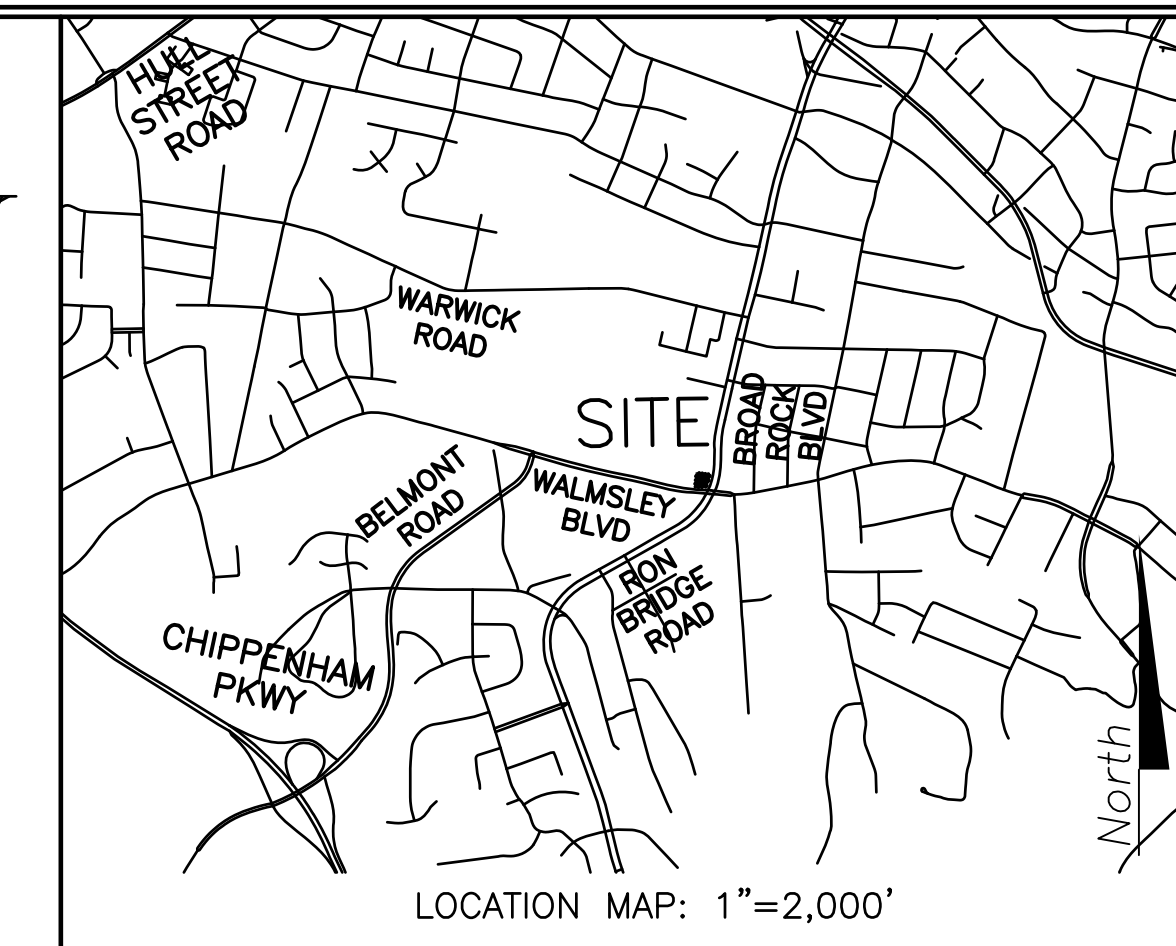


PROPOSED RETAIL BUILDING

#3350 BROAD ROCK BOULEVARD

RICHMOND, VIRGINIA



GENERAL EROSION AND SEDIMENT CONTROL NOTES

- ES-1: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA REGULATIONS 9VAC 25-840-40 EROSION AND SEDIMENT CONTROL REGULATIONS.
- ES-2: THE PLAN APPROVING AUTHORITY MUST BE NOTIFIED ONE WEEK PRIOR TO THE PRE-CONSTRUCTION CONFERENCE, ONE WEEK PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITY, AND ONE WEEK PRIOR TO THE FINAL INSPECTION.
- ES-3: ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.
- ES-4: A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.
- ES-5: PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE PLAN APPROVING AUTHORITY.
- ES-6: THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION FILTERING DEVICE.
- ES-7: ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.
- ES-8: DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED DRAINAGE SYSTEM.
- ES-9: THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
- STATE AGENCIES SHALL MAKE A CONTINUING REVIEW AND EVALUATION OF THE METHOD USED AND THE OVERALL EFFECTIVENESS OF THE EROSION CONTROL PLAN. THE 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 BECAUSE OF CHANGED CIRCUMSTANCES THE PLAN CAN NOT BE CARRIED OUT.
- 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.

UTILITY LIST OF MATERIALS

Storm Sewer Material Quantity List	
VDOT DI-3B	6 LF (4.02 VF)
VDOT DI-3C	10 LF (3.92 VF)
15" RCP	59 LF

Sewer Material Quantity List	
8" PVC Lateral	84 LF

Public Water Materials Quantity List	
8" PVC Water Line	24 LF
12"x8" Tapping Sleeve	1 ea
8"x6" Tee	1 ea
8" GV & Box	1 ea
6" GV & Box	1 ea
Fire Hydrant	1 ea
1.5" Type 'K' Domestic Water Line	56 LF
2" Corp. Stop	1 ea
1" Meter	1 ea

NOTE: QUANTITIES ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY THE ACTUAL AMOUNTS PRIOR TO BEGINNING WORK.

EROSION CONTROL LIST OF MATERIALS

E. & S Control Quantity List	
Ⓢ Construction Entrance	1 ea
Ⓜ Inlet Protection	4 ea
Ⓢ Silt Fence	130 LF
Fine Grading & Seeding	0.1 Ac.

SEEDING SCHEDULE

- ALL CUT AND FILL SLOPES AND CHANNELSIDE SLOPES WHICH ARE NOT TO BE PAVED SHALL BE SEEDED UNTIL A GOOD STAND OF GRASS IS OBTAINED IN ACCORDANCE WITH:
- 100 LBS. PER 1,000 SQ. FT. GROUND LIMESTONE OR EQUIVALENT.
 - 20 LBS. OF 10-10-10 FERTILIZER OR EQUIVALENT PER 1,000 SQ. FT.
 - VARIETIES TO BE SEEDED:
 1. SPRING SEEDING MARCH 1 - APRIL 30; SPRING OATS 2.5 LBS. PER 1,000 SQ. FT.
 2. SUMMER SEEDING MAY 1 - AUGUST 1; WEEPING LOVE GRASS AT 2 OZ. PER 1,000 SQ. FT. MIXED WITH 1 BUSHEL SAWDUST FOR UNIFORM SEEDING.
 3. AUTUMN SEEDING AUGUST 1 - NOVEMBER 15; TALL FESCUE (KY 31) AT 1.5 LBS. PER 1,000 SQ. FT.

SITE SUMMARY & NOTES:

- PLAN OF DEVELOPMENT FOR: #3350 BROAD ROCK BOULEVARD
- TAX MAP No.: C0080745021
- ZONING: B-2 (COMMUNITY BUSINESS)
- PROJECT SUMMARY / SITE DATA:
 - EXISTING USE: VACANT LOT
 - PROPOSED USE: 1-STORY RETAIL BUILDING
 - BUILDING HEIGHT: 1 STORY
 - BUILDING AREA GROSS I: 5848 SQ.FT.
 - ACREAGE: 0.45 ACRES (19,737 SQ.FT.)
 - WATER: CITY
 - SEWER: CITY
 - PARKING SPACES REQUIRED: 19 - (1 PER 300 SQ FT)
 - PARKING SPACES PROVIDED: 19 - (2 HANDICAPPED, 3 COMPACT CAR (AND 14 REGULAR 8.5'X15.5'))
- LANDSCAPING AND SITE IMPROVEMENTS SHALL BE INSTALLED AND MAINTAINED SO AS TO NOT INTERFERE WITH THE SIGHT DISTANCE NEEDS OF DRIVERS WITHIN THE PARKING AREA AND AT ENTRANCE/EXIT LOCATIONS.
- ALL TRAFFIC SIGNS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND INSTALLED IN ACCORDANCE WITH CITY STANDARDS.
- THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH THE CITY OF RICHMOND ON ALL NECESSARY PERMITS FOR THE INSTALLATION OF ALL IMPROVEMENTS AND ENCROACHMENTS ONTO BROAD ROCK BOULEVARD AND/OR WALMSLEY BOULEVARD.
- BUILDING INFORMATION
 - GROUND FLOOR - UNSEPARATED MIXED USES
 - USE GROUP S-2 PRIVATE PARKING GARAGE
 - USE GROUP B BUSINESS AND USE GROUP A-3 ASSEMBLY CONSTRUCTION TYPE SA PROTECTED SPRINKLER IN ACCORDANCE WITH NFPA 13
- PERMITS REQUIRED FOR THIS PROJECT INCLUDE, BUT NOT LIMITED TO: BUILDING PERMIT, MECHANICAL PERMIT, ELECTRICAL PERMIT, PLUMBING PERMIT, GAS PIPING PERMIT (IF APPLICABLE), SPRINKLER PERMIT FIRE ALARM PERMIT, BARRICADE PERMIT (IF APPLICABLE), AND DRIVEWAY PERMIT.

CBPA COMPLIANCE WILL BE MET THROUGH THE PURCHASE OF OFF-SITE CREDITS. 0.51 LBS/YR WILL BE PURCHASED IN ACCORDANCE WITH THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK

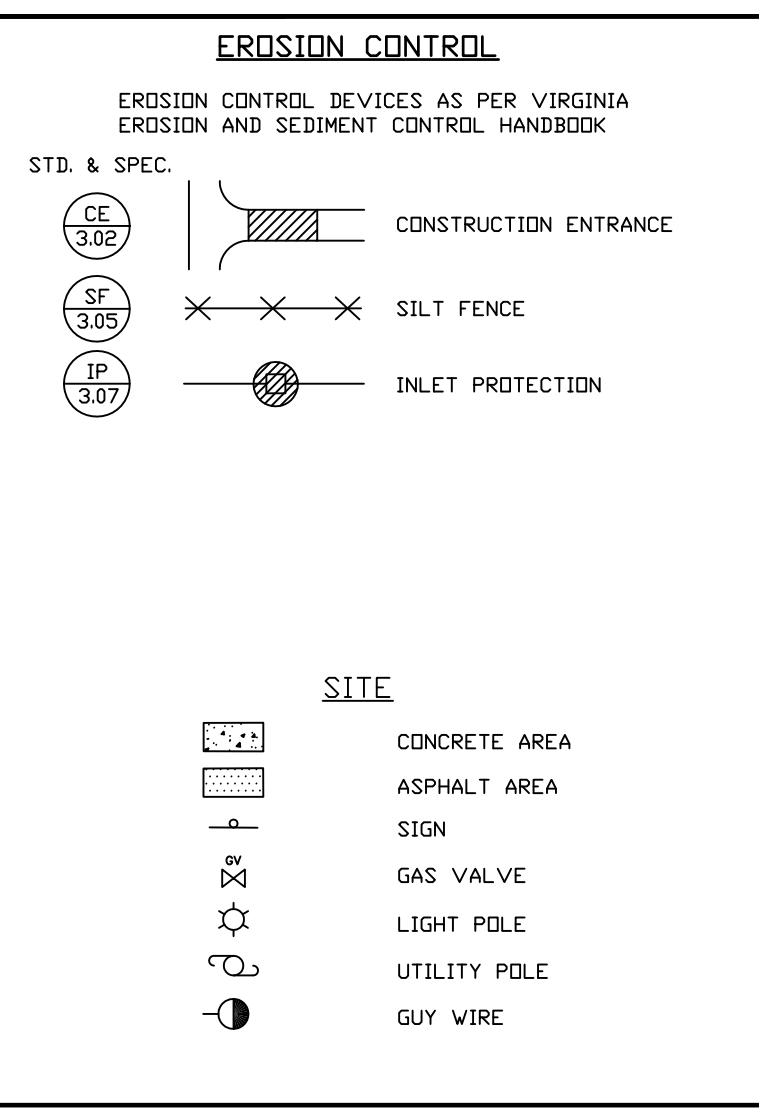
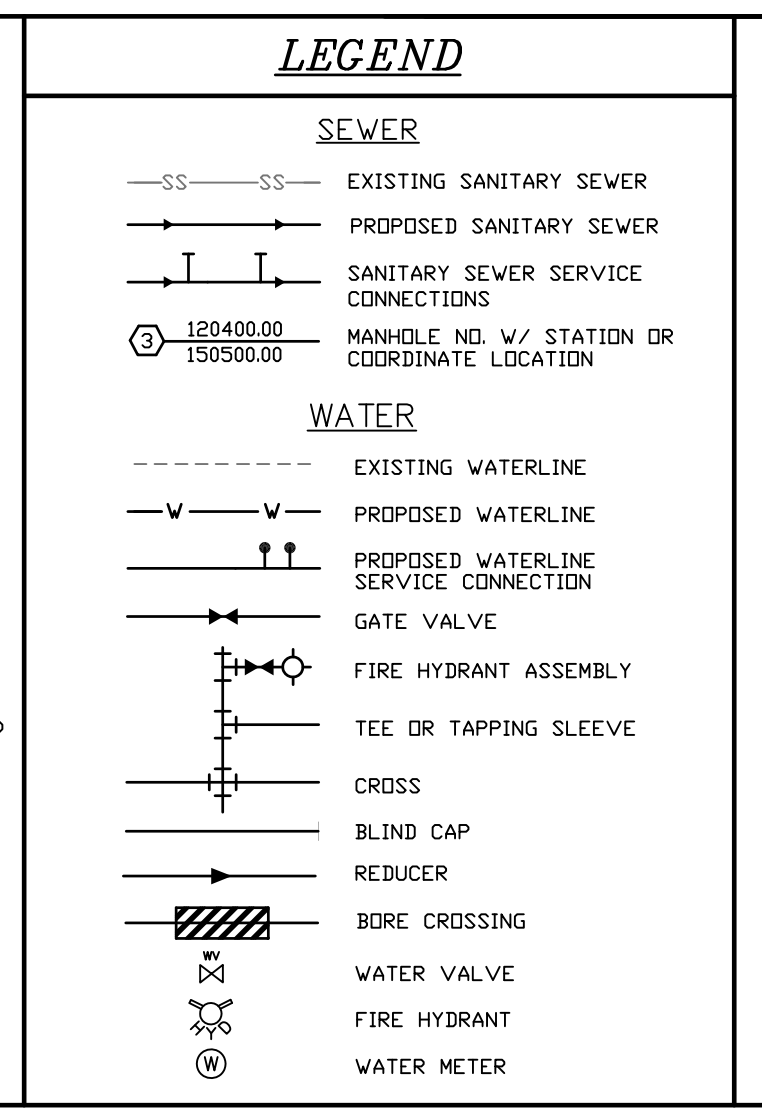
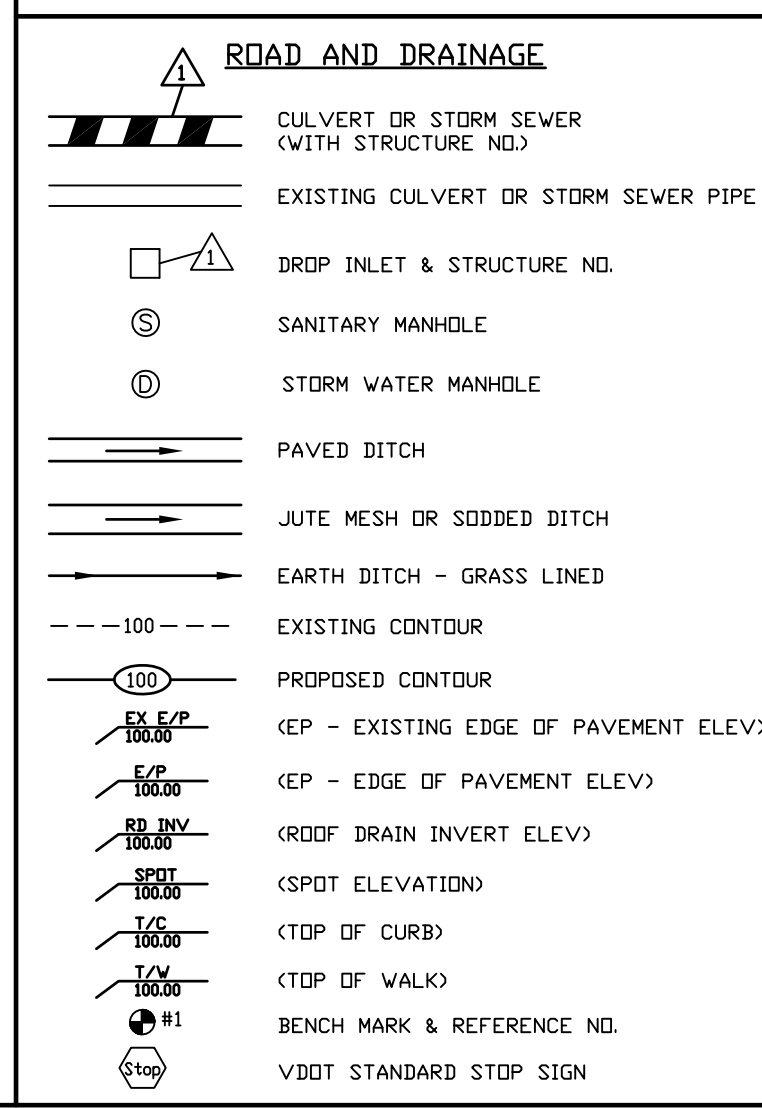
CITY OF RICHMOND - GENERAL NOTES

