in the trench bottom, such material shall be removed and backfilled with trench stabilization material, which shall be graded

Bedding material shall be VDOT #57 or #78 coarse aggregate, for

bedding, all other pipe types shall be backfilled to the spring

PIPE, JOINTS, FITTINGS AND APPURTENANCES

GENERAL

All materials and appurtenances for this work shall be new,

first run, top quality, and 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

The materials specified shall comply with the latest revisions of

the applicable American Society of Testing Materials ( ASTM),

Standards Institute (ANSI), and/or the Virginia Department of

OPTIONAL PIPE SELECTIONS

The Contractor shall install only one (1) type of pipe between

structures. Where existing pipe is to be replaced or extended,

installed in strict accordance with the recommendations of the

the same type of pipe shall be installed. All pipe shall be

Water lines shall be either PVC AWWA C-900 SDR 18 (min.) or

Sanitary sewer lines shall be either PVC ASTM D-3034, SDR 35

Contractor's option, unless specified or indicated otherwise.

JOINTS, COUPLINGS, AND APPURTENANCES

strict accordance with the recommendations of pipe manufacturer

Ductile Iron pipe and fittings shall be either mechanical joint

joints shall be in strict accordance with the recommendations of

PVC pipes and fittings shall be bell and spigot type joints.

The bell and spigot joint shall be sealed with elastomerlogaskets conforming to ASTM D 3212. The joints shall be in

or bell and spigot type joint as specified or indicated.

Fittings shall conform with AWWA C 110/ANSI 21.10. Joints

manufactured in accordance with AWWA C 111/ANSI 21.11. The

Gate valves shall be iron-body, bronse-mounted, double-disc,

parallel-seal, O-ring sealed, inside-screw, non-rising stem,

with 2 inch square operating nut for valve vault service, all

Connections shall be suitable for the pipe with which it is

used. The valve 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 two inch square operating

nut, marked with the word "open" and an arrow and shall open

Sanitary sewer service connections shall include all four(4)

All other materials and appurtenances are to be in accordance

with the details shown on the plans and in strict accordance

Any materials, equipment, tool, or accessory found to be

defective or not in fit condition to accomplish the task

continuously and expeditiously shall be promptly replaced.

The Contractor shall include expense of procuring the field

representatives for approved materials. The representative

shall instruct the Contractor's representatives or employees

The Contractor shall not lay pipe or place manholes until all

water has been removed from the trench or if the weather

lipe that may require field cutting shall be done so in a

heat and workman like manner, so as to leave a smooth cut,

at right angles to the pipe axis. Care shall be taken to

The materials shall be visually inspected for defects prior

material shall be placed in the pipe or manholes. All pipe

shall be free of debris prior to and during installation.

The pipe and manholes shall be lowered carefully into the

trench by suitable means and handled with care at all times

to avoid damage. Materials shall not be dropped or dumped

When work is not in progress, the Contractor shall plug the

open ends of the pipe to prevent water or other material

from entering the pipe. The plug shall be watertight and

shall remain in place until any required dewatering has been

to lowering the pipe or placing the manholes into the trench.

avoid damaging the pipe, including linings and coatings.

During pipe installation, no tools, clothing, or other

as to proper installation procedure for the particular

services of experienced and qualified manufacturer

with the recommendations of the manufacturer.

conditions are unsuitable for work.

inch drameter schedule 40 PVC, pipe as specified or indicated.

in accordance with AWWA Standard C500 (latest revision).

the pipe manufacturer. The pipe and fittings shall be

Bituminous coated and dement lined in accordance with

shall be made with a single watertight rubber gasket

or Ductile Iron ANSI/AWWA C151, Class 52 (min.), at the

Ductile Iron ANSI/AWWA C151 Class 52 at the Contractor's

option, unless specified or indicated otherwise.

(1) Detention tape shall be placed 24" above all PVC

American Water Works Association (AWWA), American National

line.

of the Contractor.

manufacturer.

Pipe Installed.

AWWA C104/ANSI 21.40.

by turning clockwise.

material

into the trenches

completed.

Transportation (VDOT) criteria.

to allow for the compacted bedding material. IMPROVED PIPE BEDDING MATERIAL

#### DISINFECTION OF WATER MAINS Reinforced concrete pipe and VDOT #25 or #26 crusher run aggregate or #78 coarse aggregate for all other pipes. PVC pipe shall be backfilled to the topo and the pipe with improved

All pipe shall be disinfected, tested, and flushed in accordance with AWWA Standard C601 (latest revision).

the recommendations of the manufacturer.

anchored to the water main with rods.

Before joints are made the pipe shall be well bedded on a

firm foundation and no pipe shall be brought into position

secured in place. Bell holes shall be dug sufficiently

Pipe shall be jointed in strict accordance with the

large to insure proper jointing.

manufacturer's recommendations.

tested in place.

point of the sewer.

until the preceding length has been thoroughly embedded and

SEPARATION ON WATER AND SANITARY SEWER LINES

PARALLEL INSTALLATION

Water lines shall be laid at least ten (10) feet horizontally

from a sewer or sewer manhole whenever possible. Horizontal

separation shall be measured outside to outside. Where ten

(10) feet of horizontal separation is not practical, the water

line may be laid closer provided that: (1) The bottom of the

water line shall be at least eighteen (18) inches above the

outermost grown of the sewer or; (2) the sewer shall be

constructed of AWWA approved ductile Iron water pipe pressure

tested at 50 p. s. i. without leakage prior to backfilling or;

(3) the sewer manhole shall be of watertight construction and

CROSSING

Water lines prossing sewers shall have a vertical separtaion

of at least eighteen (18) inches, measured outside to outside,

between the bottom of the water line and the top of the sewer

line. Where eighteen (18) inches of vertical separation is

not practical; (1) Sewers passing over or under water lines

shall be constructed of ductile Iron AWWA water pipe and (2)

providing; (a) an eighteen (18) vertical separation, measured

outside to outside, between the bottom of the sewer pipe and

WATER MAIN INSTALLATION

The water mains shall be laid and maintained at the required

lines and grades and fittings and valves at the required

Deflection of the line of pipe, either in the vertical or

horizontal plane, shall not exceed either AWWA standards or

All plugs, except mechanical joint plugs used at connection

points for future lines, all tees, all bends, and all fire

hydrant assemblies shall be supported by thrust blocking as

indicated. Valves for connection of future lines shall be

the top of the water line and; (b) adequate structural support

for the sewer to prevent excessive deflection of the joints and

for the pater line be spaced at equal distance from the crossing

the settling and breaking of the water line and; (c) the joints

water lines passing under sewers shall be protected by

Contractor shall provide all materials, equipment, and necessary taps and shall perform all work required for the sterilization, testing, and flushing of the water

No tested section of water line shall be approved to deliver water service until a favorable laboratory report has been achieved. Any tested section failing to meet the specified requirements shall be repaired by the Contractor and retested until the results are within accepted limits. The repairs and retesting shall be at the Contractor's expense.

