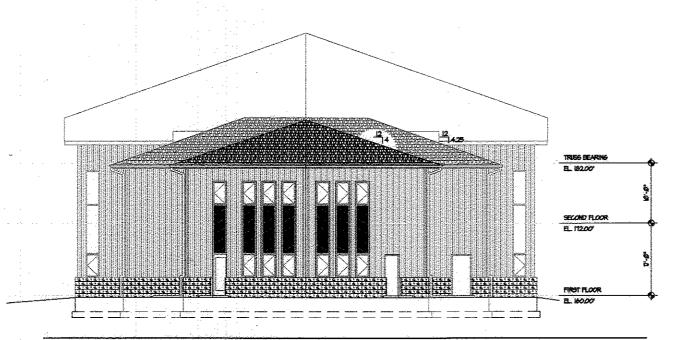
GENERAL CONSTRUCTION NOTES

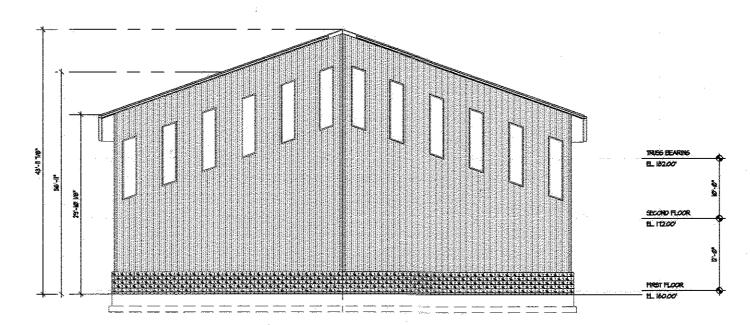
- MSHA STANDARDS AND SPECIFICATIONS IF APPLICABLE.
- 2. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS/BUREAU OF ENGINEERING/CONSTRUCTION INSPECTION
- DIVISION AT (410) 313-1880 AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE START OF WORK 3. THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1-800-257-7777 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION WORK
- BEING DONE. 4. TRAFFIC CONTROL DEVICES, MARKINGS AND SIGNING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). ALL STREET AND REGULATORY SIGNS SHALL BE IN PLACE PRIOR TO THE PLACEMENT OF ANY ASPHALT
- ALL PLAN DIMENSIONS ARE TO FACE OF CURB UNLESS OTHERWISE NOTED
- THE EXISTING TOPOGRAPHY IS TAKEN FROM AERIAL SURVEY WITH TWO FOOT CONTOUR INTERVALS PREPARED BY WINGS AERIAL
- 8. THE COORDINATES SHOWN HEREON ARE BASED UPON THE HOWARD COUNTY GEODETIC CONTROL WHICH IS BASED UPON THE
- 9. WATER IS PUBLIC. HOWARD COUNTY CONTRACT NO. 24-4047-D. DRAINAGE AREA: LITTLE PATUXENT
- 10. SEWER IS PUBLIC. HOWARD COUNTY CONTRACT NO. 24-4047-D. DRAINAGE AREA: LITTLE PATUXENT. 11. EXISTING UTILITIES SHOWN ON THESE PLANS ARE BASED UPON OBSERVABLE FIELD INFORMATION, PREVIOUS CONSTRUCTION DRAWINGS FOR THE SITE, THE BEST AVAILABLE INFORMATION FROM THE UTILITY COMPANIES AND HOWARD COUNTY. THE DEVELOPER AND ENGINEER DO NOT WARRANT OR GUARANTEE THE COMPLETENESS OR THE CORRECTNESS OF THIS EXISTING UTILITY INFORMATION. THE CONTRACTOR SHALL VERIFY ALL SUCH INFORMATION TO HIS OWN SATISFACTION.
- 12. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO SUPPORT AND PROTECT ALL EXISTING UTILITIES WHEN WORKING ADJACENT TO OR CROSSING EXISTING UTILITIES. ANY DAMAGE TO EXISTING FACILITIES SHALL BE REPAIRED OR REPLACED AT
- 13. "FULL TRENCH COMPACTION" TO 95% OF AASHTO T-180 DENSITY SHALL BE USED FOR ALL UTILITY CONSTRUCTION.
- 14. CONTRACTOR SHALL ADHERE TO ALL FEDERAL, STATE AND COUNTY HEALTH, SAFETY, AND ENVIRONMENTAL REGULATIONS.
- 15. ALL EXCESS EXCAVATION AND OTHER UNSUITABLE MATERIAL SHALL BE REMOVED FROM THIS SITE TO AN AREA WITH AN APPROVED SEDIMENT CONTROL PLAN AND PERMIT.
- 16. SIGN POST: ALL SIGN POST USED FOR TRAFFIC CONTROL SIGNS INSTALLED IN THE COUNTY RIGHT-OF-WAY SHALL BE MOUNTED ON A 2" GALVANIZED STEEL, PERFORATED, SOUARE TUBE POST (14 GAUGE) INSERTED INTO A 2-1/2" GALVANIZED STEEL, PERFORATED, SQUARE TUBE SLEEVE (12 GAUGE) - 3' LONG. A GALVANIZED STEEL POLE CAP SHALL BE MOUNTED ON TOP OF EACH POST.

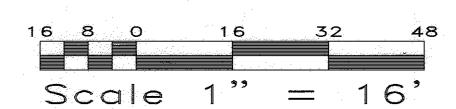
VICTORY TEMPLE - LAUREL

SITE DEVELOPMENT PLAN SDP - 12 - 007

HOWARD COUNTY, MARYLAND







=5,736 S.F. /2

SITE ANALYSIS DATA SHEET

-			
Α.	TOTAL SITE AREA:	1.9434 ac.	84,655 S.F.
	TOTAL WETLANDS AREA:	0.1707 ac.	7,437 S.F.
C.	TOTAL FLOODPLAINS AREA:	0.4552 ac.	19,828 S.F.
D.	TOTAL FORESTED AREA:	1.5611 ac.	68,000 S.F.
Ε.	TOTAL STEEP SLOPES (> 15%):	0.3903 ac.	17,000 S.F.
F.	TOTAL STREAM BUFFER AREA:	0.2571 ac.	11,200 S.F.
G.	LIMIT OF DISTURBED AREA:	1.3200 ac.	57,500 S.F.
	LOD WITHIN PAR. A (PLAT #16329):	0.86 ac.	37,500 S.F.
	LOD WITHIN PAR 8-6 (PLAT #14092)	0.46 ac	20,000 S.F.

H. PROPOSED USES FOR SITE AND

CHURCH, PERMITTED BY RIGHT PER ZONING REGULATION SECTION 127.2.B.22.

I. OPEN SPACE ON SITE:

J. PROPOSED IMPERVIOUS AREA: PERVIOUS PAVEMENT AREA: IMPERVIOUS PAVEMENT AREA:

0.9642 ac. = 42,000 S.F., INCLUDING 0.1175 ac. = 5.120 S.F. 0.6122 ac. = 26.666 S.F.

0.2345 ac. = 10.214 S.F. (AFTER PHASE 1) **BUILDING AREA:** 0.1186 ac. = 5,168 S.F. (AFTER PHASE T) (1) + 658 S.F. (TEMP. TRAILER) = K. BUILDING COVERAGE OF SITE: 0.2345 ac. = 10,214 S.F. (12.1%)

L. PRESENT ZONING DESIGNATION:

CE-CLI. CORRIDOR EMPLOYMENT DISTRICT -CONTINUING LIGHT INDUSTRIAL OVERLAY DISTRICT

M. GROSS FLOOR AREA:

10,214 (1st FLR) + 6,030 (2nd FLR) = 16,244 S.F. (TWO STORY)

SANCTUARY AREA:

4.008 S.F.

N. PROPOSED NUMBER OF SEATS:

O. NUMBER OF PARKING SPACES REQUIRED:

200/3=67 SPACES (1.0 SPACES PER 3 SEATS)

NUMBER OF PARKING SPACES 69 SPACES (ON SITE), INCLUDING 4 H/C SPACES PROVIDED:

P. APPLICABLE DPZ FILE REFERENCES: F-98-182: SECTION ONE, MAIER INDUSTRIAL PARK, PARCELS B-5 & B-6. A RESUBDIVISION OF

PARCEL B-4, PLAT #7620. APPROVED 02/03/00. F-02-010: SUBDIVISION PLAT, A.C. MILLER PROPERTY PARCELS A & B. A SUBDIVISION OF A.C.

MILLER PROPERTY, PLATS #16329 THROUGH 16332. RECORDED 11/20/03. PROPERTY WAS SUBJECT TO LEGISLATIVE REZONING FROM M-2 LIGHT INDUSTRIAL TO CE-CORRIDOR EMPLOYMENT BY THE HOWARD COUNTY COUNCIL, (d. 02/04/04).

SDP-07-022: A.C. MILLER PROPERTY, PARCEL A & MAIER INDUSTRIAL PARK, SECTION 1, PARCEL B-6 (SINGH PROPERTY), PROPOSED FLEX SPACE BUILDING, PLAN DETERMINED TO BE TECHNICALLY COMPLETE 07/18/07

WP-08-065: REQUEST TO WAIVE 16.156(i), TO REACTIVATE SDP-07-022, AND GRANT A 180 DAY EXTENSION TO SUBMIT SDP-07-022 AS A "MAJOR REVISION BY APPLICANT" FOR A PROPOSED RELIGIOUS FACILITY, WAIVER REQUEST APPROVED FEBRUARY 28, 2008. SUBSEQUENT DEADLINE HAD BEEN MISSED. DAP 2010-05-26: DAP MEETING WAS HELD ON 05/26/10. DPZ DIRECTOR'S ENDORSEMENT OF DAP RECOMMENDATIONS HAS BEEN RECEIVED 06/25/10.

ECP 11-056: ORIGINAL ENVIRONMENTAL CONCEPT PLAN WAS SIGNED ON 07/26/2011.

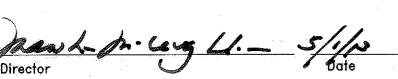
F-13-024: RESUBDIVISION PLAT, VICTORY TEMPLE - LAUREL: TO CONSOLIDATE PARCEL A (PLAT #16329) WITH PARCEL B-6 (PLAT #14092) INTO ONE CONTIGUOUS PROPERTY; ESTABLISH NEW SETBACKS; CREATE A PUBLIC SANITARY SEWER EASEMENT, A PUBLIC WATER AND UTILITY EASEMENT, AN ADDITIONAL PUBLIC 100-YR FLOODPLAIN, DRAINAGE AND UTILITY EASEMENT. THIS PLAT WAS RECORDED ON 10/19/2012 AS PLAT No. 22114.

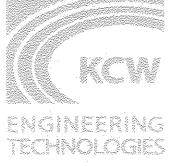
WP-13-134: REQUEST TO WAIVE 16.156(k, I, m), TO REACTIVATE SDP-12-007, AND GRANT A 180 DAY EXTENSION TO SUBMIT ORIGINAL MYLAR PLANS. WAIVER REQUEST WAS APPROVED ON 04/04/2013 WITH NEW DEADLINE ON 05/16/2013.

APPROVED: DEPARTMENT OF PLANNING AND ZONING



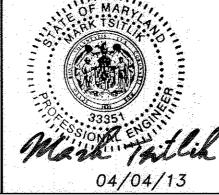






KCW Engineering Technologies, Inc. 810 Landmark Drive, Suite 215 Glen Burnie, MD 21061 Phone: 410.768.7700 Fax: 410.768.0200

www.kcw-et.com



LIST OF ADDITIONAL DRAWINGS

TITLE SHEET (2)

GRADING PLAN /2

LIST OF DRAWINGS

△ 1 OF 19

△ 5 OF 19

/\ 7 OF 19

2 OF 19

4 OF 19

6 OF 19

8 OF 19

9 OF 19

13 OF 19

15 OF 19

16 OF 19

⚠ 14 OF 19

3A OF 19 SITE DEVELOPMENT PLAN - PHASE I

17A OF 19 LANDSCAPE/HARDSCAPE PLAN - PHASE IT (2)

SITE DEVELOPMENT PLAN - PHASE I

SWM ESD PLAN/DEVELOPED CONDITIONS DA MAP

SWM RAINWATER HARVESTING SYSTEM PLAN

LANDSCAPE/HARDSCAPE PLAN - PHA SE I 🕮

RETAINING WALL SPECIFICATIONS AND DETAILS

RETAINING WALL PLAN. ELEVATION AND SECTIONS

6A OF 19 SEDIMENT CONTROL DETAILS I

EXISTING CONDITIONS PLAN

SEDIMENT CONTROL PLAN

SWM PERVIOUS PAVEMENT I

SWM PERVIOUS PAVEMENT II

SWM SANDFILTERS PLAN

CONSTRUCTION DETAILS

UTILITY DETAILS

CONSTRUCTION PROFILES

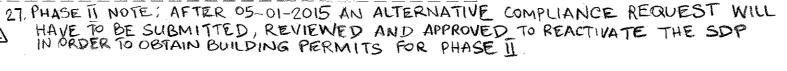
CONSTRUCTION PROFILES II

SEDIMENT CONTROL DETAILS I

SWM MICRO-BIORETENTION PLAN

hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. 33351 Expiration Date 06-30-2018

REVISIONS DESCRIPTION 03-06-14 SHOW TWO-PHASE CONSTRUCTION 05-05-17 SHOW TEMP TRAILER FOR PHASE I ADD PHASE I NOTE



TRUSS BEARING

5500ND FLOOR BL 11200'

- 18. EXISTING 50' STRUCTURE AND USE SETBACKS PER PLATS #14092 AND # 16329: THESE SETBACKS WILL BE ELIMINATED DURING SITE DEVELOPMENT PLAN VIA NEW PLAT F-13-024 (PLAT #22114).
- 19. ADEQUATE PUBLIC FACILITIES ORDINANCE AND TRAFFIC STUDY: THE APP ROAD TEST AND TRAFFIC STUDY ARE NOT REQUIRED FOR THIS PROJECT, BECAUSE THERE WILL BE NO PEAK HOUR TRAFFIC BASED ON THE USE OF THE PROPERTY AS CHURCH. THERE WILL BE NO DAYCARE PROGRAM AT THE CHURCH.
- 20. LANDSCAPE PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 16.124 OF THE HOWARD COUNTY CODE AND LANDSCAPE MANUAL.
- 21. FINANCIAL SURETY FOR THE REQUIRED LANDSCAPING HAS BEEN POSTED AS PART OF THE DPW DEVELOPER'S AGREEMENT IN THE AMOUNT OF \$4,470.00 FOR 12 SHADE TREES, 2 EVERGREEN TREES AND 19 SHRUBS (SEE SHEET 17 OF 19).
- 22. ALL OUTDOOR LIGHTING SHALL COMPLY WITH THE REQUIREMENTS OF ZONING SECTION 134.
- 23. FINAL BUILDING DESIGN WILL BE SUBJECT TO RELEVANT BUILDING AND FIRE CODES IN EFFECT AT THE TIME OF BUILDING PERMIT APPLICATION. BUILDING DESIGN AND ARCHITECTURAL DETAILS WILL BE CONSISTENT WITH THE GENERAL INFORMATION PROVIDED HEREIN. ANY SUBSTANTIVE BUILDING DESIGN OR ARCHITECTURAL DETAILS PROPOSED THAT ARE NOT CONSISTENT WITH THESE GENERAL FEATURES WILL BE SUBMITTED TO HOWARD COUNTY FOR ADMINISTRATIVE ARCHITECTURAL REVIEW AND APPROVAL PRIOR TO BUILDING PERMIT APPLICATION.
- 24. A KNOX BOX HAS BEEN LOCATED ON THE FRONT OF THE BUILDING. THE BOX SHALL BE ELECTRONICALLY SUPERVISED TO NOTIFY THE OWNER THAT IT IS BEING ACCESSED (INTEGRATED WITH THE FIRE ALARM SYSTEM).
- 25. PARKING NOTES:

- THERE WILL BE NO DAYCARE PROGRAM AT THE CHURCH. - SERVICES THAT ROUTINELY REQUIRE SEATING BEYOND THE AMOUNT ESTIMATED FOR THE PARKING CALCULATIONS SHALL FIND ADDITIONAL MEANS FOR OFF-SITE PARKING THROUGH PARKING AGREEMENTS OR AMENDMENTS TO THIS SDP.

26. TEMPORARY TRAILER NOTES!

-THE USE FOR THE TEMPORARY TRAILER IS OFFICE

-THE TRAILER IS TEMPORARY AND SHALL BE REMOVED FROM THE SITE WHEN

PHASE I CONSTRUCTION BEGINS FOR TEMP TRAILER FLOOR PLAN AND ELEVATIONS SEE SHEET 14 OF 19 FOR TEMP TRAILER LANDSCAPING SEE SHT. 17 OF 19 OWNER'S REPRESENTATIVE/ DEVELOPER

THE REDEEMED CHRISTIAN CHURCH OF GOD, INC. (VICTORY TEMPLE) LAUREL, MARYLAND

13701 OLD ANNAPOLIS ROAD **BOWIE. MD 20720**

Attn: Margaret Adeyokunnu, Pastor Tele: (301) 352-0707 Fax: (301) 352-3339

TLI DESIGNGROUP INC. 3308 DORCHESTER ROAD BALTIMORE, MD 21215 Attn: Taiwo Iluyomade, President

Toll Free/Fax/Voice mail: (1-866) 616-1497

Mobile: (443) 831-6703

BENCHMARKS HOWARD CO. HUB NO. 471C, EL. 189.05

N 532036.885 E 1362819.058

CYLINDRIĆ BASE.