- ALL CONSTRUCTION METHODS AND MATERIALS SHALL MEET THE LATEST REQUIREMENTS OF THE CITY OF RICHMOND AND THE VIRGINIA DEPARTMENT OF TRANSPORTATION.
- CONTRACTOR SHALL NOTIFY MISS UTILITY (811) BEFORE BEGINNING ANY EXCAVATION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY AND ALL NECESSARY PERMITS AND SHALL NOTIFY THE PROPER AUTHORITIES AT THE START OF CONSTRUCTION SO THAT WORK MAY BE INSPECTED.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PRESERVE ANY EXISTING RIGHT-OF-WAY MONUMENTS. ANY MARKERS DAMAGED SHALL BE REPLACED AT CONTRACTOR'S EXPENSE.
- CURRENT SPECIFICATIONS OF THE CITY OF RICHMOND SHALL GOVERN POURING, CURING, FORMS, REINFORCEMENT, WORKMANSHIP, ETC OF ALL CONCRETE USED ON THIS PROJECT.
- EXCESS EXCAVATION IS TO BE DISPOSED OF AS DIRECTED BY THE OWNER AND/OR CONTRACTOR.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE PROPER CITY AGENCIES (24) TWENTY FOUR HOURS PRIOR TO BEGINNING CONSTRUCTION.
- CONCRETE FOR CURBS SHALL BE CLASS A-3 PER CURRENT SPECIFICATIONS OF THE CITY OF RICHMOND.
- THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING ANY CONSTRUCTION.
- ALL PARKING LOT STRIPING SHALL BE WHITE.

CITY OF RICHMOND - C.B.P.A. NOTES

- NO WETLAND IMPACTS ARE PROPOSED WITH THIS PROJECT.
- THIS PROJECT IS NOT WITHIN THE LIMITS OF THE R.M.A. AND IS WITHIN THE CITY OF RICHMOND COMBINED SEWER DISTRICT

POD APPROVAL:



INDEX TO SHEETS

SHEET #	LATEST REVISION DATE	CONTENTS OF SHEET
C-1		COVER SHEET
C-2		EXISTING CONDITIONS & DEMOLITION PLAN
C-3		SITE & UTILITY LAYOUT
C-4		GRADING & DRAINAGE PLAN
C-5		EROSION & SEDIMENT CONTROL - PHASE I
C-6		EROSION & SEDIMENT CONTROL - PHASE II
C-7		EROSION & SEDIMENT CONTROL DETAILS
C-8		HYDRAULIC ANALYSIS
C-9		CBPA
C-10		PROFILES & CALCULATIONS

OWNER NAME: BROAD ROCK, INC.
 ADDRESS: 2116 WILLIS ROAD
 RICHMOND, VA 23237

DEVELOPER NAME: SKY MANAGEMENT SERVICES, LLC
 ADDRESS: 4860 COX ROAD, SUITE 20
 GLEN ALLEN, VA 23060

CONTACT PERSON: MR. NAVEED ARSHAD
 PHONE NO.: (804) 217-8344
 FAX NO.: (804) 916-6825
 E-MAIL: NAVEEDARSHAD1978@GMAIL.COM

ENGINEER NAME: TOWNES SITE ENGINEERING
 ADDRESS: 9850 LORI ROAD - SUITE 201
 CHESTERFIELD, VA 23832

CONTACT PERSON: JASON P. WILKINS, P.E.
 PHONE NO.: (804) 748-9011
 FAX NO.: (804) 748-2590
 E-MAIL: JWILKINS@CCTOWNES.COM

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TOWNES
 SITE ENGINEERING

9850 Lori Road, Suite 201
 Chesterfield, Virginia 23832
 Phone: (804) 748-9011 Fax: (804) 748-2590

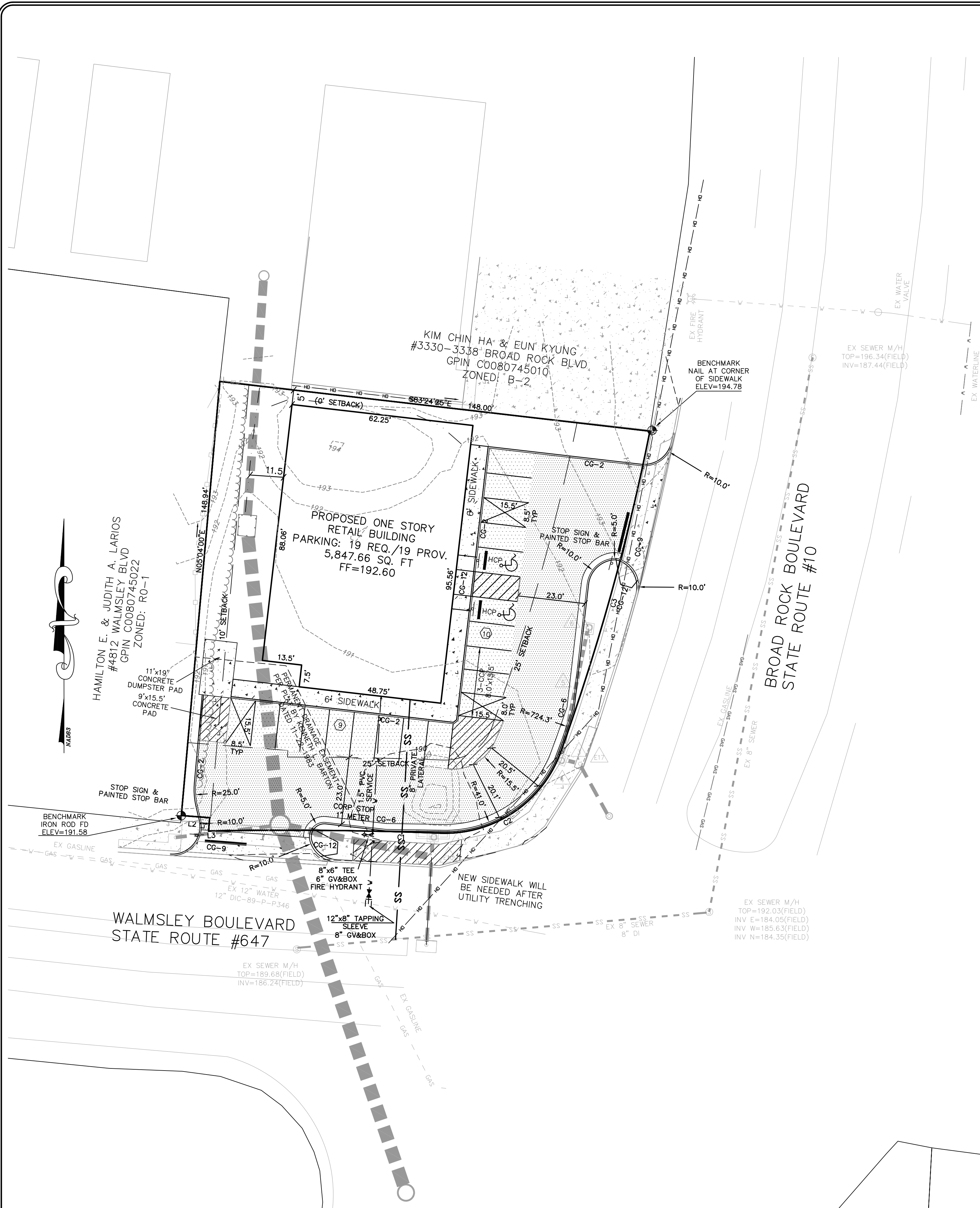
ASK US HOW

COMMONWEALTH OF VIRGINIA
 JASON P. WILKINS
 Lic. No. 041215
 03/03/2014
 PROFESSIONAL ENGINEER

PROPOSED RETAIL BUILDING
 #3350 BROAD ROCK BOULEVARD
 RICHMOND, VIRGINIA
 COVER SHEET

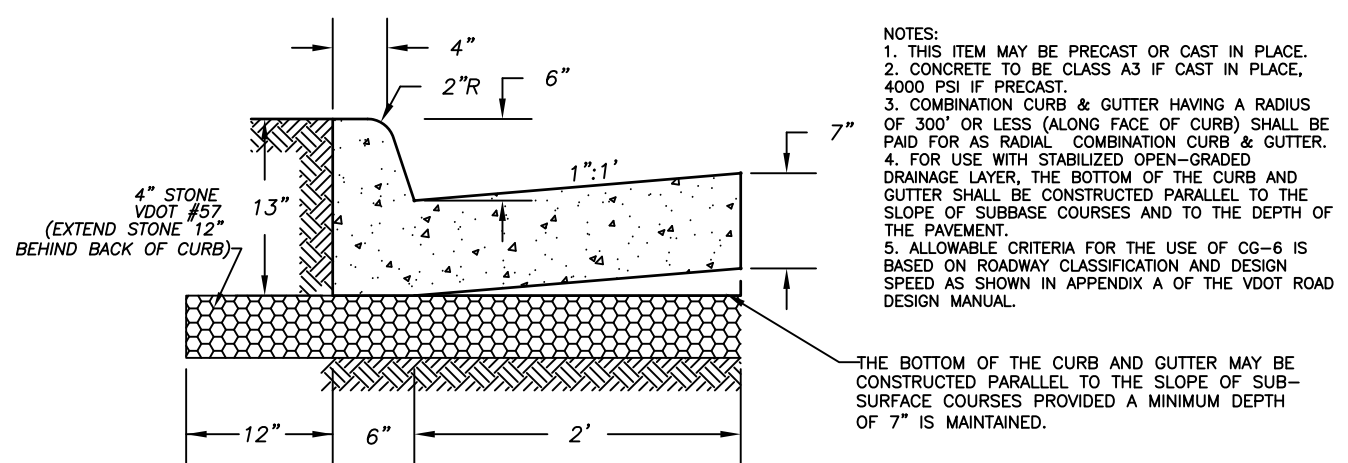
REVISIONS

DATE	ITEM
03 / 03 / 2014	SCALE
	PROJECT MANAGER JASON P. WILKINS, P.E.
	DESIGNED BY TONY R. CARUSO
	CHECKED BY
	PROJ.# 20130007
	SHEET # C - 1



CURVE TABLE						
CURVE	LENGTH	RADIUS	DELTA	CHORD	CHORD BEARING	TANGENT
C1	77.69'	1391.39'	311°57'	77.68'	N89°25'50"W	38.86'
C2	53.02'	42.00'	72°19'45"	49.57'	N56°00'16"E	30.70'
C3	113.93'	759.51'	8°35'42"	113.83'	N15°32'33"E	57.07'

LINE TABLE		
LINE	LENGTH	BEARING
L1	4.62'	N04°12'53"E
L2	9.69'	N85°35'06"W
L3	1.58'	S86°00'50"W



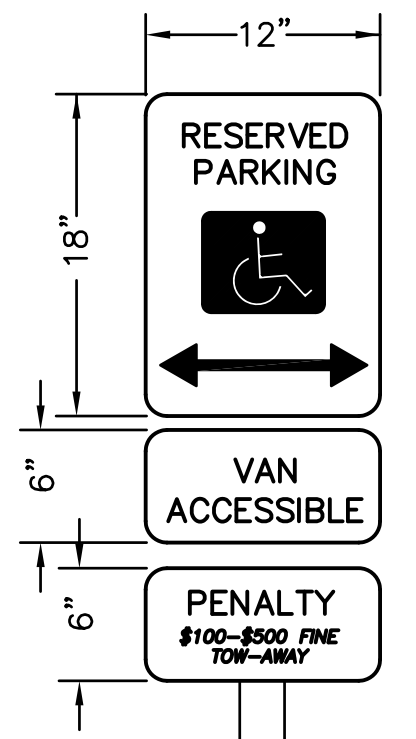
COMBINATION 6" CURB & GUTTER
CG-6



PENALTY
\$100-\$500 FINE
TOW-AWAY

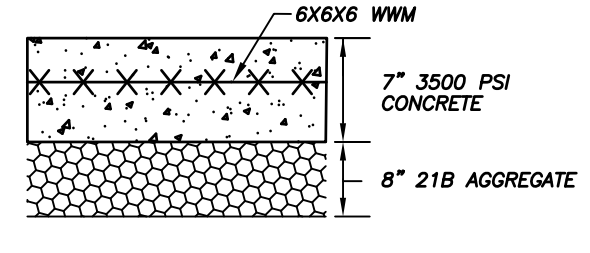
NOTE: HANDICAPPED SPACES SHALL BE IDENTIFIED BY ABOVE GRADE SIGNS AS RESERVED FOR PHYSICALLY HANDICAPPED PERSONS. PROVIDE (1) 12" X 18" SIGN AT EACH HANDICAPPED PARKING SPACE INDICATED ON THE SITE PLAN. SIGN WILL BE ALUMINUM (PAINTED WHITE) WITH GREEN LETTERS AND INTERNATIONAL WHEELCHAIR SYMBOL. PROVIDE A 6" X 12" SIGN BELOW THE WHEELCHAIR SYMBOL SPECIFYING PENALTIES FOR VIOLATION. THE LOWER EDGE OF SIGNS SHALL BE AT LEAST 60 INCHES ABOVE-GRADE.