All Values and Appurtenance shall be operated during the Disinfection Procedure. The water main or valved off section that has been completed shall be fulled, bested, and flushed

After testing and before final inspection of the completed systems, water mains and service laterals shall be flushed and disinfected in accordance with AWWA Specification 0601 [latest revision]. Flushing shall be accomplished at a flow velocity in excess of 2.5 feet per second.

Disinfection as described in AWWA C651 shall be used. Five (b) gram calcium hypo oniorite tablets with 3.25 🛭 avaliable 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 the 25 mg/l (ppm) chlorine:

Pipe diameter Tablets per 18-20 ft. Pipe section

Use of the continuous feed or slug method of disinfecting may only be used to re-chlorinate a water pipe after the initial disinfection. When filling the pipeline for disinfection, the rate of filling must result in a velocity less than 1 ft./sec.

The disinfection solution shall remain in the pipe line for 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 and tested in accordance with the Virginia Waterworks Regulation, Section 7.17.03 and 12.11.04-12. 11.04.05.

SANITARY SEWER INSTALLATION

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 into the system. 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.

The Contractor shall be responsible for establishing and maintaining the horizontal and vertical alignment of the system in accordance with the survey information indicated

The horizontal alignment of the pipe shall be maintained by a transit or theodolite plumbed over the center of the downstream manhole. The vertical alignment shall be maintained by an adjustable laser level mounted at the invert of the downstream manhole with target(s) placed at the bell end of the pipe being laid.

The sanitary sewer system shall be laid and joined complete -in-place in order that each length and section of pipe between the manholes have a smooth and uniform invert.

The previous joint shall have been completed and the entire length of pipe shall be well bedded and firmly backfilled before jointing another length of pipe. Bell holes shall be dug of sufficient size to insure proper jointing.

The Contractor shall not use excavation equipment to push the pipe into the home position, unless approved by the Engineer, and then only for one length of pipe

Joints for pipes of different materials shall either be made at manholes or with standard adapter fittings. The Contractor shall join the pipe as recommended by the pipe manufacturer in order to obtain the degree of watertightness required. The use of lubricants, primers,

adhesives, and similar materials shall be as recommended by the manufacturer. The pipe shall be connected to manholes through precast openings and joined with a flexible boot adapter.

Detection tape shall be placed 24 above all PVC pipe

GENERAL

All material for the compaction of backfill shall be in accordance with the latest revisions of the applicable American Society of Testing Materials (ASTM), American Association of State Highway and Transportaion Officaials (AASHTO), and Virginia Department of Transportation (VDOT)

The expense of obtaining and compacting earth backfill material shall be included in the Contractor's bids.

The Contractor shall comply with all Local and State erosion and sediment control ordinances and requirements and all approved Erosion and Sediment Control Plans and Reports pertaining to this project. It is the Contractor's responsibility to obtain copies of the approved plans.

Backfilling shall not be done in freezing weather and shall not be accomplished with frozen material. No fill shall be made where the material in the trench is already

The Contractor shall at all times during the construction, and at its completion for final inspection, keep the trench, excavation, or other parts of the work free from accumulated

#### JOB CONDITIONS

Prior to placing backfill, all organic material rubbish, debris, or other unsultable material within the trench shall be removed. All concrete forms shall be removed. All shoring and sheeting shall be removed or out off at the elevation 18" below finished grade.

Prior to placing backfill, the trench, the installed pipe, inlets, and manholes shall be visually inspected by the

Backfill material shall be placed in uniform horizontal layers and thoroughly compacted with proper mechanical or hand operated tampers.

Backfill material shall be placed and compacted so as to not unevenly support, damage, or displace the alignment of the pipe, inlets, or manholes. Backfill material shall be worked under the sides of the pipe to provide satisfactory

Backfill shall not be placed or compacted against cast-inplace concrete untill it has obtained sufficient strength to withstand the pressure placed upon it.

Upon completion of backfilling, all excess soil, stones, and debris shall be disposed on site as directed by the Owner and at not additional expense.

#### BACKFILL MATERIAL

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.

Material small consist of durable natural granular waterial or granular aggregates free of organic material, loam, debris. asnes, cinders, pavement, boulders, or other objectionable material which cannot be thoroughly compacted. Backfilling shall be done in such a way to prevent dropping of material directly on top of the pipe through any vertical distance greater than three (3) feet and shall be deposited in horizontal layers. No particles with a diameter greater than two (2) inches shall be placed in the initial backfill from the top of the improved bedding to a point two (2) feet over the top oth the pipe No rock particles with a diameter or dimension greater than six (6) inches shall be placed in the remainder of the backfill. Excavated rock particles with a diameter or dimension greater than six inches snall be considered unsultable material.

Excessively wet excavated material shall not be used as backfill material. Frozen material shall not be placed in the trench, nor shall approved backfill be place upon frozen

aggregate backfill material, where indicated for trenches below paved or surface treated streets shall be VDOT standard size 25 or size 26 crusher run as specified in Section 206 of the VDOT Road and Bridge Specifications (latest revision). Aggregate backfill in such situation shall be placed in eight (8) inch

### BACKFILL BELOW UNPAVED AREAS

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

Backfill from one (1) foot above the top of pipe to the topsoil subgrade shall be free of stones larger than six (6) inches in diameter and shall be placed in layers not to exceed twelve (12) inches and compacted with mechanical

Final backfill in grassed areas shall be mounded three (3) inches above surrounding ground to allow for settlement. BACKFILL BELOW PAVED AREAS

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

Backfill from one (1) foot above the top of pipe to the topsoil subgrade shall be free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical

Final backfill in paved areas shall be mounded three inches and allowed to settle for thirty (30) days prior to pavement placement or replacement. The trench in paved area shall be maintained daily, as required, to provide a smooth crossing for vehicles until pavement is placed.

### COMPACTION TESTS

Backfill shall be moistened or aerated as required to provide the proper moisture content necessary to achieve the compaction specified herein.

Compaction by water, either natural or mechanical, shall not be permitted. Each layer shall be thoroughly tamped and compacted by hand or pneumatic tamper in place. Special care shall be taken in using mechanical tamper directly over the pipe.

Backfill material shall be placed and compacted to the following minimum percentages of maximum iry density as determined by ASTM D689: Fill from the top of pipe bedding or the bottom of pipe

trench to one (1) foot above the top of the pipe, each layer shall be compacted 95 percent. Fill below unpaved areas from one (1) foot above the top pipe to the topsoil subgrade and in drainage channels to

• Fill below paved areas, each layer shall be compacted 95 percent.

the topsoil subgrade, each layer shall be compacted 90

Backfill shall be tested in accordance with ASTM D698 or ASTM D2487 and D2216. Backfill that fails to meet the minimum percentages

specified shall be reworked or replaced and retested all at the Contractor's expense.

