DEVELOPMENT PLANS

FOR

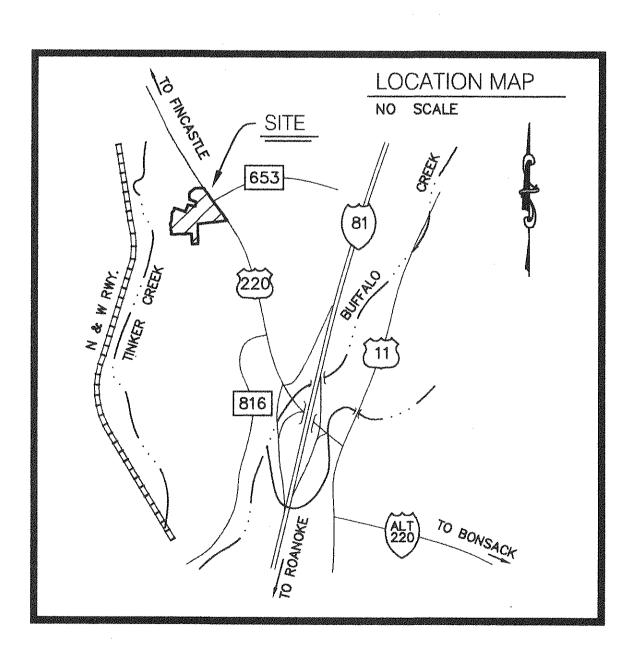
"BOTETOURT COMMONS KROGER"

STORE "R-364" SITUATED IN

AMSTERDAM MAGISTERIAL DISTRICT BOTETOURT COUNTY, VIRGINIA

DATE: 23 APRIL 1999
"AS-BUILT" 23 AUGUST 1999
PREPARED FOR

TIMBERBROOK ASSOCIATES, L.C.



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

REVISIONS

DATE SHEETS DATE

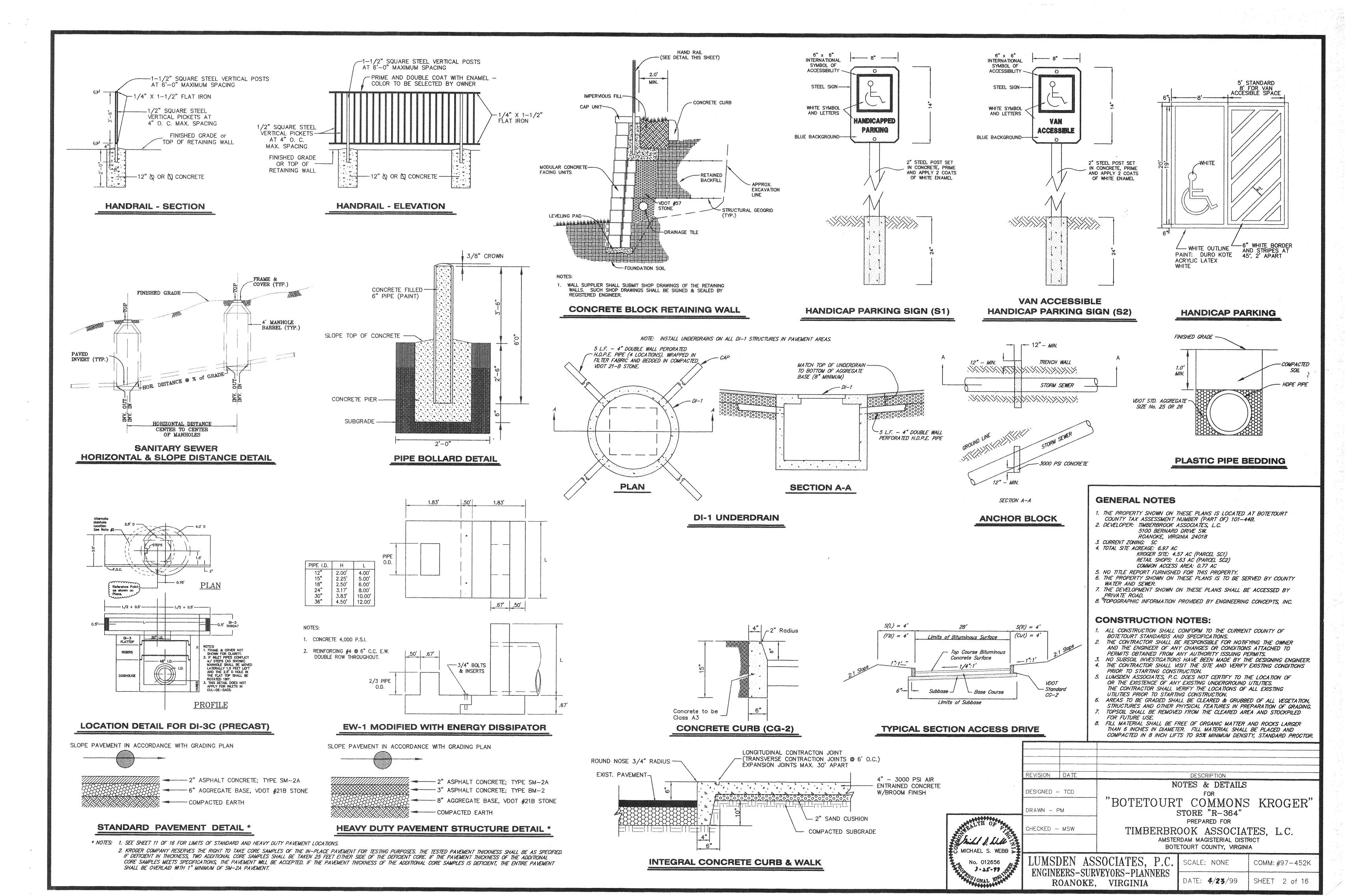
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"AS-BUILT"