REGULAR HANDICAPPED PARKING SIGN

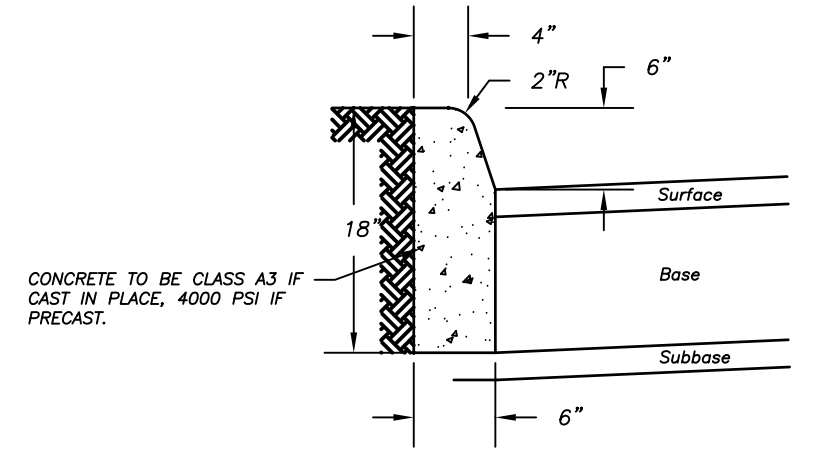


NOTE: HANDICAPPED SPACES SHALL BE IDENTIFIED BY ABOVE GRADE SIGNS AS RESERVED FOR PHYSICALLY HANDICAPPED PERSONS. PROVIDE (1) 12" X 18" SIGN AT EACH HANDICAPPED PARKING SPACE INDICATED ON THE SITE PLAN. SIGN WILL BE ALUMINUM (PAINTED BLUE) WITH WHITE LETTERS AND INTERNATIONAL WHEELCHAIR SYMBOL. THE LOWER EDGE OF SIGNS SHALL BE AT LEAST FIVE (5) FEET ABOVE-GRADE, BUT NO HIGHER THAN SEVEN (7) FEET ABOVE-GRADE.

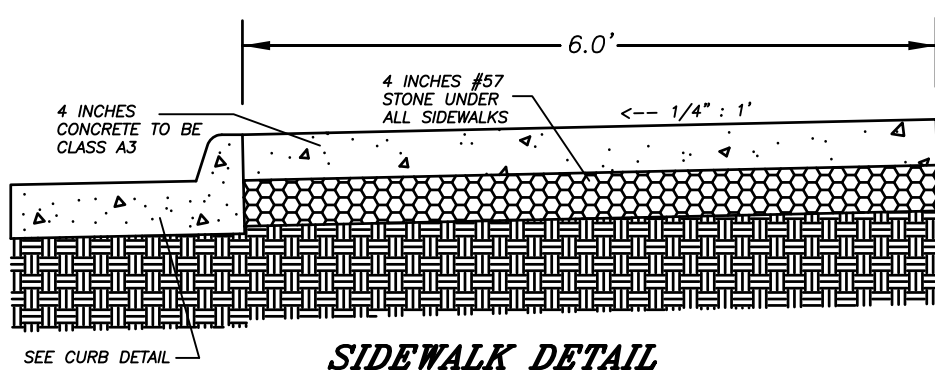
HANDICAPPED PARKING SIGN



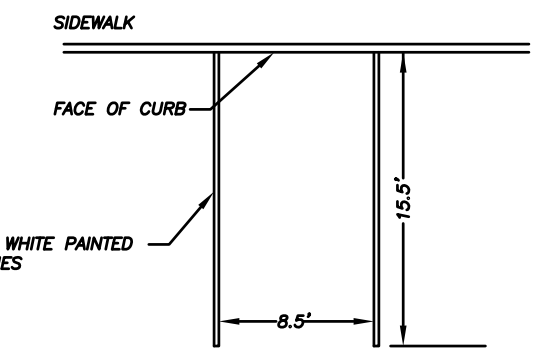
DUMPSTER PAD CONCRETE SECTION



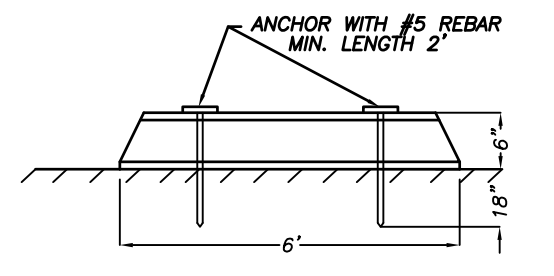
STANDARD 6" CURB
CG-2



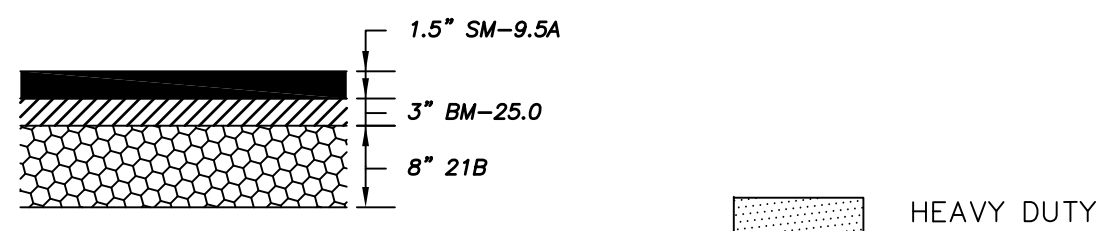
SIDEWALK DETAIL



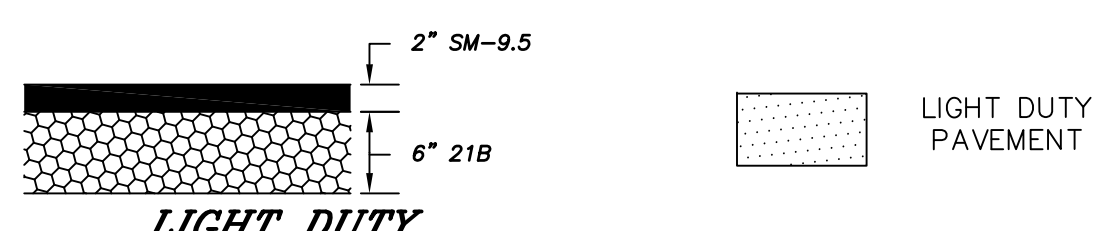
TYPICAL PARKING SPACE DETAIL



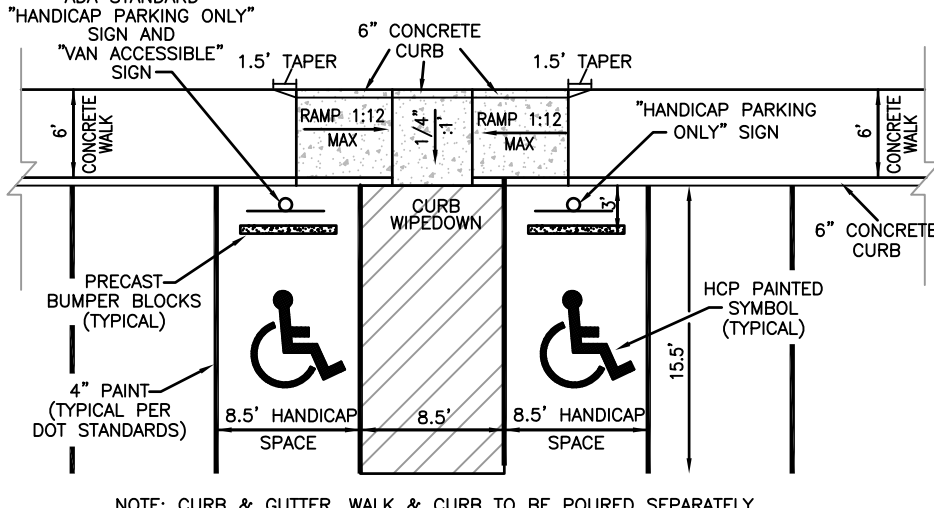
DETAIL-PROPER ANCHORING OF PRECAST BUMPER BLOCKS



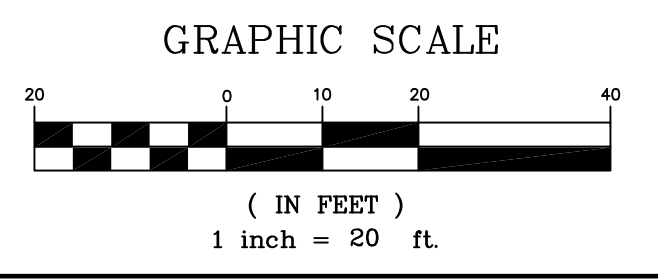
HEAVY DUTY PAVEMENT DETAIL



LIGHT DUTY PAVEMENT DETAIL



TYPICAL HANDICAP SPACE & RAMP DETAIL



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9850 Lori Road, Suite 201
Chesterfield, Virginia 23832
Phone: (804) 748-9011 Fax: (804) 748-2590

ASK US HOW

PROPOSED RETAIL BUILDING

#3350 BROAD ROCK BOULEVARD

RICHMOND, VIRGINIA

SITE & UTILITY LAYOUT

REVISIONS	
DATE	ITEM

DATE
03 / 03 / 2014

SCALE
1" = 20'

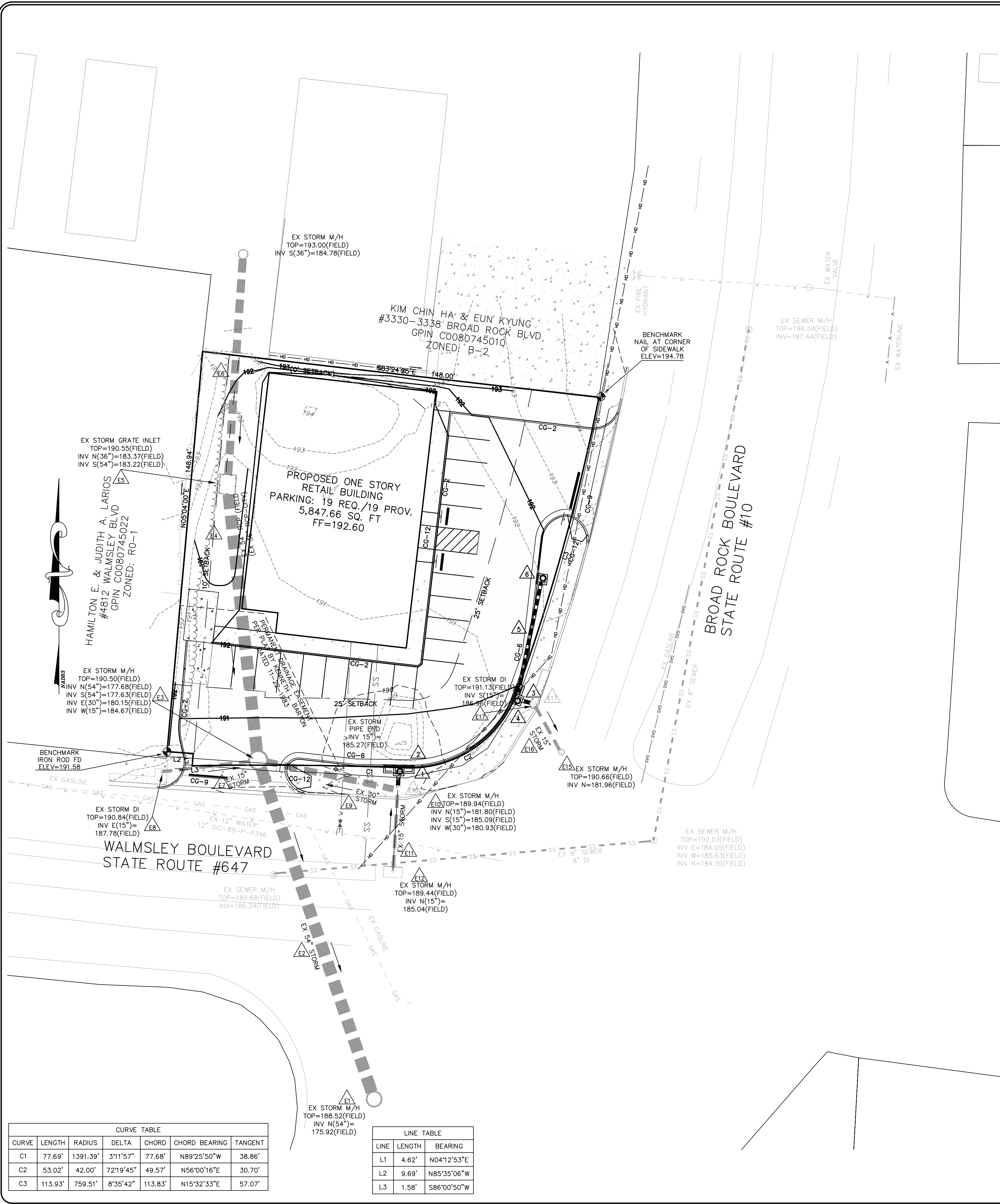
PROJECT MANAGER
JASON P. WILKINS, P.E.