RESTORATION

The Contractor shall at his own expense, clean all refuse. rubbish, set up material, and debris issued by his operation such that at all times the site shall not be a source of litter and shall present a neat, orderly, and workmanlike apperance. Immediataly following the backfilling of the trench, the Contractor shall "broom" or otherwise clean the surfaces of paved streets. All surplus material shall be removed and disposed of.

Finish grading shall be done as required to extablish the slopes indicated and to prevent low spots and pockets that do not drain.

Developed property, such as walks, steps, mailboxes, driveways, culverts and the like, disturbed by the work shall be restored or replaced to their originial condition Ditches shall be restored to their original shape and slopes All disturbed areas not covered by pavement or structures and all areas disturbed by construction activity shall be fertilized limed, and seeded in accordance with and at the rates specified in the Erosion and Sediment Control Plan and Report

Restoration of pavement shall be in accordance with the pavement details indicated.

Restoration of underground utilities shall be in accordance with the standards of the utility owner, with respect to labor, equipment, and materials.

#### INSPECTION AND TESTS TESTING OF SANITARY SEWER

The Contractor shall repair or replace, at his expense, any length of pipe, manhole, structure, or any material that is found or tested to be defective or deficient during the work or within one (1) year after the work has been completed.

The Contractor shall prove watertightness of the sewer system or portions thereof by low pressure air testing. Test shall be made only in the presence of the County Engineer and the

The Contractor shall furnish all labor and equipment required for the test and shall make repairs necessary until test results are satisfactory. The testing equipment, procedure, and results will be subject to compliance with ASTM designation C-828, current revision. The air test is to be conducted between two (2) consecutive manholes. The test equipment shall consist of two (2) plugs (one tapped and equipped for air inlet connection), a shut-off valve, a pressure regulating valve, a pressure reduction valve, a monitoring pressure gauge having a

pressure range from 0 to 5 psl. graduated in 0.1 psi with an accuracy of +-.04 psi. The test equipment shall be set up outside the manhole for easy access and reading. Air shall be supplied to the test slowly and shall be regulated to prevent the pressure inside the pipe from exceeding 5 0 psig. The pipeline shall be filled until a constant internal pressure shall be maintained at 3.5 psig, or slightly above for a five minute stabilization period, after which time the internal pressure will be adjusted to 3.5 psig, the air supply shut off and the test begun. For safety purposes, no person shall remain in the manhole while the pipe is being pressurized or throughout the test.

Should the pressure drop 1.0 psi in less time than that specified below, the sewer segment shall have failed. If the time required for the pressure to drop 1.0 psi is greated than that shown, the sewer segment shall have passed. For a more detailed description of the air test method, refer to ASTM designation S-328, current revision. An air pressure correction shall be required when the prevailing groundwater is above the sewer line being tested and shall be calculated as follows:

(Groundwater Depth (ft)/2.31) + 3.5 = starting test pressure

Ending test pressure = starting test pressure + 1.0 psi AIR TEST TABLE LENGHT OF TEST SEGMENT PIPE DIAMETER 0.30 0.53 1.10 0.50 1.28 1.39 2.56 1.49 3.14 1.59 2.19

Test for displacement of buried sanitary sewers: After the trench has been backfilled and compacted and cover over the pipeline has been brought to finished grade, pipelines will be tested as follows: Light will be flashed between manholes, or, if manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a morror. Poor alignment, displaced pipe, or other defects shall be remedied by the Contractor at no additional cost to the owner.

Manholes shall be tested by exfiltration by plugging lines with inflatable stoppers and filling the manhole with water for a twelve hour soak period. Leakage shall not exceed one-half gallon per hour in the one hour test period following the soak period. An approved air test for manholes will also be considered.

Tests for deflection shall be made with a deflectometer that produces a continous record of pipe deflection, or by pulling a mandrel, sphere, or pin-type go/no-go device through the

Displacement tests shall be conducted only after backfill above pipe has been allowed to settle for 30 days.

Should PVC or ABS gravity pipe be utilized, the Contractor shall deflection test the entire length of pipe by means of a qo-no-qo 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 the 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. 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 proving ring) shall equal the dimensions in Table I below. Critical mandrel dimensions shall carry a tolerance of ±.01."

9 Arm Mandrel

#### D Dimension ASTH D3034 ASTM D2751 (6" only) \* SDR 35 Hom. Dia. ASTM 02680 5.65" 5.65" (SDR 35" 5.49" (SDR 23.5) 7.56" 9.45" 9.31" 11.22"

13.78"

Mandrel and proving ring may be obtained from Wortco, Inc., 220 High Street, Franklin, Ohio 45005 (1-513-746-6439), or Hurco

Enterprises

VR 359-10 007,17

53.17 Disinfection - All pipes, tanks, and equipment which can convey or store potable water shall be disinfected prior to being placed in service. Plans and specifications shall outline the procedures and include the disinfectant dosage, contact time, and method of testing

A. Forms of chlorine for disinfection

1. Liquid chlorine - the use of liquid chlorine shall be acceptable only when suitable equipment is available and only under the direction of a person trained to handle liquid chlorine. Emergency handling equipment shall be provided. It will normally require 4.2 lbs. of figuid chlorine (supplied under pressure in steel containers) to produce a concentration of 50 mg/L of available chlorine in

10,000 gallons of water. 3. Sodium hypochlorite - is supplied in strengths of from 5-25% to 16% available chlorine. The required amount of sodium hypochlorite to produce a 50 mg/L

2. Calcium hypochlorite - Two forms are available - granular and tablets (both

with 65% available chlorinel. It will normally require 6.5 lbs. of Calcium

ypochlorite to produce a concentration of 50 mg/L of available chlorine in

concentration of available chlorine in 10,000 gallons of water can be calculated from the following formula:

gallons of Sodium Hypochlorite needed =

% available chlorine

B. Methods of disinfection other than chlorination may be considered by the Division on a case-by-case basis.

C. Testing of water following disinfection: 1. All chlorine residual determinations shall be made using only those methods

2. Two water samples for bacteriological analysis must be collected at least 24 hours apart and analyzed by a certified laboratory. The results of these samples must indicate no coliform contamination before the pipe, tanks, or equipment can be utilized as part of the waterworks. If contamination is

indicated, then the disinfection procedure must be repeated.