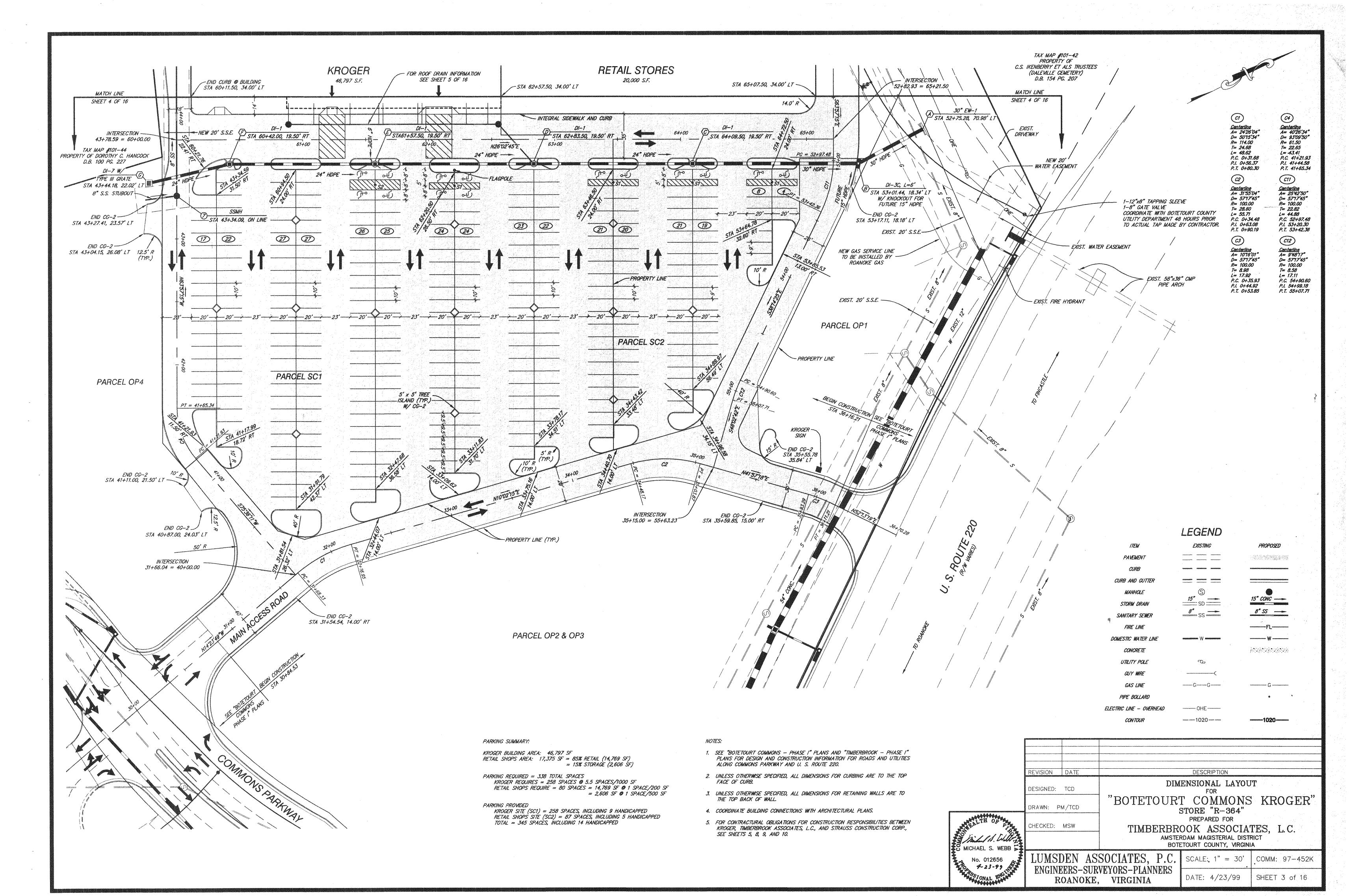
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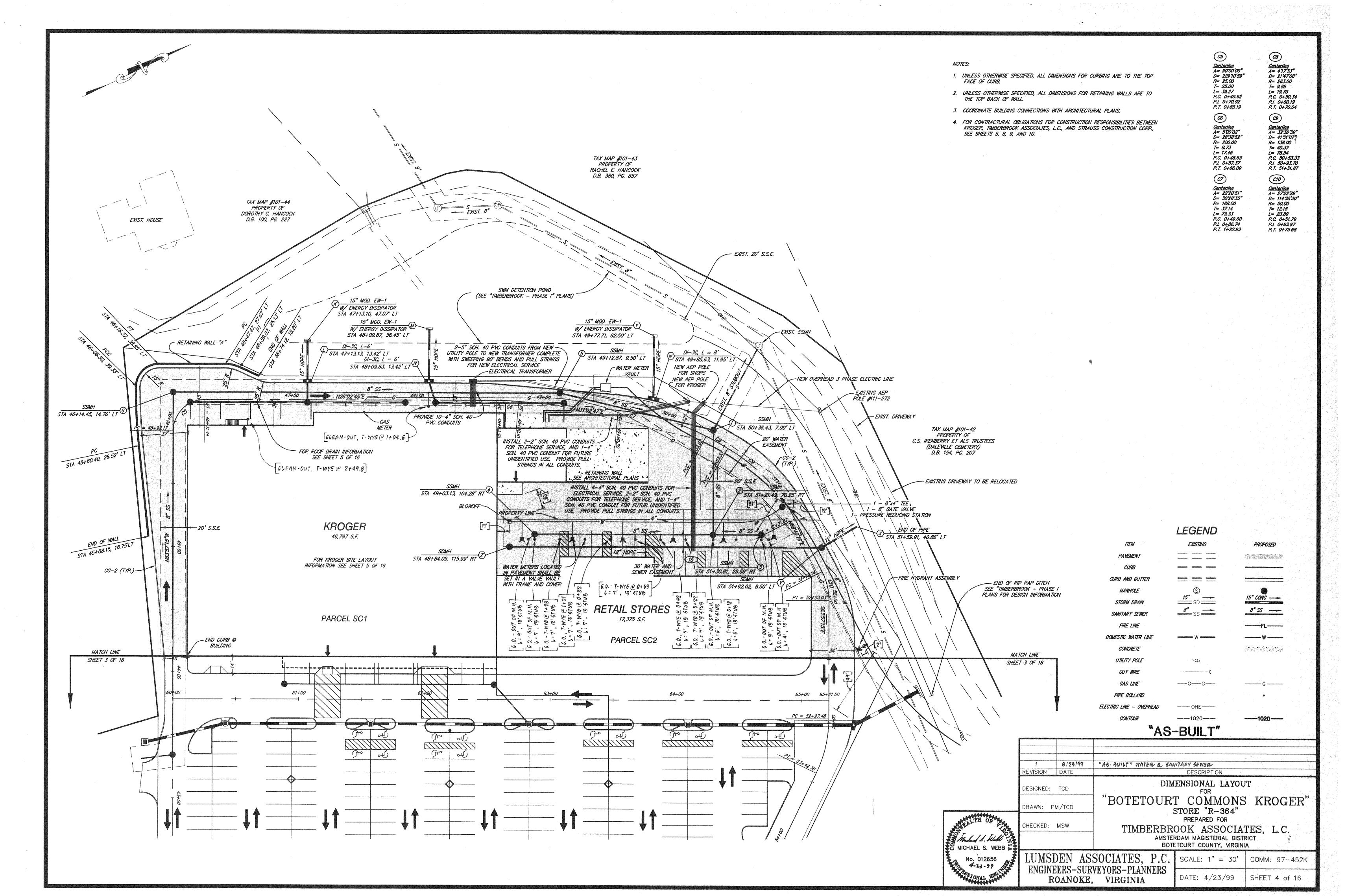
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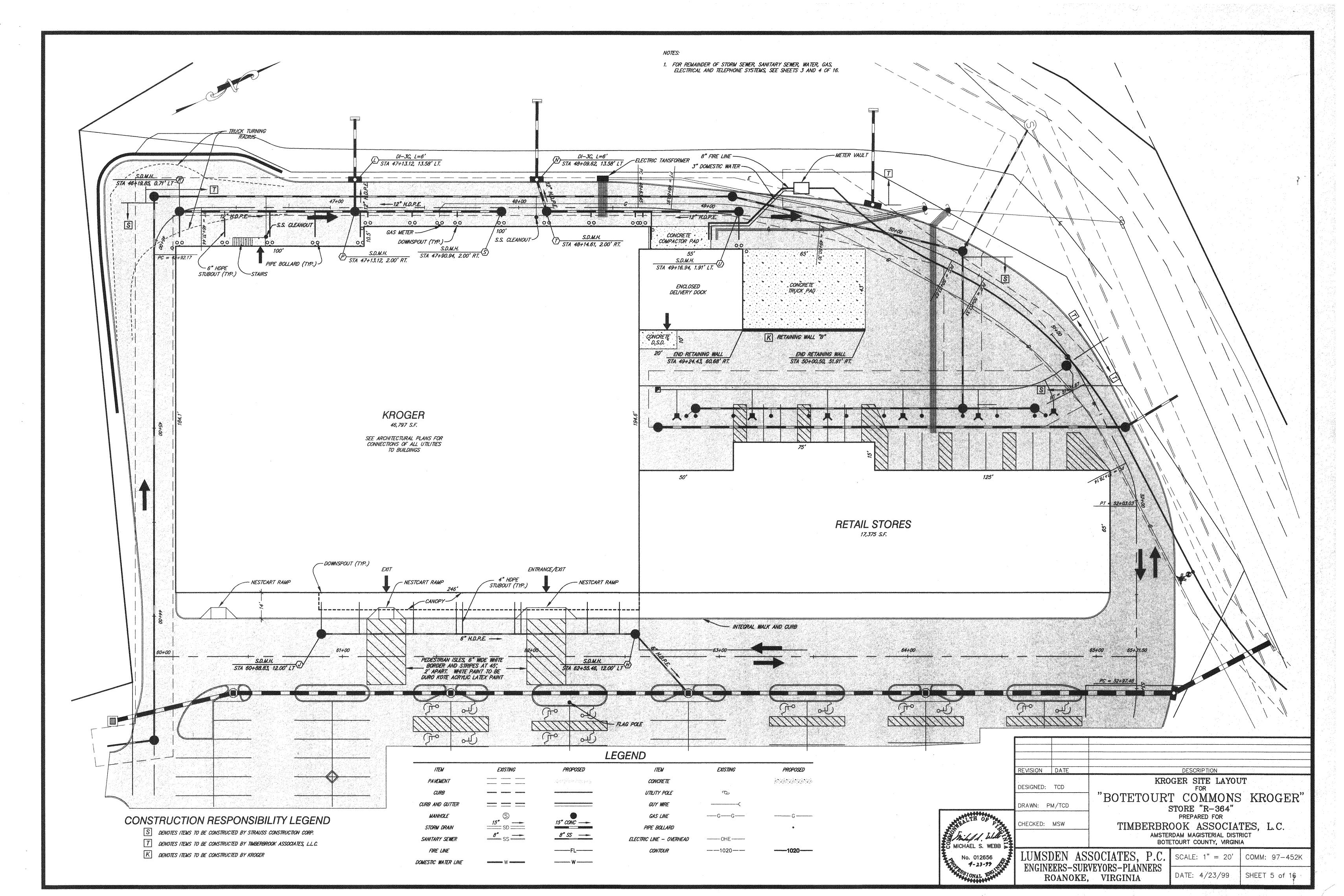


