

VICINITY SKETCH  
 NOT TO SCALE

# STEEPLECHASE

## SECTION 7

### ROAD and UTILITY PLANS

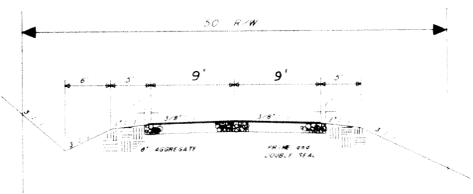
#### with Erosion and Sediment Control Measures

### Valley Magisterial District BOTETOURT COUNTY, VIRGINIA

### Owner & Developer A. R. OVERBAY

**QUALITY CONTROL**  
 Streets to be graded, paved and all structural components erected in accordance with the Virginia Department of Transportation Road and Bridge Specifications and Road Design Standards dated January 1993. All materials used shall be tested in accordance with standard practices. The developer must contact the office of the Resident Engineer, 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 CBRI/O 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 CBRI/O values be less than CBRI/O, then additional base materials 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, compaction and construction before surface is applied.  
**UTILITIES**  
 All necessary utility materials will 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, crossings and pipe lines located outside the pavement but inside the right of way will be in conformity with ASJ 8 31.0 Specifications and pipe lines with pressures less than 120 lbs. are unaffected by the above.  
 Permits will be required for all utilities within street right of way prior to acceptance into the secondary highway system.  
 Any easements granted to a utility company for placement of power, telephone, etc. must be released prior to acceptance.  
**PRIVATE ENTRANCES**  
 Standard C-6 gutter will be provided at all entrances to private lots where standard C-6 curb gutter is approved for use.  
 Permits will be required for all private entrances constructed on street right of way prior to acceptance into the secondary highway system.

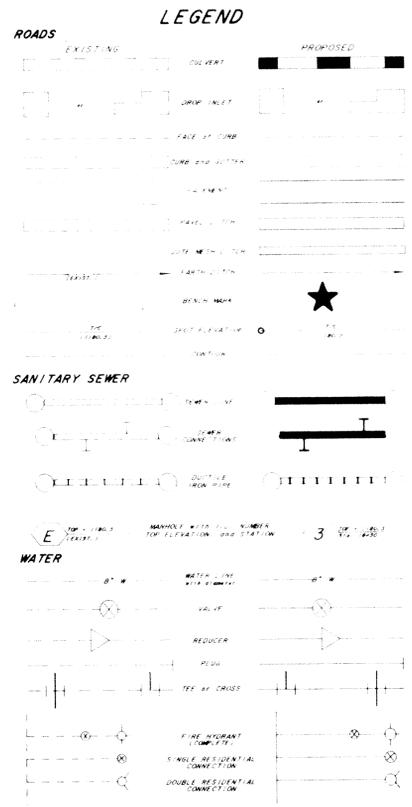
**EROSION CONTROL AND LANDSCAPING**  
 Care must be taken during construction to prevent erosion, dust and mud from dumping adjacent properties, clogging ditches, tracking public streets and otherwise creating a public or private nuisance to surrounding areas.  
 The entire construction area back of curbs and/or pavement to 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 or 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 stop, tip, rap, gravel, pave, or to do whatever is necessary to correct the problem.  
 All vegetation and overburden to be removed from shoulder to shoulder prior to the conditioning (cutting and/or re-vegetation) of the subgrade.  
**GENERAL**  
 Minimum pavement radius of 25 feet required at all street intersections.  
 While these plans have been approved, such approval does not exempt connections with existing stormwater drainage or other utilities at the time permit applications are made. This is necessary in order that the prevailing conditions be taken into consideration regarding safety accommodations such as turning lanes.  
 Standard guardrail with safety end treatments 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 in order to determine the need and limits of paved gutter and stabilization treatments. 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.  
 Contractor shall obtain entrance permit to the existing Virginia Department of Transportation right of way from Resident Engineer prior to road construction.  
 An Inspector will not be furnished except for periodic progress inspection. The above mentioned field reviews and checking or 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. As such time as all requirements have been met for acceptance, another inspection will be made to determine 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.  
 Contractor shall verify location and elevation of all underground utilities shown on the plans. In areas of construction prior to starting work, Contractor shall immediately if location or elevation is different from that shown on the plans. If there appears to be a conflict, upon discovery of any utility not shown on this plan, call "Miss Utility" of Central Virginia at 1-800-352-7001.  
 Approval of these plans will be based on specifications and standards in effect at the time of approval and will be subject to future revisions, of the Specifications and Standards.



TYPICAL STREET SECTION  
 NOT TO SCALE

**SHEET INDEX**

SHEET 1	COVER SHEET
SHEET 2	SECTION 7 PLAN & PROFILE SHEET
SHEET 3	SANITARY SEWER TYPICAL SHEET
SHEET 4	WATER DETAIL SHEET
SHEET 5	UTILITY SPECIFICATIONS
SHEET 6	EROSION & SEDIMENT CONTROL DETAILS



**CONSTRUCTION NOTES**

- Contractor must secure all permits prior to commencing work.
- County Engineer must be notified by contractor 48 hours prior to commencing.
- Locations of all underground utilities are approximate and shall be verified prior to any construction.
- Contractor is responsible for locating and uncovering all manholes and valve boxes after surface treatment of roads and to adjust them to final road grades.
- Minimum cover above water line shall be 42 inches.
- PVC plastic sewer pipe shall be ASTM D-3034 SDR 35 (minimum).
- Outlet for sewer pipe shall be ANSI/AWWA C100, Class 32 minimum.
- PVC plastic water line shall be AWWA C900, Table 2, Class 150 minimum.
- Outlet for water line shall be ANSI/AWWA C151, Class 52 up to 12" and Class 51 for larger pipe.
- An Erosion and Sediment Control Plan has been approved and is hereby made part of these plans. The contractor is responsible for obtaining and adhering to the provisions therein, which shall include inspection and repairs, if necessary, periodically and after every erodible rainfall.
- 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.
- All erosion and sediment control practices shall be in accordance with the Virginia Erosion and Sediment Control Handbook, Second Edition, 1980, (VESH).