DESIGNED BY
TONY R. CARUSO

CHECKED BY

PROJ.#
20130007

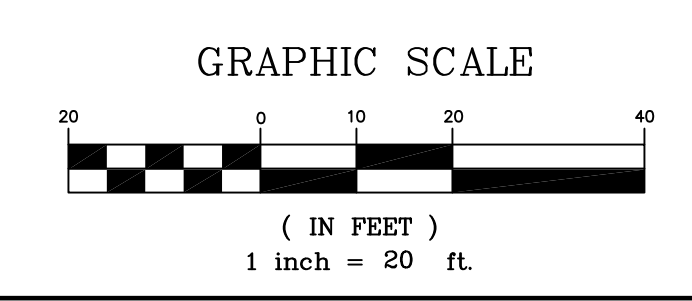
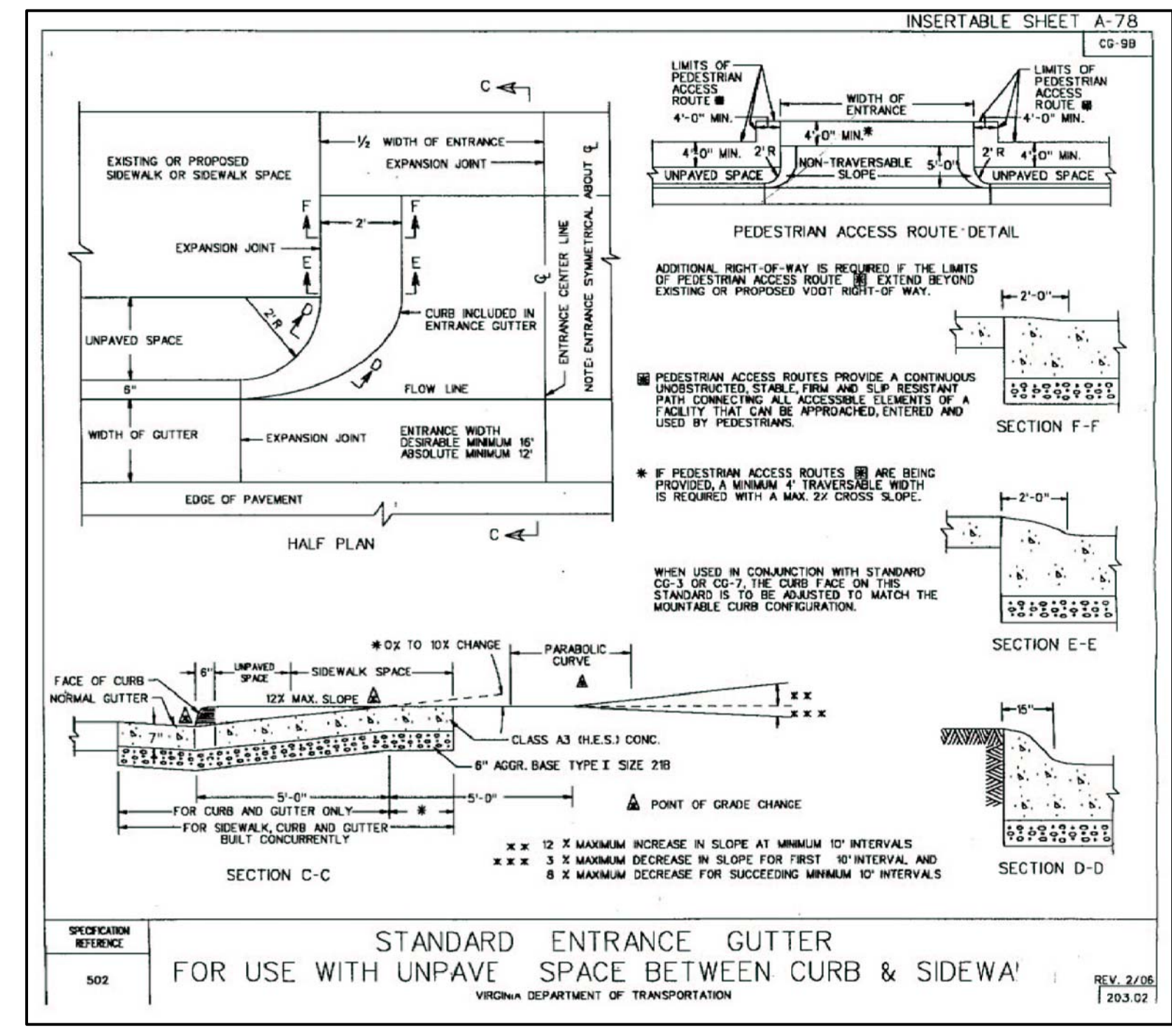
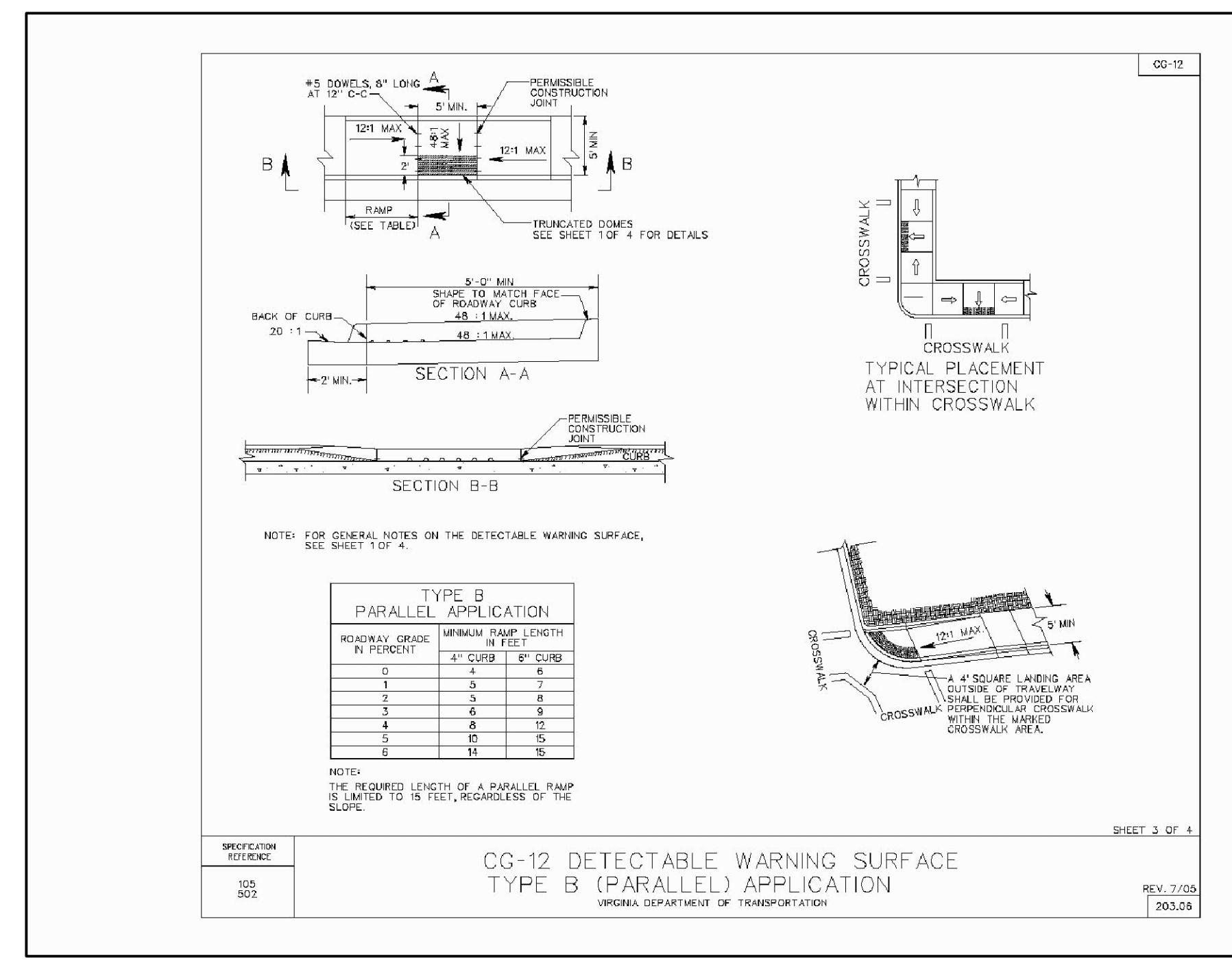
SHEET #
C - 3



CURVE TABLE						
CURVE	LENGTH	RADIUS	DELTA	CHORD	CHORD BEARING	TANGENT
C1	77.69'	1391.39'	311°57'	77.68'	N89°25'50"W	38.86'
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L2	9.69'	N85°35'06"W
L3	1.58'	S86°00'50"W

DRAINAGE STRUCTURE TABLE									
Structure #	Type	LENGTH	COMMENTS	DIAMETER	MATERIAL	TOP ELEV	INV IN	INV OUT	DEPTH
6	DI-3A	-	NO STEPS			192.00		188.08	3.92
5	DI-3A	45.53		15	RCP CLASS III		188.08	187.08	
4	DI-3B	6	STEPS REQ'D.			191.00		186.98	4.02
3	PIPE	6.78		15	RCP CLASS III		186.98	186.96	
2	DI-3C	10	NO STEPS			190.00		186.08	3.92
1	PIPE	6.50		15	RCP CLASS III		186.08	185.09	



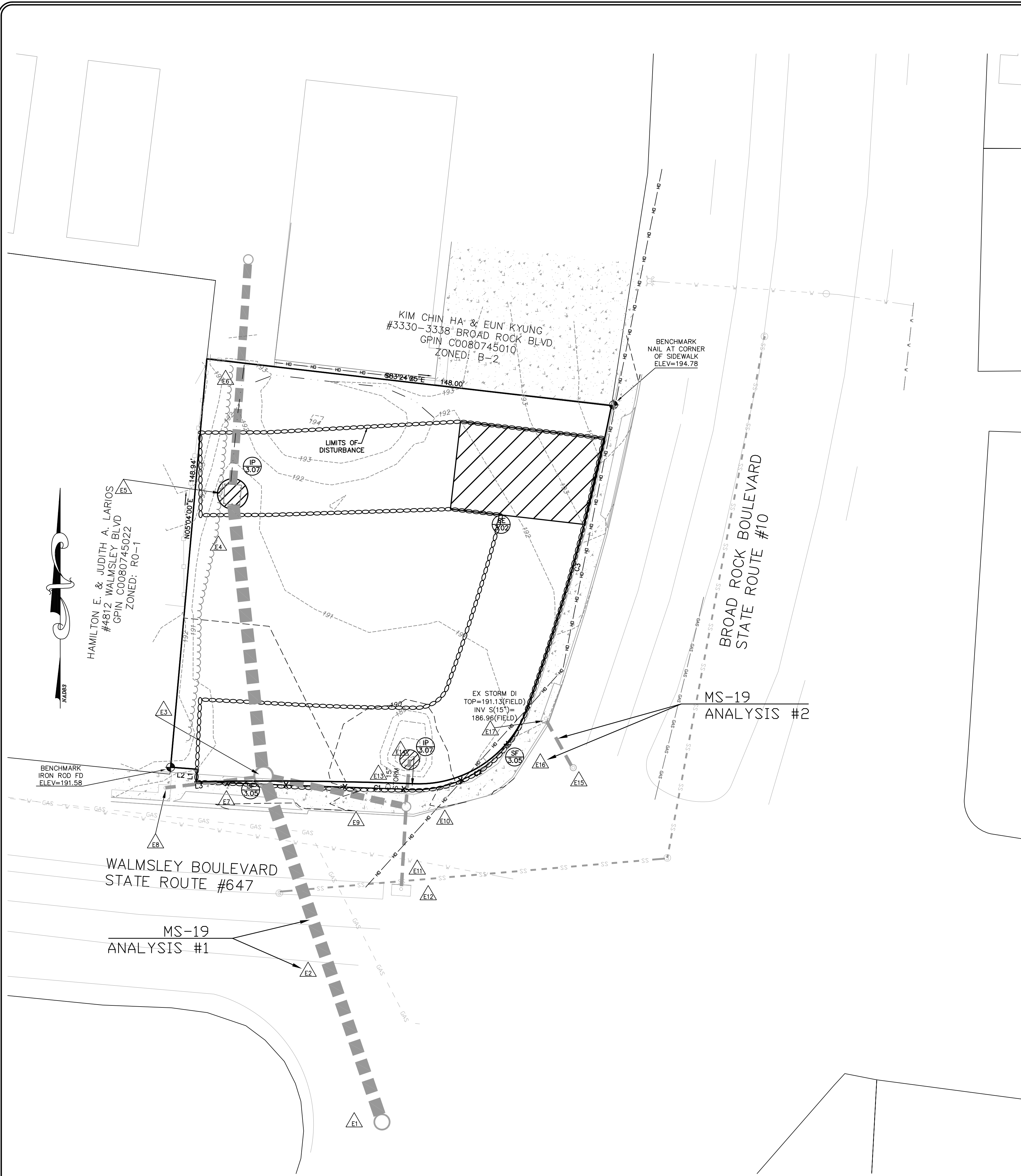
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TOWNES SITE ENGINEERING
 9850 Lori Road, Suite 201
 Chesterfield, Virginia 23832
 Phone: (804) 748-9011 Fax: (804) 748-2590

PROPOSED RETAIL BUILDING
 #3350 BROAD ROCK BOULEVARD
 RICHMOND, VIRGINIA
 GRADING & DRAINAGE PLAN

ASK US HOW

COMMONWEALTH OF VIRGINIA
 JASON P. WILKINS
 Lic. No. 041215
 03/03/2014
 PROFESSIONAL ENGINEER



CONSTRUCTION NARRATIVE 1

PROJECT DESCRIPTION
 THIS PROJECT INVOLVES A COMMERCIAL RETAIL BUILDING WITHIN THE CITY OF RICHMOND. THIS DEVELOPMENT INCLUDES A 5848SF ONE STORY RETAIL BUILDING FOR SKY MANAGEMENT SERVICES, LLC LOCATED AT 4860 COZ ROAD, SUITE 30 GLEN ALLEN, VA 23060. THE TOTAL AREA OF DISTURBANCE ASSOCIATED WITH THIS PROJECT IS 0.45 ACRES. THE PROPOSED IMPERVIOUS AREA ONSITE SHALL INCREASE THE EXISTING IMPERVIOUS AREA BY 0.20AC.

EXISTING SITE CONDITIONS
 THE SITE HAS AN EXISTING GRAVEL PARKING LOT AND DRIVE LANE. THE SITE DRAINAGE FLOWS FROM NORTH TO SOUTH AND COLLECTS IN AN EXISTING STORMWATER MANAGEMENT SYSTEM. THERE ARE NO WETLANDS ON THIS SITE.

ADJACENT AREAS
 THE SITE IS BORDERED BY BROAD ROCK BOULEVARD TO THE EAST, WALMSLEY BOULEVARD TO THE SOUTH, A COMMERCIAL PROPERTY TO THE NORTH, AND A RESIDENTIAL PROPERTY TO THE WEST.

OFFSITE AREAS
 THERE WILL BE OFFSITE DISTURBANCE ALONG THE SOUTHERN BOUNDARY TO PROVIDE WATER AND SANITARY UTILITIES TO THE SITE. THERE WILL ADDITIONALLY BE OFFSITE DISTURBANCE ALONG THE EASTERN BOUNDARY TO MODIFY THE EXISTING ENTRANCE TO THE SITE.

SOILS
 THE SITE IS CHARACTERIZED BY 43% FACEVILLE-GRITNEY-URBAN LAND COMPLEX (2-6% SLOPES) AND 57% UDORTHENTS-DUMPS COMPLEX (PITS). SOILS INFORMATION WAS PROVIDED BY WWW.WEBSOILSURVEY.NRCS.UDSA.GOV.

CRITICAL AREAS
 THIS SITE'S EXISTING CONDITIONS AND PROPOSED GRADING PLAN IS SET UP TO MAINTAIN THE CURRENT DRAINAGE PATTERN; ALL DRAINAGE SHALL SHEET FLOW AND ENTER INTO STORM SEWER SYSTEMS. THE CONTRACTOR SHALL TAKE CARE TO KEEP THE EROSION CONTROL MEASURES IN GOOD WORKING ORDER TO NOT ALLOW EXCESS SEDIMENT TO FLOW OFFSITE. THERE ARE NO W.O.U.S ON SITE.

EROSION CONTROL & CONSTRUCTION NARRATIVE 1

ALL EROSION CONTROL MEASURES MUST BE PLACED AS THE FIRST STEP IN THE CONSTRUCTION PROCESS.

EROSION CONTROL NARRATIVE

1. INSTALL CONSTRUCTION ENTRANCE AS SHOWN ON THE PLANS.
2. CONTRACTOR SHALL CLEAR ONLY THOSE AREAS SPECIFIED ON THE EROSION CONTROL PHASE ONE PLANS AS NECESSARY TO INSTALL SILT FENCE.
3. INSTALL INLET PROTECTION AT EX-14 AND EX-5 IN ACCORDANCE WITH THIS PLAN.
4. INSTALL SILT FENCE AS DESCRIBED ABOVE AND IN ACCORDANCE WITH THE EROSION CONTROL PLANS.

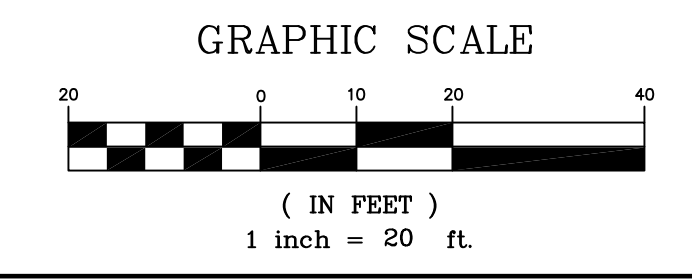
EROSION CONTROL MEASURE NOTES

1. 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 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.
2. WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY (VEHICULAR) TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PUBLIC ROAD SURFACE, THE ROAD SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER.
3. THE PERIMETER SILT FENCE MUST BE INSTALLED AND MADE FUNCTIONAL AS A FIRST STEP IN ANY LAND DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
4. THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
5. ALL DISTURBED AREAS ARE TO DRAIN TO AN APPROVED SEDIMENT CONTROL MEASURE AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.
6. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION SEDIMENTATION AS DETERMINED BY THE CITY ENVIRONMENTAL ENGINEERING DEPARTMENT.
7. ALL EROSION AND SEDIMENT CONTROL DEVICES MUST BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE CURRENT EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH) AND ANY APPLICABLE CITY OF RICHMOND ORDINANCES.

MAINTENANCE

IN GENERAL, ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH SIGNIFICANT RAINFALL. SPECIFIC ATTENTION WILL BE GIVEN TO THE FOLLOWING ITEMS:

- A. SILT FENCE SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY. SEDIMENT DEPOSIT SHOULD BE REMOVED AFTER EACH STORM EVENT. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND SEEDED.