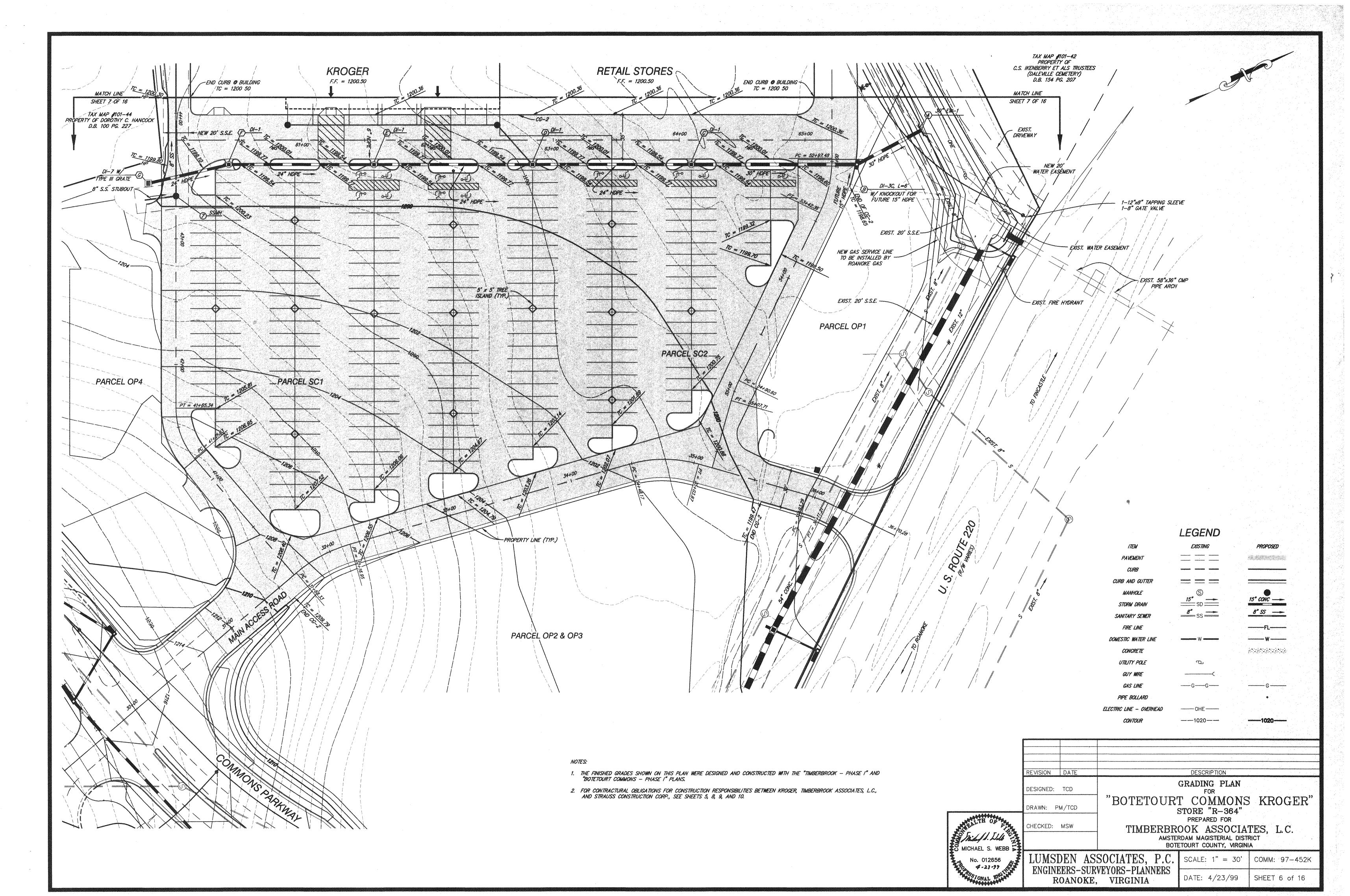
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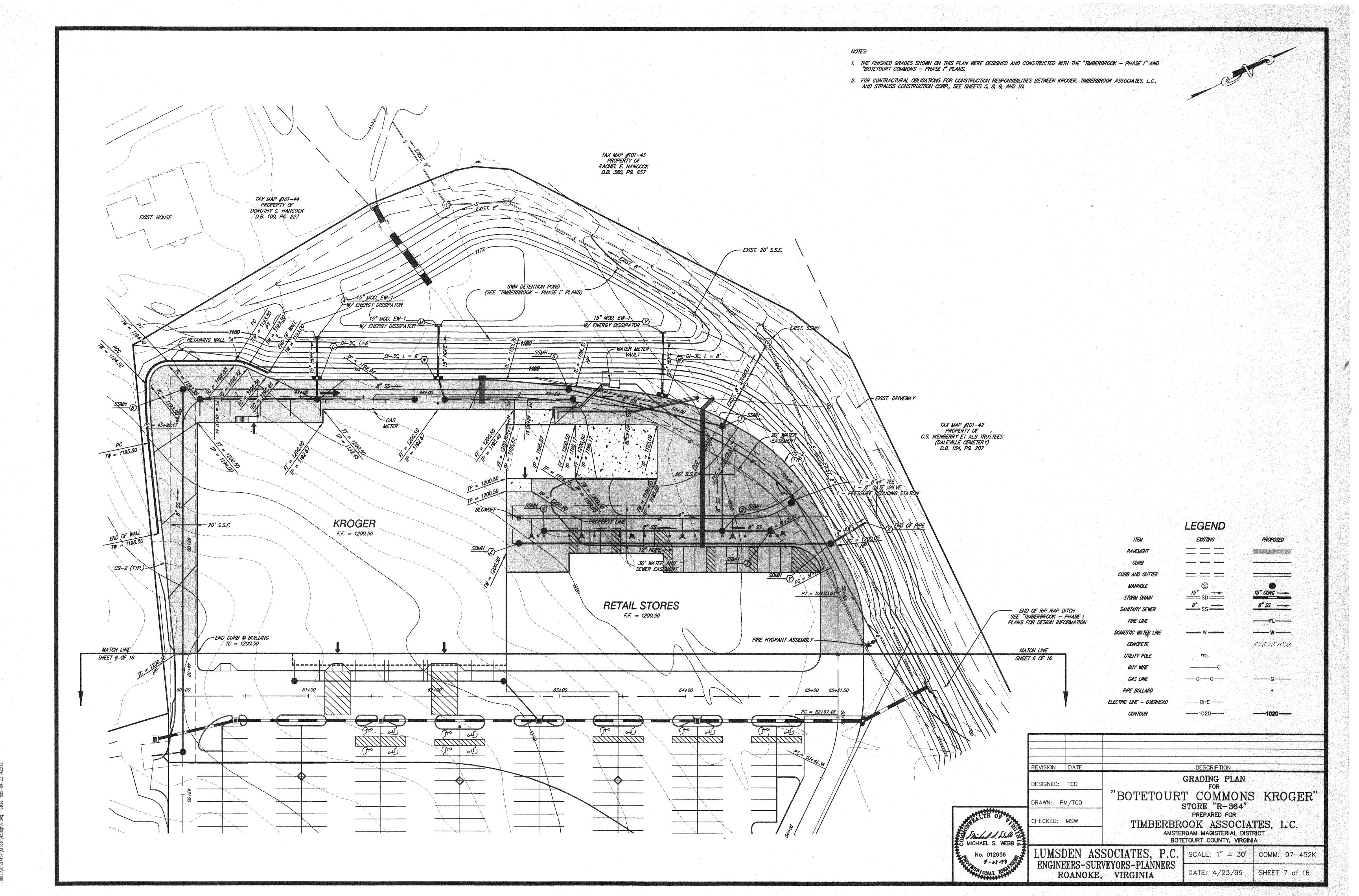
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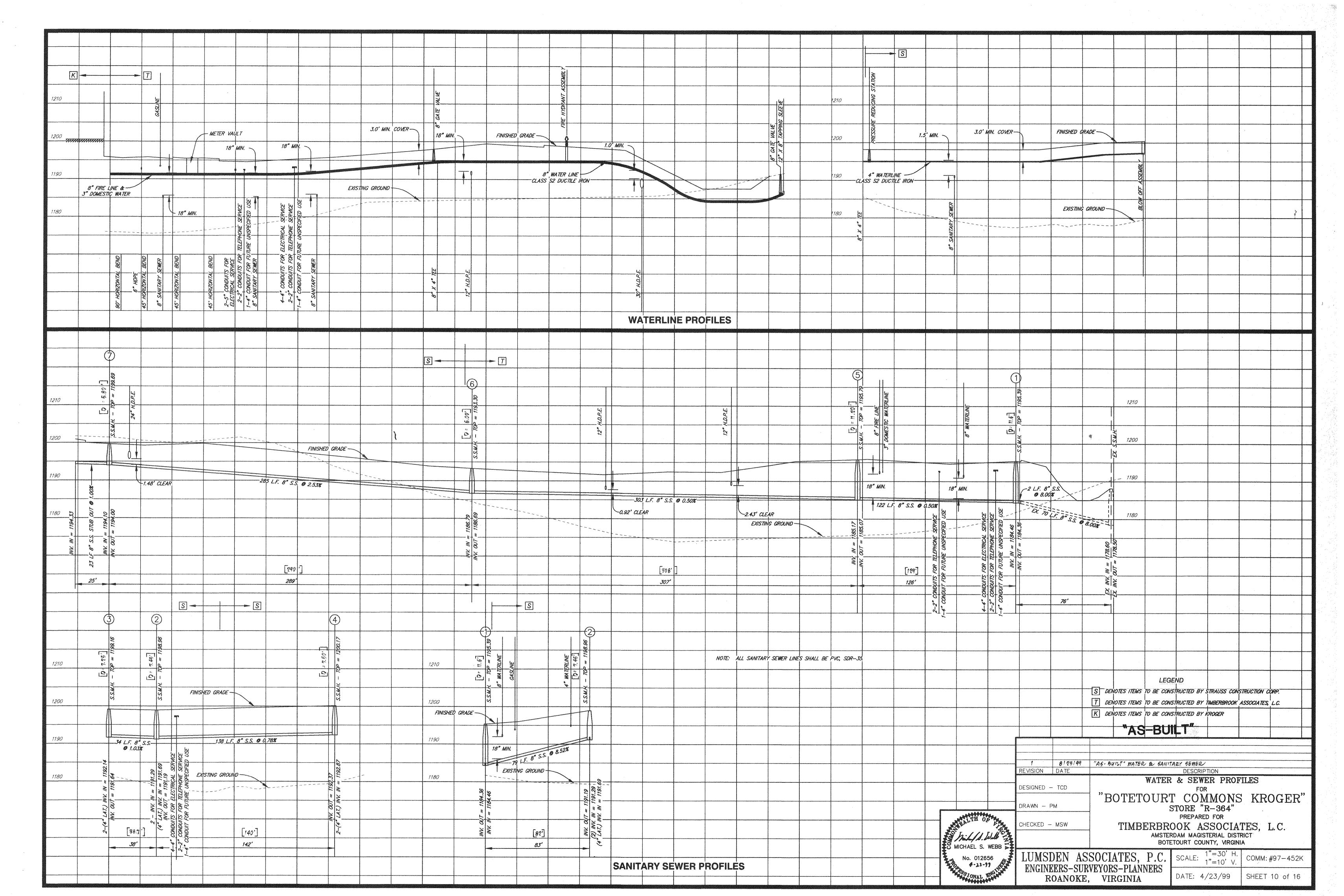