- MINIMUM STANDARDS FOR CONTROLLING EROSION AND SEDIMENTATION**
- MS-1. Stabilization of Denuded Areas**  
 Permanent 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 windup impact and flowing water. Applicable practices include vegetative establishment, mulching, and the early application of gravel, base or geog to be paved.
  - MS-2. Stabilization of Soil Stockpiles**  
 During construction of the project, soil stockpiles shall be stabilized or protected with sediment trapping measures. The applicant is responsible for the temporary or permanent stabilization of all stockpiles on site as well as soil intentionally transported from the project site.
  - MS-3. Permanent Vegetation**  
 A permanent vegetative cover shall be established on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be considered established 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 last.
  - MS-4. Timing and Stabilization of Sediment Trapping Measures**  
 Sediment basins and traps, perimeter dikes, sediment curtains and other measures used to trap sediment shall be constructed as a first step in any land-disturbing activity and shall be made functional before up slope and disturbance takes place.
  - MS-5. Stabilization of Earthen Structures**  
 Stabilization measures shall be applied to earthen structures such as dams, dikes and diversions immediately after installation.
  - MS-6. Sediment Basins**  
 Surface runoff from disturbed areas that is comprised of less than 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.
  - MS-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 shall be reworked within one year of permanent stabilization. Slopes shall be provided with additional slope stabilizing measures until the problem is corrected.  
 A. 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.
  - MS-8. Concentrated Runoff Flow Down Cut or Fill Slopes**  
 Concentrated runoff shall not flow down cut or fill slopes unless confined within an adequate temporary or permanent channel, flume or slope drain structure.
  - MS-9. Water Seeps From a Slope Face**  
 Whenever water seeps from a slope face, adequate drainage or other protection shall be provided.
  - MS-10. Storm Sewer Inlet Protection**  
 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.
  - MS-11. Stabilization of Outlets**  
 Before newly constructed stormwater conveyance channels are made operational, adequate outlet protection and any required temporary or permanent channels shall be installed in both the conveyance channel and receiving channel.
  - MS-12. Work in Live Watercourses**  
 When work in 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 fills may be used for these structures if armored by nonerodible cover materials.
  - MS-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.
  - MS-14. Applicable Regulations**  
 All applicable federal, state and local regulations pertaining to working in or crossing live watercourses shall be met.
  - MS-15. Stabilization of Bed and Banks**  
 The bed and banks of a watercourse shall be stabilized immediately after work in the watercourse is completed.
  - MS-16. Underground Utility Construction**  
 Underground utility lines shall be installed in accordance with the following standards in addition to other applicable criteria:  
 a. No more than 500 linear feet of trench may be opened at one time.  
 b. Excavated material shall be placed on the up slope of trenches.  
 c. Effluent from dewatering operations shall be filtered or passed through an approved sediment control device, or basin, and discharged in a manner that does not adversely affect flowing streams or off-site property.
  - MS-17. Construction Access Routes**  
 Where construction vehicle access routes intersect paved public roads, provisions shall be made to minimize the potential of sediment or debris tracking onto a public road surface. The road shall be cleaned thoroughly of the wheel at each day. Sediment shall be removed from the roads by sweeping 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.
  - MS-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 administrator.
  - MS-19. Properties and Waterways Downstream from Development**  
 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 and plan.

Not for Construction

BS REVIEW SET

KES VERIFY

SHANKS ASSOCIATES, P.C. - ENGINEERS - SURVEYORS - PLANNERS

313 LUCK AVENUE ROANOKE, VIRGINIA 24011 (703) 343-6665

STEEPLECHASE SECTION - 7

COVER SHEET

REVISION DESCRIPTION	DATE

DATE: 04/01/94  
 DRAWN BY: CEG  
 DESIGNED BY: FOS  
 CHECKED BY: FOS  
 SCALE: As Noted

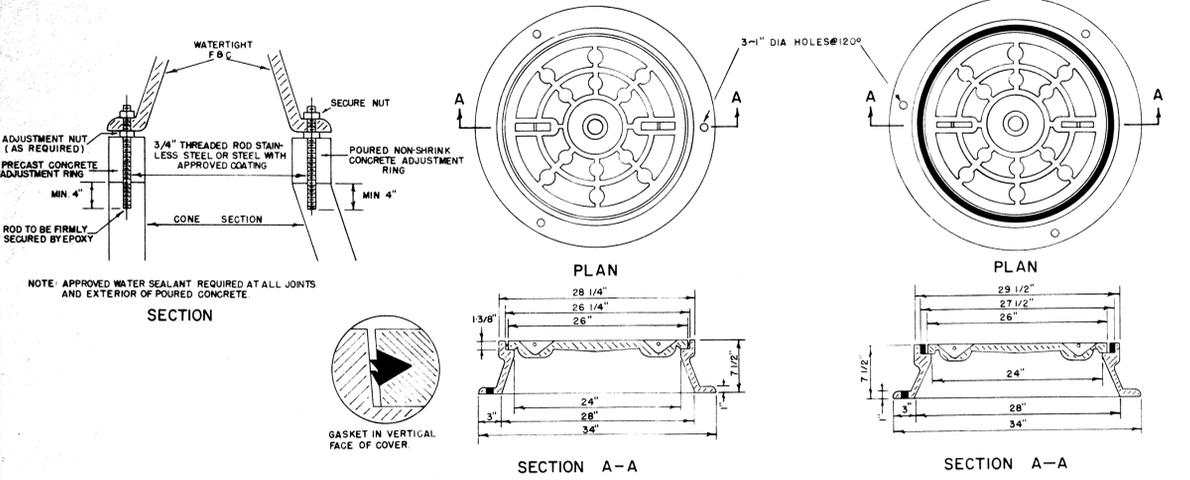
SHEET NUMBER  
 1 OF 6  
 JOB NUMBER  
 694009



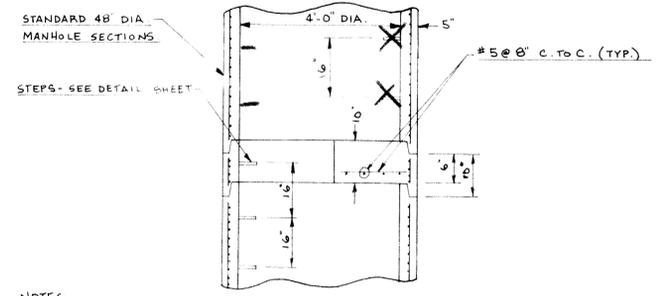
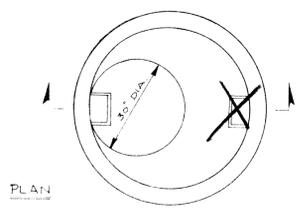
MH-RCR-3000 EC    MH-RCR-3000 W  
 300 lbs. FRAME    262 lbs. FRAME  
 170 lbs. COVER    170 lbs. COVER  
 470 lbs. TOTAL \*    432 lbs. TOTAL \*  
 \* MINIMUM AVERAGE WEIGHTS

**MANHOLE FRAME AND COVER**

DEWEY BROTHERS, INC. MH-RCR-3000 EC OR EQUIVALENT  
 DEWEY BROTHERS, INC. MH-RCR-3000 W OR EQUIVALENT  
 (where watertight specified)

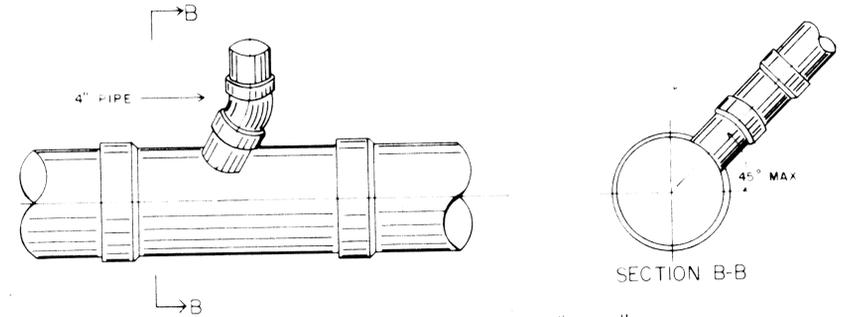


NOTE: APPROVED WATER SEALANT REQUIRED AT ALL JOINTS AND EXTERIOR OF Poured CONCRETE.