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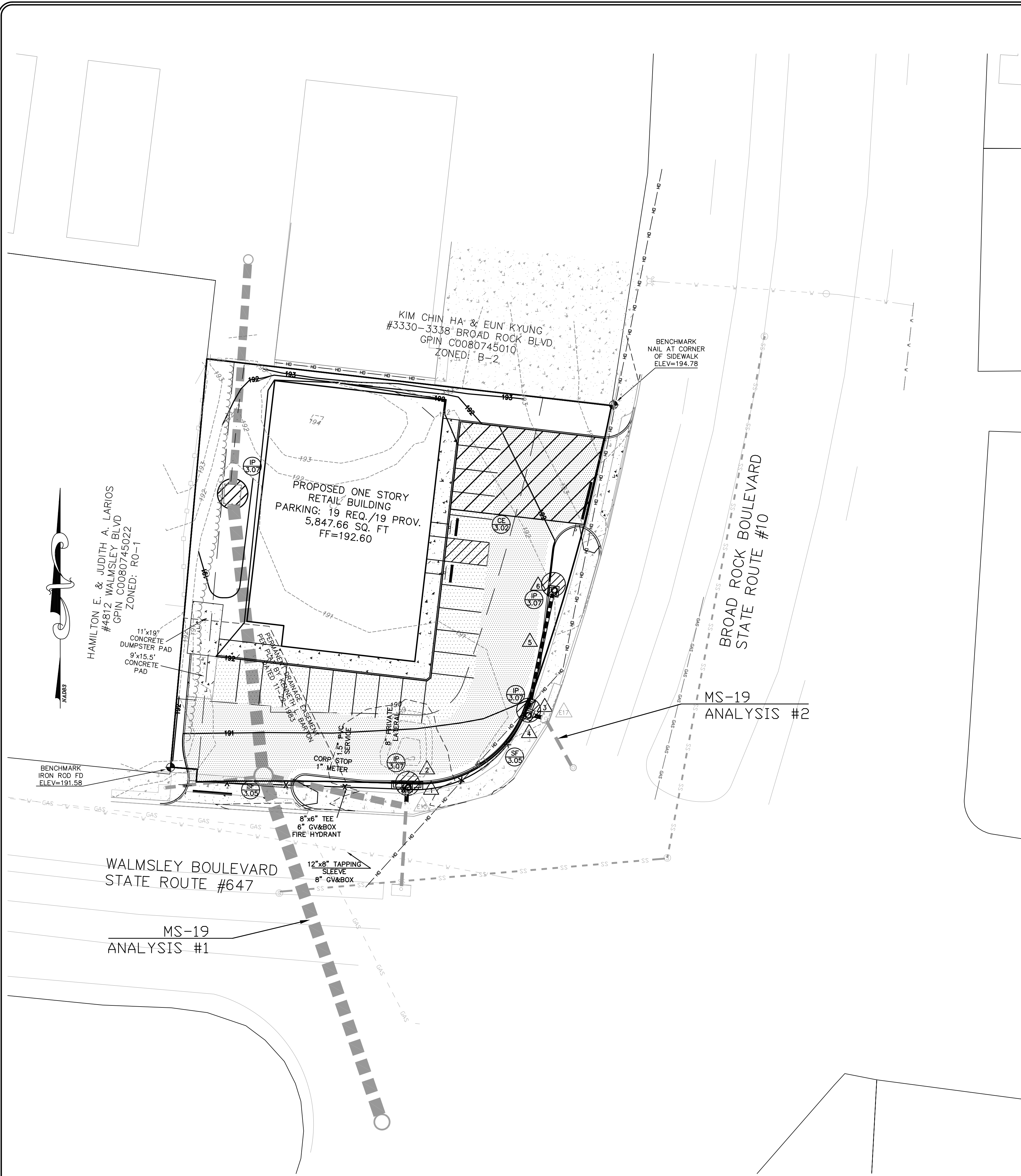
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 9850 Lori Road, Suite 201
 Chesterfield, Virginia 23832
 Phone: (804) 748-9011 Fax: (804) 748-2590
 ASK US HOW



PROPOSED RETAIL BUILDING
 #3350 BROAD ROCK BOULEVARD
 RICHMOND, VIRGINIA
 EROSION & SEDIMENT CONTROL - PHASE I

REVISIONS	
DATE	ITEM

DATE
 03 / 03 / 2014
 SCALE
 1" = 20'
 PROJECT MANAGER
 JASON P. WILKINS, P.E.
 DESIGNED BY
 TONY R. CARUSO
 CHECKED BY
 PROJ.#
 20130007
 SHEET #
 C - 5



CONSTRUCTION NARRATIVE 2

PROJECT DESCRIPTION
 THIS PROJECT INVOLVES A COMMERCIAL RETAIL BUILDING WITHIN THE CITY OF RICHMOND. THIS DEVELOPMENT INCLUDES A 5848SF ONE STORY RETAIL BUILDING FOR SKY MANAGEMENT SERVICES, LLC LOCATED AT 4860 COZ ROAD, SUITE 30 GLEN ALLEN, VA 23060. THE TOTAL AREA OF DISTURBANCE ASSOCIATED WITH THIS PROJECT IS 0.45 ACRES. THE PROPOSED IMPERVIOUS AREA ONSITE SHALL INCREASE THE EXISTING IMPERVIOUS AREA BY 0.20AC.

EXISTING SITE CONDITIONS
 THE SITE HAS AN EXISTING GRAVEL PARKING LOT AND DRIVE LANE. THE SITE DRAINAGE FLOWS FROM NORTH TO SOUTH AND COLLECTS IN AN EXISTING STORMWATER MANAGEMENT SYSTEM. THERE ARE NO WETLANDS ON THIS SITE.

ADJACENT AREAS
 THE SITE IS BORDERED BY BROAD ROCK BOULEVARD TO THE EAST, WALMSLEY BOULEVARD TO THE SOUTH, A COMMERCIAL PROPERTY TO THE NORTH, AND A RESIDENTIAL PROPERTY TO THE WEST.

OFFSITE AREAS
 THERE WILL BE OFFSITE DISTURBANCE ALONG THE SOUTHERN BOUNDARY TO PROVIDE WATER AND SANITARY UTILITIES TO THE SITE. THERE WILL ADDITIONALLY BE OFFSITE DISTURBANCE ALONG THE EASTERN BOUNDARY TO MODIFY THE EXISTING ENTRANCE TO THE SITE.

SOILS
 THE SITE IS CHARACTERIZED BY 43% FACEVILLE-GRITNEY-URBAN LAND COMPLEX (2-6% SLOPES) AND 57% UDORTHTENTS-DUMPS COMPLEX (PITS). SOILS INFORMATION WAS PROVIDED BY WWW.WEBSOILSURVEY.NRCS.UDSA.GOV.

CRITICAL AREAS
 THIS SITE'S EXISTING CONDITIONS AND PROPOSED GRADING PLAN IS SET UP TO MAINTAIN THE CURRENT DRAINAGE PATTERN; ALL DRAINAGE SHALL SHEET FLOW AND ENTER INTO STORM SEWER SYSTEMS. THE CONTRACTOR SHALL TAKE CARE TO KEEP THE EROSION CONTROL MEASURES IN GOOD WORKING ORDER TO NOT ALLOW EXCESS SEDIMENT TO FLOW OFFSITE. THERE ARE NO W.O.U.S ON SITE.

EROSION CONTROL & CONSTRUCTION NARRATIVE 2

LAND DISTURBANCE OUTSIDE THE PRELIMINARY LIMITS OF DISTURBANCE MAY NOT OCCUR UNTIL THE INSTALLATION OF THE INITIAL EROSION AND SEDIMENT CONTROL MEASURES HAVE BEEN APPROVED.

EROSION CONTROL NARRATIVE

- UPON APPROVAL OF THE INITIAL EROSION CONTROL DEVICES THE CONTRACTOR MAY PERFORM LAND DISTURBANCE OUTSIDE OF THE PRELIMINARY LIMITS OF DISTURBANCE.
- THE CONTRACTOR MAY BEGIN TIMBERING, CLEARING, GRUBBING, INITIAL GRADING, AND STOCKPIILING TO THE LIMITS OF DISTURBANCE.
- THE CONTRACTOR SHALL REMOVE E13 & E14, REPLACING WITH 1 & 2 AS SOON AS POSSIBLE. CONTRACTOR SHALL UTILIZE VESCH STANDARD (3.08) TEMPORARY CULVERT INLET PROTECTION AS NECESSARY TO PROTECT E10 FROM STORMWATER SEDIMENT.
- THE CONTRACTOR SHALL BEGIN MASS GRADING OPERATIONS, FORM BUILDING PADS, AND ADJUST STOCK PILES AS NECESSARY.
- BEGIN STORM SEWER, SANITARY SEWER, AND ALL OTHER UTILITY INSTALLATIONS.
- INLET PROTECTION SHALL BE INSTALLED AS SOON AS POSSIBLE.
- BEGIN PARKING LOT AND RIGHT-OF-WAY IMPROVEMENTS.
- 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 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.
- ONCE SITE STABILIZATION HAS BEEN ACHIEVE FOR EACH AREA (AND ITS ASSOCIATED DRAINAGE AREAS), THE CONTRACTOR SHALL CONTRACT THE ENVIRONMENTAL INSPECTOR TO GET APPROVAL TO REMOVE THE EROSION CONTROL MEASURES.

EROSION CONTROL MEASURE NOTES

- THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
- ALL DISTURBED AREAS ARE TO DRAIN TO AN APPROVED SEDIMENT CONTROL MEASURE AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.
- THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION SEDIMENTATION AS DETERMINED BY THE CITY ENVIRONMENTAL ENGINEERING DEPARTMENT.
- ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE LOCAL PROGRAM ADMINISTRATOR. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.
- ALL EROSION AND SEDIMENT CONTROL DEVICES MUST BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH) AND ANY APPLICABLE CITY OF RICHMOND ORDINANCES.

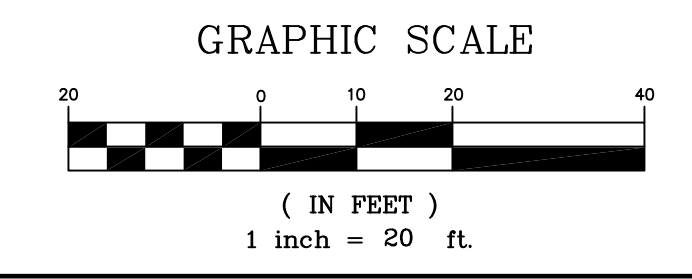
PERMANENT STABILIZATION

THE CONTRACTOR SHALL PROVIDE GRASS STABILIZATION ON ALL DENUDED AREAS PRIOR TO TURNOVER OF THE PROJECT TO THE DEVELOPER. SEED SHALL BE APPLIED AS DICTATED IN THE VESCH.

MAINTENANCE

IN GENERAL, ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH SIGNIFICANT RAINFALL. SPECIFIC ATTENTION WILL BE GIVEN TO THE FOLLOWING ITEMS:

- SILT FENCE SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND SEEDED.
- ALL STONE/GRAVEL OUTLETS WILL BE CHECKED REGULARLY FOR SEDIMENT BUILDUP THAT WILL PREVENT PROPER DRAINAGE. IF THE GRAVEL IS CLOGGED BY SEDIMENT, THE GRAVEL WILL BE REMOVED AND CLEANED, OR IT WILL BE REPLACED.



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9850 Lori Road, Suite 201
Chesterfield, Virginia 23832
Phone: (804) 748-9011 Fax: (804) 748-2590

ASK US HOW

COMMONWEALTH OF VIRGINIA
 JASON P. WILKINS
 Lic. No. 041215
 03/03/2014
 PROFESSIONAL ENGINEER

PROPOSED RETAIL BUILDING

#3350 BROAD ROCK BOULEVARD
 RICHMOND, VIRGINIA

EROSION & SEDIMENT CONTROL - PHASE II

REVISIONS	
DATE	ITEM

DATE
03 / 03 / 2014

SCALE
1" = 20'

PROJECT MANAGER
JASON P. WILKINS, P.E.

DESIGNED BY
TONY R. CARUSO

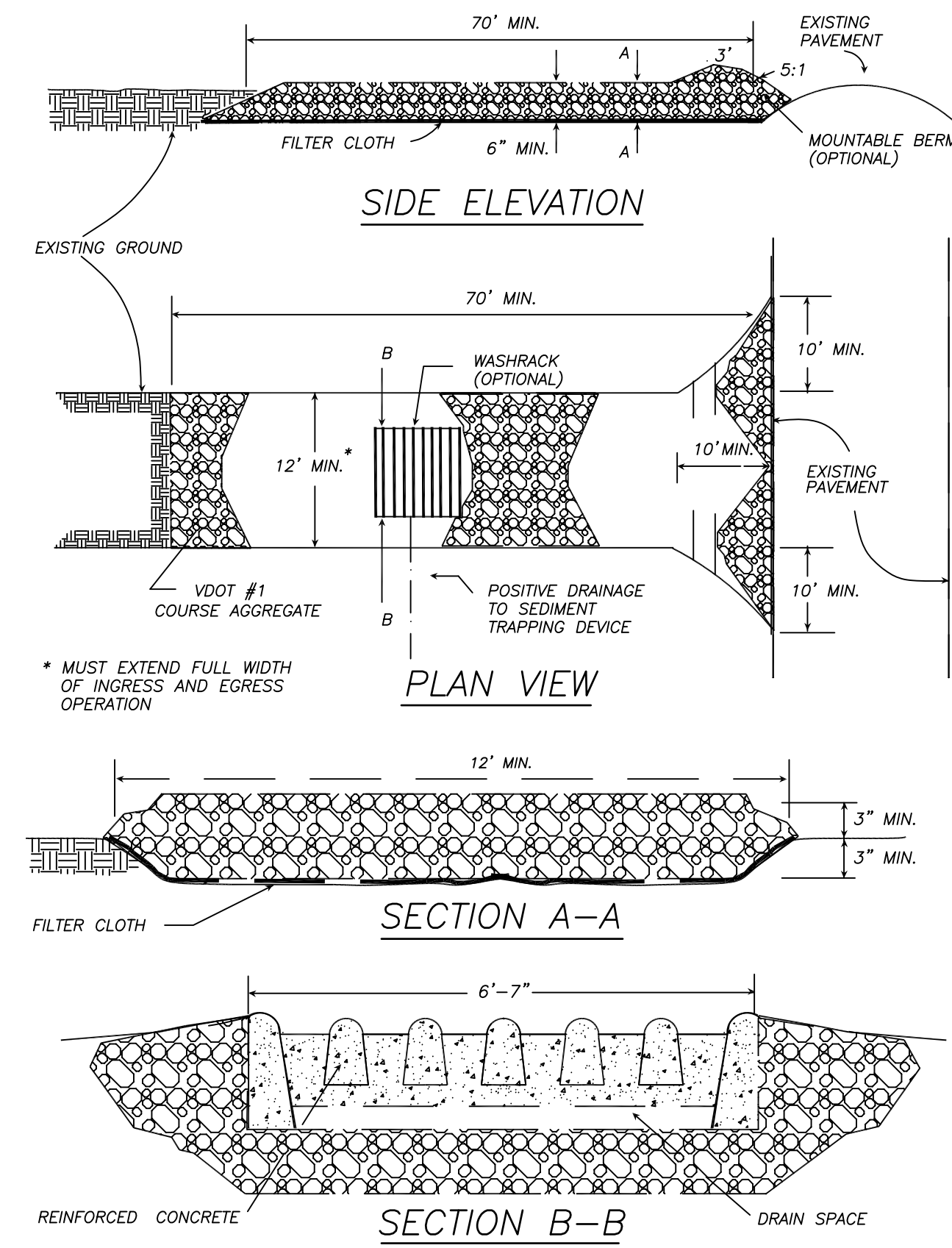
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PROJ.#
20130007