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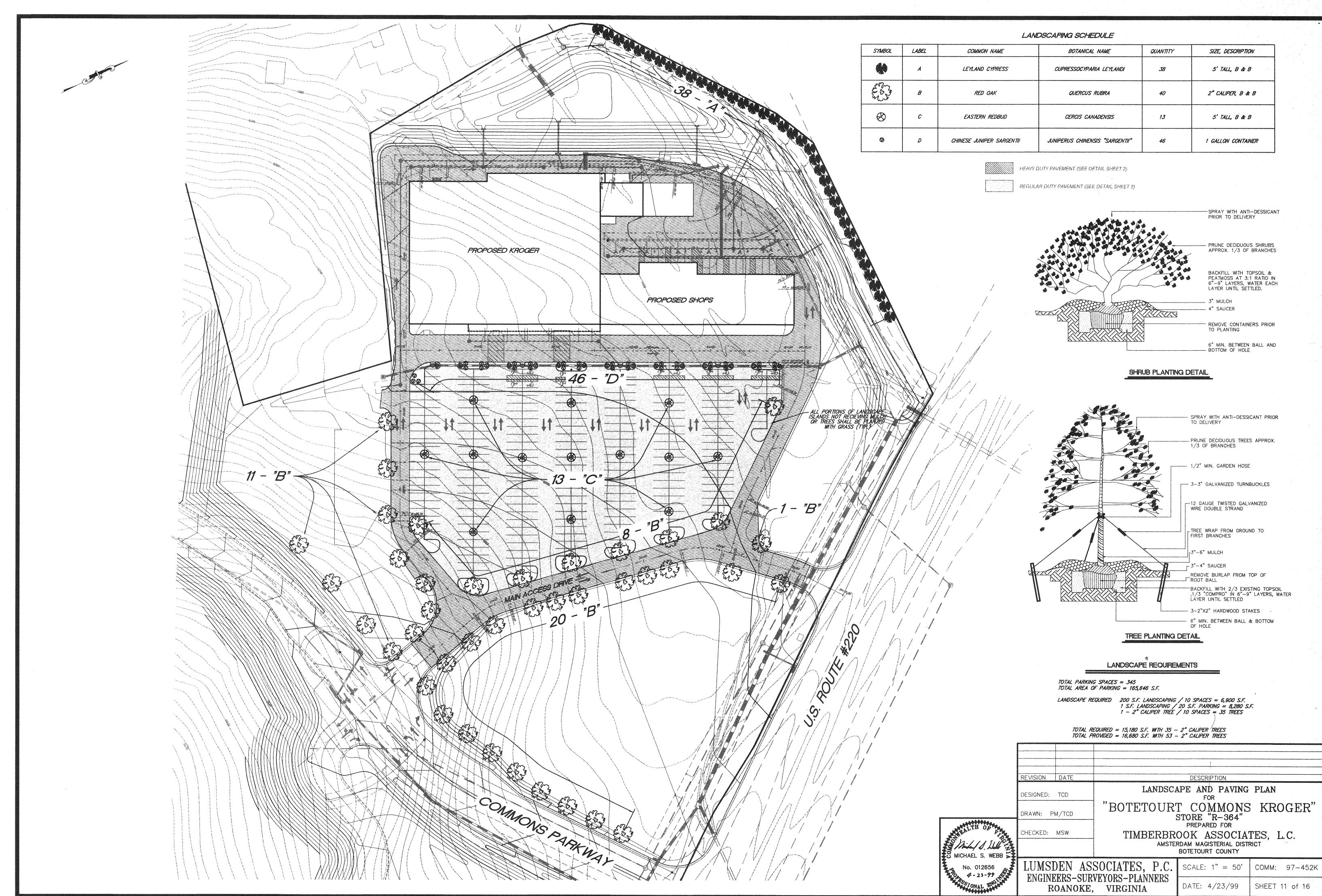


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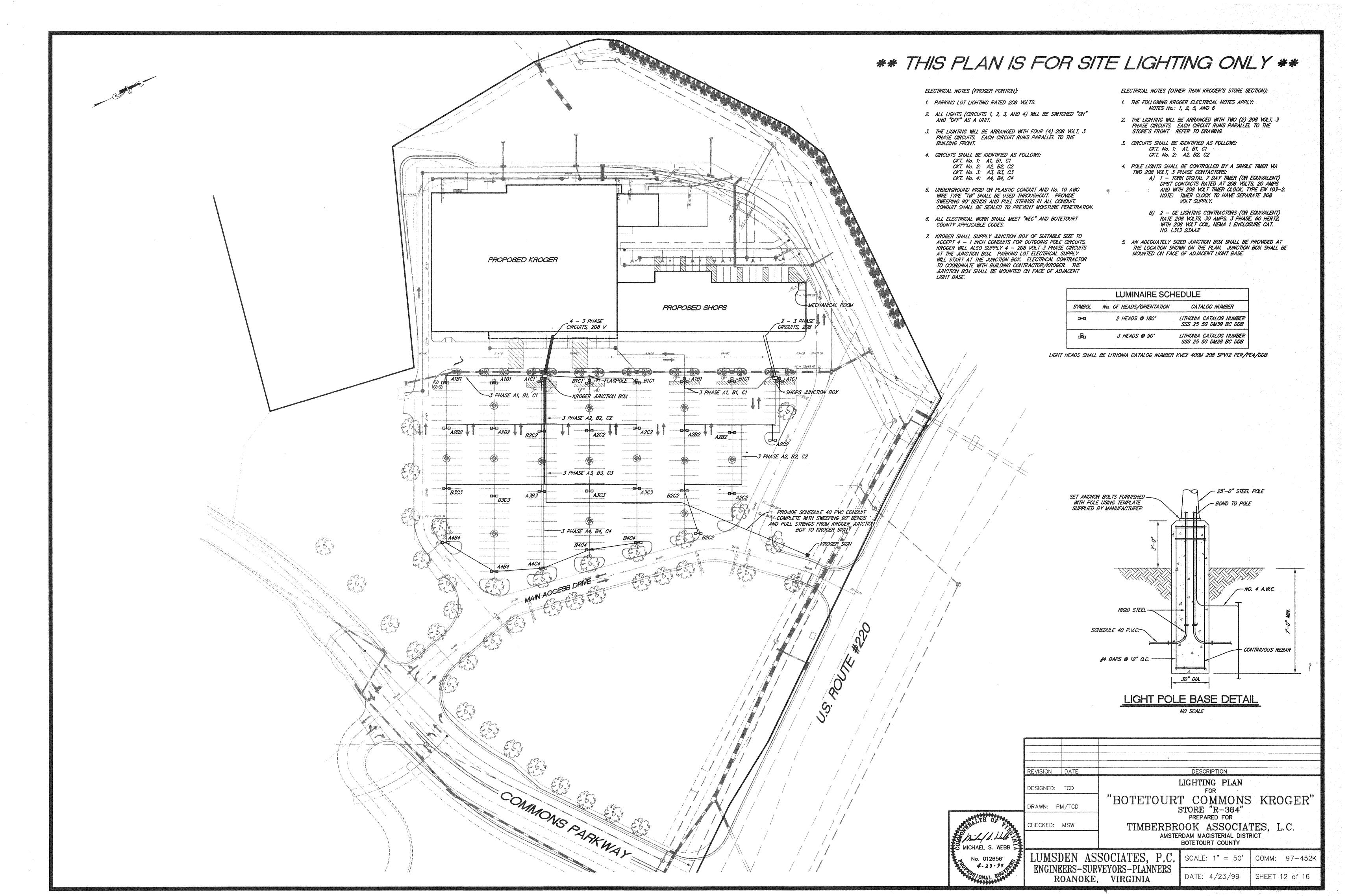
LUMSDEN ASSOCIATES, P.C. ENGINEERS-SURVEYORS-PLANNERS ROANOKE, VIRGINIA DATE: 4/23/99 SHEET 9 of 16

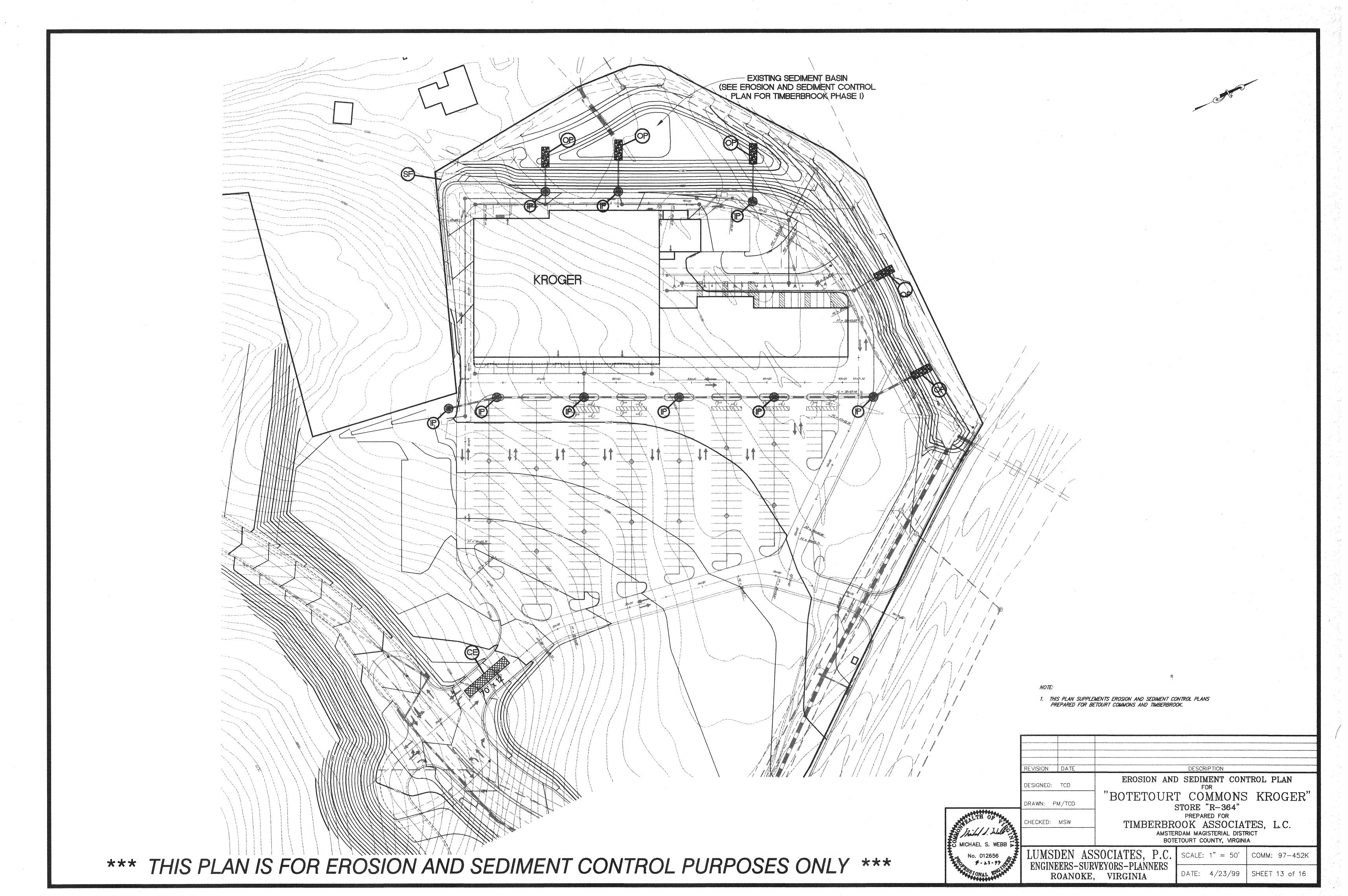


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DATE: 4/23/99 SHEET 11 of 16