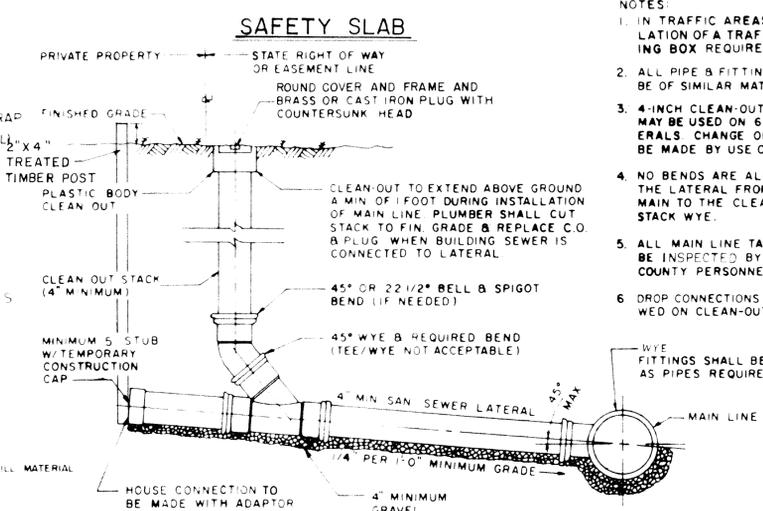


NOTES:  
 1) 4000 PSI CONCRETE  
 2) GRADE 60 STEEL  
 3) SAFETY SLAB TO BE USED PER CONTRACT DOCUMENTS

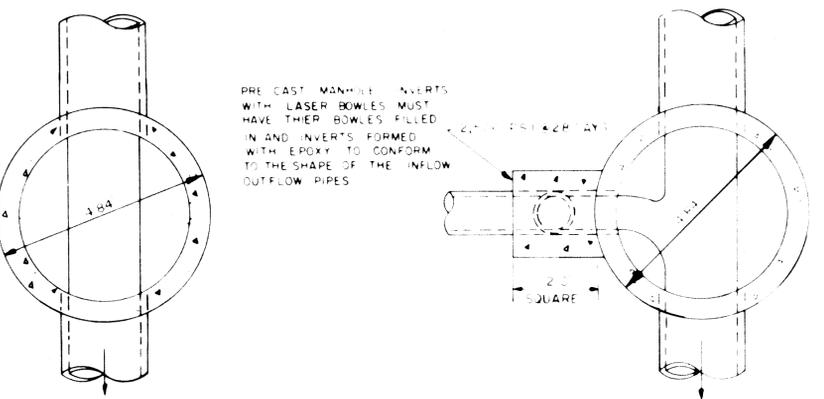
NOTES:  
 1. IN TRAFFIC AREAS INSTALLATION OF A TRAFFIC BEARING BOX REQUIRED.  
 2. ALL PIPE & FITTINGS SHALL BE OF SIMILAR MATERIAL.  
 3. 4-INCH CLEAN-OUT STACKS MAY BE USED ON 6-INCH LATERALS. CHANGE OF SIZE TO BE MADE BY USE OF 6"x4" WYE.  
 4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO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



SERVICE CONNECTION "WYE"

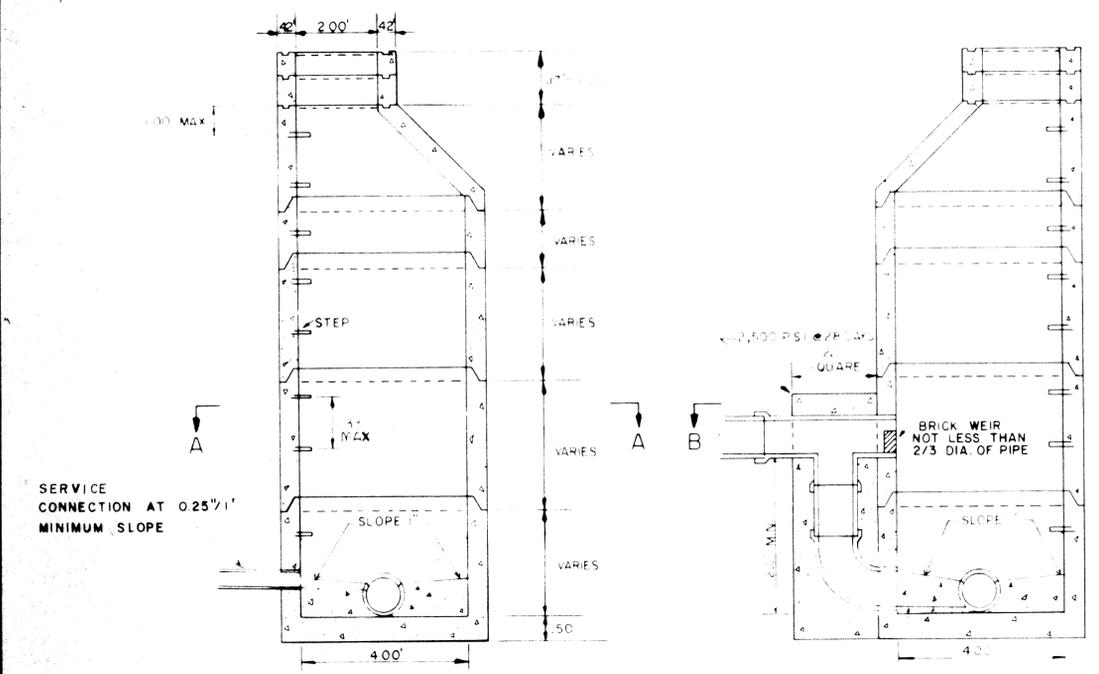


SANITARY SEWER LATERAL  
 SCALE 1"=1'-0"