#### VR 355-18-012.11

§3.58 Disinfection of Water Mains

A. All water mains shall be disinfected prior to being placed in operation. B. Prior to disinfection all water mains shall be flushed unless the tablet method of disinfection is used. All valves and hydrants shall be operated during this operation. Flushing velocities should not be less than 2.5 ft/sec

C. Methods of chlorine application

1. Continuous feed method - Potable water shall be introduced into the pipe main at a constant flow rate. Chlorine shall be added at a constant rate to this flow so that the chlorine concentration in the water in the pipe is at least 50 mg/L. The chlorinated water shall remain in the main at least 24 hours, after which, the chlorine concentration in the water shall be at least 10 mg/L. All valves and appurtenances shall be operated while the chlorinated water remains in the main

2. Slug method - Potable water shall be introduced into the main at a constant flow rate. This water shall receive a chlorine dosage which will result in a chlorine concentration of 100 mg/L in a 'slug' of the water. The chlorine shall be added long enough to insure that all portions of the main are exposed to the 100 mg/L. chloring solution for at least 3 hours. The chloring residual shall be checked at regular intervals not to exceed 2000 feet to insure that adequate residual is maintained. As the chlorinated water passes valves and appurtenances, they shall be operated to insure disinfection of these appurtenances

 Tablet method - This method shall not be used if nonpotable water or foreign materials have entered the mains or if the water temperature is below 5°C (41°F). The tablets shall be placed in each section and in all appurtenances. Endugh tablets shall be used to insure that a chlorine concentration of 25 mg/L is provided in the water. They shall be attached by an adhesive to the top of the pipe sections and crushed or rubbed in all appurtenances. The adhesive shall be acceptable to e Division. The velocity of the potable water in the main shall be fess than 1 ft./sec. The water shall then remain in contact with the pipe for 24 hours. A raives and appurtenances shall be operated while the chlorinated water is in the

D. Final Flushing - After the required retention period, the chlorinated water shall be flushed from the main using potable water.

E. Testing - After the mains have been flushed, the water mains shall be tested in accordance with §3.17C. Samples shall be collected at regular intervals, not exceeding

2000 feet, throughout the length of main. F. Repairs - Cleaning, disinfecting, flushing, testing, or similar operational actions shall be in accordance with the most current standard issued by AWWA (AWWA C-601).

SPECIFICATIONS FOR WATER MAIN

• PRESSURE TESTING AND ALLOWABLE LEAKAGE ARE LOCATED ON SHEET 3

(1) 4-26-93 VDH & BOTETOURT CO. COMMENTS RCU DRI DESCRIPTION REVISION DATE HUNTER'S GREEN - SECTION II DESIGNED RCW DRAWN CLD UTILITY SPECIFICATIONS CHECKED DRM APPROVED BOTETOURT COUNTY, VIRGINIA SUBMITTED L.M.W., P.C.

Engineering-Surveying

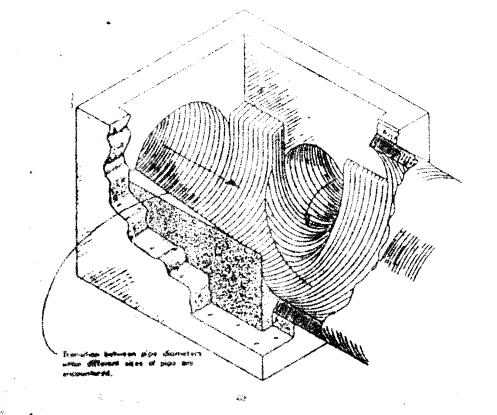
Phone (703) 345-0675 1401 2nd Street S.W.

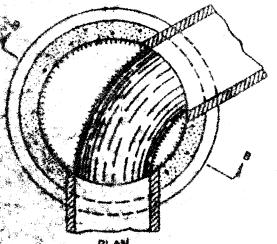
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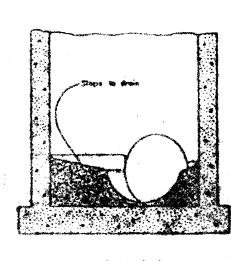
DATE: MARCH 1993

NO. 112

SHEET 10





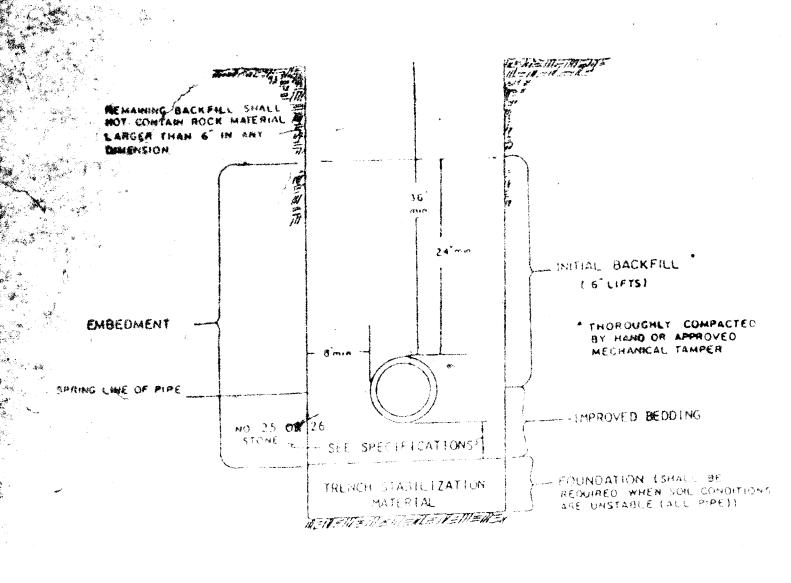


SECTION 5-8 METHOD OF TREATMENT IN MANHOLES

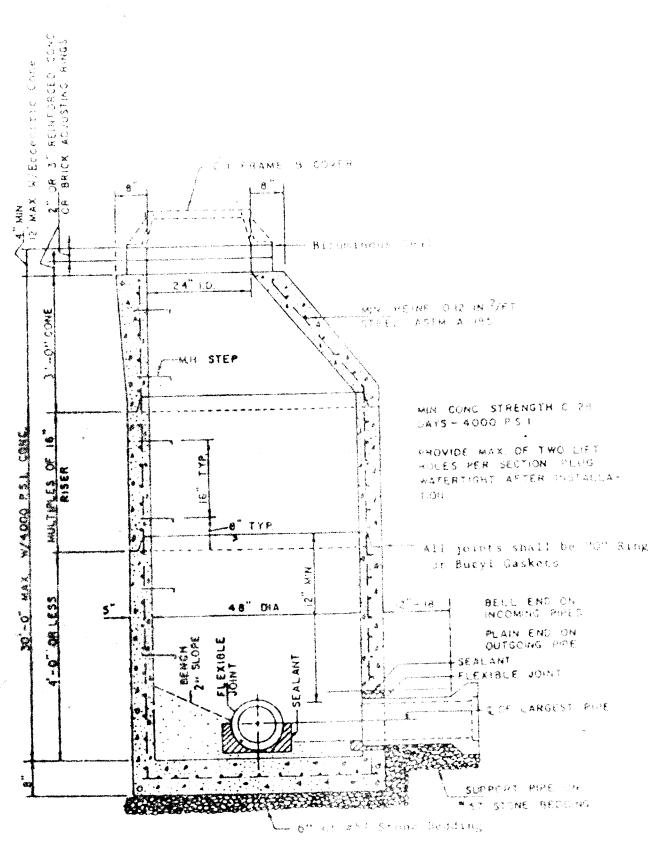
The Invert shaping as detailed hereon is to consist of a Portland Cement Concrete Conforming to Class A3 or Class C1, except that 25% of coarse aggregate may be up the dismeter and consist of stone, broken brick, broken concrete, or broken concret The surface shall be left smooth by means of hand troveling. Hone of the coarse