SHEET #
C - 6

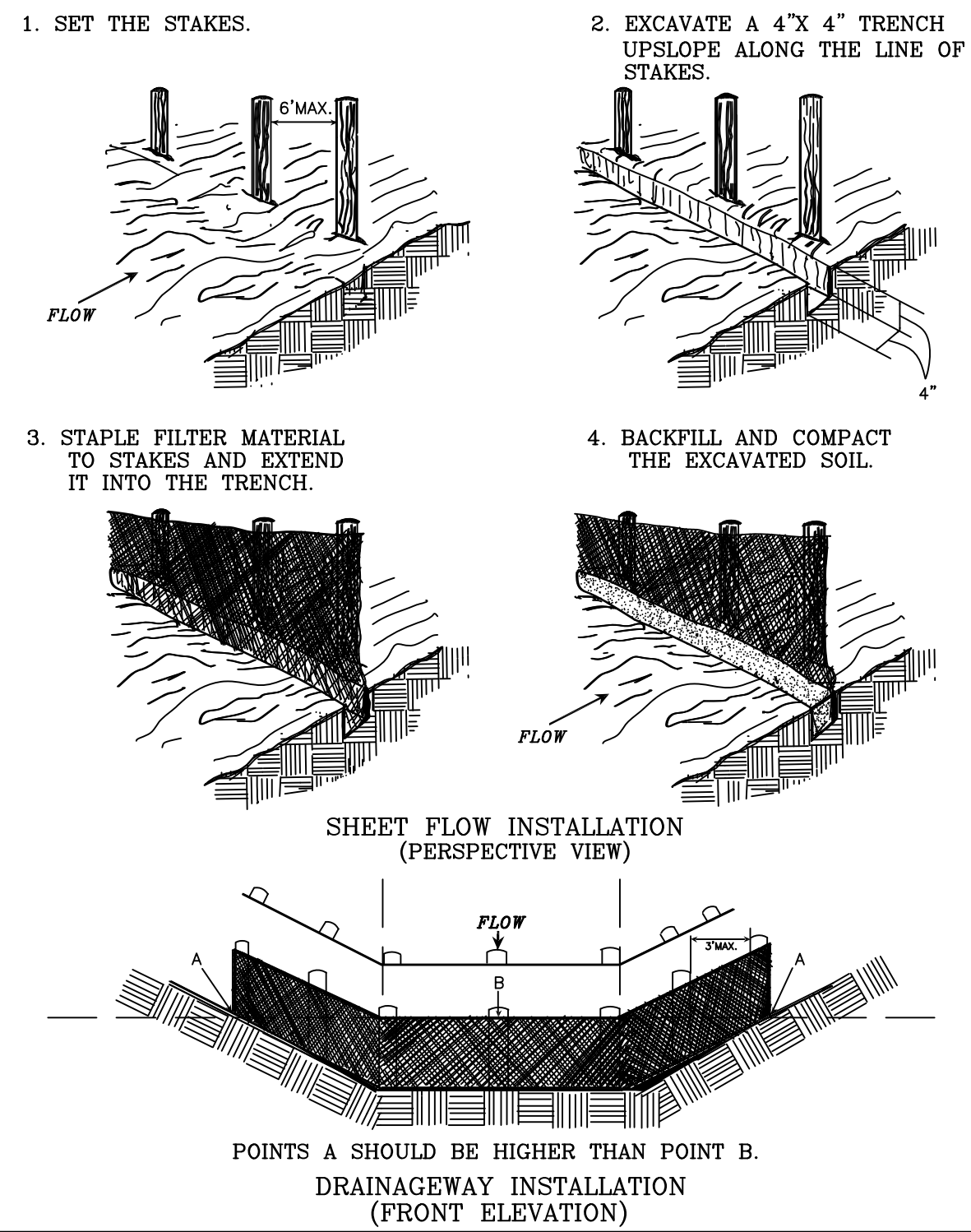
STONE CONSTRUCTION ENTRANCE

NOTE: CONTRACTOR SHALL KEEP EXISTING ROADS FREE OF SOIL BUILDUP AT ALL TIMES



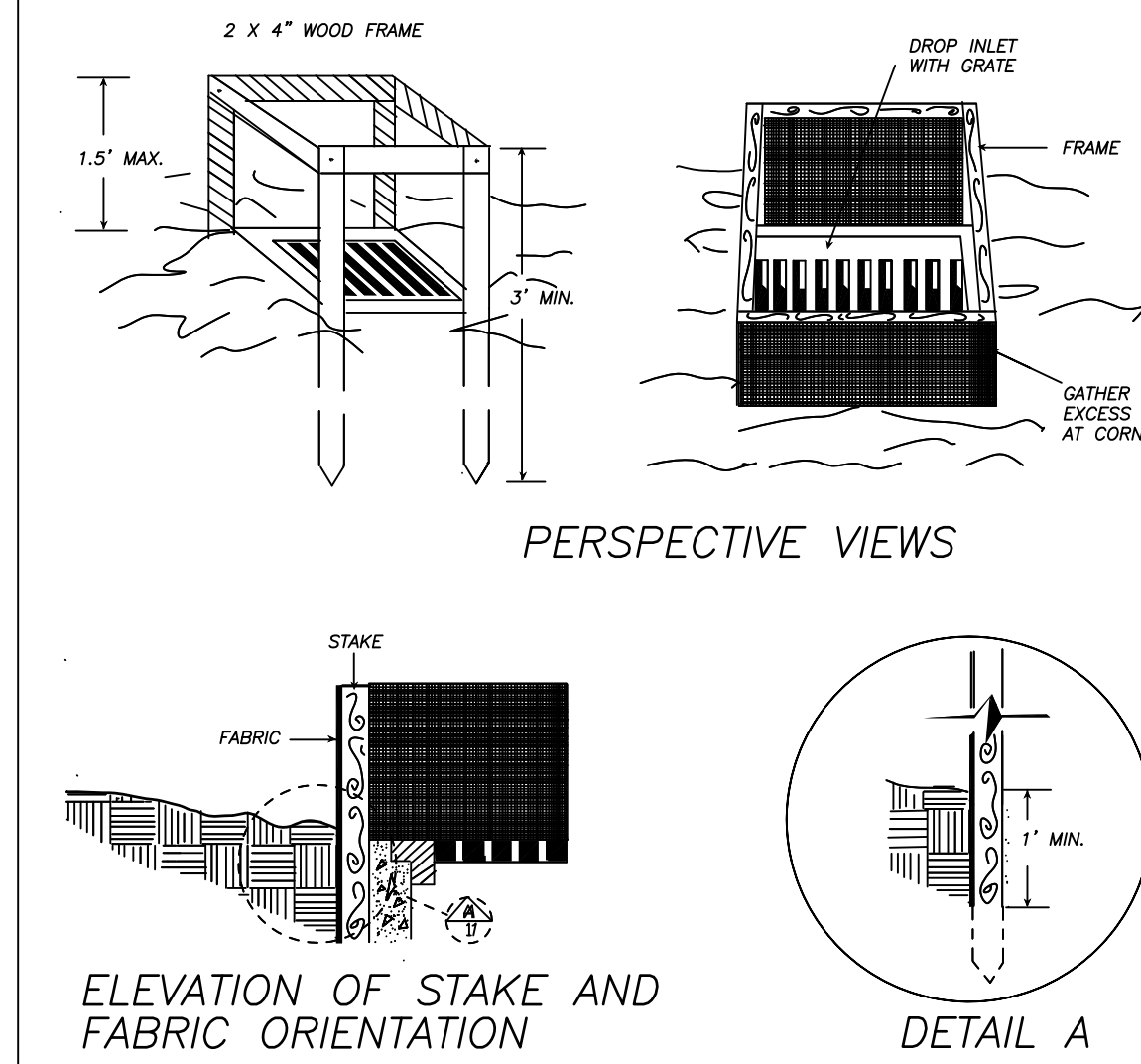
SOURCE: ADAPTED FROM 1983 Maryland Standards for Soil Erosion and Sediment Control, and Va. DSWC PLATE 3.02-1

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)



SOURCE: ADAPTED FROM Installation of Straw and Fabric Filter Barriers for Sediment Control, VA. DSWC Sherwood and Wiant PLATE 3.05-2

SILT FENCE DROP INLET PROTECTION

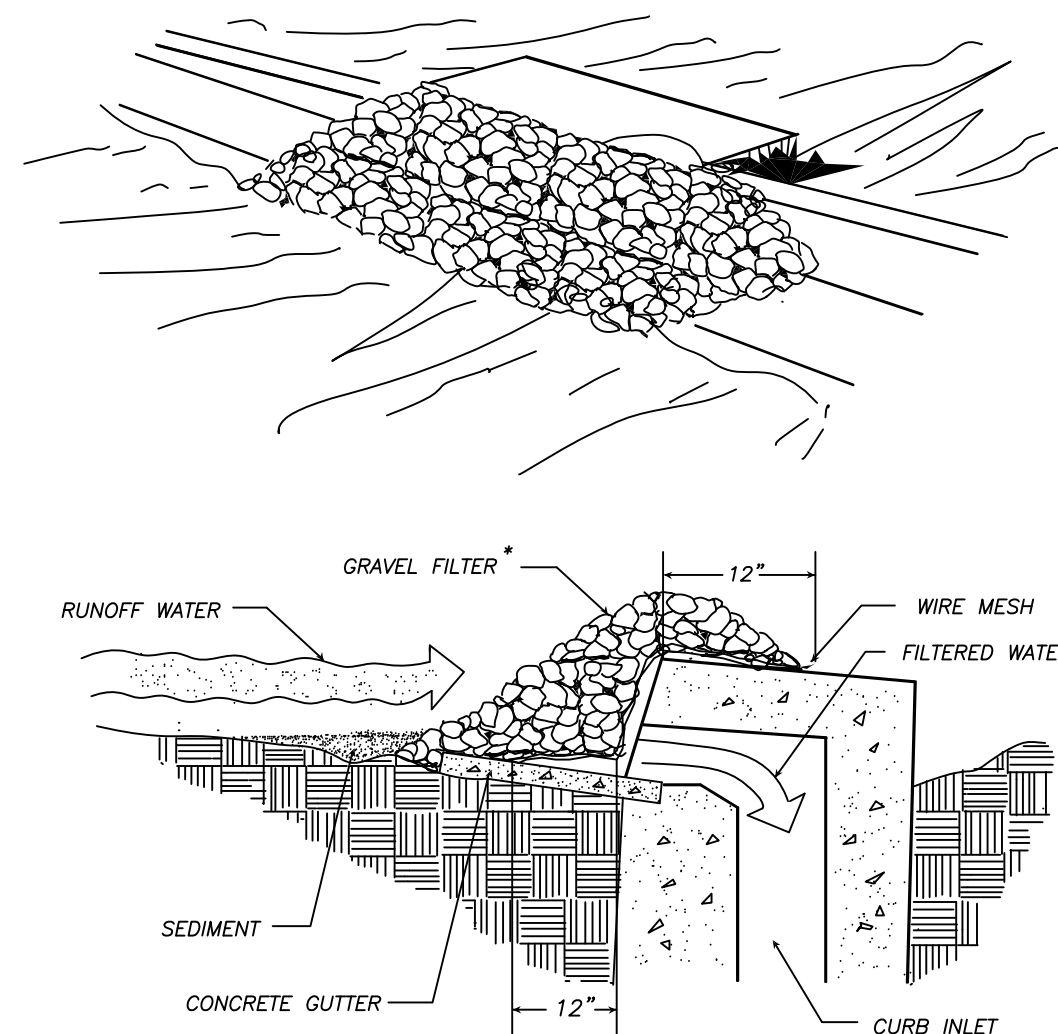


SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE THE INLET SHEET OR OVERLAND FLOWS (NOT EXCEEDING 1 C.F.S.) ARE TYPICAL. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS IN STREET OR HIGHWAY MEDIANS.

SOURCE: N.C. Erosion and Sediment Control Planning and Design Manual, 1988 PLATE 3.07-1

GRAVEL CURB INLET SEDIMENT FILTER



SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE PONDING IN FRONT OF THE STRUCTURE IS NOT LIKELY TO CAUSE INCONVENIENCE OR DAMAGE TO ADJACENT STRUCTURES AND UNPROTECTED AREAS.

* GRAVEL SHALL BE VDOT #3, #357 OR 5 COARSE AGGREGATE.

SOURCE: VA. DSWC PLATE 3.07-6

TABLE 3.32-0 (Revised June 2003) SITE SPECIFIC SEEDING MIXTURES FOR PIEDMONT AREA

LAND USE	SEED ¹	
	SPECIES	APPLICATION PER ACRE
Minimum Care Lawn (Commercial or Residential)	Tall Fescue ¹	95-100%
	Perennial Ryegrass	0-5%
	Kentucky Bluegrass ¹	0-5%
	TOTAL:	175-200 lbs.
High Maintenance Lawn	Tall Fescue ¹	TOTAL: 200-250 lbs.
General Slope (3:1 or less)	Tall Fescue	128 lbs.
	Red Top Grass or Creeping Red Fescue	2 lbs.
	Seasonal Nurse Crop ²	20 lbs.
	TOTAL:	150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	Tall Fescue ¹	108 lbs.
	Red Top Grass or Creeping Red Fescue	2 lbs.
	Seasonal Nurse Crop ²	20 lbs.
	Crownvetch ³	20 lbs.
TOTAL:	150 lbs.	

- 1 - When selecting varieties of turfgrass, use the Virginia Crop Improvement Association (V CIA) recommended turfgrass variety list. Quality seed will bear a label indicating that they are approved by V CIA. A current turfgrass variety list is available at the local County Extension office or through V CIA at 804-746-4884 or at <http://sudon.cses.vt.edu/html/Turf/turf/publications2.html>
- 2 - Use seasonal nurse crop in accordance with seeding dates as stated below:
 February 16th through April Annual Rye
 May 1st through August 15th Foxtail Millet
 August 16th through October Annual Rye
 November through February 15th Winter Rye
- 3 - Substitute Sericea lespedeza for Crownvetch east of Farmville, Va. (May through September use hulled Sericea, all other periods, use unhulled Sericea). If Flatpea is used increase rate to 30 lbs./acre. If Weeping Lovegrass is used, include in any slope of low maintenance mixture during warmer seeding periods, increase to 30 - 40

SOURCE: VA DSWC

FERTILIZER & LIME

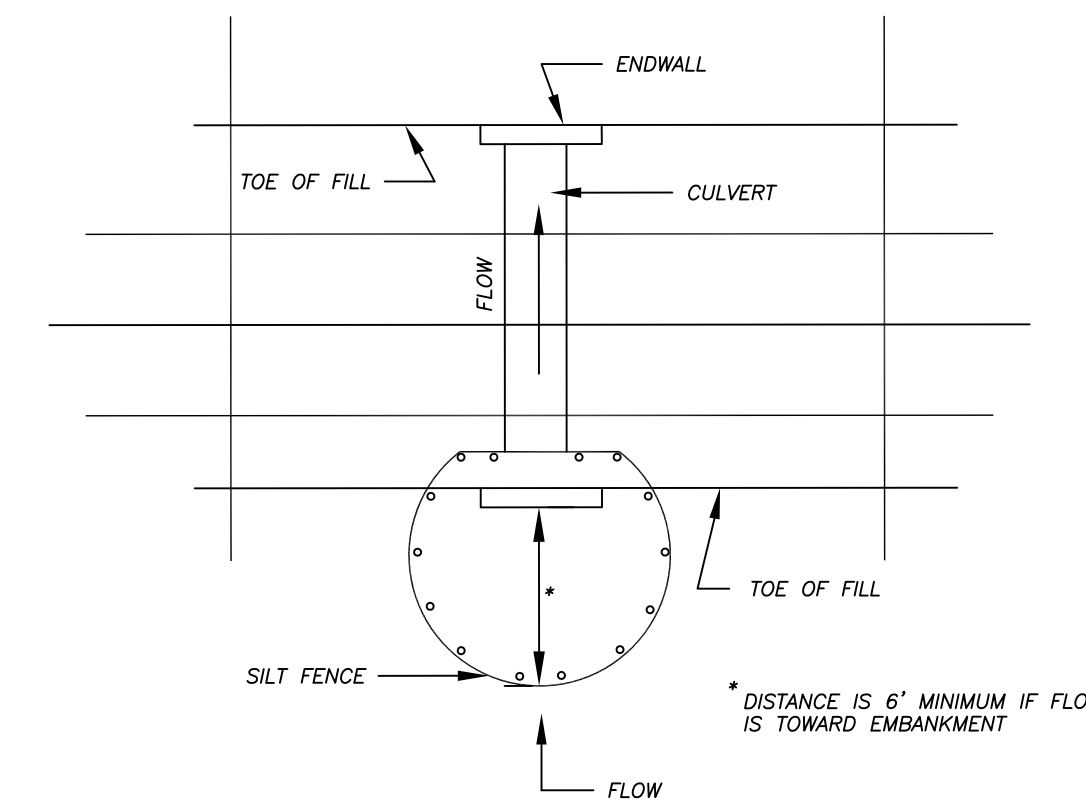
- Apply 10-10-10 fertilizer at a rate of 500 lbs./acre. (or 12 lbs./1,000 sq.ft.)
- Apply Pulverized Agricultural Limestone at a rate of 2 ton/acre (or 90 lbs./1,000 sq.ft.)