HOWARD CO. HUB NO. 471B, EL. 180.71 N 529701.579 E 1361469.758 3/4" IRON ROD WITH STAMPED ALUMINUM CAP

A BRASS DISC (1" TO 2" BELOW TERRAIN

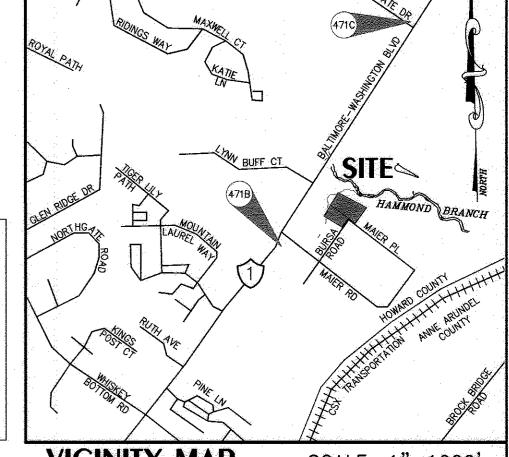
SURFACE) SET ON TOP OF CONCRETE

1. OWNERS:

3. TAX ACCOUNT NO. **ELECTION DISTRICT:**

PARCEL AREA:

DEED REFERENCE:



VICINITY MAP

SCALE: 1"=1000' ADC 5169-H1, J1

GENERAL NOTES

THE REDEEMED CHRISTIAN CHURCH OF GOD, INC. (VICTORY TEMPLE) LAUREL, MARYLAND 13701 OLD ANNAPOLIS ROAD BOWIE, MD 20720

2. PROPERTY LOCATION:

9100 BURSA ROAD AND 9110 BURSA ROAD LAUREL, MARYLAND 20723 06 - 417604

11264/592 (PLAT #16329) 47, GRID 23, PARCEL 540

06-554016 11264/592 (PLAT #14092) 47, GRID 23, PARCEL 848 0.6345 AC. (27,638 S.F.)

4. SITE AREA CALCULATIONS: TOTAL AREA: 1.3089 AC. + 0.6345 AC. = 1.9434 AC. (84,655 S.F.) 5. THE SUBJECT PROPERTY IS ZONED CE-CLI CORRIDOR EMPLOYMENT-CONTINUING LIGHT INDUSTRIAL

2/04/04 PER THE COMPREHENSIVE ZONING PLAN AND COMP LITE ZONING AMENDMENTS DATED 7/28/06 CONTRACT NO. 24-4047-D. WATER AND SEWER CONNECTIONS: THE WATER AND SEWER CONNECTIONS SHALL BE BY ADVANCED

1.3089 AC. (57,017 S.F.)

- STUDY (1980, UPDATED 1986 & 2006) PREPARED BY KCW ENGINEERING TECHNOLOGIES, INC. AS PART OF SDP-07-022. 100-YR FLOODPLAIN OVER PARCEL A. PLAT #16329 IS ALREADY RECORDED IN THE LAND RECORDS WITH PLAT #16330 AS PART OF A PREVIOUSLY APPROVED SUBDIVISION PLAT (F-02-10) FOR A.C. MILLER PROPERTY, PARCELS A & B.
- 8. TOPOGRAPHY: TOPOGRAPHY SHOWN IS BASED ON AERIAL TOPOGRAPHY PREPARED BY "WINGS AERIAL
- MAINTAINED BY THE OWNER. STORMWATER MANAGEMENT REQUIREMENTS FOR THE SITE ARE PROVIDED BY MICRO-BIORETENTION. PERMEABLE PAVEMENTS. RAINWATER HARVESTING. AND PERIMETER SANDFILTERS.
- HABITATS, UNDERGROUND STORAGE TANKS OR HAZARDOUS MATERIAL SITES LOCATED ON THIS PROPERTY. THERE ARE NO SIGNIFICANT VIEWS OR SITE FEATURES THAT MAY AFFECT THE DEVELOPMENT PROPOSAL. THERE ARE NO SIGNIFICANT REGULATED PLANT OR WILD LIFE COMMUNITIES BASED UPON DNR DATA.
- 11. FOREST CONSERVATION: THIS PROJECT COMPLIES WITH THE REQUIREMENTS OF SECTION 16.1200 OF THE HOWARD COUNTY CODE. FOREST CONSERVATION REQUIREMENTS FOR A.C. MILLER PROPERTY, PARCELS A & B WERE ADDRESSED AS PART OF A PREVIOUSLY APPROVED SUBDIVISION PLAT (F-02-10). RECORDED IN THE LAND RECORDS WITH PLAT #16330, AND APPROVED STORM DRAIN AND FOREST CONSERVATION PLAN (F-02-10). MAIER IND. PARK SECT. 1, FOR PARCEL B-6 PAYMENT OF FEE-IN-LIEU IS REQUESTED. IT WILL REQUIRE PAYMENT OF \$2,286,90 TO THE HOWARD COUNTY FOREST CONSERVATION FUND.
- 12. WETLANDS: WETLANDS SHOWN HEREON WERE DELINEATED BY KCW ENGINEERING TECHNOLOGIES, INC. AND VERIFIED BY HOWARD SOIL CONSERVATION DISTRICT SEPT. 14, 2001 AS PART OF A PREVIOUSLY APPROVED SUBDIVISION PLAT OF A.C. MILLER PROPERTY, PARCELS A & B (F-02-10). WETLANDS HAD BEEN RECORDED IN THE LAND RECORDS WITH PLAT #16332 ON 11/20/03. UPDATED WETLAND DELINEATION PLAN AND REPORT DATED JUNE 28, 2011 PREPARED BY HUMAN AND ROHDE, INC. ARE SUBMITTED HEREWITH.
- 13. NO GRADING. REMOVAL OF VEGETATIVE COVER OR TREES, PAVING AND NEW STRUCTURES SHALL BE PERMITTED WITHIN THE WETLANDS, STREAM(S) OR THEIR BUFFERS, FOREST CONSERVATION EASEMENT AREAS AND 100-YEAR FLOODPLAIN.
- 14. COMPLIANCE WITH THE ROUTE 1 MANUAL: THIS PROJECT HAS BEEN DESIGNED IN ACCORDANCE WITH ROUTE 1 MANUAL REQUIREMENTS FOR NEW DEVELOPMENTS LOCATED IN THE CE-CLI ZONE. THIS SITE DEVELOPMENT PLAN SUBMISSION PROVIDES ALL APPLICABLE STREETSCAPE, SITE AND BUILDING DESIGNS RESPONDING TO THE ROUTE 1 MANUAL'S REQUIREMENTS AND RECOMMENDATIONS. DAP MEETING WAS HELD ON 05/26/10. DPZ DIRECTOR'S ENDORSEMENT OF DAP 2010-05-26 RECOMMENDATIONS HAS BEEN RECEIVED 06/25/10.
- 15. ENVIRONMENTAL CONCEPT PLAN ECP-11-056: THE ORIGINAL ENVIRONMENTAL CONCEPT PLAN WAS SIGNED ON JULY 26,
- 16. THE DESIGN NARRATIVE CAN BE FOUND ON SWM ESD PLAN, SHEET 7 OF 19, AND IN STORMWATER MANAGEMENT REPORT
- 17. EXISTING 75' PRIVATE BGE EASEMENT FOR TRIMMING AND CUTTING TREES: PER DEED RECORDED IN LIBER 626, FOLIO 590 AND THE INQUISITION RECORDED IN LIBER 623. FOLIO 174 BGE HAS THE RIGHT TO TRIM, CUT DOWN, AND REMOVE TREES ON PARCEL OF LAND DESCRIBED AS PARCEL No. 2 AND AS SHOWN ON THESE PLANS. THERE ARE NO OTHER RIGHTS PRESCRIBED TO BGE ON PARCEL No. 2 PER DOCUMENTS MENTIONED HEREIN. BGE'S APPROVAL FOR PROPOSED DEVELOPMENT ON PARCEL No. 2 IS NOT REQUIRED.

A PURPOSE OF REVISED SITE DEVELOPMENT PLAN a) TO SHOW THAT THE PROJECT WILL BE BUILT IN TWO PHASES

C) TO ADD PHASE I NOTE

B) UPDATE SEDIMENT CONTROL PLAN TO 2011 MDE ESC SPECS. & PURPOSE OF REVISED SDP

KCW J.O.: 2080018

SCALE: AS SHOWN

DESIGNED: MT

DRAWN: MT

CHECKED: KCA

DATE: APRIL 4, 2013

DRAWING NO.

1 OF 19

ADDRESS CHART Street Address 540 9100 BURSA ROAD, LAUREL, MD 20723 PERMIT INFORMATION CHART VICTORY TEMPLE 23 47 6069.02 CE-CLI 6th S - 7100400W - C - 04

a) TO SHOW TEMP TRAILER FOR PH. I B) TO REVISE PLANT LIST ON LANDSCAPE PLANS WITH DEER RESISTANT PLANTS

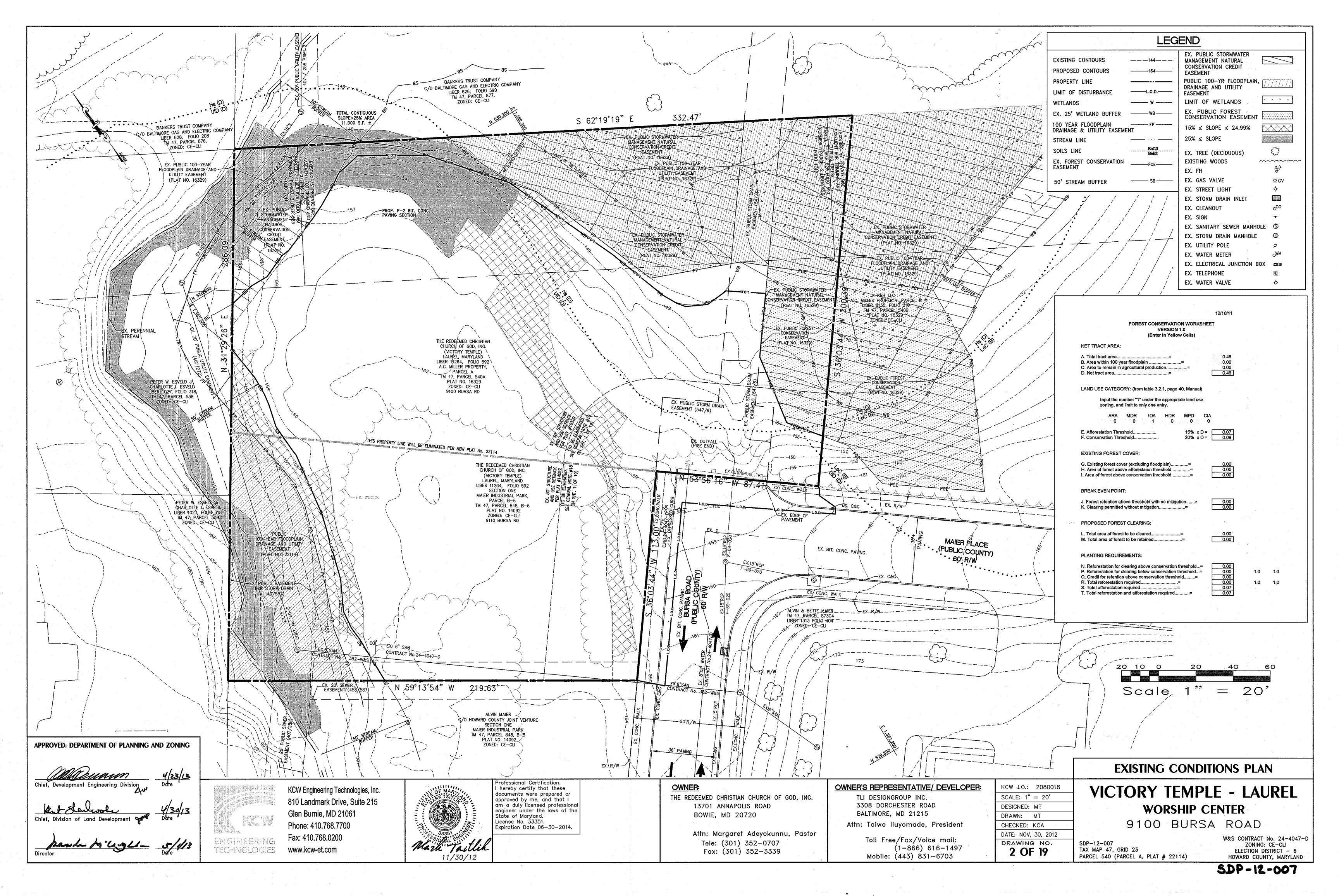
TITLE SHEET

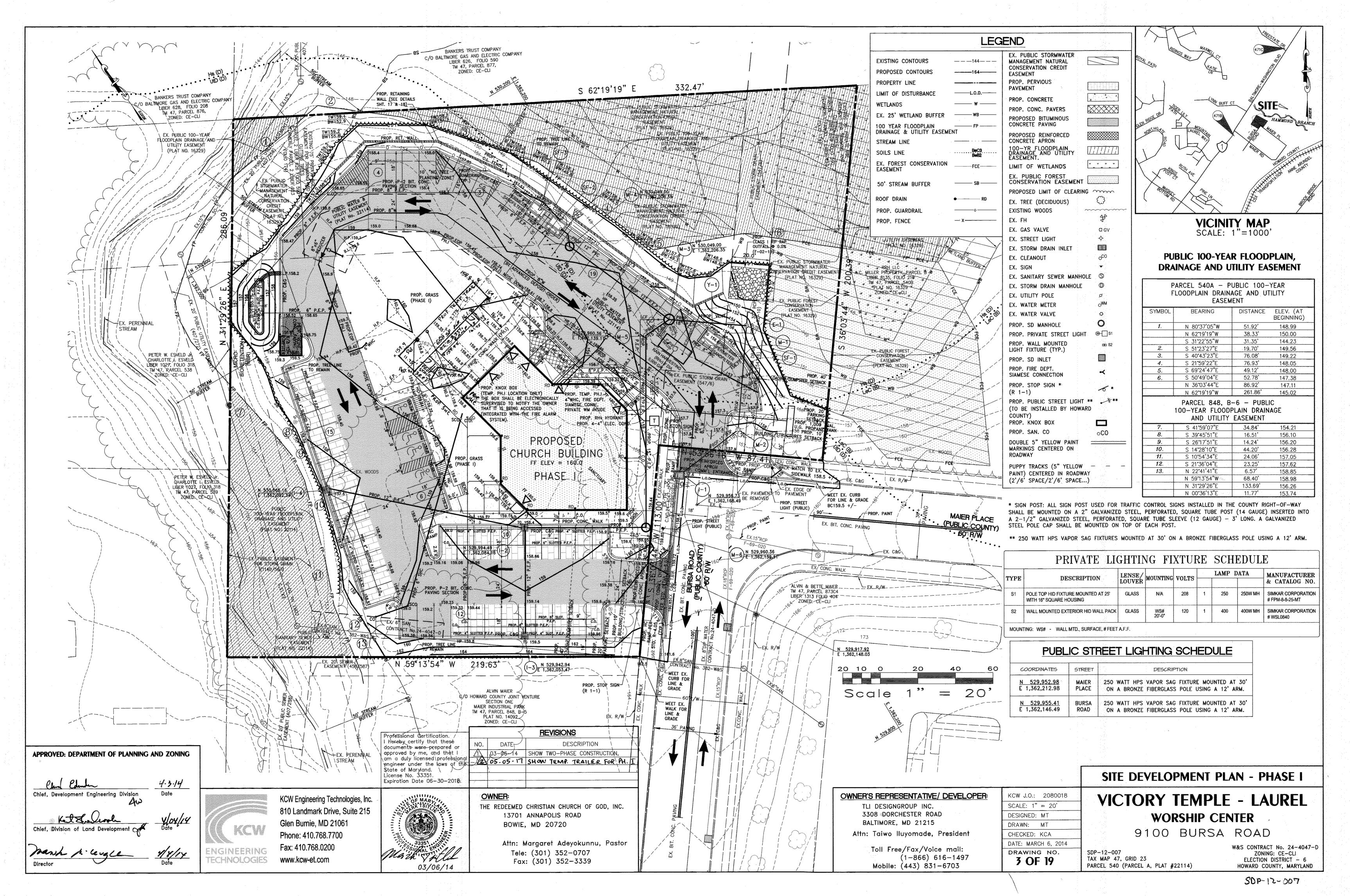
VICTORY TEMPLE - LAUREL **WORSHIP CENTER**