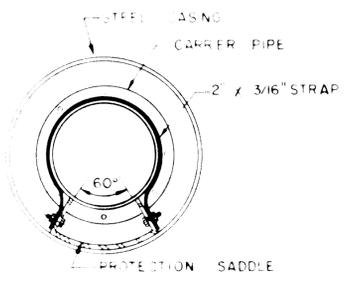
SECTION A-A STANDARD MANHOLE

SECTION B-B DROP MANHOLE

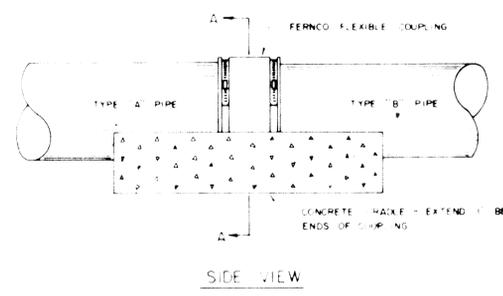


STANDARD MANHOLE

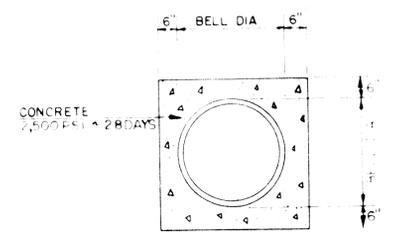
DROP MANHOLE



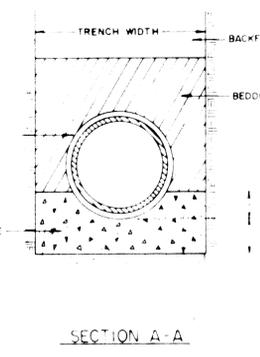
BORING AND CASING



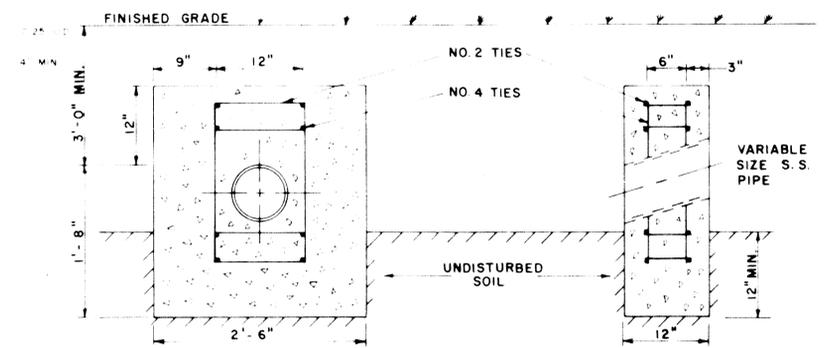
JOINING DISSIMILAR PIPE



CONCRETE ENCASED PIPE



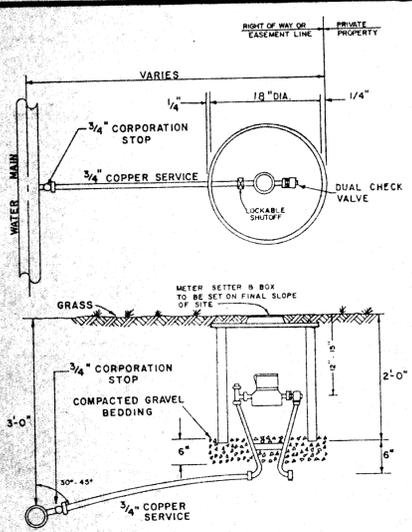
STONE CRADLE



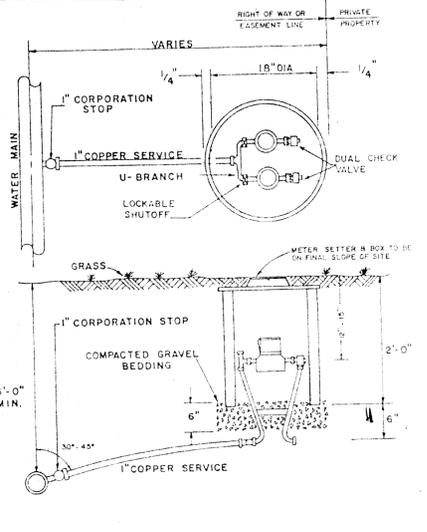
ANCHOR BLOCK  
 SCALE 1"=1'-0"

*INSIDE DROP DETAIL*  
*SS REIN. PER SPEC*

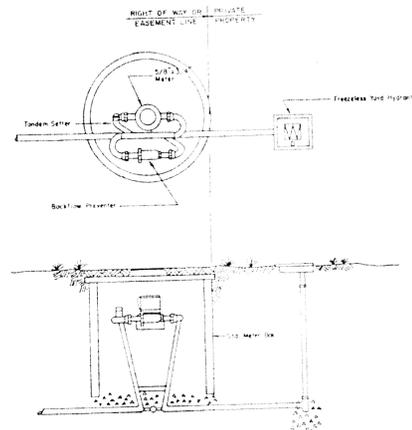
**SANITARY SEWER DETAILS**  
**SHANKS ASSOCIATES, P.C.**  
 ENGINEERS · SURVEYORS · PLANNERS  
 313 LUCK AVENUE ROANOKE, VIRGINIA 24011  
 (703) 343-6685



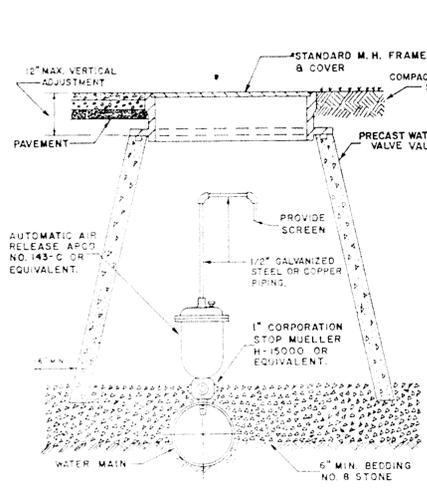
**SINGLE RESIDENTIAL WATER SERVICE**



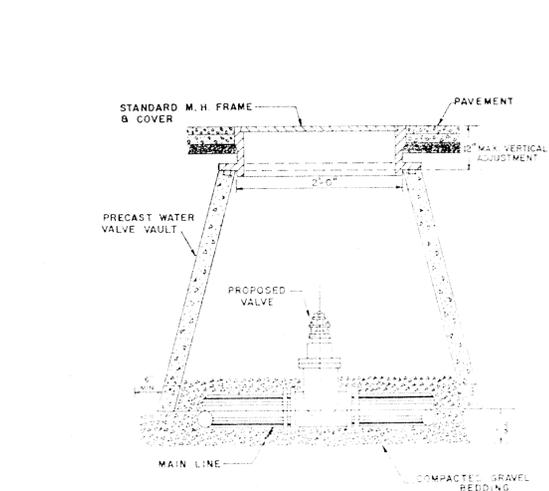
**DOUBLE RESIDENTIAL WATER SERVICE**



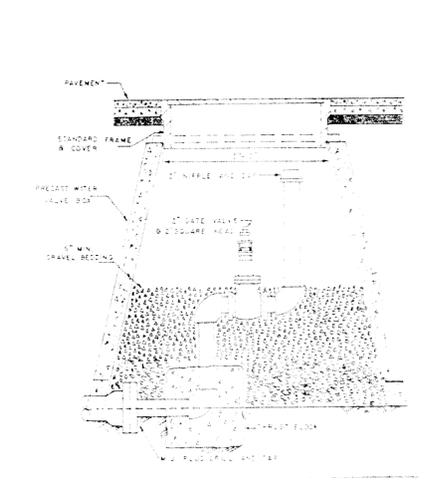
**TYPICAL SPRINKLER SERVICE**



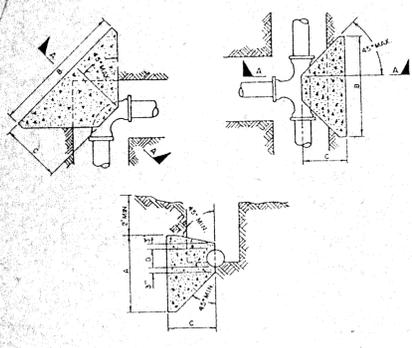
**AUTOMATIC AIR RELEASE ASSEMBLY**



**WATER LINE VALVE INSTALLATION**



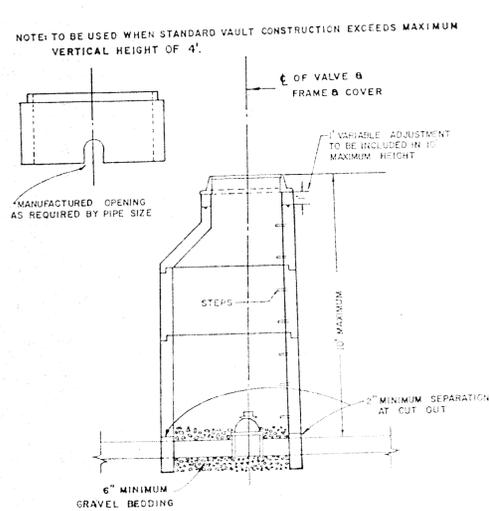
**PERMANENT END OF LINE**



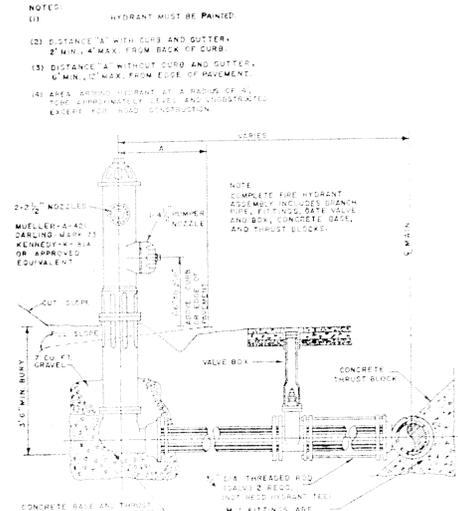
Pipe Size	90° Bend		45° Bend		22.5° Bend	
	A	B	A	B	A	B
1/2"	1.0	1.0	1.0	1.0	1.0	1.0
3/4"	1.2	1.2	1.2	1.2	1.2	1.2
1"	1.4	1.4	1.4	1.4	1.4	1.4
1 1/4"	1.7	1.7	1.7	1.7	1.7	1.7
1 1/2"	2.0	2.0	2.0	2.0	2.0	2.0
2"	2.5	2.5	2.5	2.5	2.5	2.5
2 1/2"	3.0	3.0	3.0	3.0	3.0	3.0
3"	3.5	3.5	3.5	3.5	3.5	3.5
4"	4.5	4.5	4.5	4.5	4.5	4.5
6"	7.0	7.0	7.0	7.0	7.0	7.0