Afteregate shall remain exposed Details of invert shaping as shown hereon are for example purposes only. Each man-Mon and line lines.

### INVERT SHAPING DETAIL



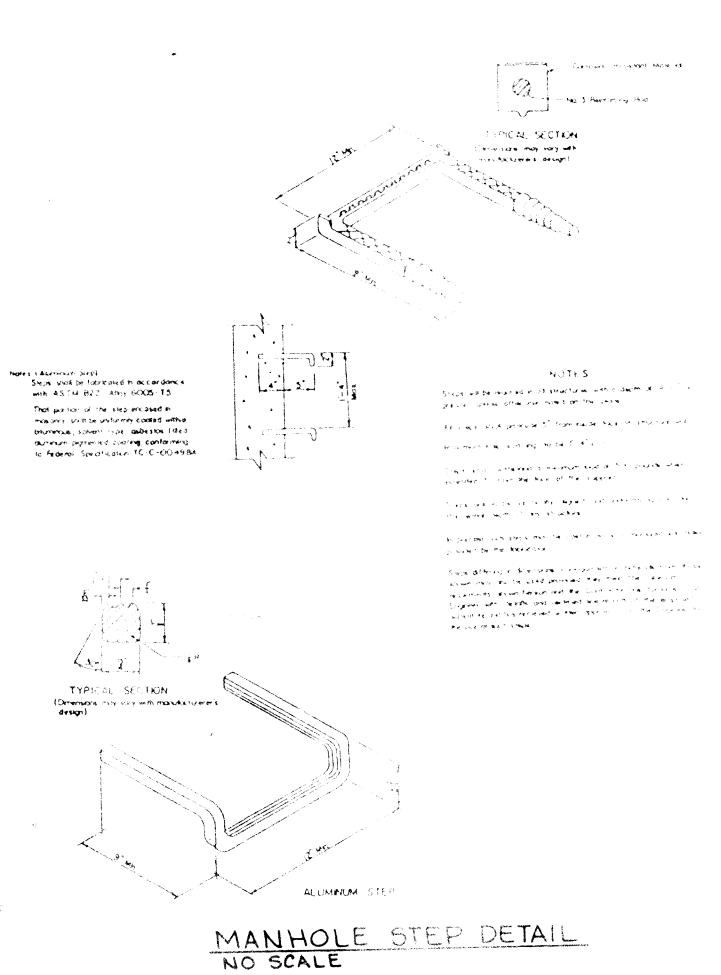
GRAVITY TRENCH DETAIL

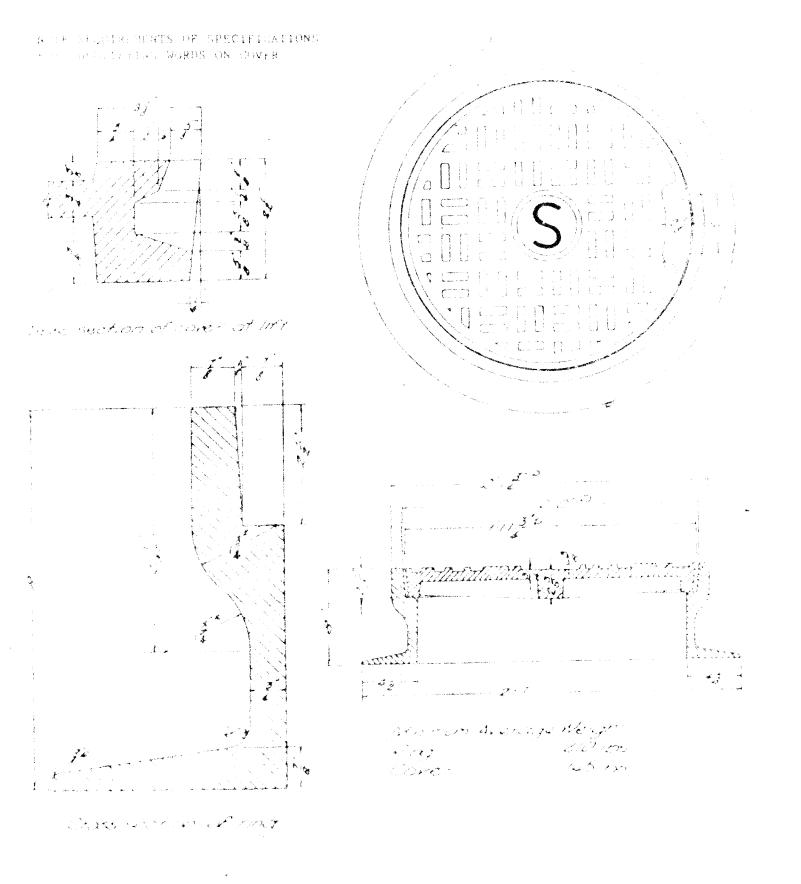


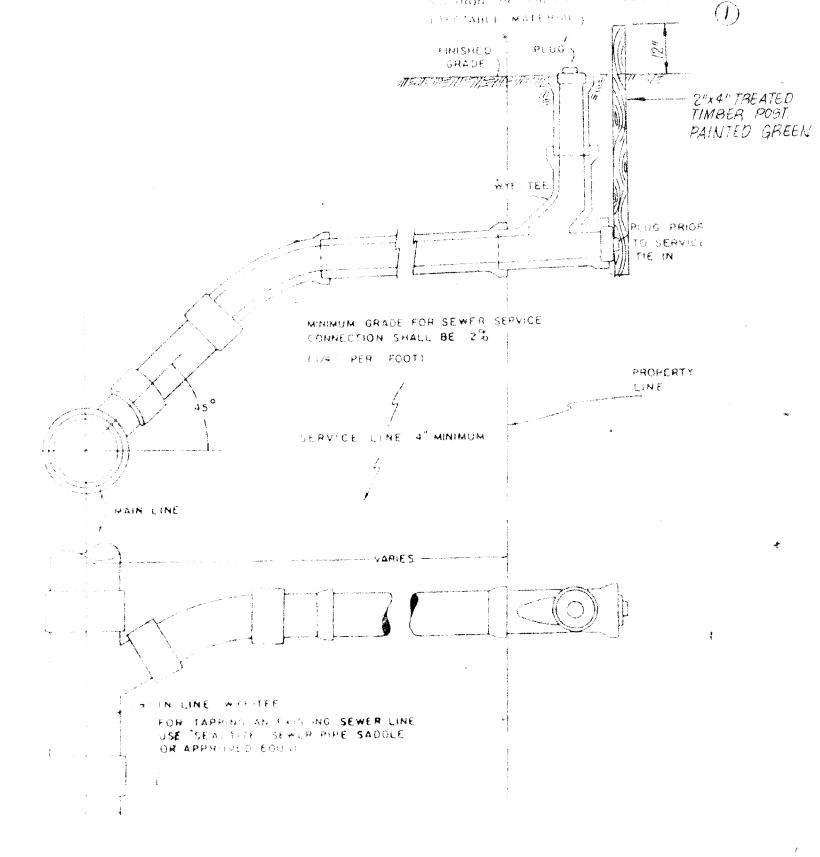
NOTE BENCH MAY BE CONC. OR BRICK AND MORTAR MANHOLE CONSTRUCTION SHALL CONFORM TO ASTM SPEC C-478

### STANDARD PRECAST MANHOLE

WHERE STUBS OR KNOCKOUTS ARE PRIVIDED FOR FUTURE CORRECTIONS RENOW SHALL BE SO FORMED