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CONSTRUCTION SPECIFICATIONS

SPECIAL CONDITIONS

- 1. A minimum cover of three (3) feet over the proposed lines is required.
- 2. A preconstruction meeting shall be scheduled with Botetourt County personnel, the owner, engineer and contractor.
- 3. No work shall begin without written approval of construction plans.
- 4. Work shall be subject to inspection by the County inspectors and design engineer.
- 5. All utility structures shall be adjusted to final grade
- 6. All existing utilities may be shown or may not be shown in the exact location. The contractor shall comply with the State Water Works regulations, Section 12.05.03 where
- 7. The contractor shall notify the County of any field corrections to the approved plans prior to such
- 8. All trenches within the existing or future Virginia State Department of Highways and Transportation right-of-way must be compacted in six inch layers.
- 9. All lines to be staked prior to construction.
- 10. Contractor shall maintain a set of red-line plans showing as-built data on all water and sewer lines. The contractor shall have the engineer field verify the grade on sewer lines which have grades of less than 1.0 percent. The contractor shall provide three reference distances to all water valves. As-built plans to be submitted by the engineer prior to acceptance by Botetourt County. As-built plan submissions shall include two sets of paper copies one set of mylar reproducible copies and a digital autocad format copy.
- 11. All construction shall be in accordance to approved construction practices of the applicable trades.
- 12. Unless noted otherwise herein all construction shall be in accordance to the latest edition of AWWA standards.
- 13. Shop drawings for fabricated materials shall be submitted to Botetourt County for approval.

EXCAVATION, STABILIZATION AND BEDDING

A. TRENCHING

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

TRENCH STABILIZATION

- Trench stabilization material shall be coarse aggregate size number 2 and shall conform with VDOT Section 203
- 2. Whenever excessively wet or unstable material is encountered in the bottom of the trench, which in the opinion of the Engineer is incapable of properly supporting the pipe or structures, such material shall be removed and backfilled with trench stabilization material and shall be graded to allow for the compacted bedding All unauthorized overdepths of excavation shall be backfilled, at the Contractor's expense, with trench

stabilization material and shall be graded to allow for the compacted bedding material.

C. COMPACTED BEDDING MATERIAL

- Bedding material shall be coarse aggregate size Number 57 and shall conform with VDOT Section 203 and/or ASTM C 33.
- 2. The bottom of the pipe trench shall be excavated to a minimum overdepth of six (6) inches below the bottom of the pipe, to provide for the compacted bedding material. Bedding material shall be placed, shaped and compacted. Bedding material shall extend a minimum of six inches above
- Bell holes and depressions required for the jointing of the pipe shall be dug after the compacted bedding material has been graded and shaped and shall be only of the length, depth and width required to make the joint

PIPE. JOINTS AND FITTINGS

A. SCOPE OF WORK

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

2. The materials specified for the construction shall comply with the latest revisions of the applicable American Society for Testing Materials (ASTM), American National Standards Institute (ANSI) and/or the Virginia Department of Transportation (VDOT) standards.

B. OPTIONAL PIPE SELECTIONS

- 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 shall be installed, unless specified or indicated otherwise.
- 2. Water line shall be Class 52 ductile iron.
- Sanitary sewers with an inside diameter less than or equal to twelve (12) inches shall be either polyvinyl chloride or ductile iron pipe, at the Contractor's option, unless specified or indicated otherwise. Contractor shall obtain approval of pipe material by Botetourt County Engineer prior to beginning construction.
- 4. Service laterals shall be either ductile iron or polyvinyl chloride pipe, at the Contractor's option, unless specified or indicated otherwise.

C. TYPES OF PIPE

- Ductile iron pipe shall conform with AWWA C 151/ANSI 21.51 and fittings shall conform with AWWA C 110/ANSI 21.10. The pipe and fittings shall be bituminous coated and cement lined in accordance with AWWA C 104/ANSI 21.40. The pipe thickness shall conform with AWWA C 150/ANSI 21.50 and shall be Class 50, as a minimum. unless specified or indicated otherwise.
- 2. PVC sewer pipe and fittings shall be SDR 35 (ASTM D

D. JOINTS COUPLINGS AND APPURTENANCES

- 1. PVC pipe and fittings shall be bell and spigot type joints. The bell and spigot joint shall be sealed with elastomeric gaskets conforming to ASTM D 3212. The joints shall be made in strict accordance with the recommendation of the pipe manufacturer.
- 2. Ductile iron pipe and fittings shall be either mechanical or bell and spigot type joints as specified or indicated. Joints shall be made with a single watertight rubber gasket manufactured in accordance with AWWA C 111/ANSI 21.11. The joints shall be made in strict accordance with the recommendations of the pipe manufacturer.
- 3. Gate Valves shall be iron-body, with resilient seat, full bronze mount, O-ring sealed, inside-screw, non-rising stem, with 2 inch square operating nut, all in accordance with AWWA Standard C509 (latest revision). Connections shall be suitable for the pipe with which it is used. The valves shall be suitable for 200 p.s.i. water working pressure and shall be tested at twice the rated working pressure. The nut shall be marked with an arrow and the word "OPEN" marked and shall open by turning to the right (clockwise).
- 4. All other materials and appurtences to be in accordance with details shown on plans.

a. General

- 1. The Contractor shall not lay pipe or place manholes until all water has been removed from the trench, or when in the opinion of the Engineer, the trench or the weather conditions are unsuitable for work.
- 2. Pipe that may require field cutting shall be done so in a neat and workmanlike manner, so as to leave a smooth end at right angles to the axis of the pipe. Care shall be taken to avoid damaging the pipe and any coatings or linings. Ductile iron pipe shall not be cut with an oxvacetylene torch.
- 3. The materials shall be visually inspected for defects before lowering the pipe or placing the manholes into the trench. During the laying operation no tools, clothing or other material shall be placed in the pipe or manhole. The interior of the pipe shall be clear of all soil, debris and superfluous materials prior to and during the
- 4. The Contractor shall exercise every precaution to prevent foreign material from entering the pipe while it is being placed in the trench. Failure by the contractor to take such precautions may result in the Engineer requiring a heavy, tightly woven canvas bag of suitable size be placed over each end of the pipe and removed only when he joint can be made properly.
- 5. The pipe and manholes shall be lowered carefully into the trench by suitable means and handled with care at all times to avoid damage. Under no circumstances shall the materials be dropped or dumped into the trenches.
- 6. When work is not in progress, the Contractor shall plug the open ends of the pipe to prevent trench water or other substances from entering the pipe. The plug shall be watertight and shall remain in place until any required dewatering has been completed.
- 7. Parallel installation Water lines shall be laid at least ten feet horizontally from a sewer or sewer manhole whenever possible. When local conditions prevent a horizontal separation of ten feet, the water line may be laid closer to a sewer or sewer manhole provided that:
 - 1. The invert of the water main shall be at least 18 inches above the crown of the sewer.
 - II. Where this vertical separation cannot be obtained, the sewer shall be constructed of AWWA approved water pipe, pressure tested in place without leakage prior to backfilling.
 - III.The sewer manhole shall be of water—tight construction and tested in place.

Crossing — Water lines crossing sewers shall be laid to provide a separation of at least 18 inches between the bottom of the water line and the top of the sewer whenever possible. When local conditions prevent this vertical separation, the following construction shall be

> I. Sewers passing over or under water lines shall be constructed of AWWA approved water pipe, pressure tested in place without leakage prior to

II. Water lines passing under sewers shall, in addition, be protected by providing:

- (a) A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water line,
- (b) Adequate structural support for the sewers to prevent excessive deflection of the joints and the settling on and breaking of the waterline,
- (c) That the length of the water line be centered at the point of the crossing so that joints shall be equal distance and as far as possible
- 8. Before joints are made the pipe shall be well bedded on a firm foundation and no pipe shall be brought into position until the preceding length has been thoroughly embedded and secured in place. Any defects due to settlement shall be made good by the Contractor at his expense. Bell holes shall be dug sufficiently large to insure the making of proper joints.
- 9. Pipe shall be jointed in full accordance with manufacturer's recommendations. Push-on joints shall be thoroughly cleaned, the rubber gasket inserted in the bell socket, a thin film of approved gasket lubricant applied, the spigot end of the pipe centered into the socket and the joint completed by forcing the spigot end to the bottom of the socket by a lack-type tool or other device approved by the Engineer. Mechanical joints shall be thoroughly cleaned, the gland slipped over the spigot end of the pipe, the rubber gasket painted with soap solution and placed on the spigot end, the spigot end of the pipe seated in the bell, the gasket pressed into place within the bell, the gland moved into position, and bolts and nuts assembled by hand and tightened with an approved torque—limiting wrench.

- The water main shall be laid and maintained at the required lines and grades with fittings and valves at the required locations.
- 2. Deflection of the line of pipe, in either, the vertical or horizontal plane to avoid obstructions, or in locations where long-radius curves are required, the amount of deflection shall not exceed approved AWWA standards. Alignment that may require deflections in excess of the recommended limitations, special bends, or a sufficient number of shorter lengths of pipe to provide the angular deflections within the limits as set forth. shall be approved by the Engineer.
- 3. All plugs, except mechanical joint plugs at connections for future lines, all tees, and all bends in water mains under pressure shall be provided with reaction backing consisting of concrete thrust blocks. Valves for connections to future lines and fire hydrants shall be anchored to the water main with the rods.
- 4. Water line valve delineators shall be installed by the contractor six feet off of and facing water line valves. or at other distance where necessary. Delineators will be supplied by Botetourt County Utility Department.
- 5. Detection tape shall be installed 12inches above water lines. Also 12 gauge bare copper wire shall be installed with pipe mains and laterals. copper wire shall be wrapped a minimum of five (5) turns around all water line structures.