NOTES:  
 1. The above noted dimensions are minimum based on concrete anchors extending to undisturbed soil. Water pressure not to exceed 100 psi and minimum soil bearing capacity of 2,500 psi (permissible) must be bearing or excess pressure will require additional design.  
 2. Concrete shall not be poured on joints or bolts.  
 3. Concrete to be minimum 4,000 psi or 28 day compressive strength.

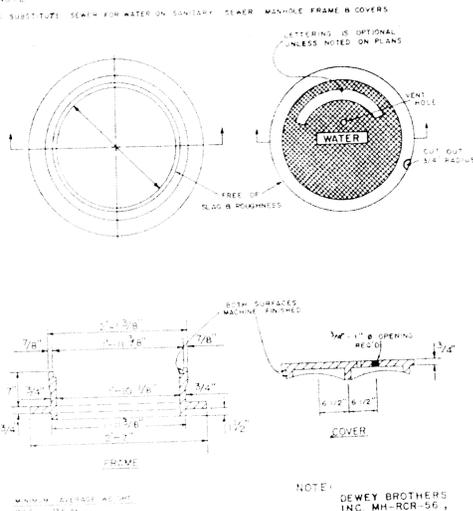
**THRUST BLOCK FOR HORIZONTAL & LOWER VERTICAL BENDS**



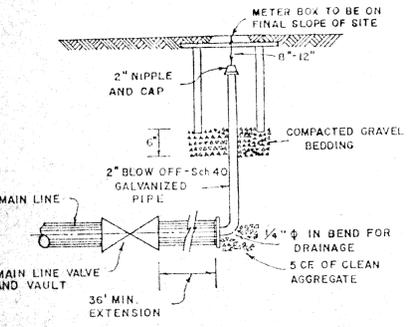
**ALTERNATE VALVE VAULT (MANHOLE)**



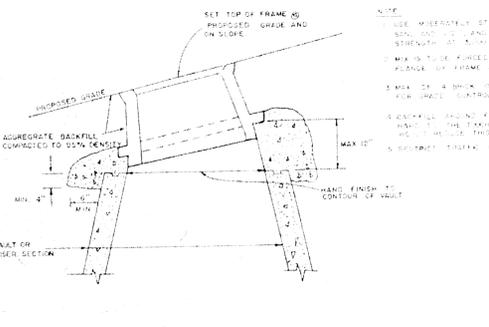
**FIRE HYDRANT SETTING**



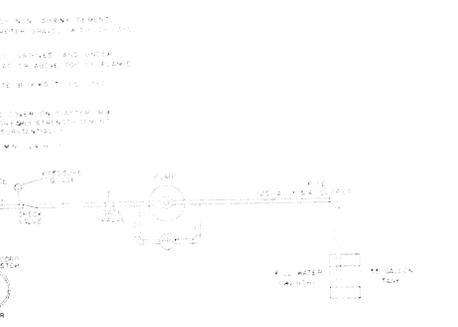
**MANHOLE FRAME AND COVER**



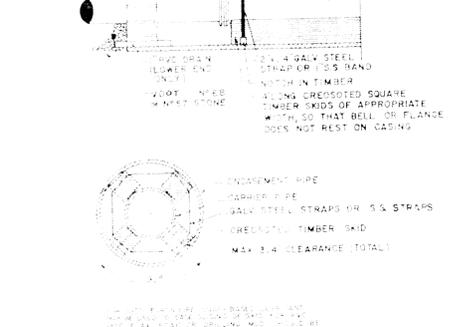
**BLOW OFF ASSEMBLY FOR MAIN LINE TEMPORARY TERMINATION**



**MANHOLE FRAME & COVER ADJUSTMENT**



**TYPICAL WATER PRESSURE TEST RIG**



**PIPE SUPPORT IN CASING PIPE**

VAULT & WATER STANDARDS FOR CONCRETE  
 1. Vaults, manhole boxes, frames, covers and grade curbs shall be placed, constructed and installed in accordance with Virginia Department of Transportation, Road and Bridge Specifications, Section 501.  
 2. Manhole base and riser sections construction shall be vertical with maximum 1" of 4" tilt.  
 3. A maximum of 2 construction grade joints or maximum of 2" of grade rings and frame and cover adjustment are allowable.  
 4. Final adjustment of frame and cover shall be in accordance to frame and cover adjustment detail and 1/2" gap shall be provided with maximum of 4 inches of concrete bedding for grade control. Frame and cover are to be set at least 1/4" above final grade of pavement and 1/2" above and 1/4" above final grade of street grade. Manhole frames and covers are not to be set at final grade valley bottom.  
 5. Joints and operation of manhole units shall be made watertight by using gaskets, sealants, and gaskets of material. The concrete surface shall be cleaned prior to use of gaskets.  
 6. Frame and Covers  
 a. Dewey Brothers Inc. MH-RCR-56  
 b. Approved equals.  
 7. All light holes, openings around pipes and shall be filled from inside and outside to final grade of pavement.  
 8. All units used in manholes and vaults construction shall be securely connected to surrounding pavement, manhole or vault by using approved method.  
 9. Give around manhole at a 1/4" of 4" slope, 1/4" of 4" slope and 1/4" of 4" slope to final grade of pavement.

*No 35 Railroad*

WATER DETAILS  
 STEEPCOURSE SET 7  
 JOB # 694009  
 DATE 4-7-94  
 SHEET 4 of 6

GENERAL CONDITIONS

The Contractor shall be responsible for notifying the County of any work on this project. All work shall be subject to inspection by County inspectors and design engineer. The Contractor shall obtain all necessary permits.

The Contractor shall include in applicable bid price the cost of locating and uncovering all sewer manholes and all valve boxes after surface treatment of roads and adjusting them to final road grades, if necessary. The Contractor shall be responsible for cleaning out sewer lines for final inspection, if necessary.

The location of existing utilities across or along the line of proposed work is not necessarily shown on the plans and where shown, is approximate. The Contractor shall, on his own initiative and at his extra cost, locate all existing 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 call "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' 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 operations under this contract shall be repaired or replaced by the Contractor at his own expense.

All trenches within existing or future Virginia Department of Transportation right-of-way shall be compacted in six inch layers.

Minimum cover over top of pipe shall be three (3) feet.

The Contractor shall notify the County of any field revisions or corrections to the approved plans prior to such construction.

All lines to be staked prior to construction.

Contractor to coordinate with engineer to provide As-Built Plans.

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.

EROSION CONTROL

Utility construction is subject to all provisions set forth in the approved Erosion and Sediment Control Plan. The Contractor is responsible for obtaining a copy of the plan, including the Narrative Report prior to construction.