NOTE:

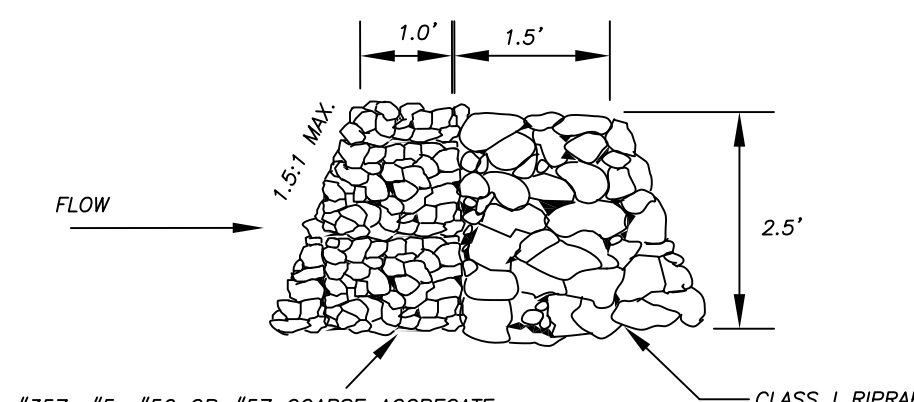
- 1 - A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site.
- 2 - Incorporate the lime and fertilizer into the top 4 - 6 inches of the soil by or by other means.
- 3 - When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin #4, 2003 Nutrient Management for Development Sites at <http://www.dcr.va.us/sw/e&s.htm#pubs>

SOURCE: VA DSWC

SILT FENCE CULVERT INLET PROTECTION



OPTIONAL STONE COMBINATION**

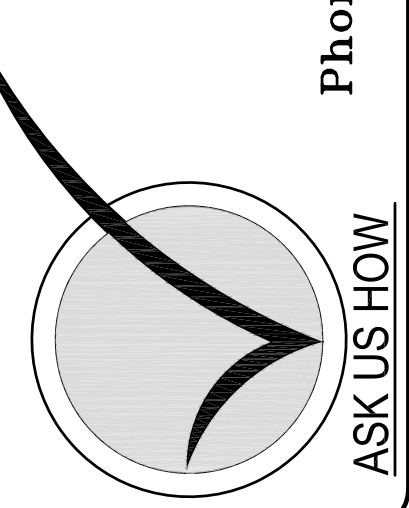


** VDOT #3, #357, #5, #56 OR #57 COARSE AGGREGATE TO REPLACE SILT FENCE IN "HORSESHOE" WHEN HIGH VELOCITY OF FLOW IS EXPECTED

SOURCE: ADAPTED FROM VDOT Standard Sheets and Va. DSWC PLATE 3.08-1

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9850 Lori Road, Suite 201
Chesterfield, Virginia 23832
Phone: (804) 748-9011 Fax: (804) 748-2590



ASK US HOW



PROPOSED RETAIL BUILDING

#3350 BROAD ROCK BOULEVARD

RICHMOND, VIRGINIA

EROSION & SEDIMENT CONTROL DETAILS

REVISIONS	
DATE	ITEM

DATE
03 / 03 / 2014
SCALE
NO SCALE
PROJECT MANAGER
JASON P. WILKINS, P.E.

DESIGNED BY
TONY R. CARUSO
CHECKED BY

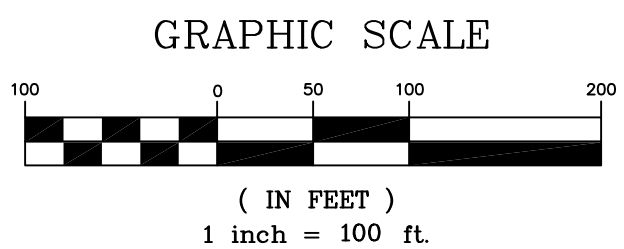
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49.27 ACRES
C=0.44



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Chesterfield, Virginia 23832
Phone: (804) 748-9011 Fax: (804) 748-2590

ASK US HOW



PROPOSED RETAIL BUILDING
#3350 BROAD ROCK BOULEVARD
RICHMOND, VIRGINIA
HYDRAULIC ANALYSIS

REVISIONS	
DATE	ITEM

DATE
03 / 03 / 2014

SCALE
1" = 100'

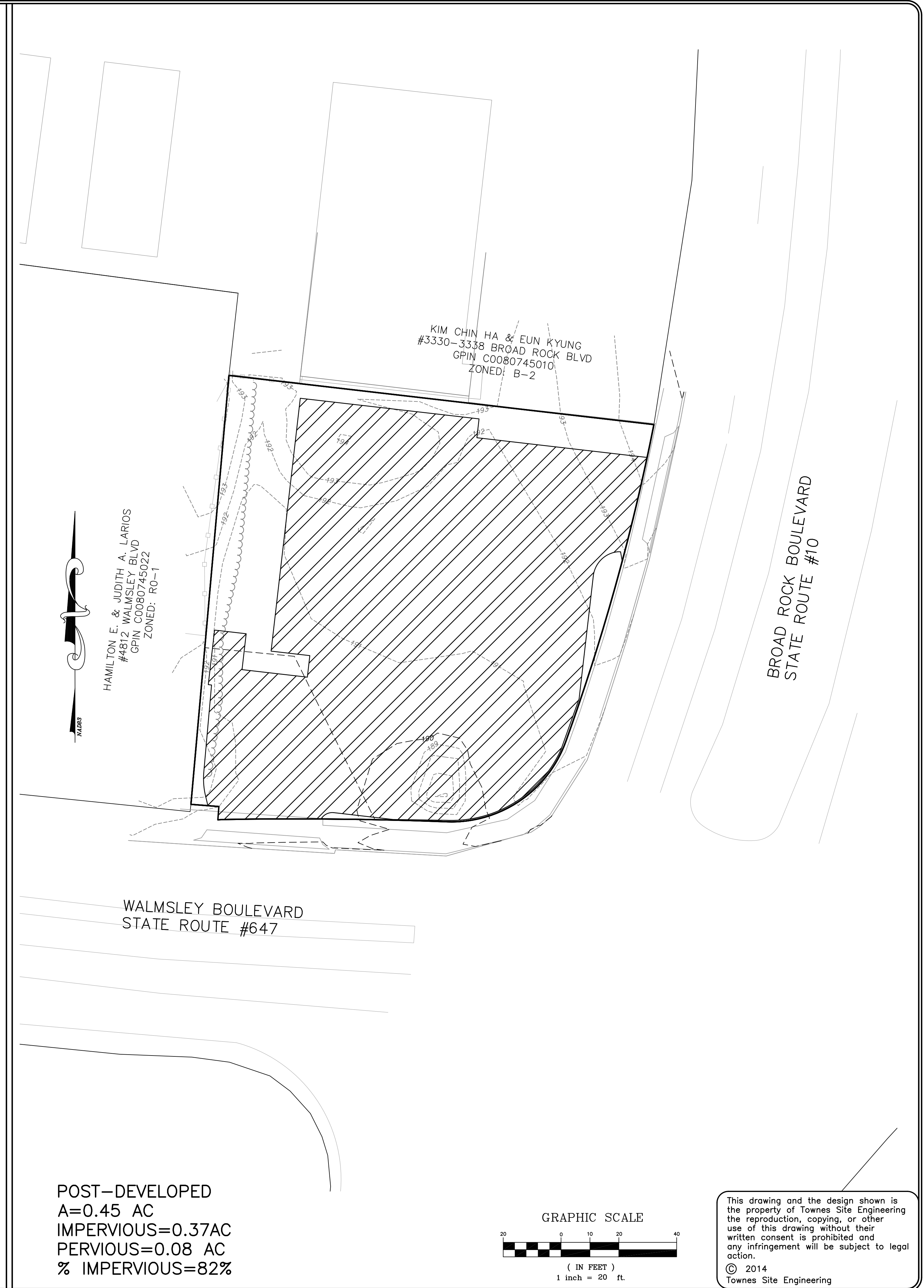
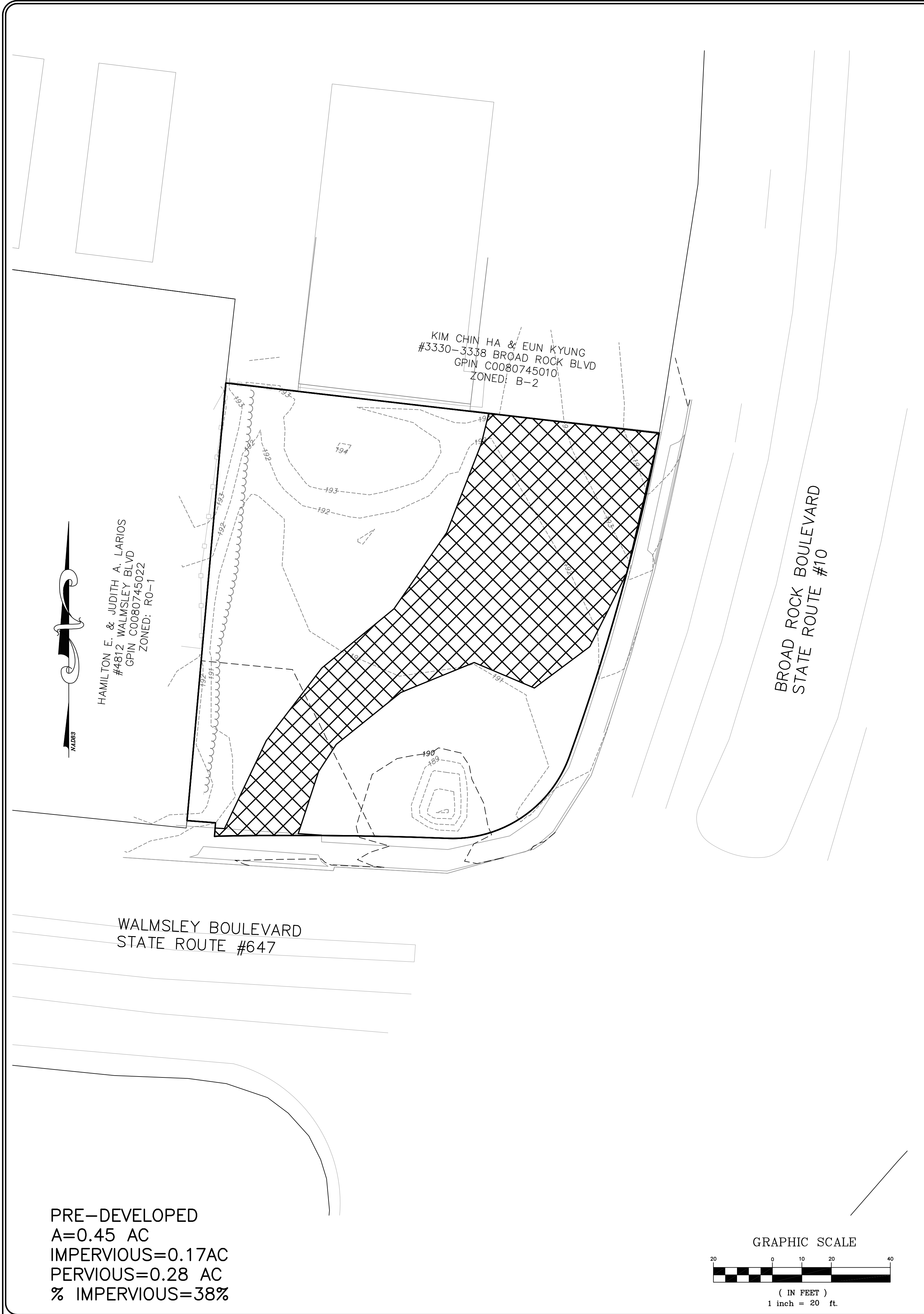
PROJECT MANAGER
JASON P. WILKINS, P.E.

DESIGNED BY
TONY R. CARUSO

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Phone: (804) 748-9011 Fax: (804) 748-2590

ASK US HOW

COMMONWEALTH OF VIRGINIA
JASON P. WILKINS
Lic. No. 041215
03/03/2014
PROFESSIONAL ENGINEER

PROPOSED RETAIL BUILDING
#3350 BROAD ROCK BOULEVARD
RICHMOND, VIRGINIA
CBPA

REVISIONS	
DATE	ITEM

DATE
03 / 03 / 2014

SCALE
1" = 20'

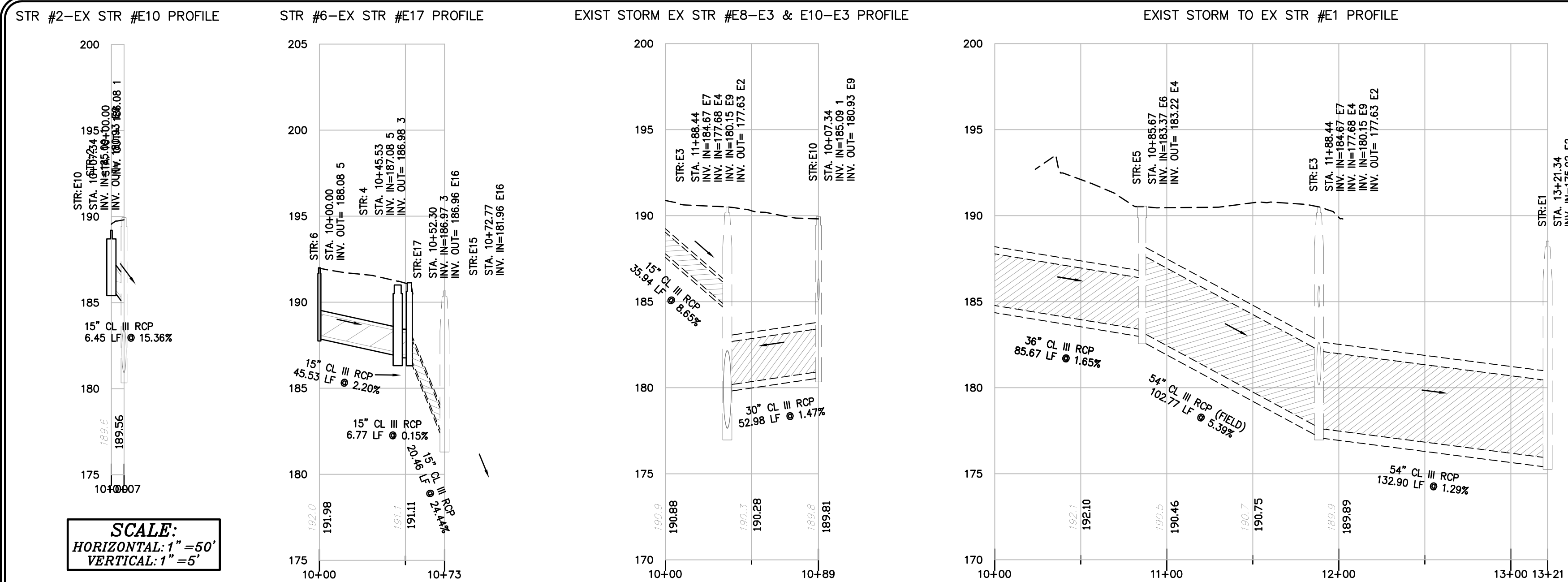
PROJECT MANAGER
JASON P. WILKINS, P.E.