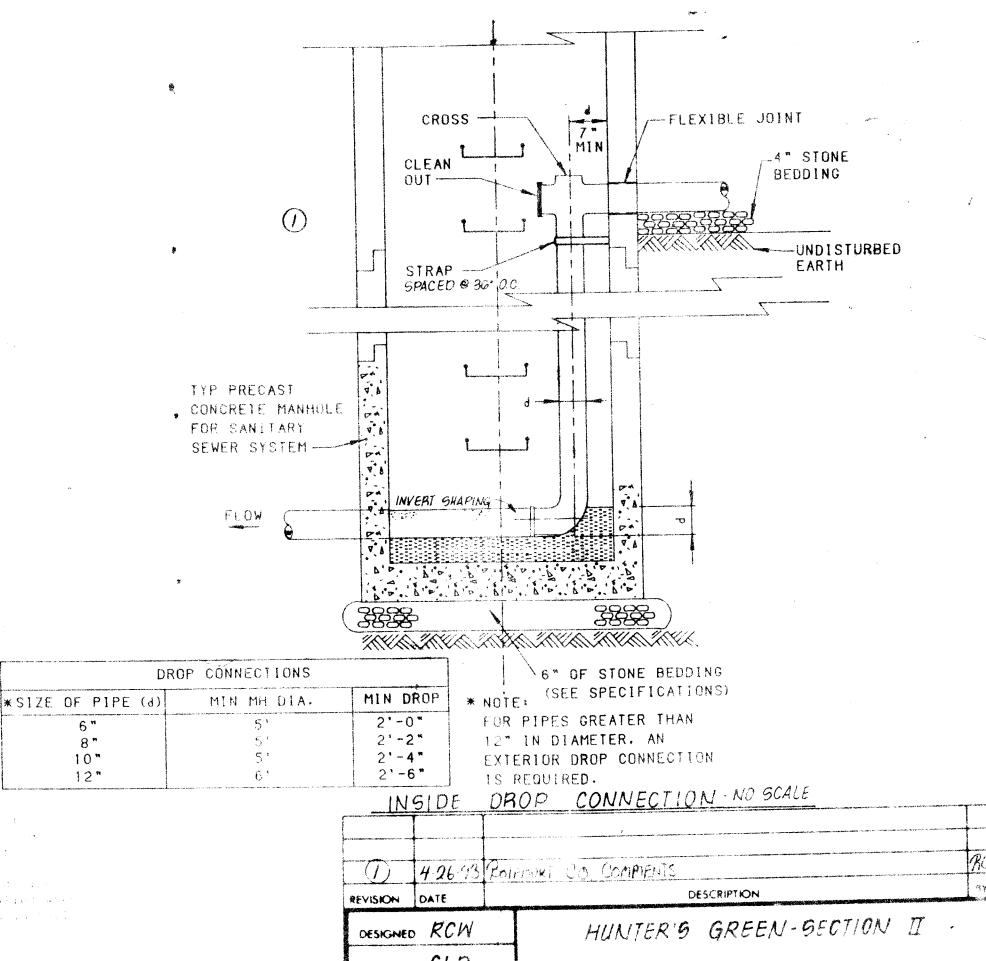






MANHOLE FRAME & COVER DETAIL

SANITARY SEWER SERVICE CONNECTION NO SCALE



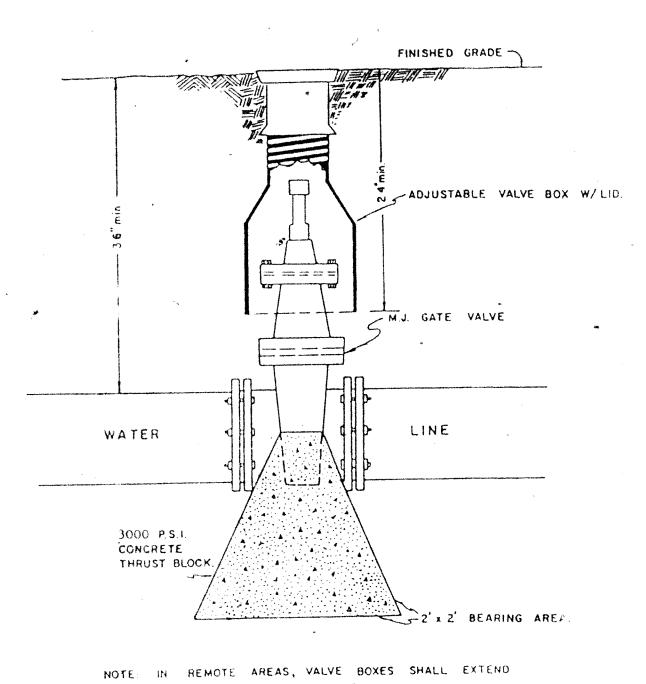
AIR TEST SKETCH

DOUGLAS R. MEREDITH, JR. No. 22942

DRAWN CLD SANITARY SEWER DETAILS CHECKED DRM APPROVED BOTETOURT COUNTY, VIRGINIA

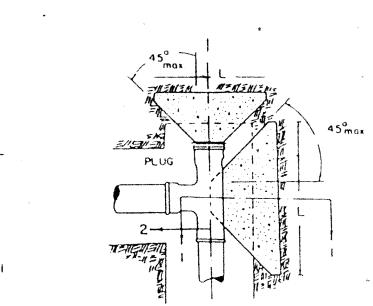
LMW. PC. SCALE NOTED

Engineering Surveying DATE MARCH 1993 SHEET



# TYPICAL GATE VALVE

SIX (6) INCHES ABOVE GRADE



SECTION- 2

FOR ALL BENDS

FOR TEE OR WYE FITTINGS

WIDEN TRENCH TO ACCOMMODATE

ANCHOR IF REQUIRED

3'min.