- All pipe shall be disinfected, tested and flushed in accordance with AWWA Standard C651 (latest revision).
- 2. Contractor shall provide all materials, equipment, necessary taps and perform all work required for the sterilization, testing and flushing of the water main.
- 3. No tested section of water line shall be approved to deliver water service until a favorable laboratory report has been achieved. Any tested section of water line falling to meet the requirements specified shall be repaired by the Contractor and retested until the results are within the limits specified.
- 4. The water main or valved off section that has been completed shall be filled, tested and flushed. Test locations shall be subject to the discretion of the Engineer and as valves and blow-offs permit.
- 5. After testing and before final inspection of the completed systems, water mains and service laterals shall be flushed and disinfected in accordance with AWWA Specifications C601 (latest revision). Flushing shall be accomplished at a flow velocity of not less than 2.5 feet
- Disinfection as described in AWWA C651 "Placing of calcium hypochlorite tablets" shall be used. 5 gram calcium hypochlorite tablets with 3.25 gram available chlorine per tablet shall be attached at the inside top of the pipe by an adhesive such as Permatex No. 1 or equal. The following number of tablets for the given pipe size shall be used for an initial dose of 25 mg/1 (ppm) chlorine:

Number Tablets Per Pipe Diameter

18-20 Ft. Pipe Section

or the number of tablets equal to 0.0012d2L rounded to the next higher integer, where d is the inside diameter, in inches and L is the length of the pipe section, in feet. Use of the continuous feed or slug method or disinfecting may only be used to re-chlorinate a water pipe after the initial disinfection or in other specific cases approved by the Design Engineer. When filling the pipeline for disinfection, the rate of filling must result in a velocity of less than 1 ft./sec.

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

Following chlorination, the piping shall be thoroughly flushed. The Virginia Waterworks Regulations require at least two consecutive satisfactory bacteriological samples at 24 hour intervals from the distribution system at maximum spacing of 2000 feet before the system on be placed in service. If the initial testing is not satisfactory the new lines will be retested until satisfactory results are achieved. The Contractor shall pay all costs associated with disinfection and testing of installed facilities including any bacteriological samples and retesting if required. Samples will be collected in accordance with the Virginia Waterworks Regulations.

INSTALLING SEWER PIPE & MANHOLES

The installation of the sanitary sewer system shall begin at the downstream manhole and proceed upstream. The gowestream sections shall be completed, tested and approved prior to allowing sanitary sewage to enter the

- 2. The pipe shall be installed in accordance with the pipe manufacturer's recommendations and as directed by the Engineer. The pipe shall be laid in true straight lines with the bell ends upstream and with the invert of the pipe being the true elevation and grade of the system.
- 3. The Contractor shall be responsible for establishing and maintaining the horizontal alignment and vertical elevation and grade of the system in accordance with the survey information indicated on the plans.
- 4. The horizontal alignment of the pipe shall be maintained by a transit or theodolite plumbed over the center of the downstream manhole. The vertical elevation and grade shall be maintained by not less than three (3) batter boards placed between manholes or by an adjustable laser level mounted at the invert of the downstream manhole with target(s) placed in the bell and of the pipe being
- Sewer pipe shall be installed in 6 Inch gravel bedding extending a minimum of six inches above the top of the pipe and in accordance with manufacturers recommendations.
- The sanitary sewer system shall be laid and joined complete—in-place so that each length and section of pipe between the manholes shall have a smooth and uniform
- 7. The pipe shall be connected to manholes through precast openings and joined with either a flexible boot adapter or a pipe seal gasket.
- 8. Detection tape to be installed 12" to 18" above all new pipe mains and laterals, also, 12 gauge bare copper wire shall be installed with pipe mains and laterals.

E. CONNECTION TO EXISTING SYSTEMS

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

F. SERVICE CONNECTIONS

- The Contractor shall make all service connections to the sewer pipe and from manholes where shown on the plans and/or where located in the field. The service connections to the sewer pipe shall be made with a wye branch fitting.
- 2. The wye branch fittings for service connections shall be commercially manufactured and installed in strict accordance with the recommendations of the pipe manufacturer.
- 3. The sewer pipe shall not be cut or tapped for service connections except when and where permitted by the
- All service connections shall be made with four (4) inch pipe as a minimum, unless the size of an existing service connection dictates otherwise, and shall be installed on a minimum grade of one-quarter (1/4) inch per one (1) foot from the sewer pipe or manhole to the property or
- 5. Future service connections shall extend to the property or easement line with cleanout and be properly capped with a watertight fitting to prevent infiltration into the sewerage system. The fitting shall be installed in strict accordance with the recommendations of the pipe
- Future service connections shall be field marked by a treated, solid wooden (2 x 4) marker set vertically splumb with the end of the capped extension. The tops of the markers shall be painted green and set 24" above the finished grade. The location and invert depth of the service connection shall be shown on the as-built plans.

BACKFILLING A. JOB CONDITIONS

- Prior to placing backfill, all organic, rubbish debris or other unsuitable or objectionable material within the trench shall be removed. All concrete forms shall be removed. All shoring or sheeting shall be removed or cut off at the depth stipulated by the Engineer.
- Prior to placing backfill, the trench box shall be removed. All concrete forms shall be removed. All shoring or sheeting shall be removed or cut off at the depth stipulated by the Engineer.
- Backfill material shall be placed in uniform horizontal layers and thoroughly compacted with proper mechanical or hand operated tampers or other equipment as approved by the Engineer to perform such work. The degree of compaction of backfill material shall be tested by a solls engineer. The cost of testing to be paid by the owner. At least two compaction tests shall be performed for every 1000 feet of installed utility line.
- Backfill material shall be placed and compacted so as to not unevenly support, damage or displace the alignment of
- 5. Backfill shall not be placed or compacted against cast in place concrete until it has obtained sufficient strength to withstand the backfilled pressure placed upon it.
- 6. Upon the completion of backfilling, all excess soil, stones and debris shall be removed from the site and disposed of by the Contractor.

B. BACKFILL MATERIAL

- Materials for backfill shall be approved excavated material or approved suitable material obtained from other sources. All material shall be approved by a Soils
- Material shall consist of durable natural granular material or granular aggregates free of organic material, loam, debris, or other objectionable material which cannot be thoroughly compacted.
- Material shall not contain stones larger in diameter than those specified herein, granite, broken concrete, masonry rubble or other material which in the opinion of the Engineer is unsuitable for backfill.

4. Excessively wet excavated material shall not be used as backfill. Frozen material shall not be placed in the trench, nor shall approved backfill be placed upon frozen material. However, backfilling may be allowed in freezing weather with prior approval of the Engineer.

C. BACKFILL BELOW UNPAVED AREAS

- 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.
- 2. Backfill from one (1) foot above the top of the pipe to the topsoll 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 tampers.
- 3. Drainage channels to be constructed of fill material shall be graded and shaped to the topsoil subgrade with material free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical tampers.

BACKFILL BELOW EXISTING OR NEW PAVED AREAS AND SIDEWALKS

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

INSPECTION AND TESTS

TESTING OF SANITARY SEWER

The Contractor shall prove the watertightness of the sewer system or portions thereof by one of the following tests. All testing shall be performed at least 30 days after installation and proper backfill completion. All tests shall be coordinated with the Design Engineer for his attendance. observation and proper documentation. All test results to be submitted to Botetourt County by the Design Engineer.

B. AIR TEST - SANITARY SEWER LINES

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

based upon the designated pipe size and test segment length.

AIR TEST TABLE BASED ON EQUATIONS FROM ASTM C-828-80 SPECIFICATIONS TIME (MIN: SEC) REQUIRED FOR PRESSURE DROP FROM 3.5 TO 2.5 PSI WHEN

LENGTH OF PIPE DIAMETER, INCHES

TESTING ONE PIPE DIAMETER ONLY.

400 1:10 2:38

450 1:19 2:50

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

5:14 7:341 1:49 17:01 500 1:28 Should the 1.0 psi drop occur in less time than that specified in the table, the sewer segment shall have failed. If the time required for the pressure to drop 1.0 psi is greater than

that shown in the table, the sewer segment shall have passed

For a more detailed description of the air test method refer to ASTM designation C-828, current revision. An air pressure correction shall be required when the prevailing ground water is above the sewer line being tested and shall be calculated

Ground Water Depth (ft) + 3.5 = Starting Test Pressure

Ending Test Pressure = Starting Pressure - 1.0 psi

There is no change from time requirements established for the

C. VACUUM TEST - SANITARY SEWER MANHOLES

- All sanitary sewer manholes shall be vacuum tested. Installation and operation of vacuum equipment and indicating devices shall be in accordance with equipment specifications. 3. A measured vacuum of 10 inches of mercury shall be established
- in the manhole. The time for the vacuum to drop to nine inches of mercury shall be recorded.
- 4. The elapsed time for the vacuum pressure to drop from 10 to 9 inches of mercury shall exceed the following times:

4 Ft. Dia. Manhole Depth 10 ft. Or less >10 ft. but < 15 ft.

60 seconds 75 seconds

For 5 foot diameter manholes, add an additional 15 seconds to the listed minimum time. For 6 foot diameter manholes, add an additional 30 seconds to the listed minimum time If a manhole falls a test, repairs shall be made and the vacuum

D. MANDREL TEST

All sewer lines shall be tested by pulling a standard test mandrel between test sections.

E. TESTING OF WATER LINES

test shall be repeated.

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

Test pressure restrictions. Test pressures shall:

the highest point along the test section;

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

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

section includes closed gate valves or hydrants;

in a manner satisfactory to the Engineer.

Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. All exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repeated

4. A leakage test shall be conducted concurrently with the pressure test. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. No pipe installation will be accepted If the leakage is greater than that determined by the

until it is satisfactory to the Engineer.

following formula:

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

REVISION | DATE DESCRIPTION CONSTRUCTION SPECIFICATIONS DESIGNED - TCD BOTETOURT COMMONS KROGER' DRAWN - PM STORE "R-364" PREPARED FOR CHECKED - MSW LUMSDEN ASSOCIATES, SCALE: NONE

MICHAEL S. WEBB No. 012656 3-25-99

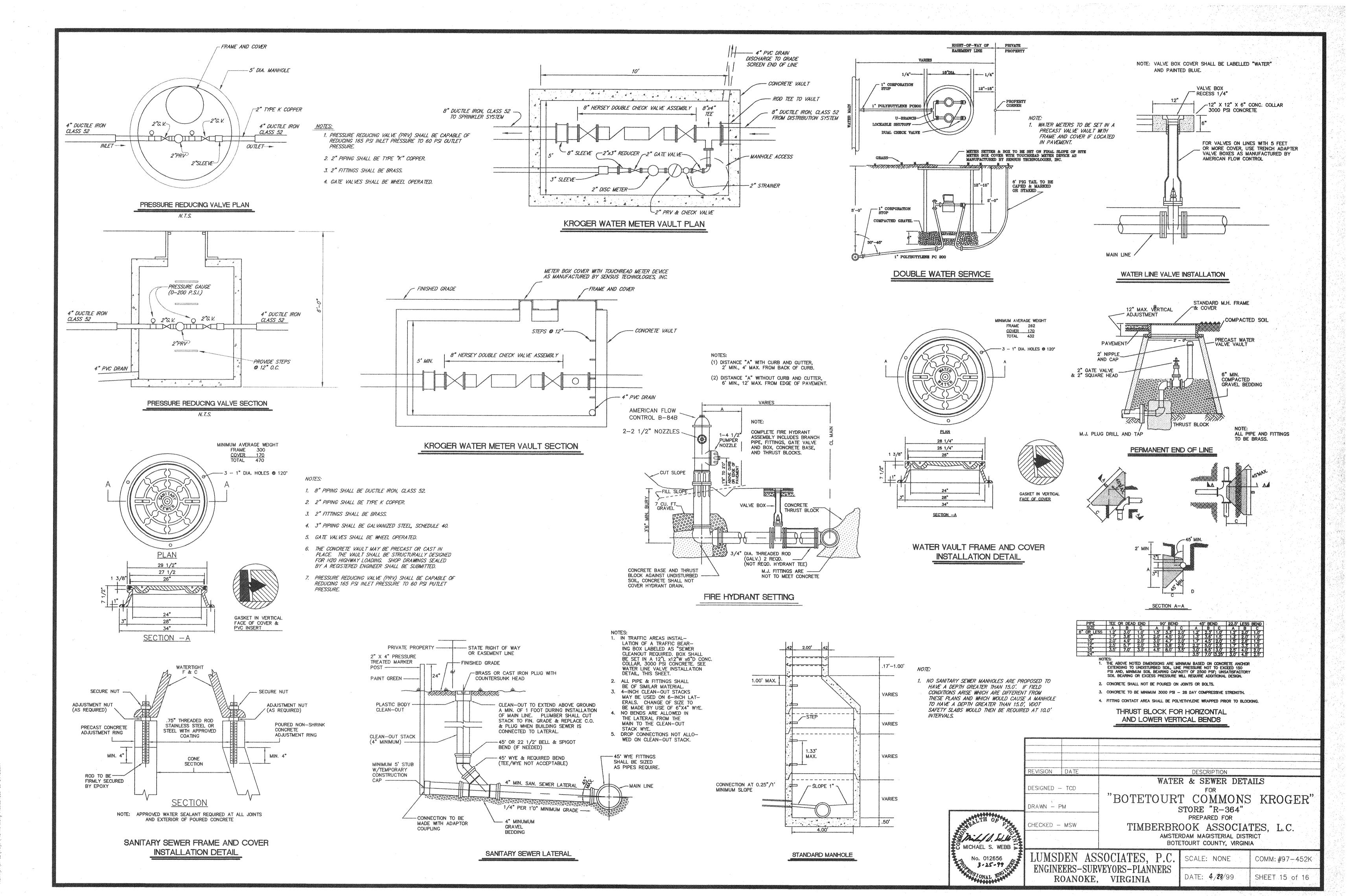
6:03 9:27 13.36

6: 481 0: 38 15: 19

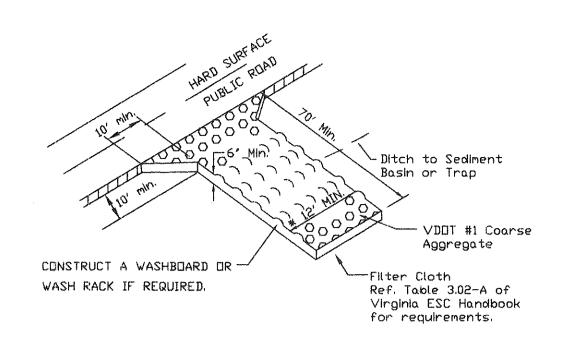
TIMBERBROOK ASSOCIATES, L.C. AMSTERDAM MAGISTERIAL DISTRICT BOTETOURT COUNTY, VIRGINIA

COMM: #97-452K SHEET 14 of 16

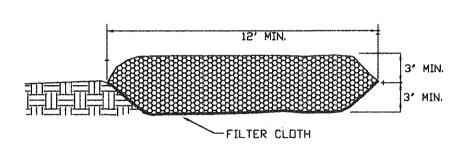
ENGINEERS-SURVEYORS-PLANNERS DATE: 4/23/99 ROANOKE, VIRGINIA

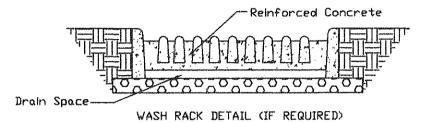


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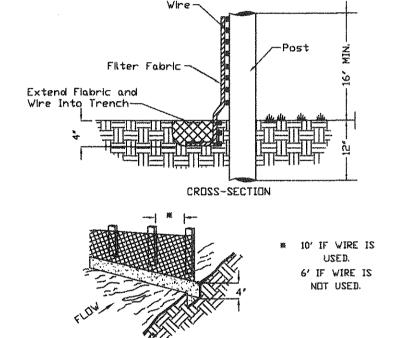


* MUST EXTEND FULL WIDTH OF INGRESS & EGRESS OPERATION.

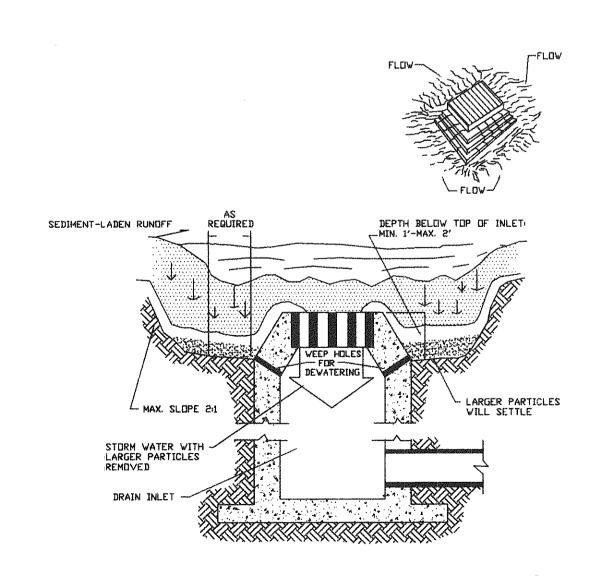




TEMPORARY GRAVEL CONSTRUCTION ENTRANCE



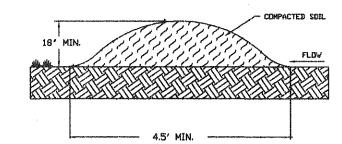
F CONSTRUCTION OF A SILT FENCE



SPECIFIC APPLICATION

This method of inlet protection is applicable where heavy flows are expected and where an overflow capability and ease of maintenance are desirable.

(IP) EXCAVATED DROP INLET SEDIMENT TRAP

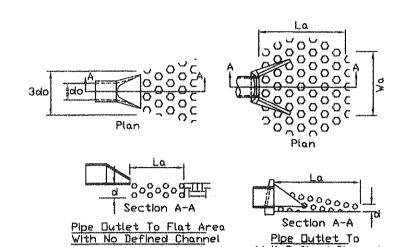


DD TEMPORARY DIVERSION DIKE

FD TEMPORARY FILL DIVERSION

RWD TEMPORARY RIGHT-OF-WAY DIVERSION

DV DIVERSION



With No Defined Channel

Pipe Dutlet To Well-Defined Channel

OP

OUTLET PROTECTION

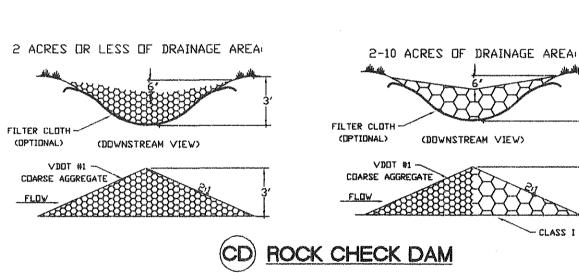
- NOTES

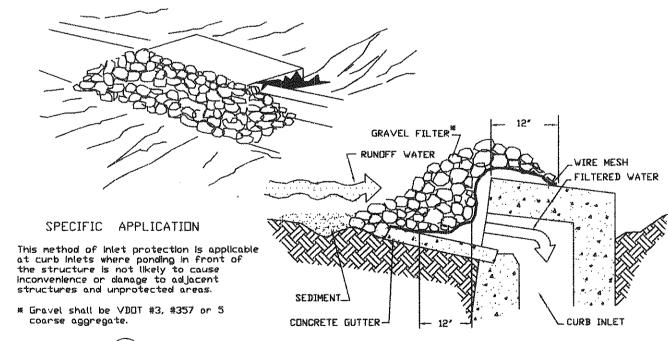
 1. Apron lining may be rip-rap,
 grouted rip-rap, or concrete.

 2. La is the length of the rip-
- grouted rip-rap, or concrete.

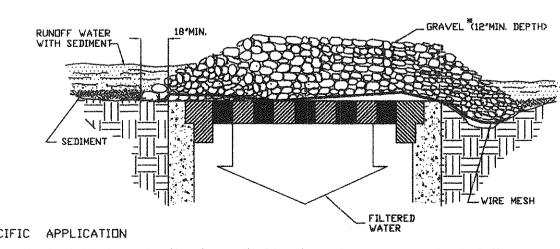
 2. La is the length of the riprap apron as calculated using
 plates 1.36d and 1.36e.

 3. d = 1.5 times the maximum
 stone diameter, but not less





IP GRAVEL CURB INLET SEDIMENT FILTER



SPECIFIC APPLICATION

This method of inlet protection is applicable where heavy concentrated flows are expected, but not where ponding around the structure might cause excessive inconvenience or damage to adjacent structures and unprotected areas.