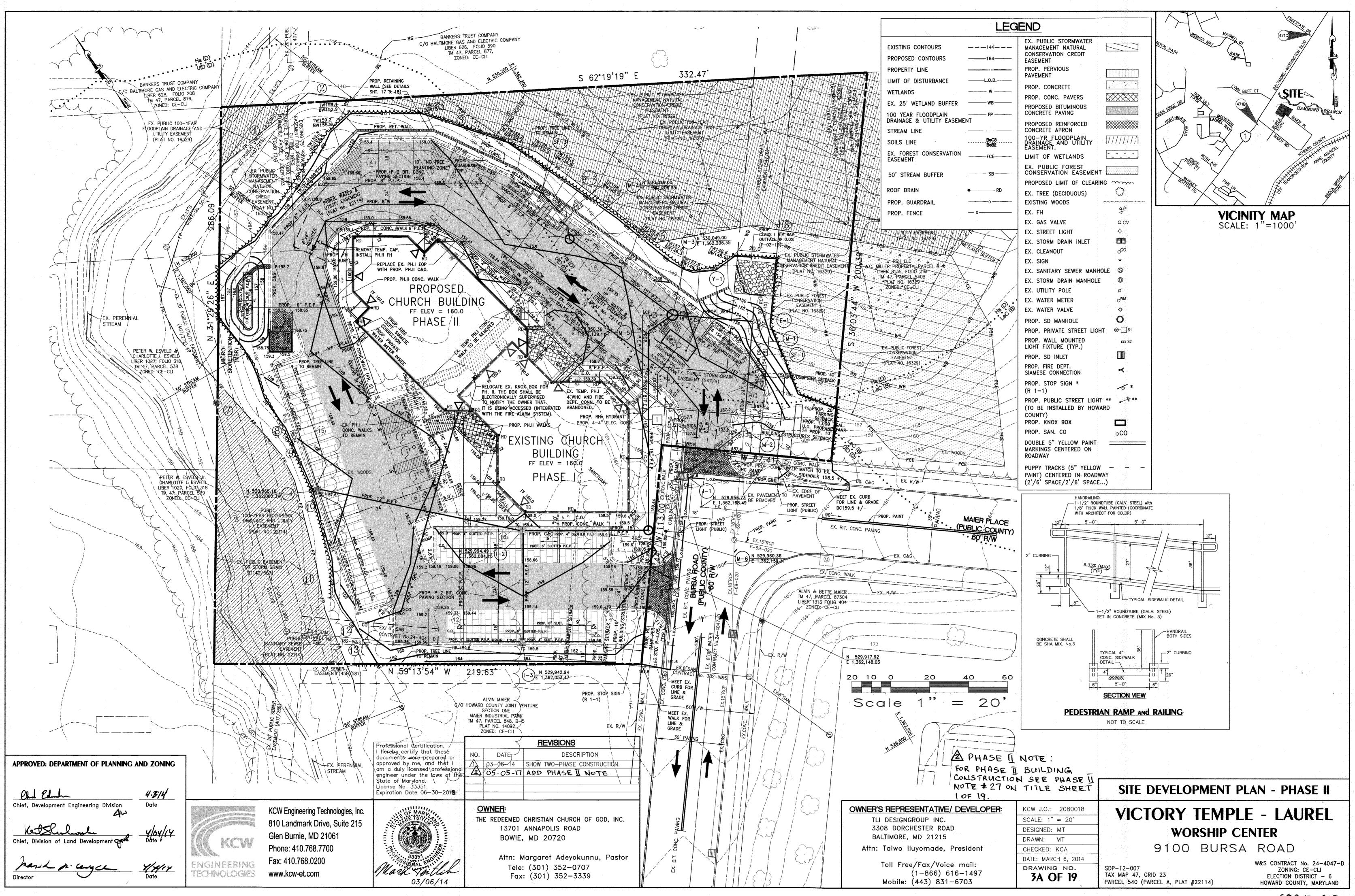
9100 BURSA ROAD

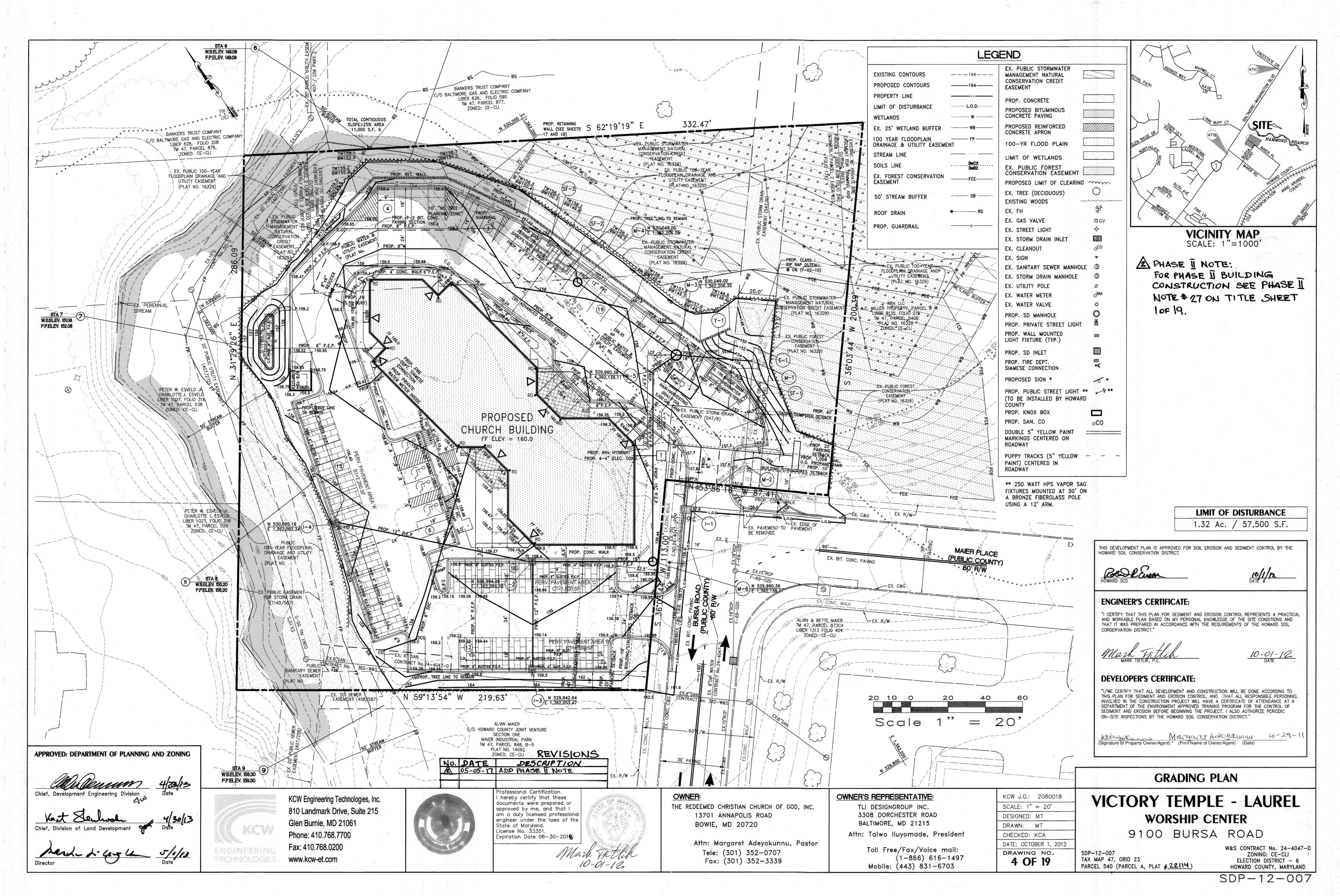
W&S CONTRACT No. 24-4047-D SDP-12-007 ZONING: CE-CLI TAX MAP 47, GRID 23 ELECTION DISTRICT - 6 PARCEL 540 (PARCEL A, PLAT # 22114) HOWARD COUNTY, MARYLAND

SDP-12-007









2011 VEGETATIVE STABILIZATION

B-4 STANDARDS AND SPECIFICATIONS FOR VEGETATIVE STABILIZATION

Using vegetation as cover to protect exposed soil from erosion

<u>Purpose</u>
To promote the establishment of vegetation on exposed soil.

Conditions Where Practice Applies
On all disturbed areas not stabilized by other methods. This specification is divided into sections on incremental stabilization; soil preparation, soil amendments and topsoiling; seeding and mulching; temporary stabilization: and permanent stabilization

Effects on Water Quality and Quantity
Stabilization practices are used to promote the establishment of vegetation on exposed soil. When soil is stabilized with vegetation, the soil is less likely to erode and more likely to allow infiltration of rainfall. thereby reducing sediment loads and runoff to downstream areas.

Planting vegetation in disturbed areas will have an effect on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, percolation, and groundwater recharge. Over time, vegetation will increase organic matter content and improve the water holding capacity of the soil and subsequent plant growth.

Vegetation will help reduce the movement of sediment, nutrients, and other chemicals carried by runoff to receiving waters. Plants will also help protect groundwater supplies by assimilating those substances present

Sediment control practices must remain in place during grading, seedbed preparation, seeding, mulching,

and vegetative establishment Adequate Vegetative Establishment

Inspect seeded areas for vegetative establishment and make necessary repairs, replacements, and reseedings within the planting season.

1. Adequate vegetative stabilization requires 95 percent groundcover. 2. If an area has less than 40 percent groundcover, restabilize following the original recommendations

4. Maintenance fertilizer rates for permanent seeding are shown in Table B.6.

for lime, fertilizer, seedbed preparation, and seeding. 3. If an area has between 40 and 94 percent groundcover, over-seed and fertilize using half of the rates originally specified.

B-4-1 STANDARDS AND SPECIFICATIONS FOR INCREMENTAL STABILIZATION

<u>Definition</u>
Establishment of vegetative cover on cut and fill slopes.

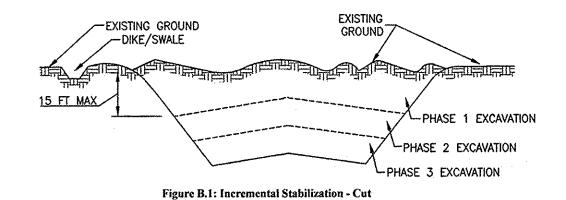
<u>Purpose</u>
To provide timely vegetative cover on cut and fill slopes as work progresses.

Conditions Where Practice Applies Any cut or fill slope greater than 15 feet in height. This practice also applies to stockpiles.

A. Incremental Stabilization - Cut Slopes

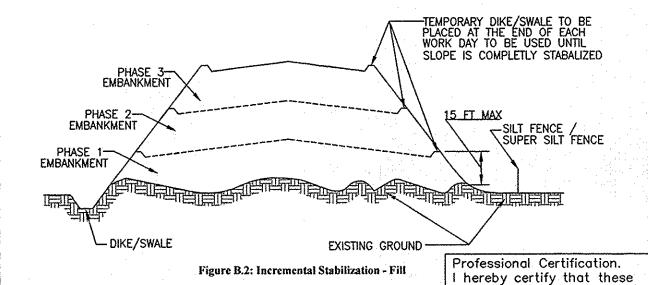
areas as necessary.

- 1. Excayate and stabilize cut slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all cut slopes as the work progresses.
- 2. Construction sequence example (Refer to Figure B.1): a. Construct and stabilize all temporary swales or dikes that will be used to convey runoff
- around the excavation. b. Perform Phase 1 excavation, prepare seedbed, and stabilize.
- c. Perform Phase 2 excavation, prepare seedbed, and stabilize. Overseed Phase 1 areas as d. Perform final phase excavation, prepare seedbed, and stabilize. Overseed previously seeded
- Note: Once excavation has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.



B. Incremental Stabilization - Fill Slopes

- 1. Construct and stabilize fill slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all slopes as the work progresses. 2. Stabilize slopes immediately when the vertical height of a lift reaches 15 feet, or when the grading
- operation ceases as prescribed in the plans. 3. At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.
- 4. Construction sequence example (Refer to Figure B.2): a. Construct and stabilize all temporary swales or dikes that will be used to divert runoff around the fill. Construct silt fence on low side of fill unless other methods shown on the
- b. At the end of each day, install temporary water conveyance practice(s), as necessary, to
- intercept surface runoff and convey it down the slope in a non-erosive manner. c. Place Phase 1 fill, prepare seedbed, and stabilize.
- d. Place Phase 2 fill, prepare seedbed, and stabilize.
- e. Place final phase fill, prepare seedbed, and stabilize. Overseed previously seeded areas as
- Note: Once the placement of fill has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.



APPROVED: DEPARTMENT OF PLANNING AND ZONING

documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. 33351. Expiration Date 06-30-2014.

4.3.14

Chief, Development Engineering Division Date



B-4-2 STANDARDS AND SPECIFICATIONS FOR SOIL PREPARATION, TOPSOILING, AND SOIL AMENDMENTS

<u>Definition</u>
The process of preparing the soils to sustain adequate vegetative stabilization.

<u>Purpose</u>
To provide a suitable soil medium for vegetative growth.

Conditions Where Practice Applies Where vegetative stabilization is to be established.

<u>Criteria</u>

- A. Soil Preparation
- a. Seedbed preparation consists of loosening soil to a depth of 3 to 5 inches by means of suitable agricultural or construction equipment, such as disc harrows or chisel plows or rippers mounted on construction equipment. After the soil is loosened, it must not be rolled or dragged smooth but left in
- b. Apply fertilizer and lime as prescribed on the plans. c. Incorporate lime and fertilizer into the top 3 to 5 inches of soil by disking or other suitable means.

the roughened condition. Slopes 3:1 or flatter are to be tracked with ridges running parallel to the

- a. A soil test is required for any earth disturbance of 5 acres or more. The minimum soil conditions
- required for permanent vegetative establishment are: i. Soil pH between 6.0 and 7.0.
- ii. Soluble salts less than 500 parts per million (ppm).
- iii. Soil contains less than 40 percent clay but enough fine grained material (greater than 30 percent silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception: if lovegrass will be planted, then a sandy soil (less than 30 percent silt plus clay) would be acceptable.
- iv. Soil contains 1.5 percent minimum organic matter by weight. v. Soil contains sufficient pore space to permit adequate root penetration.
- b. Application of amendments or topsoil is required if on-site soils do not meet the above conditions. c. Graded greas must be maintained in a true and even grade as specified on the approved plan, then scarified or otherwise loosened to a depth of 3 to 5 inches. d. Apply soil amendments as specified on the approved plan or as indicated by the results of a soil
- e. Mix soil amendments into the top 3 to 5 inches of soil by disking or other suitable means. Rake lawn areas to smooth the surface, remove large objects like stones and branches, and ready the area
- for seed application. Loosen surface soil by dragging with a heavy chain or other equipment to roughen the surface where site conditions will not permit normal seedbed preparation. Track slopes 3:1 or flatter with tracked equipment leaving the soil in an irregular condition with ridges running parallel to the contour of the slope. Leave the top 1 to 3 inches of soil loose and friable. Seedbed loosening may be unnecessary on newly disturbed areas.
- B. Topsoiling
- 1. Topsoil is placed over prepared subsoil prior to establishment of permanent vegetation. The purpose is to provide a suitable soil medium for vegetative growth. Soils of concern have low moisture content, low nutrient levels, low pH, materials toxic to plants, and/or unacceptable soil gradation.
- 2. Topsoil salvaged from an existing site may be used provided it meets the standards as set forth in these specifications. Typically, the depth of topsoil to be salvaged for a given soil type can be found in the representative soil profile section in the Soil Survey published by USDA-NRCS.
- 3. Topsoiling is limited to areas having 2:1 or flatter slopes where:
- a. The texture of the exposed subsoil/parent material is not adequate to produce vegetative growth. b. The soil material is so shallow that the rooting zone is not deep enough to support plants or furnish continuing supplies of moisture and plant nutrients.
- c. The original soil to be vegetated contains material toxic to plant growth. d. The soil is so acidic that treatment with limestone is not feasible.
- 4. Areas having slopes steeper than 2:1 require special consideration and design.
- 5. Topsoil Specifications: Soil to be used as topsoil must meet the following criteria: a. Topsoil must be a loam, sandy loam, clay loam, silt loam, sandy clay loam, or loamy sand. Other soils may be used if recommended by an agronomist or soil scientist and approved by the appropriate approval authority. Topsoil must not be a mixture of contrasting textured subsoils and must contain less than 5 percent by volume of cinders, stones, slag, coarse fragments, gravel, sticks, roots, trash,
- or other materials larger than 1½ inches in diameter. b. Topsoil must be free of noxious plants or plant parts such as Bermuda arass, quack arass. Johnson grass, nut sedge, poison ivy, thistle, or others as specified.
- c. Topsoil substitutes or amendments, as recommended by a qualified agronomist or soil scientist and approved by the appropriate approval authority, may be used in lieu of natural topsoil.
- 6. Topsoil Application
- a. Erosion and sediment control practices must be maintained when applying topsoil. b. Uniformly distribute topsoil in a 5 to 8 inch layer and lightly compact to a minimum thickness of 4 inches. Spreading is to be performed in such a manner that sodding or seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations must be corrected in order to prevent the formation of depressions or
- c. Topsoil must not be placed if the topsoil or subsoil is in a frozen or muddy condition, when the subsoil is excessively wet or in a condition that may otherwise be detrimental to proper grading and seedbed
- C. Soil Amendments (Fertilizer and Lime Specifications)
- 1. Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas of 5 acres or more. Soil analysis may be performed by a recognized private or commercial laboratory. Soil samples taken for engineering purposes may also be
- 2. Fertilizers must be uniform in composition, free flowing and suitable for accurate application by appropriate equipment. Manure may be substituted for fertilizer with prior approval from the appropriate approval authority. Fertilizers must all be delivered to the site fully labeled according to the applicable laws and must bear the name, trade name or trademark and warranty of the producer. 3. Lime materials must be ground limestone (hydrated or burnt lime may be substituted except when
- hydroseeding) which contains at least 50 percent total oxides (calcium oxide plus magnesium oxide). Limestone must be ground to such fineness that at least 50 percent will pass through a #100 mesh sieve and 98 to 100 percent will pass through a #20 mesh sieve.
- 4. Lime and fertilizer are to be evenly distributed and incorporated into the top 3 to 5 inches of soil by disking or other suitable means. 5. Where the subsoil is either highly acidic or composed of heavy clays, spread ground limestone at the rate of 4 to 8 tons/acre (200-400 pounds per 1,000 square feet) prior to the placement of topsoil.