BEDDING

AS REQUIRED

PLUG

45°

min.

T

PIPE SIZE+	DEGREE OF BEND	BEND DIMENSIONS			VOL. CU. YD.	TEE AND PLUGS (FEET)			VOL.
		L	Н	Τ		L	Н	Т	
4"86"	90 43 22 1/2	2.50 2.00 1.50 1.50	2.50 2.25 2.00 2.00	3.01 2.60 2.52 2.50	0.24 0.55 0.10	2.00	2.25	2.50	0.15
8"	90 45 221/2	3.66 2.66 1.66	3.16 2.66 2.16 2.16	3.21 2.77 2.69 2.67	0.48 0.26 0.13 0.13	3.16	2.91	2.66	0.35
10" 812"	90	4,83 3,33 2,33	3.83 3.58 2.58 2.33	3.42 2.95 2.86 2.84	0.62 0.43 0.24 0.18	3.83	4.00	2.63	0.52

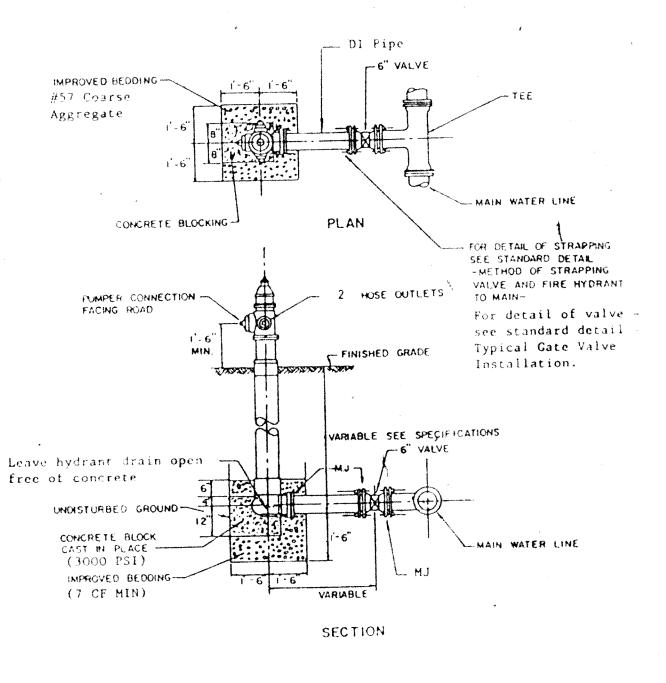
AND AT VALVES

2. USE 3000 P.S.I. CONCRETE ...

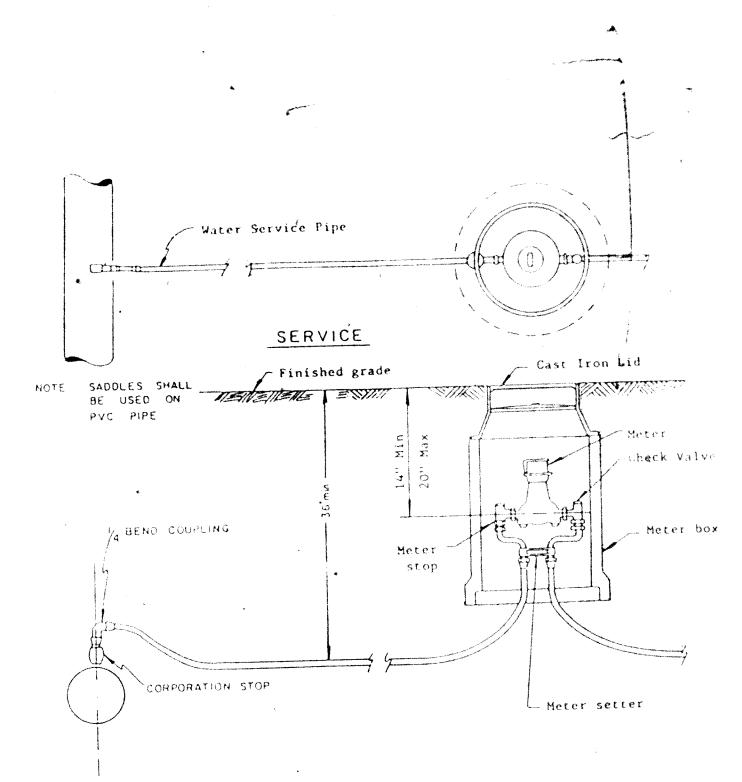
3. NO CONCRETE SHALL BE POURED ON ANY PART OF THE JOINT