DESIGNED BY
TONY R. CARUSO

CHECKED BY

PROJ.#
20130007

SHEET #
C - 9



SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 5'

STORM SEWER DESIGN COMPUTATIONS

PIPE SIZING
Design Storm = 10 Year

PROJECT: BROADROCK RETAIL
DESCRIPTION: RETAIL BUILDING

FROM POINT	TO POINT	IDA ACRES	RUNOFF "C"	"CA" INC.	"ACC. ACC."	Tc MIN.	I10 IN/HR	Q10 CFS	I100 IN/HR	Q100 CFS	INVELEV. UPPER LOWER	L FT	S FT/FT	D IN	Qcap CFS	V10 FPS	Time MIN.	Status	
EASTERN SYSTEM																			
6	4	0.01	0.70	0.01	0.01	5.0	7.1	0.05	11.3	0.08	188.08	187.08	45.53	0.0220	15	9.57	7.8	0.10	OK
4	EX 17	0.10	0.85	0.09	0.09	5.1	7.0	0.65	11.2	1.03	186.98	186.96	6.78	0.0040	15	4.08	3.3	0.03	OK
EX 17	EX 15	0.32	0.90	0.29	0.38	5.1	7.0	2.67	11.2	4.25	186.96	181.96	21.00	0.2381	15	31.51	25.7	-	OK
WESTERN SYSTEM																			
2	EX 10	0.23	0.90	0.21	0.21	5.0	7.1	1.46	11.3	2.33	186.08	185.09	6.50	0.1528	15	25.24	20.6	0.01	OK
EX 12	EX 10	0.01	0.90	0.01	0.01	5.0	7.1	0.06	11.3	0.10	185.04	181.80	32.50	0.0997	15	20.39	16.6	0.03	OK
EX 10	EX 3	0.00	0.00	0.00	0.22	5.0	7.1	1.53	11.2	2.43	180.93	180.15	53.00	0.0147	30	49.75	10.1	0.09	OK
EX 5	EX 3	0.23	0.60	0.14	21.98	37.6	3.0	66.13	5.1	111.24	183.22	177.68	100.00	0.0554	54	462.86	29.1	0.06	OK
EX 8	EX 3	0.42	0.90	0.38	0.38	5.0	7.1	2.67	11.3	4.25	187.78	184.67	35.70	0.0871	15	19.06	15.5	0.04	OK
EX 3	EX 1	0.00	0.00	0.00	0.00	37.6	3.0	67.86	5.1	114.16	177.63	175.92	133.00	0.0129	54	222.98	14.0	0.16	OK
OFFSITE																			
Winn Dixie - Approved 4/22/99		49.27	0.44	21.84	21.84												0.0		OK

HYDRAULIC GRADE LINE COMPUTATION

10 yr Event

INLET STATION	OUTLET WATER SURFACE ELEV.	Do	Qo	Lo	Sfo %	Hf	Vo	Ho	Qo	Vi	Qivi	Vi^2/2g	Hf	Angle 90-15	K	delta H	Ht	1.3 Ht	0.5 Ht	Final H	Inlet Water Surface Elev.	Rim Elev.	WSE check	Hydraulic Grade Line above Crown of Pipe	Overide Open Channel Flow Velocity with Velocity flowing full
EASTERN SYSTEM																									
EX 2	179.52	54	67.86	133.00	0.12	0.16	4.3	0.07	66.13	4.2	275.13	0.27	0.09	10	0.19	0.05	0.22	0.37	179.89	190.50	189.44	10.61	no	X	
EX 4	181.28	54	66.13	100.00	0.11	0.11	4.2	0.07	-	-	-	-	-	-	-	-	0.07	0.09	0.20	181.48	190.55	189.55	9.07	no	X
EX 7	185.67	15	2.67	35.70	0.17	0.06	2.2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	185.76	190.86	189.86	5.08	no	X
EX 9	182.15	30	1.53	53.00	0.147	0.78	10.1	0.40	1.46	1.2	1.75	0.02	0.01	90	0.70	0.02	0.40	1.18	183.33	189.94	188.94	6.61	no	X	
WESTERN SYSTEM																									
EX 11	183.33	15	0.06	32.50	0.00	0.00	0.1	0.00	-	-	-	-	-	-	-	-	0.00	0.00	0.00	183.33	189.44	188.44	6.11	no	X
1	186.09	15	1.46	6.50	0.05	0.00	1.2	0.01	-	-	-	-	-	-	-	-	0.01	0.01	0.01	186.10	190.00	189.00	3.90	no	X
WESTERN SYSTEM																									
EX 16	182.96	15	2.67	21.00	0.17	0.04	2.2	0.02	0.65	3.3	2.16	0.17	0.06	40	0.38	0.07	0.02	0.02	0.06	183.02	191.13	189.13	8.11	no	X
3	187.96	15	0.65	6.78	0.40	0.03	3.3	0.04	-	-	-	-	-	-	-	-	0.04	0.06	0.08	188.04	191.00	189.00	2.96	no	X
5	188.08	15	0.05	45.53	0.00	0.00	0.0	0.00	-	-	-	-	-	-	-	-	0.00	0.00	0.00	188.08	192.00	192.00	3.92	no	X

PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D

Worksheet 1: Situation 1

Summary of Situation 1: Determine the relative pre-development pollutant load (L_{rel}) based on the average land cover condition.

Applicable area (A) = 0.65 acres

L_{rel} = (total post-development impervious cover - A) / 100 = 82.5%

L_{rel} = 82.5% or L_{rel} = 18%

L_{rel} = (total existing impervious cover - A) / 100 = 38.5%

L_{rel} = 38.5% or L_{rel} = 18.5%

STEP 4 Determine the relative pre-development pollutant load (L_{rel})

1. Pre-development pollutant load based on the existing impervious cover:

L_{rel} = [(0.05 - (0.009 * L_{rel})) / A] * 2.38 (Equation 5-1)

where: L_{rel} = relative pre-development total phosphorus load (pounds per year)

L_{rel} = average land cover condition (the value is weighted or unweighted as the Chesapeake Bay default value of 18% (percent impervious in whole catchment))

A = applicable area (acres)

L_{rel} = [(0.05 - (0.009 * 38.5)) / 0.65] * 2.38 = 0.40 pounds per year

2. Pre-development pollutant load based on the average land cover condition:

L_{rel} = [(0.05 - (0.009 * L_{rel})) / A] * 2.38 (Equation 5-1)

where: L_{rel} = relative pre-development total phosphorus load (pounds per year)

L_{rel} = post-development percent impervious cover (percent expressed in whole catchment)

A = applicable area (acres)

L_{rel} = [(0.05 - (0.009 * 82.5)) / 0.65] * 2.38 = 0.81 pounds per year

STEP 5 Determine the relative pre-development pollutant load (L_{rel})

where: L_{rel} = relative pre-development total phosphorus load (pounds per year)

L_{rel} = post-development percent impervious cover (percent expressed in whole catchment)

A = applicable area (acres)

L_{rel} = [(0.05 - (0.009 * 82.5)) / 0.65] * 2.38 = 0.81 pounds per year

STEP 6 Determine the relative pollutant removal requirement (RR)

RR = L_{rel} * C_{pre-dev}

RR = 0.81 * 0.9 = 0.73 pounds per year

RR = L_{rel} * C_{post-dev}

RR = 0.81 * 0.22 = 0.18 pounds per year

Worksheet 1: Situation 2

Summary of Situation 2: Determine the relative pre-development pollutant load (L_{rel}) based on the average land cover condition.

RR = 0.45 pounds per year

STEP 1 Identify best management practices (BMP) for the site.

1. Determine the required pollutant removal efficiency for the site:

EFF = (RR - L_{rel}) / L_{rel} * 100 (Equation 5-2)

where: EFF = required pollutant removal efficiency (percent expressed in whole catchment)

RR = pollutant removal requirement (pounds per year)

L_{rel} = relative pre-development total phosphorus load (pounds per year)

EFF = (0.45 - 0.81) / 0.81 * 100 = -48%

2. Select BMP(s) from Table 5-15 and locate on the site:

BMP 1: _____

BMP 2: _____

BMP 3: _____

Worksheet 1: Situation 3

Summary of Situation 3: Determine the pollutant load entering the proposed BMP(s).

L_{rel} = [(0.05 - (0.009 * L_{rel})) / A] * 2.38 (Equation 5-3)

where: L_{rel} = relative pre-development total phosphorus load entering proposed BMP (pounds per year)

L_{rel} = post-development percent impervious cover of BMP drainage area (percent expressed in whole catchment)

A = applicable area (acres)

L_{rel} = [(0.05 - (0.009 * 38.5)) / 0.65] * 2.38 = 0.40 pounds per year

L_{rel} = [(0.05 - (0.009 * 82.5)) / 0.65] * 2.38 = 0.81 pounds per year

L_{rel} = [(0.05 - (0.009 * 38.5)) / 0.65] * 2.38 = 0.40 pounds per year

Worksheet 1: Situation 4

Summary of Situation 4: Calculate the pollutant load removed by the proposed BMP(s).

L_{rel} = L_{rel} * L_{rem} (Equation 5-4)

where: L_{rel} = pre-development pollutant load removed by proposed BMP (pounds per year)

L_{rel} = pollutant removal efficiency of BMP (expressed in decimal form)

L_{rel} = relative pre-development total phosphorus load entering proposed BMP (pounds per year)

L_{rel} = 0.40 * 0.9 = 0.36 pounds per year

L_{rel} = 0.81 * 0.9 = 0.73 pounds per year

L_{rel} = 0.40 * 0.22 = 0.09 pounds per year

Worksheet 1: Situation 5

Summary of Situation 5: Calculate the total pollutant load removed by the BMP(s).

L_{rel} = L_{rel} * L_{rem} + L_{rel} * L_{rem} + L_{rel} * L_{rem} + L_{rel} * L_{rem} + L_{rel} * L_{rem} (Equation 5-5)

where: L_{rel} = total pollutant load removed by proposed BMPs (pounds per year)

L_{rel} = pollutant load removed by proposed BMP No. 1 (pounds per year)

L_{rel} = pollutant load removed by proposed BMP No. 2 (pounds per year)

L_{rel} = pollutant load removed by proposed BMP No. 3 (pounds per year)

L_{rel} = 0.36 + 0.73 + 0.09 = 1.18 pounds per year

6. Verify compliance:

A = 0.45

B = 0.18

0.45 - 0.18 = 0.27 LB TO BE PURCHASED FROM OFF SITE NUTRIENT BANK

In accordance with Minimum Standard 19 of the Erosion and Sediment Control Regulations, adequacy of receiving channels or pipes must be verified by addressing one of the following Adequacy Situations:

A. The drainage area from the project at the discharge point is less than or equal to one percent (1%) of the total drainage area at the discharge point. (Project Drainage Area and Total Drainage Area are required).

Or

B. Natural channels must be analyzed to demonstrate that (1) the two-year storm will not overtop the channel banks and (2) the two-year storm will not cause erosion of the channel bed or banks (Q_{capacity}, Q₂, and V₂ are required).

Or

C. Man-made channels must be analyzed to demonstrate that (1) the ten-year storm will not cause erosion of the channel bed or banks for improvements within County Drainage Easements (Q_{capacity}, Q₁₀, and V₁₀ / V₁₀ are required).

Or

D. Pipes and storm sewer systems must be analyzed to demonstrate that the ten-year storm will be contained within the system (Q_{capacity}, Q₁₀, and hydraulic grade line calculations are required).

Or

E. Runoff is discharged through an energy dissipator where flat poorly drained topography exists within the limits of the 100-year floodplain, RPA, or Wetland and when acceptable velocities are demonstrated. (A formal written variance request must be submitted to and approved by Env. Eng.)

Or

F. The pre-development runoff rate is maintained by methods other than onsite detention for the Q₂ (natural) or Q₁₀ (man-made) storm event during the same post-developed storm event discharging into an adequate natural or man-made conveyance system. If not adequate, a formal written variance request must be submitted to and approved by Env. Eng.

Or

G. The pre-development runoff rate has been achieved via onsite detention. (A formal written variance request must be submitted to and approved by Env. Eng.)

Or

H. A combination of the above methods to include detention and drainage improvements, or other measures acceptable to Environmental Engineering to prevent downstream erosion. (A formal written variance request must be submitted to and approved by Env. Eng.)

Discharge Point	Adequacy Situation	Project Drainage Area	Total Drainage Area	Q _{capacity}	Q ₂	Q ₁₀	V ₂	V ₁₀	Cross Section, Profile, DA Map and Calculations Shown on Sheet
Analysis #1	D	0.23	50.16	222.98	67.86	67.86			C-8 & C-10
Analysis #2	D	0.11	0.43	31.51	2.67	2.67			C-8 & C-10

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CITY OF RICHMOND DPU
FIRE FLOW ESTIMATE FORM

ISO (Insurance Service Office) Method of Calculating NFF (Needed Fire Flow)

ENGINEER: Jason P. Wilkins DATE: 21-Feb-14
PROJECT NAME: BROAD ROCK - RETAIL CALC BY: TRC

TYPE OF CONSTRUCTION: IBC-5B / ISO-1
Class of Construction Coef. = F: 1.5
GROUND FLOOR AREA = 5848 # of Stories: 1
Total Floor Area = A_i (effective area): 5848

FIRE AREA CONSIDERED
Construction Factor C_i = 18(F_i)A_i^{0.5} C_i = 2000
(Rounded to the Nearest 250 GPM)

TYPE OF OCCUPANCY: C-3 COMBUSTIBLE
(Worst Case) Occupancy Factor = O_i: 1

EXPOSURE (X) AND COMMUNICATION (P):
X₁+P₁ = X₂+P₂ = X₃+P₃ =

(X+P)_i = 1.0 + Σ (X+P)_j = 1.00
(n = NUMBER OF SIDES OF SUBJECT BUILDING)

[Max (X+P)_i = 1.75]

NEEDED FIRE FLOW
NFF = (C_i)(O_i)(X+P)_i NFF = 2000
Automatic Sprinklers (Yes/No/X) Reduction Factor: 0 % x NFF = 0
TOTAL: 2000
Required Fire Flow - Rounded (if < 2500 nearest 250) 2000 gpm
(if > 2500 nearest 500)
Fire Hydrants Required: 2

I CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND CORRECT.
SIGNATURE: [Signature] P.E.
*COMMERCIAL AREA REQUIRES 350 GPM MINIMUM HOSE LAY.
References: NFF CALCULATION PROCEDURE DESCRIBED IN A.W.W.A. M31, I.S.O.'s 1980 COMMERCIAL FIRE RATING SCHEDULE AND I.S.O.'s 1980 FIRE SUPPRESSION RATING SCHEDULE

Townes
SITE ENGINEERING

9850 Lori Road, Suite 201
Chesterfield, Virginia 23832
Phone: (804) 748-9011 Fax: (804) 748-2590

ASK US HOW

COMMONWEALTH OF VIRGINIA
JASON P. WILKINS
Lic. No. 041215
03/03/2014
PROFESSIONAL ENGINEER

PROPOSED RETAIL BUILDING
#3350 BROAD ROCK BOULEVARD
RICHMOND, VIRGINIA
PROFILES & CALCULATIONS

REVISIONS

DATE	ITEM
03 / 03 / 2014	SCALE AS SHOWN
	PROJECT MANAGER JASON P. WILKINS, P.E.
	DESIGNED BY TONY R. CARUSO
	CHECKED BY
	PROJ.# 20130007
	SHEET # C - 10