* Gravel shall be VDOT #3, #357 or #5 coarse aggregate.

(IP) GRAVEL AND WIRE MESH DROP INLET SEDIMENT FILTER

	TEMPOF	Yary sei	DIMENT TI	rap da	ΓΑ	,
TDUCTURE	DRAINAGE AREA (ACRES)	STORAC	SE (C.Y.)	WEIR LENGTH (FT.)	WEIR	BERM HEIGHT (FT.)
STRUCTURE	(ACRES)	REQ'D	DESIGN	(FT.)	HEIGHT (FT.)	
	***************************************			and a second of the second of		
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	man and the same a	······································		J	<u></u>	<u> </u>

67 CU. YD./ACRE 4.0' MAX. (EXCAVATED)	ELEV.
CROSS	S-SECTION

CLASS I RIP-RAP

CDARSE AGGREGATE ***

FILTER CLOTH

EXCAVATED AREA

*** CDARSE AGGREGATE SHALL BE VDOT #3,#357 0F#5

NOTE; FOR AREAS LESS THAN 3.0 ACRES. FOR AREAS LARGER THAN 3.0 ACRES A SEDIMENT BASIN IS REQUIRED. SEE DETAIL THIS SHEET.

ST SEDIMENT TRAP

MAX ACCOUNTS			\\		I L					
	3.02	TEMPORARY GRAVEL CONSTRUCTION ENTRANCE	(CE)		3'51	LEVEL SPREADER	(LS)			
	3.03	CONSTRUCTION ROAD STABILIZATION	CRS		3.22	VEGETATIVE STREAMBANK STABILIZATION	(SS)	9		
	3.04	STRAW BALE BARRIER	STB		3.23	STRUCTURAL STREAMBANK STABILIZATION	(223)	6		
	3.05	SILT FENCE	SF	* * * *	3.24	TEMPORARY VEHICULAR STREAM CROSSING	(√s)			
	3.06	BRUSH BARRIER	BB	(222000000)	3,25	UTILITY STREAM CRUSSING	(USC)	=#=		
	3.07	STORM DRAIN INLET PROTECTION	(IP)		3.26	DEWATERING STRUCTURE	DS	E.J.		
	3.08	CULVERT INLET PROTECTION	CIP		3.27	TURBIDITY CURTAIN	TO	DV		
	3.09	TEMPORARY DIVERSION DIKE	DD	(10)	3.28	SUBSURFACE DRAIN	(SD)			
	3.10	TEMPORARY FILL DIVERSION	FD	(P)	3.29	SURFACE ROUGHENING	(SR)	(SR)		
	3.11	TEMPORARY RIGHT-OF-WAY DIVERSION	(RWI)	W	3.30	TOPSOILING	ョ			
	3.12	DIVERSION	(DV)	(a)	3.31	TEMPORARY SEEDING	TS	- (1)		
	3.13	TEMPORARY SEDIMENT TRAP	ST		3.32	PERMANENT SEEDING	(PS)	0-		
	3.14	TEMPORARY SEDIMENT BASIN	(SB)		3.33	SODDING	(SD)			
	3.15	TEMPORARY SLOPE DRAIN	TSD	[13]	3,34	BERMUDA GRASS AND ZOYSIAURASS ESTABLISHMENT	(B)			
	3.16	PAVED FLUME	PF	(PF)	3,35	MULCHING	(<u>R</u>			
	3.17	STORMWATER CONVEYANCE CHANNEL	(CC)		3.36	SOIL STABILIZATION BLANKETS AND MATTING		TREAT. 1		
	3.18	OUTLET PROTECTION	ОР		3,37	TREES, SHRUBS, VINES AND GROUND COVERS	(VE)			
	3.19	RIPRAP	RR		3,38	TREE PRESERVATION AND PROTECTION	(F)			
					3.39	DUST CONTROL	(DC)			

SYMBOL

NO.

TITLE

ROCK CHECK DAMS

SYMBOL

GENERAL EROSION AND SEDIMENT CONTROL NOTES

TITLE

SAFETY FENCE

1. ALL SOIL EROSION & SEDIMENT CONTROL MEASURES SHALL BE ACCOMPLISHED IN STRICT ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS CONTAINED IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.

2. THE APPROVING AUTHORITY MAY ADD TO, DELETE, RELOCATE, CHANGE, OR OTHERWISE MODIFY CERTAIN EROSION AND SEDIMENT CONTROL MEASURES WHERE FIELD CONDITIONS ARE ENCOUNTERED THAT WARRANT SUCH MODIFICATIONS.

3. ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES AS SHOWN ON THE PLAN SHALL BE PLACED IN ADVANCE OF THE WORK BEING PERFORMED, AS FAR AS PRACTICAL.

4. IN NO CASE DURING CONSTRUCTION SHALL WATER RUNOFF BE DIVERTED OR ALLOWED TO FLOW TO LOCATIONS WHERE ADEQUATE PROTECTION HAS NOT BEEN PROVIDED.

PROVIDED.

5. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LEAVE THE SITE ADEQUATELY PROTECTED AGAINST EROSION, SEDIMENTATION, OR ANY DAMAGE TO ANY ADJACENT PROPERTY AT THE END OF EACH DAY'S WORK.

6. FOR THE EROSION CONTROL KEY SYMBOLS SHOWN ON THE PLANS, REFER TO THE VIRGINIA UNIFORM CODING SYSTEM FOR EROSION AND SEDIMENT CONTROL PRACTICES CONTAINED IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION. THESE SYMBOLS AND KEYS ARE TO BE UTILIZED ON ALL EROSION CONTROL PLANS SUBMITTED.

MAINTENANCE

IN GENERAL, ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED WEEKLY AND AFTER EACH SIGNIFICANT RAINFALL. THE FOLLOWING ITEMS WILL BE CHECKED IN PARTICULAR:

1. ALL SEDIMENT TRAPPINGS WILL BE CHECKED REGULARLY FOR NECESSRY SEDIMENT REMOVAL.

2. ALL STORM DRAIN INLETS AND OUTLETS WILL BE CHECKED REGULARLY FOR SEDIMENT BUILDUP.

3. ALL SILT BARRIERS WILL BE CHECKED REGULARLY FOR UNDERMINING OR DETERIORATION.

4. ALL SEEDED AREAS WILL BE CHECKED REGULARLY TO SEE THAT GOOD STABILIZATION IS MAINTAINED. AREAS SHOULD BE FERTILIZED AND RESEEDED AS NEEDED.

PERMANENT STABILIZATION

ALL AREAS DISTURBED BY CONSTRUCTION WILL BE STABILIZED WITH PERMANENT SEEDING WITHIN 7 DAYS OR IMMEDIATELY FOLLOWING FINISH GRADING. SEEDING WILL BE DONE ACCORDING TO STANDARD AND SPECIFICATION 3.32 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK. PERMANENTLY SEEDED AREAS SHALL BE PROTECTED DURING ESTABLISHMENT WITH STRAW MULCH.

(PS) PERMANENT SEEDING MIXTURE

TYPE A TYPE B (SLOPES 3:1 OR STEEPER)

15 OCTOBER TO 1 FEBRUARY 15 MARCH TO 1 MAY

K-31 FESCUE @ 5 LB / 1000 SF CROWN VETCH @ 1/2 LB / 1000 SF

BORZY WINTER RYE @ 1/2 LB / 1000 SF RED TOP @ 1/8 LB / 1000 SF

1 FEBRUARY TO 1 JUNE

K-31 FESCUE @ 5 LB / 1000 SF 15 AUGUST TO 1 OCTOBER

ANNUAL RYE @ 1/2 LB / 1000 SF CROWN VETCH @ 1/2 LB / 1000 SF

1 JUNE TO 1 SEPTEMBER

K-31 FESCUE @ 5 LB / 1000 SF

GERMAN MILLET @ 1/2 LB / 1000 SF

1 SEPTEMBER TO 15 OCTOBER

K-31 FESCUE @ 5 LB / 1000 SF

ANNUAL RYE @ 1/2 LB / 1000 SF

LIME: 140 LB / 1000 SF PULVERIZED AGRICULTURAL LIMESTONE
FERTILIZER: 5-20-10 @ 25 LB / 1000 SF

CH: IF REQUIRED, SHALL BE USED OVER ALL SEEDED AREAS AND SHALL BE APPLIED IN ACCORDANCE WITH SECTION 1.75 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.

SOIL CONDITIONING:
INCORPORATION OF LIME AND FERTILIZER, SELECTION OF CERTIFIED
SEED, MULCHING, MAINTENANCE OF NEW SEEDLINGS, AND RESEEDING
SHALL BE IN ACCORDANCE WITH SPECIFICATIONS CONTAINED WITHIN
THE VIRGINIA SOIL EROSION AND SEDIMENT CONTROL HANDBOOK,
LATEST EDITION. ADDITIONAL SEEDING TO BE PERFORMED AS REQUIRED
BY THE INSPECTOR.

SEED APPLICATION: APPLY SEED UNIFORMLY WITH A CYCLONE SEEDER, DRILL, CULTIPACKER SEEDER, OR HYDROSEEDER ON A FIRM, FRIABILE, SEEDBED. MAXIMUM SEEDING DEPTH SHALL BE 1/4 INCH.

REVISION DATE DESCRIPTION

DESIGNED - TCD

DRAWN - PM

DRAWN - PM

DESCRIPTION

EROSION CONTROL NOTES & DETAILS
FOR
"BOTETOURT COMMONS KROGER"
STORE "R-364"

MICHAEL S. WEBB
No. 012656

STORE "R-364"

PREPARED FOR

CHECKED - MSW

TIMBERBROOK ASSOCIATES, L.C.

AMSTERDAM MAGISTERIAL DISTRICT
BOTETOURT COUNTY, VIRGINIA

LUMSDEN ASSOCIATES, P.C. scale: none comm: #97-452k
ENGINEERS-SURVEYORS-PLANNERS
ROANOKE, VIRGINIA

DATE: 4/23/99 SHEET 16 of 16