SECTION-I

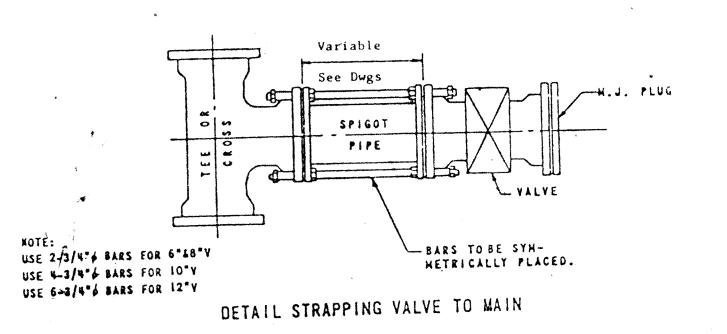
THRUST BLOCK DETAILS

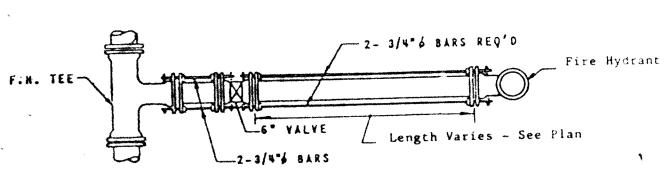


TYPICAL FIRE HYDRANT INSTALLATION



TYPICAL SERVICE CONNECTION DETAIL NO SCALE

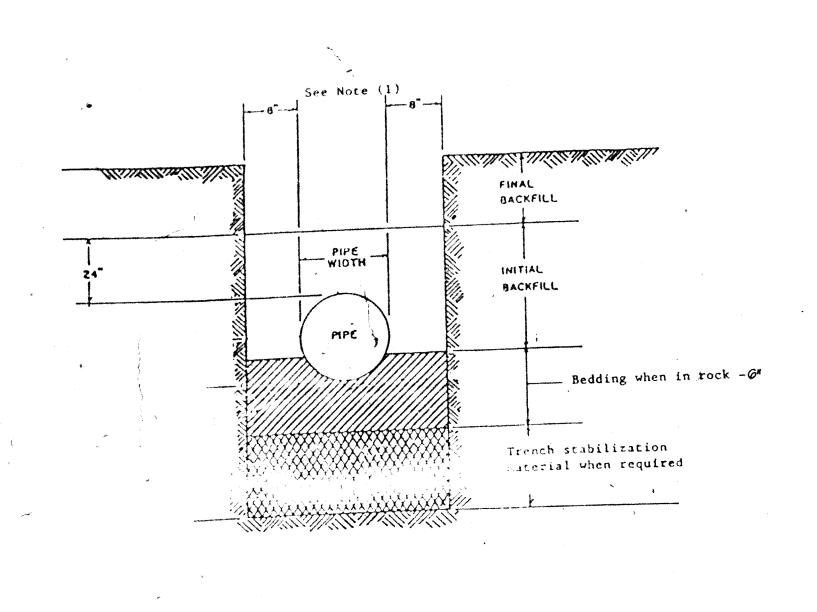




DETAIL STRAPPING FIRE HYDRANT TO MAIN

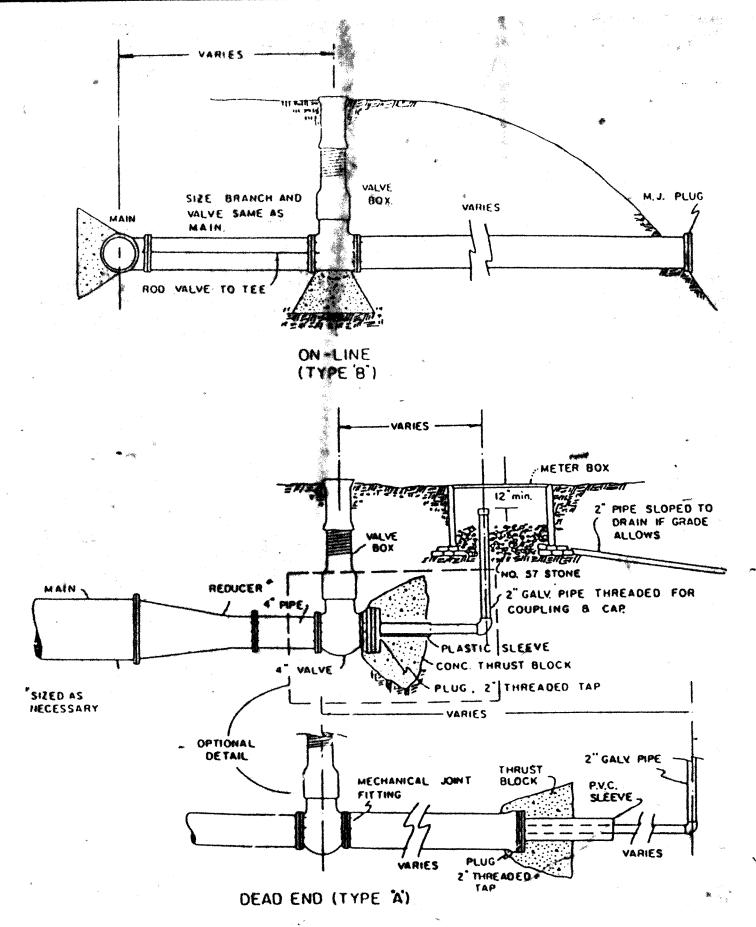
Note: See Specifications For Harnessing Requirements

### HARNESSING VALVE & FIRE HYDRANT TO MAIN

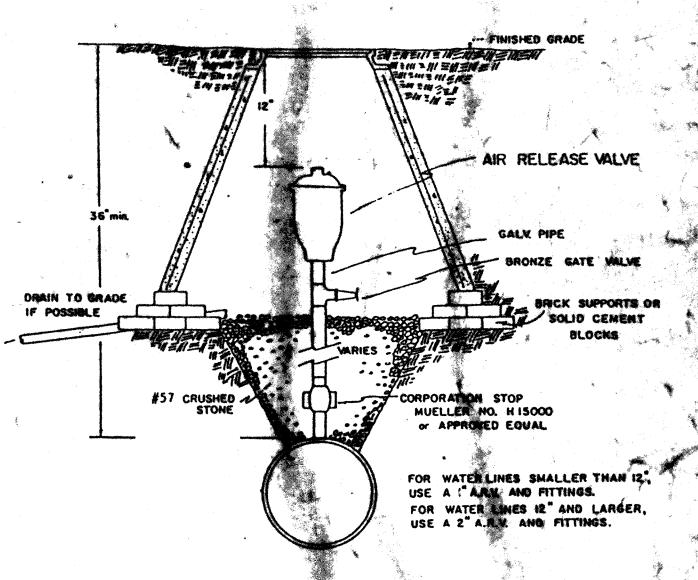


Note: 1. FOR SERVICE CONNECTIONS, TOTAL TRENCH WIDTH SHALL NOT EXCEED 4".

# TRENCH INSTALLATION FOR PRESSURE PIPE NO SCALE



## 1) TYPICAL BLOW-OFF INSTALLATION NO SCALE



A precast manhole come and cover with "Water" cast on the lid shall be used. An adequate foundation shall be installed so the water line doesn't support the manhole come.

NOTE: DURING CONSTRUCTION IF FIELD CONDITIONS NECESSITATE, THE CONTRACTOR WILL BE DIRECTED TO INSTALL AN A.R.V. AS REQUIRED BY THE ENGINEER

O AIR RELEASE VALVE

Engineering-Surveying

				<b>)</b>			
	4-26-93	VDH COMMENTS				REW	DRV
REVISION	DATE		DESCRIPTION		***************************************	87	MP.
DESIGNE	RCW	HUNTER	GREEN-	BECTIO	NII		
DRAWN	CLD	*:	i.			ي د	
CHECKED	DRM	WATER	GY STEM	DETA	169		* *
APPROVE	D .	20757044	nt COULTY	MAG	n HA		`*4
SUBMITT	ED	Butefour	RT COUNTY,	VINGI	NIA		
	L.M.	N., P.C	SCALE: NO	TED	COMM NO.	112	