B-4-8 STANDARDS AND SPECIFICATIONS FOR STOCKPILE AREA

A mound or pile of soil protected by appropriately designed erosion and sediment control measures. To provide a designated location for the temporary storage of soil that controls the potential for erosion,

sedimentation, and changes to drainage patterns. Conditions Where Practice Applies

Stockpile areas are utilized when it is necessary to salvage and store soil for later use.

- 1. The stockpile location and all related sediment control practices must be clearly indicated on the erosion and sediment control plan. 2. The footprint of the stockpile must be sized to accommodate the anticipated volume of material and based on a side slope ratio no steeper than 2:1. Benching must be provided in accordance with
- 3. Runoff from the stockpile area must drain to a suitable sediment control practice. 4. Access the stockpile area from the upgrade side. 5. Clear water runoff into the stockpile area must be minimized by use of a diversion device such as an earth dike, temporary swale or diversion fence. Provisions must be made for discharging concentrated
- flow in a non-erosive manner. 6. Where runoff concentrates along the toe of the stockpile fill, an appropriate erosion/sediment control practice must be used to intercept the discharge. . Stockpiles must be stabilized in accordance with the 3/7 day stabilization requirement as well as
- Standard B-4-1 Incremental Stabilization and Standard B-4-4 Temporary Stabilization. 8. If the stockpile is located on an impervious surface, a liner should be provided below the stockpile to facilitate cleanup. Stockpiles containing contaminated material must be covered with impermeable
- The stockpile area must continuously meet the requirements for Adequate Vegetative Establishment in accordance with Section B-4 Vegetative Stabilization. Side slopes must be maintained at no steeper than a 2:1 ratio. The stockpile area must be kept free of erosion. If the vertical height of a stockpile exceeds 20 feet for 2:1 slopes, 30 feet for 3:1 slopes, or 40 feet for 4:1 slopes, benching must be provided in accordance with Section B-3 Land Grading.

B-4-3 STANDARDS AND SPECIFICATIONS FOR SEEDING AND MULCHING

<u>Definition</u>
The application of seed and mulch to establish vegetative cover.

Purpose
To protect disturbed soils from erosion during and at the end of construction.

Conditions Where Practice Applies To the surface of all perimeter controls, slopes, and any disturbed area not under active aradina.

- 1. Specifications
- a. All seed must meet the requirements of the Maryland State Seed Law. All seed must be subject to re-testing by a recognized seed laboratory. All seed used must have been tested within the 6 months immediately preceding the date of sowing such material on any project. Refer to Table B.4 regarding the quality of seed. Seed tags must be available upon request to the inspector to verify type of seed and seeding rate. b. Mulch alone may be applied between the fall and spring seeding dates only if the ground is frozen. The
- appropriate seeding mixture must be applied when the ground thaws. c. Inoculants: The inoculant for treating legume seed in the seed mixtures must be a pure culture of nitrogen fixing bacteria prepared specifically for the species. Inoculants must not be used later than the date indicated on the container. Add fresh inoculants as directed on the package. Use four times the recommended rate when hydroseeding. Note: It is very important to keep inoculant as cool as possible until used. Temperatures above 75 to 80 degrees Fahrenheit can weaken bacteria and make the
- d. Sod or seed must not be placed on soil which has been treated with soil sterilants or chemicals used for weed control until sufficient time has elapsed (14 days min.) to permit dissipation of phylo-toxic
- 2. Application a. Dry Seeding: This includes use of conventional drop or broadcast spreaders.
- Incorporate seed into the subsoil at the rates prescribed on Temporary Seeding Table B.1, Permanent Seeding Table B.3, or site-specific seeding summaries. ii. Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction.
- Roll the seeded area with a weighted roller to provide good seed to soil contact. b. Drill or Cultipacker Seeding: Mechanized seeders that apply and cover seed with soil. i. Cultipacking seeders are required to bury the seed in such a fashion as to provide at least 1/4 inch of
- soil covering. Seedbed must be firm after planting.

 ii. Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction. c. Hydroseeding: Apply seed uniformly with hydroseeder (slurry includes seed and fertilizer). i. If fertilizer is being applied at the time of seeding, the application rates should not exceed the following: nitrogen, 100 pounds per acre total of soluble nitrogen; P205 (phosphorous), 200 pounds per acre;
- K20 (potassium), 200 pounds per acre. ii. Lime: Use only ground agricultural limestone (up to 3 tons per acre may be applied by hydroseeding). Normally, not more than 2 tons are applied by hydroseeding at any one time. Do not use burnt or
- hydrated lime when hydroseeding. iii. Mix seed and fertilizer on site and seed immediately and without interruption. iv. When hydroseeding do not incorporate seed into the soil.
- 1. Mulch Materials (in order of preference)
- a. Straw consisting of thoroughly threshed wheat, rye, oat, or barley and reasonably bright in color. Straw is to be free of noxious weed seeds as specified in the Maryland Seed Law and not musty, moldy, caked, decayed, or excessively dusty. Note: Use only sterile straw mulch in areas where one species of
- b. Wood Cellulose Fiber Mulch (WCFM) consisting of specially prepared wood cellulose processed into a
- uniform fibrous physical state. i. WCFM is to be dyed green or contain a green dye in the package that will provide an appropriate color to facilitate visual inspection of the uniformly spread slurry.
- ii. WCFM, including dye, must contain no germination or growth inhibiting factors. iii. WCFM materials are to be manufactured and processed in such a manner that the wood cellulose fiber mulch will remain in uniform suspension in water under agitation and will blend with seed, fertilizer and other additives to form a homogeneous slurry. The mulch material must form a blotter-like ground cover, on application, having moisture absorption and percolation properties and must cover and hold grass seed in contact with the soil without inhibiting the growth of the grass seedlings.
- iv. WCFM material must not contain elements or compounds at concentration levels that will be phyto-toxic. v. WCFM must conform to the following physical requirements: fiber length of approximately 10 millimeters, diameter approximately 1 millimeter, pH range of 4.0 to 8.5, ash content of 1.6 percent maximum and water holding capacity of 90 percent minimum.
- 2. Application a. Apply mulch to all seeded areas immediately after seeding.
- b. When straw mulch is used, spread it over all seeded areas at the rate of 2 tons per acre to a uniform loose depth of 1 to 2 inches. Apply mulch to achieve a uniform distribution and depth so that the soil surface is not exposed. When using a mulch anchoring tool, increase the application rate to 2.5 tons
- the wood cellulose fiber with water to attain a mixture with a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water. a. Perform mulch anchoring immediately following application of mulch to minimize loss by wind or water.

c. Wood cellulose fiber used as mulch must be applied at a net dry weight of 1500 pounds per acre. Mix

- the area and erosion hazard: i. A mulch anchoring tool is a tractor drawn implement designed to punch and anchor mulch into the soil surface a minimum of 2 inches. This practice is most effective on large areas, but is limited to flatter
- ii. Wood cellulose fiber may be used for anchoring straw. Apply the fiber binder at a net dry weight of 750 pounds per acre. Mix the wood cellulose fiber with water at a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.

slopes where equipment can operate safely. If used on sloping land, this practice should follow the

- iii. Synthetic binders such as Acrylic DLR (Agro-Tack), DCA-70, Petroset, Terra Tax II, Terra Tack AR or other approved equal may be used. Follow application rates as specified by the manufacturer. Application of liquid binders needs to be heavier at the edges where wind catches mulch, such as in
- valleys and on crests of banks. Use of asphalt binders is strictly prohibited. iv. Lightweight plastic netting may be stapled over the mulch according to manufacturer recommendations. Netting is usually available in rolls 4 to 15 feet wide and 300 to 3,000 feet long.

B-4-4 STANDARDS AND SPECIFICATIONS FOR TEMPORARY STABILIZATION

- <u>Definition</u>
 To stabilize disturbed soils with vegetation for up to 6 months.
- Purpose
 To use fast growing vegetation that provides cover on disturbed soils.
- Exposed soils where ground cover is needed for a period of 6 months or less. For longer duration of time, permanent stabilization practices are required.
- 1. Select one or more of the species or seed mixtures listed in Table B.1 for the appropriate Plant Hardiness Zone (from Figure B.3), and enter them in the Temporary Seeding Summary below along with application rates, seeding dates and seeding depths. If this Summary is not put on the plan and completed, then Table B.1 plus fertilizer and lime rates must be put on the plan.
- 2. For sites having soil tests performed, use and show the recommended rates by the testing agency. Soil tests are not required for Temporary Seeding.
- 3. When stabilization is required outside of a seeding season, apply seed and mulch or straw mulch alone as prescribed in Section B-4-3.A.1.b and maintain until the next seeding season.

TEMF	POR	ARI	SEEDIN	G SU	MMAR	Y	
1	RE FOR	_	SS ZONE 6b		FERTILIZER	WAY A SHAPE TO THE SHAPE A SHA	
00.000		EDING ATES	SEEDING	SEEDING	RATE: * (10-20-10)	LIME RATE	*
SPECIES	lbs/ acre	lbs/ 1000 sf	DATES	DEPTHS	e.	The part of the state of the st	
ANNUAL RYEGRASS	40	1.0	Mar. 1 to May 15 and Aug. 1 to Oct. 15	1/2"	436 lbs/acre	2 tons/a	re
CEREAL RYE	112	2.8	Mar. 1 to May 15 and Aug. 1 to Nov. 15	1"	or 10 lbs/ 1000 sf	or 90 lbs/ 1000 sf	
FOXTAIL MILLET	30	0.7	May 16 to July 31	1/2"	- *	A Anna turn 1 an	

B-4-5 STANDARDS AND SPECIFICATIONS FOR PERMANENT STABILIZATION

<u>Definition</u>
To stabilize disturbed soils with permanent vegetation.

summary is to be placed on the plan.

<u>Purpose</u>
To use long—lived perennial grasses and legumes to establish permanent ground cover on disturbed soils. Conditions Where Practice Applies

exposed soils where ground cover is needed for 6 months or more. Criterio A. Seed Mixtures

- 1. General Use a. Select one or more of the species or mixtures listed in Table B.3 for the appropriate Plant Hardiness Zone (from Figure 8.3) and based on the site condition or purpose found on Table B.2. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The Summary is to
- b. Additional planting specifications for exceptional sites such as shorelines, stream banks, or dunes or for special purposes such as wildlife or aesthetic treatment may be found in USDA-NRCS Technical Field Office Guide, Section 342 - Critical Area Plantina. c. For sites having disturbed area over 5 acres, use and show the rates recommended by the soil testina
- d. For areas receiving low maintenance, apply urea form fertilizer (46-0-0) at 3 ½ pounds per 1000 square feet (150 pounds per acre) at the time of seeding in addition to the soil amendments shown in
- 2. Turfgrass Mixtures a. Areas where turfgrass may be desired include lawns, parks, playgrounds, and commercial sites which will receive a medium to high level of maintenance. b. Select one or more of the species or mixtures listed below based on the site conditions or purpose. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The
- i. Kentucky Bluegrass: Full Sun Mixture: For use in greas that receive intensive management. Irrigation required in the areas of central Maryland and Eastern Shore. Recommended Certified Kentucky Bluegrass Cultivars Seeding Rate: 1.5 to 2.0 pounds per 1000 square feet. Choose a minimum of three Kentucky bluegrass cultivars with each ranging from 10 to 35 percent of the total mixture by weight.
- ii. Kentucky Bluegrass/Perennigl Rye; Full Sun Mixture: For use in full sun areas where rapid establishment is necessary and when turf will receive medium to intensive management. Certified Perennial Ryegrass Cultivars/Certified Kentucky Bluegrass Seeding Rate: 2 pounds mixture per 1000 square feet. Choose a minimum of three Kentucky bluegrass cultivars with each ranging from 10 to 35 percent of the total
- mixture by weight. iii. Tall Fescue/Kentucky Bluegrass: Full Sun Mixture: For use in drought prone areas and/or for areas receiving low to medium management in full sun to medium shade. Recommended mixture includes; Certified Tall Fescue Cultivars 95 to 100 percent, Certified Kentucky Bluegrass Cultivars 0 to 5 percent.

Seeding Rate: 5 to 8 pounds per 1000 square feet. One or more cultivars may be blended

- iv. Kentucky Bluegrass/Fine Fescue: Shade Mixture: For use in greas with shade in Bluegrass lawns. For establishment in high quality, intensively managed turf area. Mixture includes; Certified Kentucky Bluegrass Cultivars 30 to 40 percent and Certified Fine Fescue and 60 to 70 percent. Seeding Rate: 1½ to 3 pounds per 1000 square feet.
- Select turfarass varieties from those listed in the most current University of Maryland Publication, Agronomy Memo #77, "Turfgrass Cultivar Recommendations for Maryland" Choose certified material. Certified material is the best guarantee of cultivar purity. The certification program of the Maryland Department of Agriculture, Turf and Seed Section, provides a reliable means of consumer protection and assures a pure genetic line
- c. Ideal Times of Seeding for Turf Grass Mixtures Western MD: March 15 to June 1, August 1 to October 1 (Hardiness Zones: 5b, 6a)
- Central MD: March 1 to May 15, August 15 to October 15 (Hardiness Zone: 6b)
- Southern MD, Eastern Shore: March 1 to May 15, August 15 to October 15 (Hardiness Zones: 7a, 7b) d. Till areas to receive seed by disking or other approved methods to a depth of 2 to 4 inches, level and
- rake the areas to prepare a proper seedbed. Remove stones and debris over 1½ inches in diameter. The resulting seedbed must be in such condition that future moving of grasses will pose no difficulty. e. If soil moisture is deficient, supply new seedings with adequate water for plant growth (1/2 to 1 inch every 3 to 4 days depending on soil texture) until they are firmly established. This is especially true when seedings are made late in the planting season, in abnormally dry or hot seasons, or on adverse
- B. Sod: To provide quick cover on disturbed areas (2:1 grade or flatter).

between sod roots and the underlying soil surface.

3. Sod Maintenance

specified.

- a. Class of turfgrass sod must be Maryland State Certified. Sod labels must be made available to the iob
- foreman and inspector. b. Sod must be machine cut at a uniform soil thickness of 3/4 inch, plus or minus 1/4 inch, at the time of cutting. Measurement for thickness must exclude top growth and thatch. Broken pads and torn uneven ends will not be acceptable.
- c. Standard size sections of sod must be strong enough to support their own weight and retain their size and shape when suspended vertically with a firm grasp on the upper 10 percent of the section. d. Sod must not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.
- e. Sod must be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period must be approved by an agronomist or soil scientist prior to its installation.
- a. During periods of excessively high temperature or in areas having dry subsoil, lightly irrigate the subsoil immediately prior to laying the sod. b. Lay the first row of sod in a straight line with subsequent rows placed parallel to it and tightly wedged
- against each other. Stagger lateral joints to promote more uniform growth and strength. Ensure that sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would cause air drying of the roots. c. Wherever possible, lay sod with the long edges parallel to the contour and with staggering joints. Roll

and tamp, peg or otherwise secure the sod to prevent slippage on slopes. Ensure solid contact exists

- d. Water the sod immediately following rolling and tamping until the underside of the new sod pad and soil surface below the sod are thoroughly wet. Complete the operations of laying, tamping and irrigating for any piece of sod within eight hours.
- a. In the absence of adequate rainfall, water daily during the first week or as often and sufficiently as necessary to maintain moist soil to a depth of 4 inches. Water sod during the heat of the day to b. After the first week, sod watering is required as necessary to maintain adequate moisture content. c. Do not mow until the sod is firmly rooted. No more than 1/3 of the grass leaf must be removed by

the initial cutting or subsequent cuttings. Maintain a grass height of at least 3 inches unless otherwise

٠	SEED MIXTURE FOR HAP (From Table E	RDINESS 3.3)	ZONE 6b			rtilizer ra 10–20–20)		
NO.	SPECIES	APPLIC. RATE lbs/ acre	SEEDING DATES	SEEDING DEPTHS	N	P205	K₂O	LIME RATE*
8	SEED MIXTURE: TALL FESCUE (100%)	100	March 1 to May 15 Aug. 1 to Oct. 15	1/4" to 1/2"	45 lbs/ acre	90 lbs/ acre	90 lbs/ acre	2 tons/ acre
iii	TURFGRASS MIXTURE: TALL FESCUE (95%) KENTUCKY BLUEGRASS (5%)	250 13	March 1 to May 15 Aug. 15 to Oct. 15	1/4" to 1/2"	or 1.0 lbs/ 1000 sf	or 2.0 lbs/ 1000 sf	or 2.0 lbs/ 1000 sf	or 90 lbs/ 1000 si

H-1 STANDARDS AND SPECIFICATIONS

<u>FOR</u> MATERIALS

Table H.1: Geotextile Fabrics

		WOVEN SLIT FILM GEOTEXTILE		WOVEN MONOFILAMENT GEOTEXTILE		NONWOVEN GEOTEXTILE		
			MINIMU	M AVERAC	E ROLL	/ALUE ¹	ALUE	
PROPERTY	MD	CD	MD	CD	MD	CD		
Grab Tensile Strength	ASTM D-4632	200 lb	200 lb	370 lb	250 lb	200 lb	200 lb	
Grab Tensile Elongation	ASTM D-4632	15%	10%	15%	15%	50%	50%	
Trapezoidal Tear Strength	ASTM D-4533	75 lb	75 lb	100 lb	60 lb	80 lb	80 lb	
Puncture Strength	ASTM D-6241	450 lb		900 lb		450 lb		
Apparent Opening Size ²	ASTM D-4751	U.S. Sieve 30 (0.59 mm)		U.S. Sieve 70 (0.21 mm)		U.S. Sieve 70 (0.21 mm)		
Permittivity	ASTM D-4491	0.05 sec ⁻¹		0.28 sec ⁻¹		1.1 sec-1		
Ultraviolet Resistance Retained at 500 hours	ASTM D-4355	70% strength		70% str	ength	70% strength		

All numeric values except apparent opening size (AOS) represent minimum average roll values (MARV). MARV is calculated as the typical minus two standard deviations. MD is machine direction; CD is cross

Values for AOS represent the average maximum opening.