Throughout construction, temporary measures shall control erosion and minimize siltation 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 may cause the owner to take actions necessary to accommodate the requirements of the County. The cost of such action, including engineering fees, will be deducted from monies due the Contractor for other work.

EXCAVATION, STABILIZATION & BEDDING

TRENCHING

The Contractor shall comply with the latest revisions of the Virginia Occupational Safety and Health Commission's Safety and Health Code Construction Industry as adopted by the Safety and Health Codes Commission of Virginia.

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

The Contractor shall excavate all materials encountered to the lines and grades indicated on 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 removed promptly.

Trenches shall be excavated in straight lines and shall be accurately graded in order to establish a true elevation for the invert of the pipe.

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 practical.

Excavation for structures 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 rocks, boulders, and large stones shall be removed to provide six (6) inches of soil above or improved bedding on all sides of the pipe, including the bottom, and on all sides if necessary. When an unacceptable substrate material is encountered 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 to 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, each to rock, where bedding shall be six inches deep. The bedding shall be shaped so that the bottom quadrant of the pipe lies on the bed.

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

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 #2 coarse aggregate as specified in Section 203 of the 1997 Virginia Department of Transportation (VDOT) Road and Bridge Specifications.

Whenever 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 to allow for the compacted bedding material.

COMPACTED BEDDING MATERIAL

Bedding material shall be #57 coarse aggregate, or #25 or #26 crusher run aggregate, such as specified in Section 203 of the 1997 VDOT Road and Bridge Specifications.

PIPE, JOINTS, FITTINGS AND APPURTENANCES

GENERAL

All materials and appurtenances for this work new, top quality, and shall be furnished, delivered, erected, connected, and finished in every detail as specified or indicated. All materials found defective, regardless of the circumstances, shall be replaced with new material at the expense of the Contractor.

The materials specified shall comply with the latest revisions of the applicable American Society of Testing Materials (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), and/or the Virginia Department of Transportation (VDOT).

OPTIONAL PIPE SELECTIONS

The Contractor shall install only one (1) type of pipe between structures. Where existing pipe is to be replaced or extended, the same type of pipe is to be installed. All pipe is to be installed in strict accordance with the recommendations of the manufacturer.

Water lines shall be either PVC AWWA C-900 OR 18 (min.) or ductile iron ANSI/AWWA C151, Class 52 for 12" diameter or smaller and Class 51 for 16" diameter and larger, at the Contractor's option, unless specified or indicated otherwise.

Sanitary sewer lines shall be either PVC ASTM D-3034 F40 SDR 35 Concrete ASTM C-14, Class 2, or Ductile Iron ANSI/AWWA C151, Class 52 (min.), at the Contractor's option, unless specified or indicated otherwise.

JOINTS, COUPLINGS, AND APPURTENANCES

PVC pipes and fittings shall be bell and spigot joints. The bell and spigot joints shall be installed with elastomeric gaskets conforming to ASTM D 3212. The joints shall be in strict accordance with the recommendation of the pipe manufacturer.

Ductile iron pipe and fittings shall be either mechanical or bell and spigot type joints as specified or indicated. Fittings shall conform with AWWA C 110/ANSI 21.10. Joints shall be made with a single water-tight rubber gasket manufactured in accordance with AWWA C 111/ANSI 21.10. Joints shall be in strict accordance with the recommendation of the pipe manufacturer. The pipe and fittings shall be gulluminous coated and cement lined in accordance with AWWA C 110/ANSI 21.10.

Gate valves shall be iron-body, bronze-mounted, double-flange, centrifugal, and hand operated. Overhead mounted, hand-cranked valves 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. 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 operate by turning clockwise.

Sanitary sewer service connections shall include all four (4) inch diameter pipe as specified or indicated.

All other materials and appurtenances are to be in accordance with the details shown on the plans and in strict accordance with the recommendation of the manufacturer.

SEPARATION OF POTABLE 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 edge of the sewer; (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 and (3) The sewer manhole shall be of water-tight construction and tested in place.

CROSSING

Water lines crossing sewers shall have a vertical separation 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) water lines passing under sewers shall be protected by providing: (a) between the bottom of the sewer pipe and the top of the water line and; (b) adequate structural support for the sewer to prevent excessive deflection of the joints and the settling and breaking of the water line and; (c) the joints for the water line be spaced at equal distance from the crossing point of the sewer.

The contractor shall comply with State Water Works Regulations, Section 12.05.03 where lines cross.

WATER MAIN INSTALLATION

The water mains shall be laid and maintained at the required lines and grades and fittings and valves at the required locations.

Deflection of the line of pipe, either in the vertical or horizontal plane, shall not exceed either AWWA standards or the recommendations of the manufacturer.

All plugs, except mechanical joint plugs used at connection points for future lines, all test lines, all bends, and all fire hydrant assemblies shall be supported by thrust blocking as indicated. Valves or connections for future lines shall be anchored in the water main with rods.

DISINFECTING OF WATER MAINS

All pipe shall be disinfected, tested, and flushed in accordance with AWWA Standard C600 latest revision.

Chemicals and equipment for disinfection, and necessary testing and flushing of the water main.

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

The water main at valved off section that has been completed and tested shall be disinfected, tested, and flushed.

After testing and before final inspection of the completed system, water mains and service laterals shall be flushed and disinfected in accordance with AWWA Specification C600, latest revision. The test water shall be pumped at a flow velocity in excess of 2.5 feet per second.

Disinfection as described in AWWA C601 shall be used. Five (5) gram sodium hypochlorite tablets with 3.25% available chlorine shall be used. One (1) tablet shall be placed at the top of an adhesive such as Permutest No. 1, or equal. The following number of tablets shall be placed in the pipe section to be used for an initial dose of 25 mg/l. applicable: Pipe diameter: 18"-20" ft. pipe section: 1 tablet; 24"-30" ft. pipe section: 2 tablets; 36"-42" ft. pipe section: 3 tablets; 48"-54" ft. pipe section: 4 tablets.

Use of the continuous feed or slug method of disinfecting may only be used to finish or finish a water pipe after the slug method has been used. During the finishing process, the rate of filling must result in a velocity less than 1 ft./sec.

The disinfection solution shall remain in the pipe lines for twenty-four (24) hours, after which time a chlorine residual of 10 ppm at all parts of the pipe shall be required.

Final testing and before final inspection of the completed system, water mains and service laterals shall be flushed and disinfected in accordance with AWWA Specification C600, latest revision. The test water shall be pumped at a flow velocity in excess of 2.5 feet per second.

SANITARY SEWER INSTALLATION

The installation of the sanitary sewer system shall begin at the downstream manhole and proceed upstream. The downstream manhole shall be completed, tested, and approved prior to laying sanitary sewer 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 on the plans.

The horizontal alignment of the pipe shall be maintained by a team of two (2) men: one (1) man at the top of the downstream manhole. The vertical alignment shall be maintained by an adjustable level (see note) mounted at the invert of the downstream manhole with (targets) placed at the bell end of the pipe being laid.

DETECTION TAPE SHALL BE PLACED 18" - 24" ABOVE ALL SEWER MAINS & LATERALS

JOINTING

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 joining 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 at a time.

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 either a flexible bell adapter or pipe seal gasket.

BACKFILLING

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 Transportation Officials (AASHTO), and Virginia Department of Transportation (VDOT) standards.

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

The Contractor shall comply with all Local and State erosion and sediment control ordinances and requirements and all approved erosion 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 frozen.

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 water.