Geotextiles must be evaluated by the National Transportation Product Evaluation Program (NTPEP) and conform to the values in Table H.1.

The geotextile must be inert to commonly encountered chemicals and hydrocarbons and must be rot and mildew resistant. The geotextile must be manufactured from fibers consisting of long chain synthetic polymers and composed of a minimum of 95 percent by weight of polyolefins or polyesters, and formed into a stable network so the filaments or varns retain their dimensional stability relative to each other, including selvages.

When more than one section of geotextile is necessary, overlap the sections by at least one foot. The geotextile must be pulled taut over the applied surface. Equipment must not run over exposed fabric. When placing riprap on geotextile, do not exceed a one foot drop height.

Table H.2: Stone Size

ТҮРЕ		SIZE RANGE	d ₅₀	d ₁₀₀	AASHTO	MIDSIZE WEIGHT ³
NUMBER	. 57 ¹	3/8 to 1 1/2 inch	½ in	1 ½ in	M-43	N/A
NUMBE	R 1	2 to 3 inch	2 ½ in	3 ìn	M-43	N/A
RIPRAI (CLASS		4 to 7 inch	5 ½ in	7 in:	N/A	N/A
CLASS	I	N/A	9 ½ in	15 in	N/A	40 lb
CLASS	П	N/A	l6 in	24 in	N/A	200 lb
CLASS	Ш	N/A	23 in	34 in	N/A	600 lb

This classification is to be used on the upstream face of stone outlets and check dams.

² This classification is to be used for gabions.

Optimum gradation is 50 percent of the stone being above and 50 percent below the midsize.

Stone must be composed of a well graded mixture of stone sized so that fifty (50) percent of the pieces by weight are larger than the size determined by using the charts. A well graded mixture, as used herein, is defined as a mixture composed primarily of larger stone sizes but with a sufficient mixture of other sizes to fill the smaller voids between the stones. The diameter of the largest stone in such a mixture must not exceed the respective dim selected from Table H.2. The dso refers to the median diameter of the stone. This is the size for which 50 percent, by weight, will be smaller and 50 percent will be larger.

measures only. Concrete broken into the sizes meeting the appropriate classification, containing no steel reinforcement, and having a minimum density of 150 pounds per cubic foot may be used as an equivalent.

ENGINEER'S CERTIFICATE: "I CERTIFY THAT THIS PLAN FOR SEDIMENT AND EROSION CONTROL REPRESENTS A PRACTICAL AND WORKABLE PLAN BASED ON MY PERSONAL KNOWLEDGE OF THE SITE CONDITIONS AND THAT T WAS PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF THE HOWARD SOIL

CONSERVATION DISTRICT."

DEVELOPER'S CERTIFICATE: "I/WE CERTIFY THAT ALL DEVELOPMENT AND CONSTRUCTION WILL BE DONE ACCORDING TO THIS

SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT. I ALSO AUTHORIZE PERIODIC ON-SITE INSPECTIONS BY THE HOWARD SOIL CONSERVATION DISTRICT." (Signature of Property Owner/Agent) * (Print Name of Owner/Agent) (Date) 4-29-1

PLAN FOR SEDIMENT AND EROSION CONTROL, AND THAT ALL RESPONSIBLE PERSONNEL

INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A

DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF

THIS DEVELOPMENT PLAN IS APPROVED FOR SOIL EROSION AND SEDIMENT CONTROL BY THE HOWARD SOIL CONSERVATION DISTRICT

**** DURING THE PERIOD OF OCTOBER 16 THROUGH FEBRUARY 28, PROTECT SITE BY: OPTION (1) 2 TONS PER ACRE OF WELL ANCHORED STRAW MULCH AND SEED AS SOON AS POSSIBLE IN THE SPRING, OPTION (2) USE SOD. OPTION (3) SEED WITH 100 LBS/ACRE KENTUCKY 31 TALL FESCUE AND MULCH WITH 2 TONS/ACRE WELL ANCHORED STRAW, MULCHING: APPLY 1-1/2 TO 2 TONS PER ACRE (70 TO 90 LBS/1000 SF) OF UNROTTED SMALL GRAIN STRAW IMMEDIATELY AFTER SEEDING. ANCHOR MULCH IMMEDIATELY AFTER APPLICATION USING MULCH ANCHORING TOOL OR 218 GAL PER ACRE (5 GAL/1000 SF) OF EMULSIFIED ASPHALT ON FLAT AREAS, ON SLOPES 8 FEET OR HIGHER, USE 348 GAL PER ACRE (8 GAL/1000 SF) FOR ANCHORING, MAINTENANCE: INSPECT ALL SEEDING AREAS AND MAKE NEEDED REPAIRS,

SEDIMENT CONTROL DETAILS I

VICTORY TEMPLE - LAUREL WORSHIP CENTER

9100 BURSA ROAD

SDP-12-007 TAX MAP 47, GRID 23 W&S CONTRACT No. 24-4047-D ZONING: CE-CLI ELECTION DISTRICT - 6 HOWARD COUNTY, MARYLAND

OWNER'S REPRESENTATIVE: KCW J.O.: 2080018 TLI DESIGNGROUP INC. SCALE: AS SHOWN

03/06/14

DATE

SDP-12-007

KCW Engineering Technologies, Inc. 810 Landmark Drive, Suite 215 Glen Burnie, MD 21061 Phone: 410.768.7700 Fax: 410.768.0200

www.kcw-et.com

Section B-3 Land Grading.

03/06/14

DESCRIPTION NO. 1 03-06-14 SHOW TWO-PHASE CONSTRUCTION. UPDATE TO 2011 MDE ESC SPECS

REVISIONS

THE REDEEMED CHRISTIAN CHURCH OF GOD. INC.

OWNER:

13701 ANNAPOLIS ROAD BOWIE, MD 20720

Tele: (301) 352-0707 Fax: (301) 352-3339

TO SEED MIX #8 ABOVE.

TO SEED MIX #iii ABOVE

Attn: Margaret Adeyokunnu, Pastor Mobile: (443) 831-6703

3308 DORCHESTER ROAD

Attn: Taiwo Iluyomade, President

Toll Free/Fax/Voice mail: (1-866) 616-1497

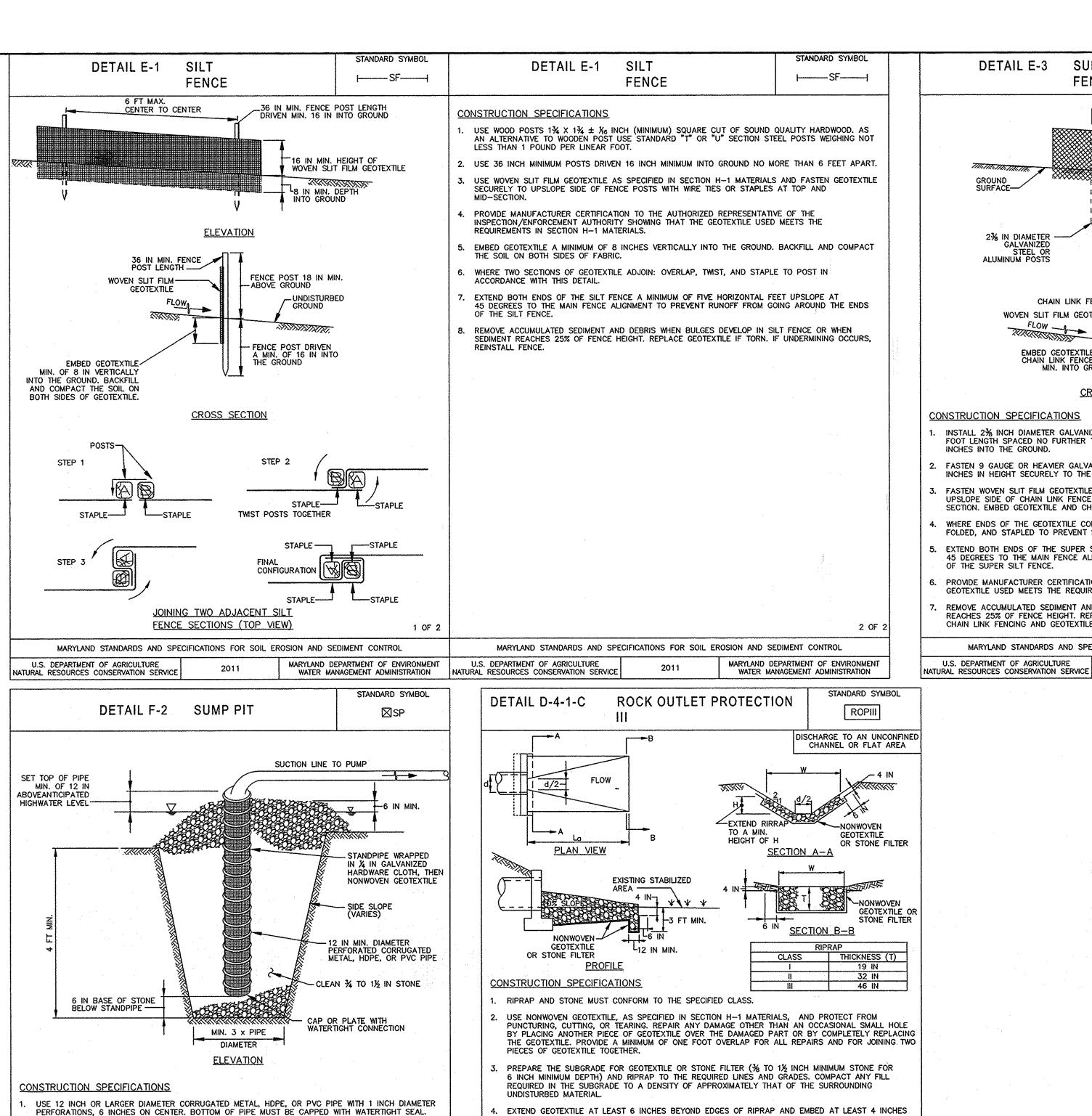
** FOR DATES BETWEEN 5/16-8/14 ADD 13 LB/AC OF EITHER FOXTAIL MILLET OR PEARL MILLET

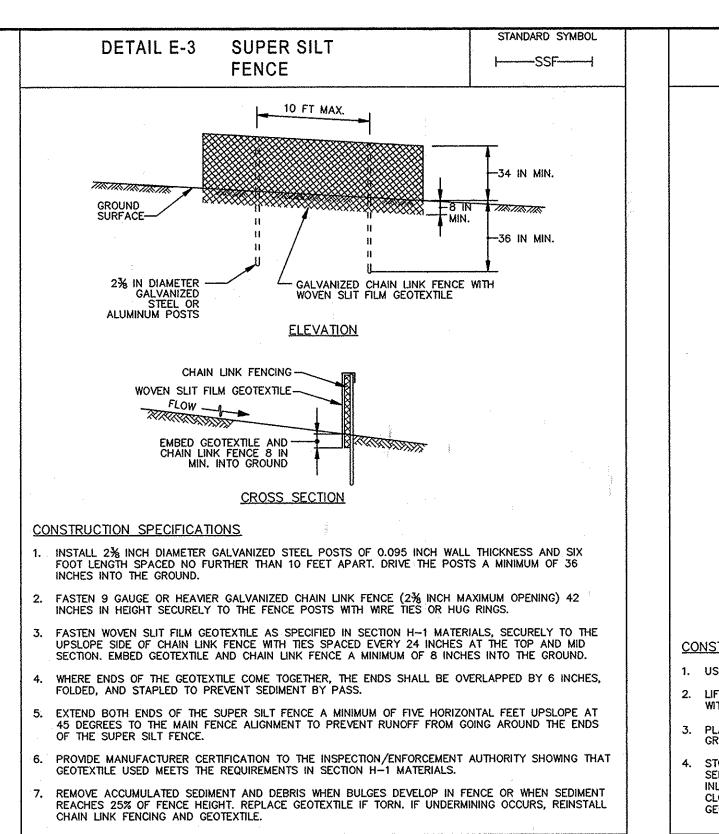
BALTIMORE, MD 21215

DESIGNED: MT DRAWN: MT CHECKED: KCA DATE: MARCH 6, 2014

DRAWING NO. 6 OF 19

PARCEL 540 (PARCEL A. PLAT #22114)

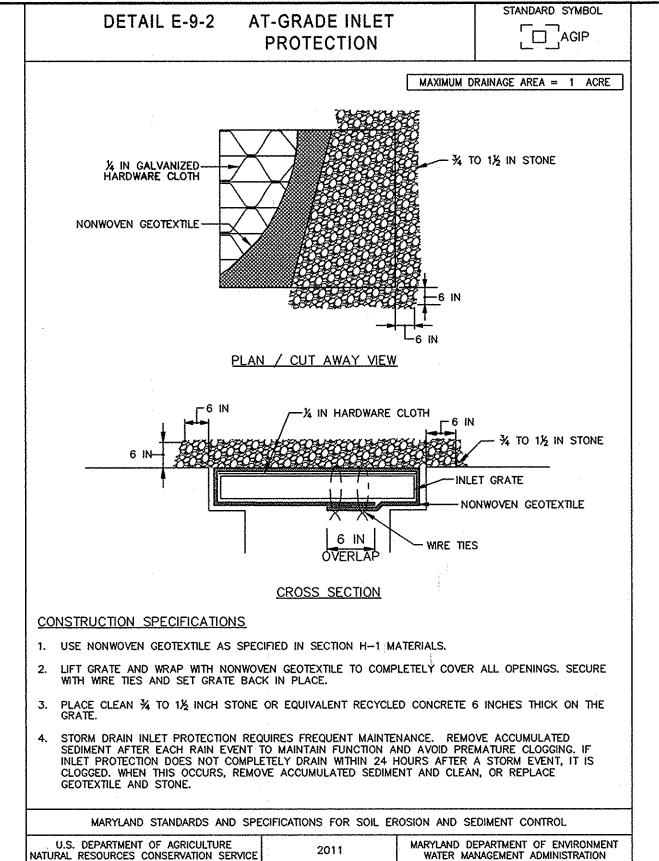


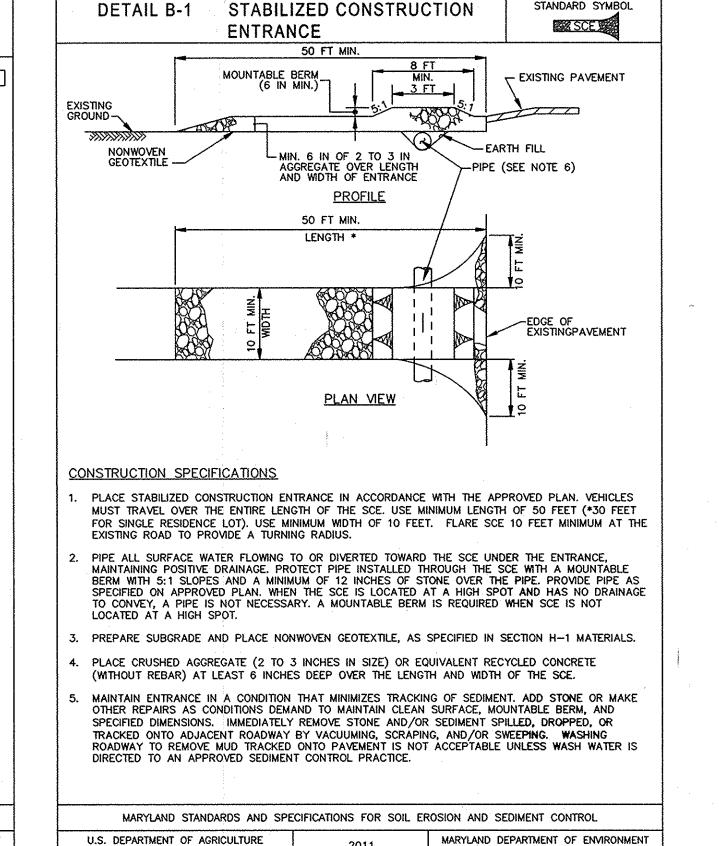


MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

MARYLAND DEPARTMENT OF ENVIRONMENT

WATER MANAGEMENT ADMINISTRATION





NATURAL RESOURCES CONSERVATION SERVICE



WATER MANAGEMENT ADMINISTRATION



DISCHARGE TO A STABLE AREA AT A NONEROSIVE RATE.

WRAP PIPE WITH 1/2 INCH GALVANIZED HARDWARE CLOTH AND WRAP NONWOVEN GEOTEXTILE, AS

BACKFILL PIT AROUND THE PIPE WITH 1/4 TO 11/2 INCH CLEAN STONE OR EQUIVALENT RECYCLED CONCRETE AND EXTEND STONE A MINIMUM OF 6 INCHES ABOVE ANTICIPATED WATER SURFACE

A SUMP PIT REQUIRES FREQUENT MAINTENANCE. IF SYSTEM CLOGS, REMOVE PERFORATED PIPE AND REPLACE GEOTEXTILE AND STONE. KEEP POINT OF DISCHARGE FREE OF EROSION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

SET TOP OF PIPE MINIMUM 12 INCHES ABOVE ANTICIPATED WATER SURFACE ELEVATION.

EXCAVATE PIT TO THREE TIMES THE PIPE DIAMETER AND FOUR FEET IN DEPTH. PLACE ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE, 6 INCHES IN DEPTH PRIOR TO PIPE PLACEMENT.

SPECIFIED IN SECTION H-1 MATERIALS, OVER THE HARDWARE CLOTH.

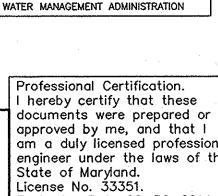
4.3.14

U.S. DEPARTMENT OF AGRICULTURE

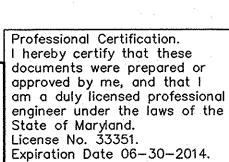
NATURAL RESOURCES CONSERVATION SERVICE

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. 33351. Expiration Date 06-30-2014.

TECHNOLOGIES



MARYLAND DEPARTMENT OF ENVIRONMENT



KCW Engineering Technologies, Inc. 810 Landmark Drive, Suite 215 Glen Burnie, MD 21061

Phone: 410.768.7700

Fax: 410.768.0200

www.kcw-et.com

NO.

THAT IT BLENDS IN WITH EXISTING GROUND.

WIDTH

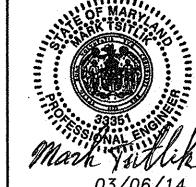
19.5'

MAKE NECESSARY REPAIRS IMMEDIATELY.

IATURAL RESOURCES CONSERVATION SERVICE

LENGTH

17'



CLASS

MARYLAND DEPARTMENT OF ENVIRONMEN

WATER MANAGEMENT ADMINISTRATION

19"

d₅ STONE

9.5"

CONSTRUCT RIPRAP OUTLET TO FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. PLACE STONE FOR RIPRAP OUTLET IN A

WHERE NO ENDWALL IS USED, CONSTRUCT THE UPSTREAM END OF THE APRON SO THAT THE WIDTH IS

CONSTRUCT APRON WITH 0% SLOPE ALONG ITS LENGTH AND WITHOUT OBSTRUCTIONS. PLACE STONE SO

MAINTAIN LINE, GRADE, AND CROSS SECTION. KEEP OUTLET FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. AFTER HIGH FLOWS INSPECT FOR SCOUR AND RIPRAP DISLODGED RIPRAP.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

WIDTH/2

9.75

TWO TIMES THE DIAMETER OF THE OUTLET PIPE, AND EXTEND THE STONE UNDER THE OUTLET BY A

MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. PLACE RIPRAP IN A MANNER TO PREVENT DAMAGE TO THE FILTER BLANKET OR GEOTEXTILE. HAND PLACE TO THE EXTENT NECESSARY.

110 F MAD. 11	REVISIONS				
K TS Y	NO.	DATE	DESCRIPTION		
	Λ	03-06-14	SHOW TWO-PHASE CONSTRUCTION,		
			UPDATE TO 2011 MDE ESC SPECS		
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THE REDEEMED CHRISTIAN CHURCH OF GOD, INC. 13701 ANNAPOLIS ROAD BOWIE, MD 20720

> Attn: Margaret Adeyokunnu, Pastor Tele: (301) 352-0707 Fax: (301) 352-3339

OWNER'S REPRESENTATIVE:

TLI DESIGNGROUP INC. 3308 DORCHESTER ROAD BALTIMORE, MD 21215 Attn: Taiwo Iluyomade, President

> Toll Free/Fax/Voice mail: (1-866) 616-1497 Mobile: (443) 831-6703

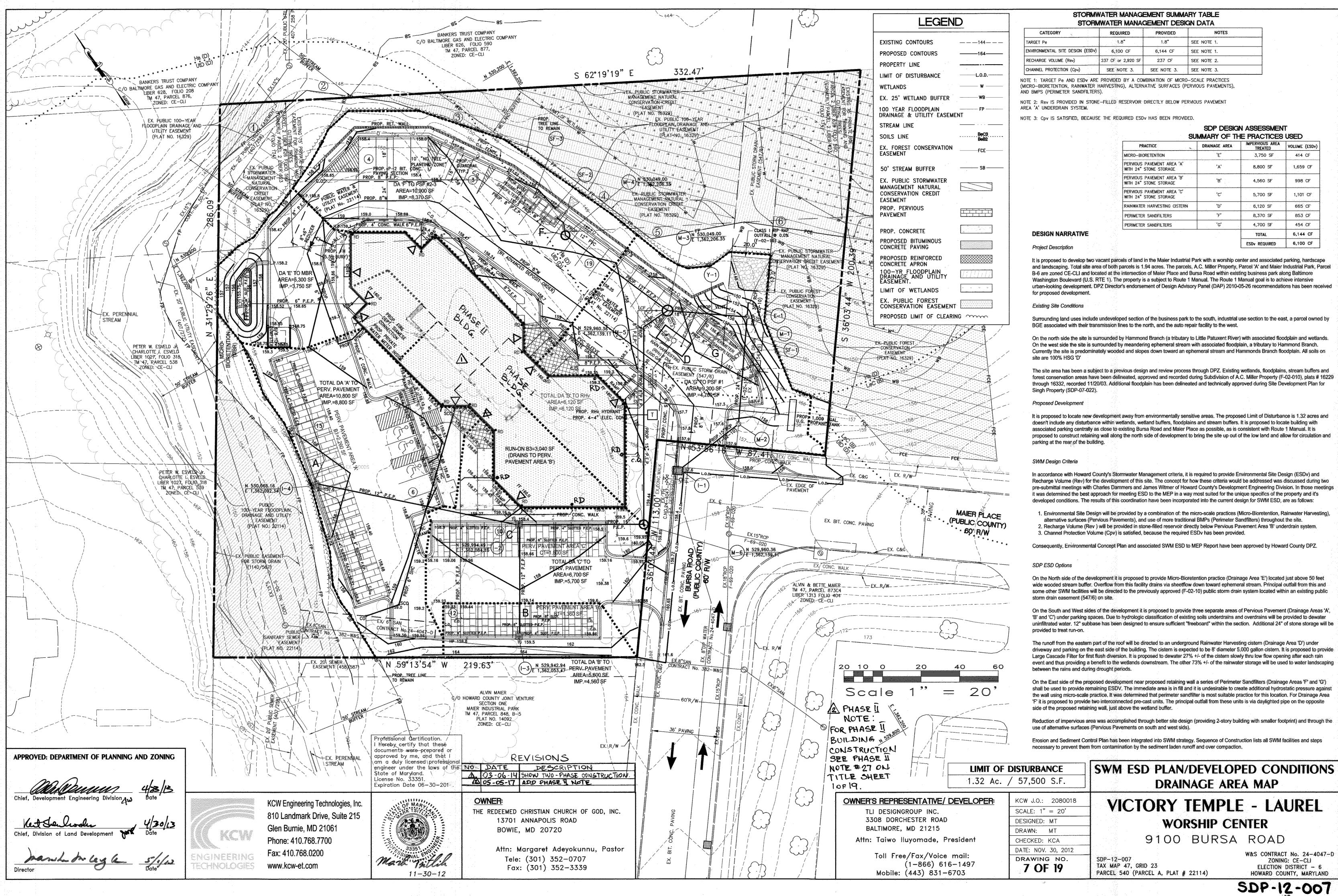
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KCW J.O.: 2080018
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DRAWN: MT
CHECKED: KCA
DATE: MARCH 6, 2014
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6A OF 19

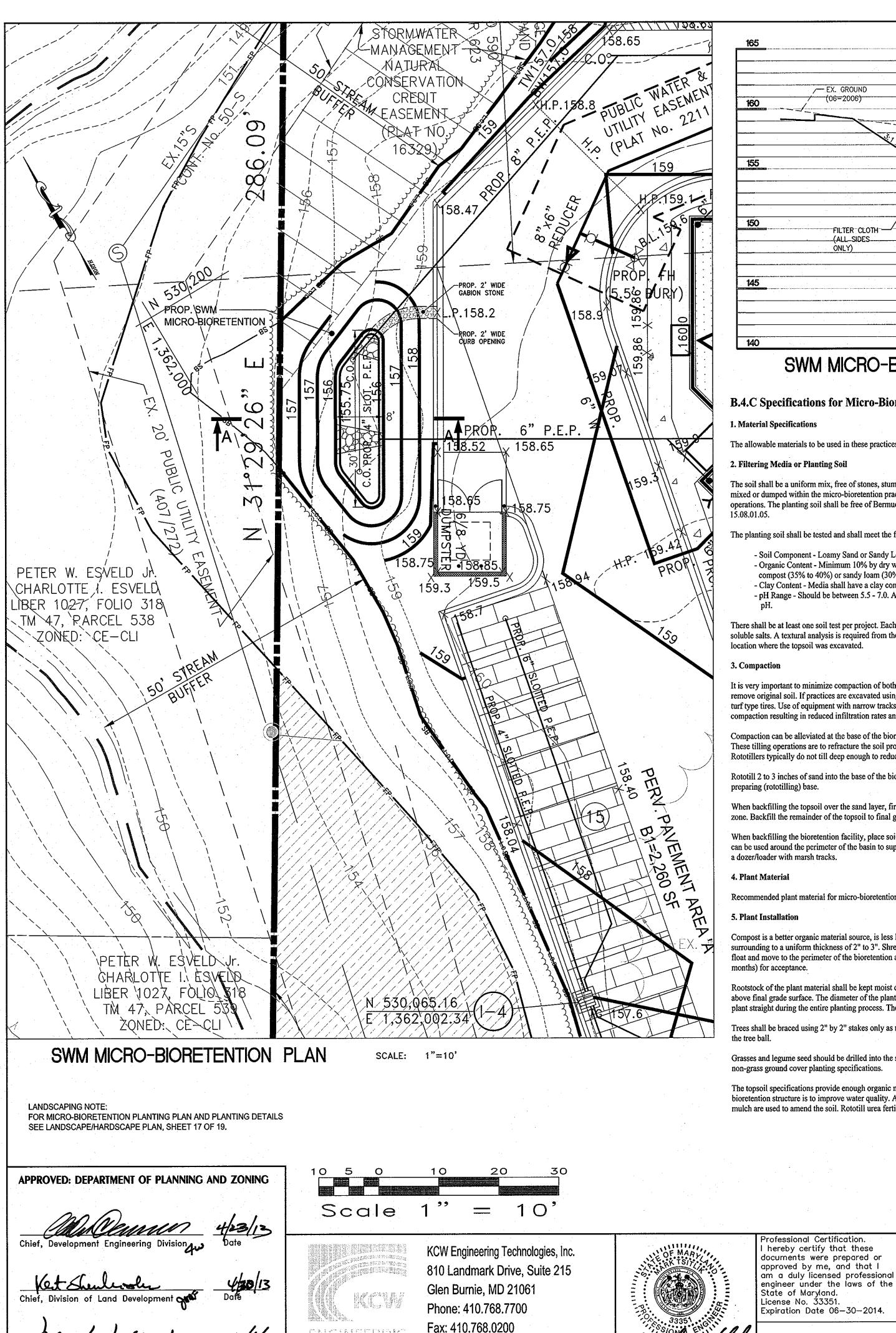
SEDIMENT CONTROL DETAILS II

VICTORY TEMPLE - LAUREL **WORSHIP CENTER**

9100 BURSA ROAD

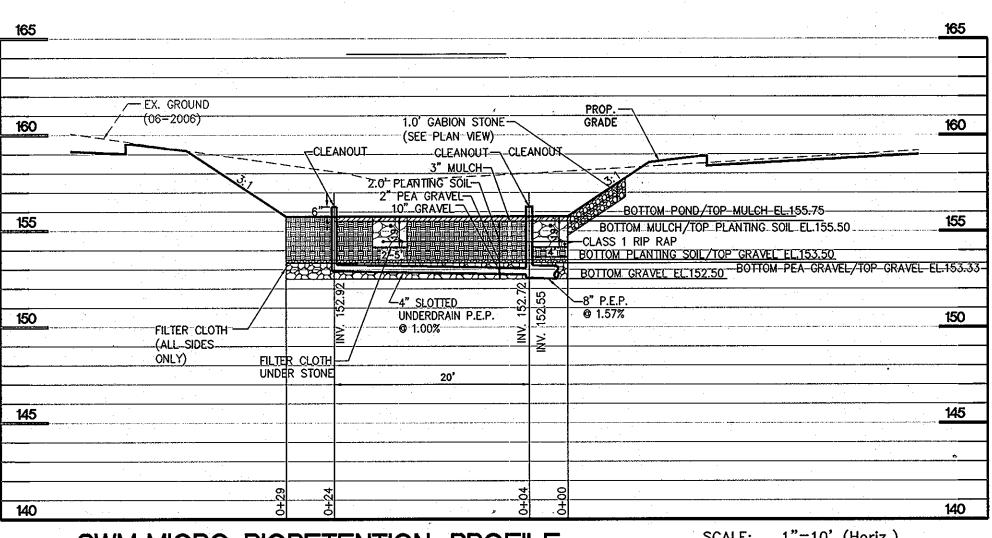
TAX MAP 47, GRID 23 PARCEL 540 (PARCEL A, PLAT #22114) W&S CONTRACT No. 24-4047-D ZONING: CE-CLI ELECTION DISTRICT - 6 HOWARD COUNTY, MARYLAND





www.kcw-et.com

11/30/12



SCALE: 1"=10' (Horiz.) SWM MICRO-BIORETENTION PROFILE 1"=5' (Vert.)

EX. GROUND -(06-2006)BOTTOM MULCH/TOP PLANTING SOIL EL.155.50 BOTTOM PLANTING SOIL/TOP PEA GRAVEL EL.153.50
BOTTOM GRAVEL EL.152.50
TOP GRAVEL EL.153.33 FILTER CLOTH -(ALL SIDES 3' | 3.75' | 6.5'

SWM MICRO-BIORETENTION SECTION A-A SCALE: 1"=10' (Horiz.)

B.4.C Specifications for Micro-Bioretention.

The allowable materials to be used in these practices are detailed in Table B.4.1.

2. Filtering Media or Planting Soil

The soil shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the micro-bioretention practice that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The planting soil shall be free of Bermuda grass, Quackgrass, Johnson grass, or other noxious weeds as specified under COMAR

The planting soil shall be tested and shall meet the following criteria:

- Soil Component - Loamy Sand or Sandy Loam (USDA Soil Textural Classification)

- Organic Content - Minimum 10% by dry weight (ASTM D 2974). In general, this can be met with a mixture of loamy sand (60%-65%) and compost (35% to 40%) or sandy loam (30%), coarse sand (30%), and compost (40%). - Clay Content - Media shall have a clay content of less than 5%.

- pH Range - Should be between 5.5 - 7.0. Amendments (e.g., lime, iron sulfate plus sulfur) may be mixed into the soil to increase or decrease

There shall be at least one soil test per project. Each test shall consist of both the standard soil test for pH, and additional tests of organic matter, and soluble salts. A textural analysis is required from the site stockpiled topsoil. If topsoil is imported, then a texture analysis shall be performed for each location where the topsoil was excavated.

It is very important to minimize compaction of both the base of bioretention practices and the required backfill. When possible, use excavation hoes to remove original soil. If practices are excavated using a loader, the contractor should use wide track or marsh track equipment, or light equipment with turf type tires. Use of equipment with narrow tracks or narrow tires, rubber tires with large lugs, or high-pressure tires will cause excessive compaction resulting in reduced infiltration rates and is not acceptable. Compaction will significantly contribute to design failure.

Compaction can be alleviated at the base of the bioretention facility by using a primary tilling operation such as a chisel plow, ripper, or subsoiler. These tilling operations are to refracture the soil profile through the 12 inch compaction zone. Substitute methods must be approved by the engineer. Rototillers typically do not till deep enough to reduce the effects of compaction from heavy equipment.

Rototill 2 to 3 inches of sand into the base of the bioretention facility before backfilling the optional sand layer. Pump any ponded water before preparing (rototilling) base.

When backfilling the topsoil over the sand layer, first place 3 to 4 inches of topsoil over the sand, then rototill the sand/topsoil to create a gradation zone. Backfill the remainder of the topsoil to final grade.

When backfilling the bioretention facility, place soil in lifts 12" to 18". Do not use heavy equipment within the bioretention basin. Heavy equipment can be used around the perimeter of the basin to supply soils and sand. Grade bioretention materials with light equipment such as a compact loader or a dozer/loader with marsh tracks.

Recommended plant material for micro-bioretention practices can be found in Appendix A, Section A.2.3.

Compost is a better organic material source, is less likely to float, and should be placed in the invert and other low areas. Mulch should be placed in surrounding to a uniform thickness of 2" to 3". Shredded or chipped hardwood mulch is the only accepted mulch. Pine mulch and wood chips will float and move to the perimeter of the bioretention area during a storm event and are not acceptable. Shredded mulch must be well aged (6 to 12

Rootstock of the plant material shall be kept moist during transport and on-site storage. The plant root ball should be planted so 1/8th of the ball is above final grade surface. The diameter of the planting pit shall be at least six inches larger than the diameter of the planting ball. Set and maintain the plant straight during the entire planting process. Thoroughly water ground bed cover after installation.

Trees shall be braced using 2" by 2" stakes only as necessary and for the first growing season only. Stakes are to be equally spaced on the outside of

Grasses and legume seed should be drilled into the soil to a depth of at least one inch. Grass and legume plugs shall be planted following the non-grass ground cover planting specifications.