JOB CONDITIONS

Prior to placing backfill, all organic material rubbish, debris, or other unsuitable material within the trench shall be removed. All concrete forms shall be removed. All shoring and sheeting shall be removed or cut off at the elevation stipulated by the Engineer.

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

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 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 haunching.

Backfill shall not be placed or compacted against cast-in-place concrete until it has obtained sufficient strength to withstand the backfill 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 no additional expense.

BACKFILL MATERIAL

Materials for backfill shall be approved excavated material or approved substitute material within the limits of the approved plans. Material shall be approved by a Soils Engineer.

Material shall consist of durable natural granular material or granular aggregates free of organic material, loam, debris, stones, cinders, clumps of soil, or other deleterious matter. Material which cannot be thoroughly compacted. Backfilling shall be done in such a way to prevent dropping of material directly on the pipe. The backfill shall be placed in layers not greater than 13 feet and shall be deposited in horizontal layers. No particles with a diameter greater than two (2) inches shall be placed in the fill. Backfill shall be placed in layers not greater than 12 inches bedding to a point two (2) feet over the top of 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 (6) inches shall be considered unsuitable.

Excavated material shall not be used as backfill material. Frozen material shall not be placed in the trench, nor shall approved backfill be placed upon frozen material.

Aggregate backfill material, where indicated for trenches below paved or surface treated streets or parking areas shall be VDOT standard size #25, unless otherwise 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 lifts.

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 upgrade shall be free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical tampers.

Final backfill in grassed areas shall be mounted 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 upgrade shall be free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical tampers.

Final backfill in paved areas shall be mounted three (3) inches above surrounding ground to allow for settlement.

BACKFILL BELOW GRADED 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 upgrade shall be free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical tampers.

Final backfill in paved areas shall be mounted three (3) inches above surrounding ground to allow for settlement.

COMPACTION TESTS

Backfill shall be moistened or perated 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 dry density as determined by ASTM D693:

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 paved areas or walks, each layer shall be compacted 95 percent.

Backfill shall be tested in accordance with ASTM D698 or ASTM D1557 and D2926.

Backfill that fails to meet the minimum percentages specified shall be reworked or replaced and retested all of the Contractor's expense.

RESTORATION

The Contractor shall at his own expense, clean all refuse, rubbish, scrap material, and debris caused by his operations such that at all times the site shall not be a source of litter and shall present a neat, orderly, and workmanlike appearance immediately following the backfilling of the trench. The Contractor shall remove or otherwise clean the surface of paved streets. All surplus material shall be removed and disposed of.

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

Developed property, such as walks, steps, mailboxes, driveways, curbs and the like, disturbed by the work, shall be restored or replaced to their original condition. Ditches shall be restored to their original shape and slope. All disturbed areas not covered by pavement or structures shall be graded by construction activity shall be verified, limed, and seeded in accordance with 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 at low pressure air testing. Testing shall be made only in the presence of the City Engineer and the Engineer.

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 be filled until two (2) plugs (one tamped 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 psi, 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 psi. The pipe line shall be filled until a constant internal pressure shall be maintained at 3.5 psi or slightly above for a five minute stabilization period, after which time the internal pressure will be adjusted to 3.5 psi. The air supply shall be 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 test is less than that specified, the test shall be repeated. The sewer segment shall have passed. For a more detailed description of the air test method, refer to ASTM designation C-828, current revision. No 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

LENGTH OF TEST SEGMENT	PIPE DIAMETER	STARTING TEST PRESSURE (PSI)	ENDING TEST PRESSURE (PSI)
25	0.10	0.18	1.08
30	0.20	0.35	1.35
40	0.30	0.52	1.62
100	0.40	0.70	2.10
125	0.50	1.00	2.50
150	0.59	1.46	2.96
175	0.75	2.03	3.53
200	1.09	2.21	3.30
225	1.29	2.38	3.67
250	1.39	2.56	3.95
275	1.59	3.14	4.53
300	1.59	3.32	4.81
350	2.19	3.90	5.39
400	2.38	4.17	5.66

TEST FOR DISPLACEMENTS 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 MIRROR. POOR ALIGNMENT, DISPLACED PIPE, OR OTHER DEFECTS SHALL BE REMEDIATED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

Manholes shall be tested by infiltration 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 CONTINUOUS RECORD OF PIPE DEFLECTION, OR BY PULLING A MANDREL, SPHERE, OR PIN-TYPE GO/NO-GO DEVICE THROUGH THE PIPELINE.

SHANKS ASSOCIATES, P.C.  
ENGINEERS SURVEYORS PLANNERS  
313 LUCK AVENUE - ROANOKE, VIRGINIA 24015  
(703) 343-6685

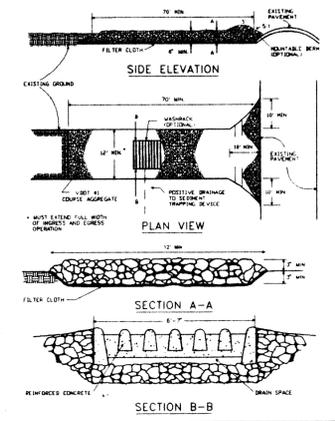
STEEPLECHASE SECTION 7

UTILITY SPECIFICATIONS

DATE: 7-94	REVISIONS:	JOB NO.:
SCALE: N/A	1	CS-14
DESIGNED:		SHEET
DRAWN: FUS		5 of 6
CHECKED: FUS		

55 REVISIONS  
6/27/94 KES

**STONE CONSTRUCTION ENTRANCE**



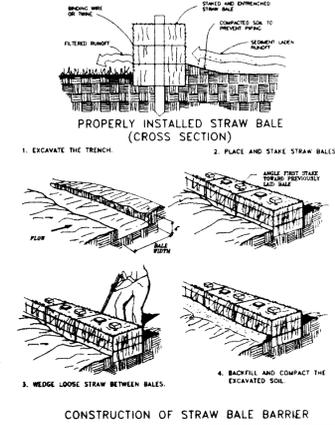
STD & SPEC 3.02

**TEMPORARY STONE CONSTRUCTION ENTRANCE**



CE

**STRAW BALE BARRIER**



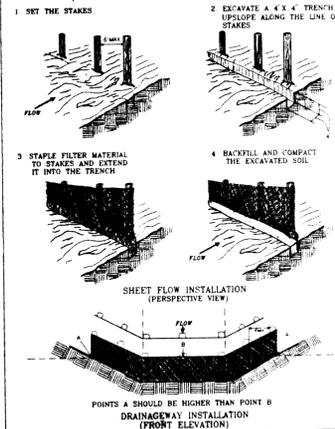
STD & SPEC 3.04

**STRAW BALE BARRIER**



STB

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



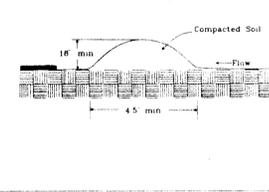
STD & SPEC 3.05

**SILT FENCE**



SF

**TEMPORARY DIVERSION DIKE**



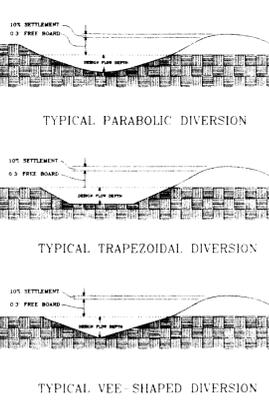
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**TEMPORARY DIVERSION DIKE**