The topsoil specifications provide enough organic material to adequately supply nutrients from natural cycling. The primary function of the bioretention structure is to improve water quality. Adding fertilizers defeats, or at a minimum, impedes this goal. Only add fertilizer if wood chips or mulch are used to amend the soil. Rototill urea fertilizer at a rate of 2 pounds per 1000 square feet.

B.4.C Specifications for Micro-Bioretention.

6. Underdrains

Underdrains should meet the following criteria:

- Pipe- Should be 4" to 6" diameter, slotted or perforated rigid plastic pipe (ASTMF 758, Type PS 28, AASHTO-M-278, or AASHTO-M-252, Type S) in a gravel layer. The preferred material is slotted, 4" rigid pipe (e.g., PVC or HDPE).

- Perforations - If perforated pipe is used, perforations should be 3/8" diameter located 6" on center with a minimum of four holes per row. Pipe shall be wrapped with a 1/4" (No. 4 or 4x4) galvanized hardware cloth.

- Gravel - The gravel layer (No. 57 stone preferred) shall be at least 3" thick above and below the underdrain. - The main collector pipe shall be at a minimum 0.5% slope.

Table B 4.1 Materials Specifications for Micro-Bioretention, Rain Gardens & Landscane Infiltration

- A rigid, non-perforated observation well must be provided (one per every 1,0000 square feet) to provide a clean-out port and monitor

- A 4" layer of pea gravel (1/4" to 1/4" stone) shall be located between the filter media and underdrain to prevent migration of fines into the underdrain. This layer may be considered part of the filter bed when bed thickness exceeds 24".

The main collector pipe for underdrain systems shall be constructed at a minimum slope of 0.5%. Observation wells and/or clean-out pipes must be provided (one minimum per every 1000 square feet of surface area).

These practices may not be constructed until all contributing drainage area has been stabilized

Material	Specification	Size	Notes
Plantings	see Appendix A. Table A.4	n/a	plantings are site-specific (See Plant List below)
Planting soil [2' to 4' deep]	loamy sand (60 - 65%) & compost (35 - 40%) or sandy loam (30%), coarse sand (30%) & compost (40%)	n/a	USDA soil types loamy sand or sandy loam; clay content < 5%
Organic content	Min. 10% by dry weight (ASTM D 2974)		
Mulch	shredded hardwood	:	aged 6 months, minimum; no pine or wood chips
Pea gravel diaphragm	pea gravel: ASTM-D-448	NO. 8 OR NO. 9 (1/8" TO 3/8")	
Curtain drain	ornamental stone: washed cobbles	stone: 2" to 5"	
Geotextile		n/a	PE Type 1 nonwoven (Mirafi-180 N or approved equal.)
Gravel (underdrains and infiltration berms)	AASHTO M-43	NO. 57 OR NO. 6 AGGREGATE (3/8" to 3/4")	
Underdrain piping	F 758, Type PS 28 or AASHTO- M-278 AASHTO M-252, Type S	4" to 6" rigid schedule 40 PVC or SDR35- HDPE	Slotted or perforated pipe; 3/8" perf. @ 6" on center, 4 holes per row; minimum of 3" of gravel over pipes; not necessary underneath pipes. Perforated pipe shall be wrapped with 1/4-inch galvanized hardware cloth
Poured in place concrete (if required)	MSHA Mix No. 3; f _e = 3500 psi @ 28 days, normal weight, air-entrained; reinforcing to meet ASTM-615-60	n/a	on-site testing of poured-in-place concrete required: 28 day strength and slump test; all concrete design (cast-in-place or pre-cast) not using previously approved State or local standards requires design drawings sealed and approved by a professional structural engineer licensed in the State of Maryland - design to include meeting ACI Code 350.R/89; vertical loading [H-10 or H-20]; allowable horizontal loading (based on soil pressures); and analysis of potential cracking
Sand	AASHTO-M-6 or ASTM-C-33	0.02" to 0.04"	Sand substitutions such as Diabase and Graystone (AASHTO) #10 are not acceptable. No calcium carbonated or dolomitic sand substitutions are acceptable. No "rock dust" can be used for sand.

SWM MICRO-BIORETENTION PLANT LIST

KEY	QTY	BOTANICAL NAME COMMON NAME	SIZE	COND	REMARKS
	1	ACER RUBRUM 'RED SUNSET' RED SUNSET RED MAPLE	2½"-3" CAL.	B & B	FULL, HEAVY SPECIMEN, HEADED TO 6' HT.
	9	ITEA VIRGINICA 'LITTLE HENRY' LITTLE HENRY SWEETSPIRE	24"-30" HT.	#5	3'-6" O.C., STAGGERED
	8	PANICUM VIRGATUM 'HEAVY METAL' HEAVY METAL SWITCHGRASS		#3	4' O.C., STAGGERED
Α	26	MONARDA DIDYMA 'PETITE DELIGHT' PETITE DELIGHT BEE BALM		1 QT. POTS	18" O.C., STAGGERED
В	35	IRIS VERSICOLOR BLUE FLAG IRIS		1 QT. POTS	18" O.C., STAGGERED
C	16	ASCLEPIAS INCARNATA SWAMP MILKWEED		1 QT. POTS	24" O.C., STAGGERED

Construction Criteria:

The following items should be addressed during construction of projects with micro-bioretention:

Erosion and Sediment Control: Micro-bioretention practices should not be constructed until the contributing drainage area is stabilized. If this is impractical, runoff from disturbed areas shall be diverted away and no sediment control practices shall be used near the proposed location.

Soil Compaction: Excavation should be conducted in dry conditions with equipment located outside of the practice to minimize bottom and sidewall compaction. Only lightweight, low ground-contact equipment should be used within micro-bioretention practices and the bottom scarified before installing underdrains and

Underdrain Installation: Gravel for the underdrain system should be clean, washed, and free of fines. Underdrain pipes should be checked to ensure that both the material and perforations meet specifications. The upstream ends of the underdrain pipe should be capped prior to installation.

Filter Media Installation: Bioretention soils may be mixed on-site before placement. However, soils should not be placed under saturated conditions. The filter media should be placed and graded using excavators or backhoes operating adjacent to the practice and be placed in horizontal layers (12 inches per lift maximum). Proper compaction of the media will occur naturally. Spraying or sprinkling water on each lift until saturated may quicken settling times.

Landscape Installation: The optimum planting time is during the Fall. Spring planting is also acceptable but may require watering.

Inspection:

Regular inspections shall be made during the following stages of construction:

During excavation to subgrade and placement and backfill of underdrain systems. During placement of filter media. During construction of appurtenant conveyance. Upon completion of final grading and establishment of permanent stabilization.

Maintenance Criteria:

The following items should be addressed to ensure proper maintenance and long-term performance of micro-bioretention practices:

Privately owned practices shall have a maintenance plan and shall be protected by easement, deed restriction, ordinance, or other legal measures preventing its neglect, adverse alteration, and

The top few inches of filter media should be removed and replaced when water ponds for more than 48 hours. Silts and sediment should be removed from the surface of the filter bed when accumulation exceeds one inch.

Where practices are used to treat areas with higher concentrations of heavy metals (e.g., parking lots, roads), mulch should be replaced annually. Otherwise, the top two to three inches should be replaced as necessary.

Occasional pruning and replacement of dead vegetation is necessary. If specific plants are not surviving, more appropriate species should be used. Watering may be required during prolonged dry

STANDARD HOWARD COUNTY OPERATION AND MAINTENANCE SCHEDULE FOR MICRO-BIORETENTION (M-6)

- a. The Owner shall maintain the plant material, mulch layer and soil layer annually. Maintenance of mulch and soil is limited to correcting areas of erosion or wash out. Any mulch replacement shall be done in the spring. Plant material shall be checked for disease and insect infestation and maintenance will address dead material and pruning. Acceptable replacement plant material is limited to the following: 2000 Maryland Stormwater Design Manual Volume II, Table A.4.1 and 2.
- b. The Owner shall perform a plant in the spring and in the fall of each year. During the inspection, the Owner shall remove dead and diseased vegetation considered beyond treatment, replace dead plant material with acceptable replacement plant material, treat diseased trees and shrubs, and replace all deficient stakes and wires.
- c. The Owner shall inspect the mulch each spring. The mulch shall be replaced every two to three years. The previous mulch layer shall be removed before the new layer is applied.
- d. The Owner shall correct soil erosion on an as needed basis, with a minimum of once per month and after each heavy storm.

SWM MICRO-BIORETENTION PLAN

VICTORY TEMPLE - LAUREL WORSHIP CENTER

9100 BURSA ROAD

SDP-12-007 TAX MAP 47, GRID 23 PARCEL 540 (PARCEL A, PLAT # 22114)

KCW J.O.: 2080018

SCALE: AS SHOWN

DATE: NOV. 30, 2012

DRAWING NO.

8 OF 19

DESIGNED: MT

DRAWN: MT

CHECKED: KCA

W&S CONTRACT No. 24-4047-D ZONING: CE-CLI ELECTION DISTRICT - 6 HOWARD COUNTY, MARYLAND

OWNER:

THE REDEEMED CHRISTIAN CHURCH OF GOD, INC. 13701 ANNAPOLIS ROAD BOWIE, MD 20720.

Attn: Margaret Adeyokunnu, Pastor

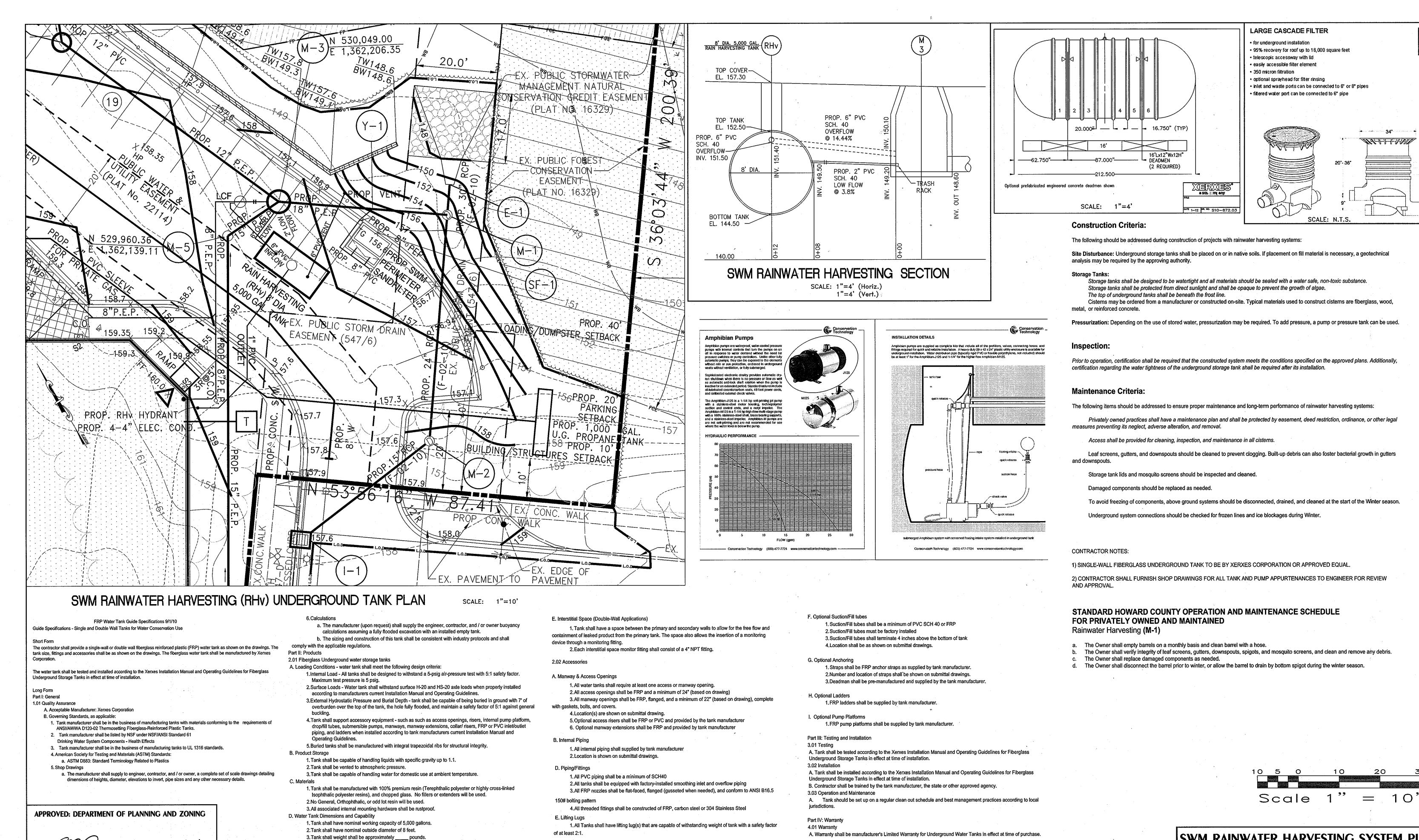
Tele: (301) 352-0707 Fax: (301) 352-3339

OWNER'S REPRESENTATIVE/ DEVELOPER: TLI DESIGNGROUP INC.

3308 DORCHESTER ROAD BALTIMORE, MD 21215

Attn: Taiwo Iluyomade, President

Toll Free/Fax/Voice mail: (1-866) 616-1497 Mobile: (443) 831-6703



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13701 ANNAPOLIS ROAD

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rofessional Certification.

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Glen Burnie, MD 21061

Phone: 410.768.7700

Fax: 410.768.0200

www.kcw-et.com

hereby certify that these

documents were prepared or

approved by me, and that I

Expiration Date 06-30-2014.

State of Maryland. License No. 33351.

11/30/12

am a duly licensed professional

engineer under the laws of the

SWM RAINWATER HARVESTING SYSTEM PLAN

VICTORY TEMPLE - LAUREL WORSHIP CENTER

9100 BURSA ROAD

SDP-12-007 W&S CONTRACT No. 24-4047-D ZONING: CE-CLI ELECTION DISTRICT - 6

OWNER'S REPRESENTATIVE/ DEVELOPER:

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TLI DESIGNGROUP INC.

3308 DORCHESTER ROAD

BALTIMORE, MD 21215

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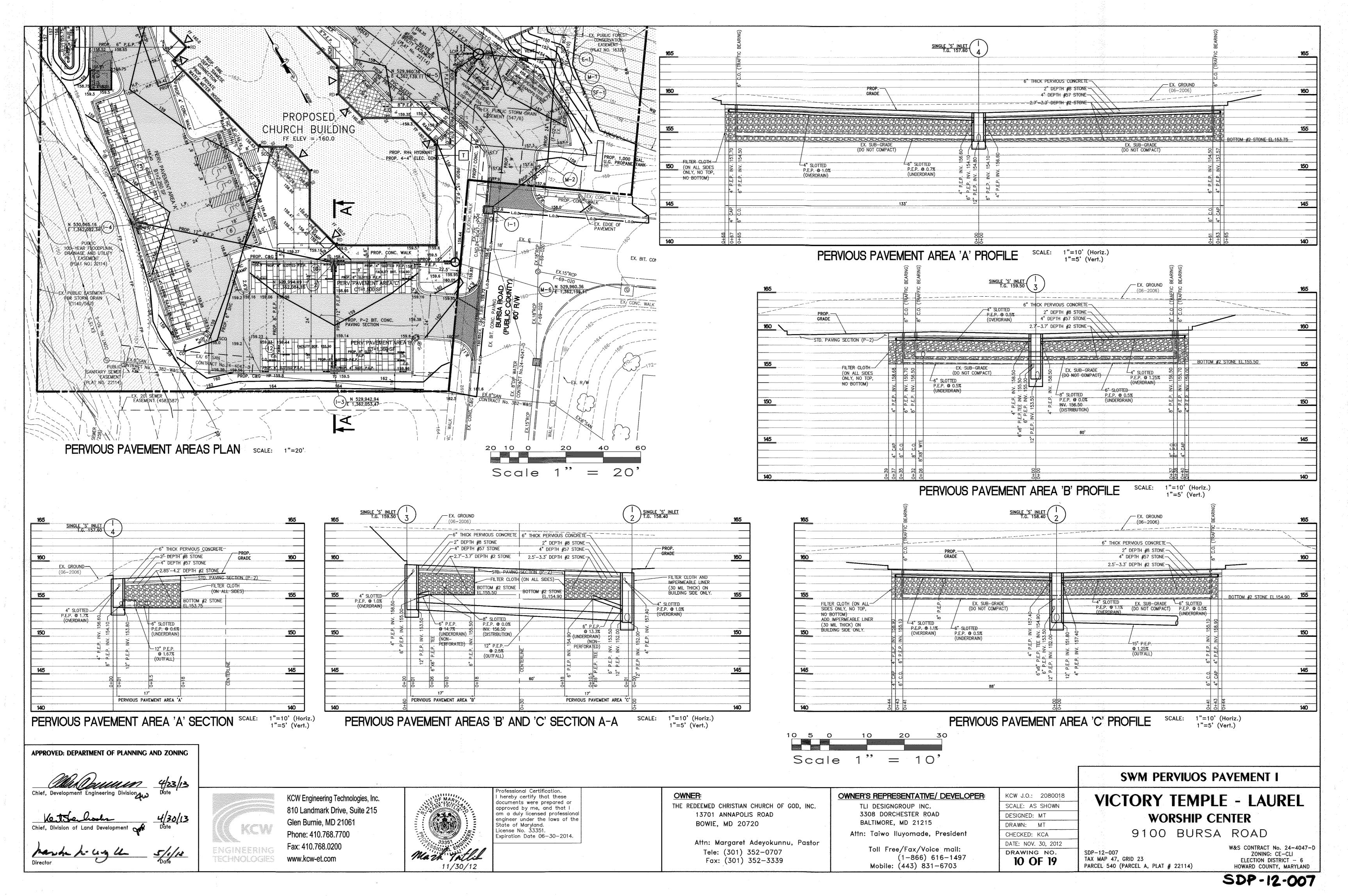
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SDP-12-007
TAX MAP 47, GRID 23
PARCEL 540 (PARCEL A, PLAT # 22114)

ZONING: CE-CLI
ELECTION DISTRICT - 6
HOWARD COUNTY, MARYLAND

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B.4.B Specifications for Permeable Pavements

These specifications include information on acceptable materials for typical applications and are not exclusive or limiting. The designer is responsible for developing detailed specifications for individual projects and specific conditions.