DD

**DIVERSIONS**



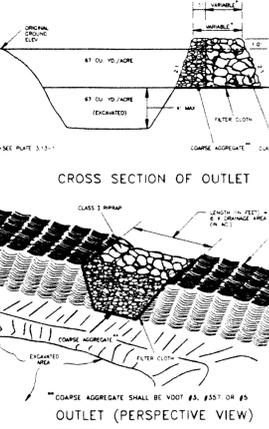
STD & SPEC 3.12

**DIVERSION**



SD

**TEMPORARY SEDIMENT TRAP**



**MINIMUM TOP WIDTH (W) REQUIRED FOR SEDIMENT TRAP EMBANKMENTS ACCORDING TO HEIGHT OF EMBANKMENT (FEET)**

H	W
1.0	0.5
2.0	1.0
3.0	1.5
4.0	2.0
5.0	2.5
6.0	3.0
7.0	3.5
8.0	4.0
9.0	4.5
10.0	5.0

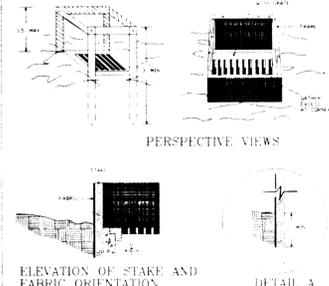
STD & SPEC 3.13

**TEMPORARY SEDIMENT TRAP**



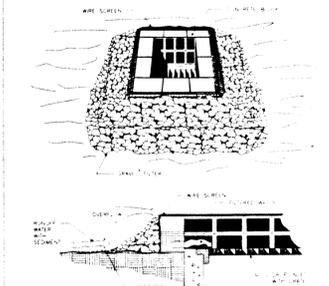
SF

**SILT FENCE DROP INLET PROTECTION**



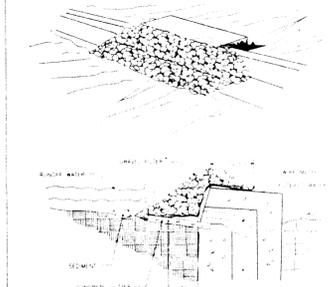
**SPECIFIC APPLICATION**  
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 0% WHERE THE INLET SLOPE OR OVERLAND FLOW IS NOT EXCEEDING 1.5%) ARE TYPICAL. THIS METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS SUCH AS IN STREET OR HIGHWAY MEDIAN.

**BLOCK AND GRAVEL DROP INLET SEDIMENT FILTER**



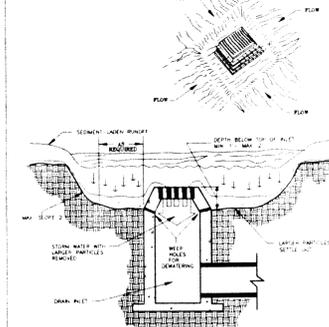
**SPECIFIC APPLICATION**  
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE.

**GRAVEL CURB INLET SEDIMENT FILTER**



**SPECIFIC APPLICATION**  
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE.

**EXCAVATED DROP INLET SEDIMENT TRAP**



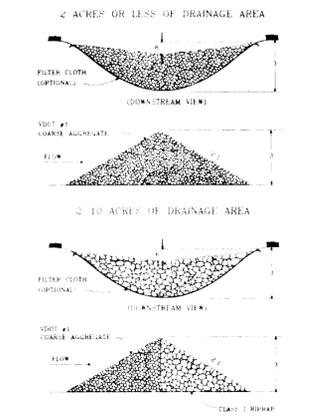
**SPECIFIC APPLICATION**  
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPACITY AND EASE OF MAINTENANCE ARE DESIRABLE.

**STORM DRAIN INLET PROTECTION**



STD & SPEC 3.07

**ROCK CHECK DAM**

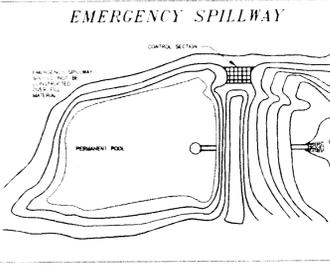
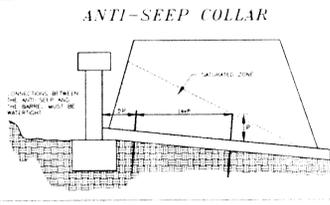
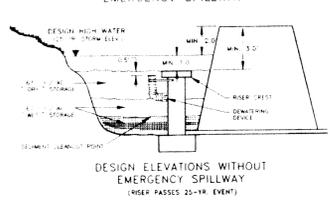
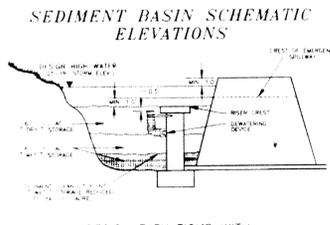


STD & SPEC 3.20

**ROCK CHECK DAMS**



CD



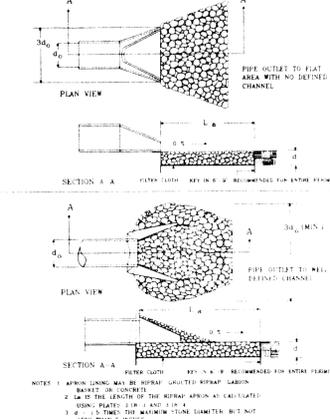
STD & SPEC 3.14

**TEMPORARY SEDIMENT BASIN**



SB

**PIPE OUTLET CONDITIONS**



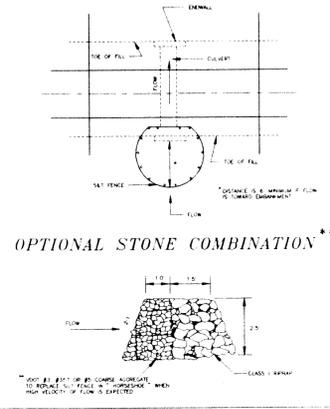
STD & SPEC 3.18

**OUTLET PROTECTION**



OP

**SILT FENCE CULVERT INLET PROTECTION**



STD & SPEC 3.08

**CULVERT INLET PROTECTION**



CIP

**GENERAL NOTES**

- All Erosion and Sediment Control Practices and Procedures shall be in accordance with the latest edition of the Virginia Erosion and Sediment Control Handbook.
- Owner/Developer grants Right of Entry to any personnel for the purpose of monitoring compliance with the Code of Virginia, Erosion and Sediment Control Law (Title 21, Chapter 1, Article 6).
- Building permits will not be issued until the Initial Erosion and Sediment Control measures reflected in the approved plans have been properly installed.
- Erosion and Sediment Control measures shall be inspected after each rainfall and daily during periods of prolonged rainfall. Maintenance is the responsibility of the developer.
- All Erosion and Sediment Controls shall be in place prior to clearing, stripping of topsoil, or grading.
- All details are from the Virginia Erosion and Sediment Control Handbook. The handbook shall supplant this sheet, should a discrepancy exist.
- Any necessary repairs or cleanup to maintain the effectiveness of the erosion control devices shall be made immediately by the contractor.

*No 55 P.C. Res 6/2/14*

**SHANKS ASSOCIATES, P.C.**  
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**EROSION AND SEDIMENT CONTROL DETAILS**

PLAN NAME	SHANKS ASSOCIATES, P.C.
OWNER	SHANKS ASSOCIATES, P.C.
DEVELOPER	SHANKS ASSOCIATES, P.C.
ENGINEER	SHANKS ASSOCIATES, P.C.
ARCHITECT	
MAGISTERIAL DISTRICT	
DATE	11/14
JOB NO.	14-014-001
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