Pervious Concrete Specifications

Design Thickness - Pervious concrete applications shall be designed so that the thickness of the concrete slab shall support the traffic and vehicle types that will be carried. Applications may be designed using either standard pavement procedures (e.g., AASHTO, ACI 325.9R, ACI 330R) or using structural values derived from flexible pavement design procedures.

Mix & Installation - Traditional Portland cements (ASTM C 150, C 1157) may be used in pervious concrete applications. Phosphorus admixtures may also be used. Materials should be tested (e.g., trial batching) prior to construction so that critical properties (e.g., settling time, rate of strength development, porosity, permeability) can be determined.

Aggregate - Pervious concrete contains a limited fine aggregate content. Commonly used gradations include ASTM C 33 No. 67 (% in. to No. 4), No. 8 (% in. to No. 16) and No. 89 (% in. to No. 50) sieves. Single-sized aggregate (up to 1 inch) may also be used.

Water Content - Water-to-cement ratios between 0.27 and 0.30 are used routinely with proper inclusion of chemical admixtures. Water quality should meet ACI 30a. As a general rule, potable water should be used although recycled concrete production water meetingASTM C 94 or AASHTO M 157 may also be used.

Admixtures - Chemical admixtures (e.g., retarders or hydration-stabilizers) are used to obtain special properties in pervious concrete. Use of admixtures should meet ASTM C 494 (chemical admixtures) and ASTM C 260 (air entraining admixtures) and closely follow manufacturer's recommendations.

Base Course - The base course shall be AASHTO No. 3 or 4 course aggregate with an assumed open pore space of 30% (n = 0.30).

Filter Cloth - Shall be Mirafi-180N or approved equal.

Impermeable Liner - Liner thickness shall be 30 mil (ASTM-D-4813). A geotextile fabric should be used to protect the liner from puncture.

Underdrain pipes should meet the following criteria:

- Distribution Pipe - Should be 8" diameter, slotted rigid HDPE pipe (AASHTO M252, Type S) in

- Underdrain Pipe - Should be 6" diameter, slotted rigid HDPE pipe (AASHTO M252, Type S) in a gravel layer.

- Overdrain Pipe - Should be 4" diameter, slotted rigid HDPE pipe (AASHTO M252, Type S) in a gravel layer.

- Perforations - If perforated pipe is used, perforations should be %" diameter located 6" on center with a minimum of four holes per row. Pipe shall be wrapped with a 1/4" (No. 4 or 4x4) galvanized hardware cloth.

Construction Criteria:

The following items should be addressed during construction of projects with permeable pavement:

Erosion and Sediment Control: Final grading for installation should not take place until the surrounding site is stabilized. If this cannot be accomplished, runoff from disturbed areas shall be diverted around proposed pavement locations.

Soil Compaction: Sub soils shall not be compacted. Construction should be performed with lightweight, wide tracked equipment to minimize compaction. Excavated materials should be placed in

Distribution Systems: Overdrain, underdrain, and distribution pipes shall be checked to ensure that both the material and perforations meet specifications. The upstream ends of pipes should be capped prior to installation. All distribution pipes used should be installed flat along the bed bottom.

Subbase Installation: Subbase aggregate shall be clean and free of fines. The subbase shall be placed in lifts and lightly rolled according to the specifications.

Inspection:

Regular inspections shall be made during the following stages of construction:

During excavation to subgrade.

During placement and backfill of any drainage or distribution system(s).

During placement of the crushed stone subbase material. During placement of the surface material.

Upon completion of final grading and establishment of permanent stabilization.

Maintenance Criteria:

The following procedures should be considered essential for maintaining permeable pavement systems:

Pavements should be used only where regular maintenance can be performed. Maintenance agreements should clearly specify how to conduct routine tasks to ensure long-term performance.

Pavement surfaces should be swept and vacuumed to reduce sediment accumulation and ensure continued surface porosity. Sweeping should be performed at least twice annually with a commercial cleaning unit. Washing systems and compressed air units should not be used to perform surface

Drainage pipes, inlets, stone edge drains, and other structures within or draining to the subbase should be cleaned out at regular intervals.

Trucks and other heavy vehicles can grind dirt and grit into the porous surfaces, leading to clogging and premature failure. These vehicles should be prevented from tracking and spilling material onto the

Deicers should be used in moderation. When used, deicers should be non-toxic and organic and can be applied either as calcium magnesium acetate or as pretreated salt. Snow plowing should be done carefully with blades set one-inch higher than normal. Plowed snow piles and snowmelt should not be directed to permeable pavement.

CONSTRUCTION SPECIFICATIONS

1. INTRODUCTION

THESE SPECIFICATIONS PROVIDE TECHNICAL INFORMATION ON PERVIOUS CONCRETE APPLICATION, DESIGN METHODS, MATERIALS, PROPERTIES, MIXTURE PROPORTIONING, CONSTRUCTION METHODS, TESTING, AND INSPECTION.

THE TERM "PERVIOUS CONCRETE" DESCRIBES A ZERO-SLUMP, OPEN-GRADED MATERIALCONSISTING OF PORTLAND CEMENT, COARSE AGGREGATE, LITTLE OR NO FINE AGGREGATE, ADMIXTURES, AND WATER. THE COMBINATION OF THESE INGREDIENTS WILL PRODUCE A HARDENEDMATERIAL WITH CONNECTED PORES, RANGING IN SIZE FROM 0.08 TO 0.32 IN. THAT ALLOW WATER TO PASS THROUGH EASILY. THE VOID CONTENT SHALL BE A MINIMUM OF 15% WITH A MINIMUM COMPRESSIVE STRENGTHS OF 3,000 PSI, THE ORAINAGE RATE OF PERVIOUS CONCRETE PAVEMENTWILL VARY WITH AGGREGATE SIZE AND DENSITY OF THE MIXTURE. BUT WILL GENERALLY FALL INTOTHE RANGE OF 2 TO 18 GAL/MIN/FT2.

AGGREGATES

AGGREGATE GRADINGS USED IN PERVIOUS CONCRETE SHALL BE EITHER SINGLE-SIZED COARSE AGGREGATE OR GRADING BETWEEN 3/4 AND 3/8 INCH. ROUNDED AND CRUSHED AGGREGATES, BOTH NORMAL AND LIGHTWEIGHT, ARE ACCEPTABLE. THE AGGREGATE USED SHOULD MEET REQUIREMENTS OF ASTM D 448 AND C 33. FINE AGGREGATES SHALL NOT BE USED IN PERVIOUS CONCRETE MIXTURES.

3. CEMENTITIOUS MATERIALS

PORTLAND CEMENT CONFORMING TO ASTM C 150, C 595, OR C 1157 IS USED AS THE MAIN BINDER. FLY ASH, SLAG CEMENT, AND SILICA FUME SHOULD MEET THE REQUIREMENTS OF ASTM C 618, C 989, AND C 1240, RESPECTIVELY.

ADMIXTURES SHOULD MEET THE REQUIREMENTS OF ASTM C 494, WATER-REDUCING ADMIXTURES (HIGH-RANGE OR MEDIUM-RANGE) ARE USED DEPENDING ON THE W/C. RETARDING ADMIXTURES ARE USED TO STABILIZE AND CONTROL CEMENT HYDRATION.

PERCOLATION RATE

THE PERCOLATION RATE OF PERVIOUS CONCRETE IS DIRECTLY RELATED TO THE AIR VOID CONTENT: A MINIMUM VOID CONTENT OF 15% IS REQUIRED.

6. PROPORTIONS OF CONSTITUENT MATERIALS

PORTLAND CEMENT TYPE 1/11	LB-DRY/YD3	600
COARSE AGGREGATE, PEA GRAVEL	LB-SSD/YD3	2740
WATER	LB/YD3	145
WATER-REDUCING ADMIXTURE	OZ/100LB CEMENT	5.0
VISCOSITY MODIFYING ADMIXTURE	OZ/100LB CEMENT	6.0
SET STABILIZING ADMIXTURE	OZ/100LB CEMENT	6.0

7 DESIGN PROPERTIES

7. DEGICIATION ENTIES		
RATIO WATER/CEMENT	BY WEIGHT	0.24
RATIO AGGREGATE/CEMENT	BY WEIGHT	4.5
VOID CONTENT	PERCENT BY COLUMN	19
PLASTIC UNIT WEIGH	POUNDS PER CUBIC FOOT	129.1
WATER STORAGE	INCHES PER INCH DEPTH OF PAVEMENT	0.19
WATER PERCOLATION	GALLONS PER SQUARE FOOT-MINUTE	2.1
FLEXURAL STRENGTH	POUNDS-FORCE PER SQUARE INCH	460

8. SUBGRADE PREPARATION AND LAYOUT

THE TOP 4 IN OF THE SUBGRADE SHALL BE COMPOSED OF GRANULAR OR GRAVELLY MATERIAL VITH NO MORE THAN A MODERATE AMOUNT (10%) OF SILT OR CLAY. THE SUBGRADE SHALL NOT BE MUDDY, SATURATED, OR FROZEN WHEN PLACEMENT BEGINS, THE SUBGRADE SOILS SHALL BE MOISTENED BEFORE CONCRETE PLACEMENT. FAILURE TO PROVIDE A MOIST SUB-BASE WILL RESULT IN A REDUCTION IN STRENGTH OF THE PAVEMENT AND CAN LEAD TO A PREMATURE PAVEMENT FAILURE. TO ENSURE UNIFORM COMPACTION, WHEEL RUTS SHOULD BE RAKED AND RE-COMPACTED BEFORE CONCRETE PLACEMENT OPERATIONS. IF THE SUBGRADE SOIL PROPERTIES REQUIRE THAT AN AGGREGATE RECHARGE BED BE INCORPORATED INTO THE DRAINAGE DESIGN OF THE SITE, IT SHALL BE PLACED ON THE PREPARED SUBGRADE, COMPACTED, AND TRIMMED TO THE PROPER ELEVATIONS.

CONSTRUCTION OF PERVIOUS CONCRETE SHALL BE ACCOMPLISHED BY A CERTIFIED CONTRACTOR. A TECHNICIAN CERTIFIED BY THE NATIONAL READY MIX ASSOCIATION (NRM) TO INSTALL PERVIOUS CONCRETE SHALL BE ON SITE OVERSEEING INSTALLATION DURING ALL PERVIOUS CONCRETE ACTIVITIES TO VERIFY THAT THE PERVIOUS CONCRETE IS BEING INSTALLED IN ACCORDANCE WITH PROJECT PLANS AND SPECIFICATIONS AND IN ACCORDANCE WITH THE ACCEPTED METHODS OF INSTALLING PERVIOUS CONCRETE AS ESTABLISHED BY THE NRM AND THE AMERICAN CONCRETE INSTITUTE (ACI). A PRECONSTRUCTION CONFERENCE AND CONSTRUCTION OF TEST SECTIONS ARE RECOMMENDED TO ADDRESS ISSUES SUCH AS:

- DETERMINING THE CONSTRUCTION SEQUENCE:
- ARRANGING FOR A REALISTIC DELIVERY RATE OF CONCRETE: ARRANGING FOR ADEQUATE ACCESS TO THE PROJECT SITE FOR THE CONCRETE TRUCKS:
- SELECTING THE OPTIMUM EQUIPMENT FOR THE SIZE OF THE PROJECT;
- COORDINATING TESTING AND INSPECTION; DEMONSTRATING THAT THE PROPOSED MIXTURE PROPORTIONS PERFORM AS EXPECTED; AND
- VERIFYING THAT THE PERVIOUS CONCRETE CONTRACTOR IS ADEQUATELY QUALIFIED.

PLACEMENT OF PERVIOUS CONCRETE NEEDS TO BE COMPLETED AS QUICKLY AS POSSIBLE. PERVIOUS CONCRETE HAS LITTLE EXCESS WATER IN THE MIXTURE. DRYING OF THE CEMENT PASTE CAN LEAD TO A RAVELING FAILURE OF THE PAVEMENT SURFACE; THEREFORE, RAPID PLACEMENT OF THE PAVEMENT IS ESSENTIAL.

11. FORM CONSTRUCTION

FORMS SHALL BE MADE OF WOOD, PLASTIC. OR STEEL AND SHOULD BE THE DEPTH OF THE PAVEMENT. FORMS SHALL BE OF SUFFICIENT STRENGTH AND STABILITY TO SUPPORT MECHANICAL EQUIPMENT. THE SUBGRADE UNDER THE FORMS SHALL BE COMPACTED IN ACCORDANCE WITH THE GEOTECH'S RECOMMENDATIONS AND CUT TO GRADE TO SUPPORT SCREED AND ROLLER EQUIPMENT

12. CONCRETE DISTRIBUTION

CONCRETE SHOULD BE DEPOSITED AS CLOSE TO ITS FINAL POSITION AS PRACTICAL FOR PLACEMENTS THAT MIXERS CANNOT REACH, OR WHERE THE SUBGRADE DISTURBANCE IS TO BE MINIMIZED, A CONVEYOR MAY BE USED. PERVIOUS CONCRETE MIXTURES ARE TYPICALLY HARSH (ZERO SLUMP), PUMPING IS NOT RECOMMENDED. AFTER DEPOSITING CONCRETE IT SHOULD BE CUT TO A ROUGH ELEVATION WITH A RAKE OR SIMILAR HAND TOOL.

PERVIOUS CONCRETE ALONG THE FORMS SHOULD BE COMPACTED BY HAND TAMP TO ENSURE THAT THE EDGES MAINTAIN STRUCTURAL INTEGRITY AFTER THE FORMS ARE REMOVED AND THE CONCRETE IS PUT INTO SERVICE DURING COMPACTION OF THE CONCRETE. THE OUTSIDE EDGE OF THE TAMPER SHOULD BE KEPT ON THE FORM TO ENSURE THAT THE CONCRETE IS NOT COMPACTED BELOW

- CARE SHOULD BE TAKEN TO MINIMIZE: PULLING OR SHOVELING OF FRESH CONCRETE INTO FINAL POSITION;
- FILLING VOIDS IN THE CONCRETE;

 CONTAMINATING THE PERVIOUS CONCRETE WITH DELETERIOUS MATERIAL; AND WALKING IN THE PERVIOUS CONCRETE, 13. RISER STRIPS

RISER STRIPS SHALL BE PLACED ON TOP OF THE FORMS FOR INITIAL STRIKE-OFF. THESE STRIPS VARY FROM J/8 TO 3/4 IN. THICK; DEPENDING ON THE NECESSARY THICKNESS OF THE PAVEMENT SECTION, THE AGGREGATE USED IN THE PERVIOUS CONCRETE, AND THE CONTRACTOR'S PLACEMENT METHODS.

14. STRIKE-OFF METHODS AND EQUIPMENT

STRIKE-OFF METHODS WILL VARY DEPENDING ON THE SIZE OF THE PLACEMENT. FOR SMALL JOBS, SUCH AS DRIVEWAYS, OR FOR TIGHT AREAS, A HAND-HELD STRAIGHTEDGE OR JITTERBUG SCREED IS ACCEPTABLE. FOR LARGER JOBS, THE USE OF AN A-FRAME VIBRATING SCREED IS RECOMMENDED. IT IS IMPORTANT TO STRIKE-OFF THE CONCRETE AS QUICKLY AS POSSIBUE: THUS, HANDWORK IS NOT RECOMMENDED DUE TO ITS LACK OF SPEED.

15. MISCELLANEOUS TOOLS

TRADITIONAL CONCRETE FINISHING TOOLS SUCH AS EDGERS AND COME-ALONG MAY BE USED TO FACILITATE PROPER PLACEMENT OF PERVIOUS CONCRETE. BULL FLOATS SHOULD NOT BE USED.

SPECIAL CARE WILL BE TAKEN WHEN PLACING A PERVIOUS CONCRETE SECTION NEXT TO AN EARLIER PLACEMENT FROM THE SAME DAY TO PREVENT DAMAGE TO THE EARLIER SECTION. WHEREAS THIS PROCEDURE IS NOT TYPICALLY RECOMMENDED, IT MAY BE NECESSARY IN SOME APPLICATIONS.

- CAREFULLY PEEL BACK THE CURING SHEET COVERING THE EARLIER PLACEMENT TO JUST REVEAL THE INSIDE EDGE OF THE FORM. CARE SHOULD BE TAKEN TO KEEP THE EARLIER PERVIOUS
- CONCRETE COMPLETELY COVERED: PLACE SHEETS OF PLYWOOD OR ORIENTED STRAND BOARD (OSB) (3/8 IN [1 0 MM] OR THICKER AS REQUIRED) ON TOP OF THE CURING SHEET, ALONG THE EDGE OF THE EARLIER PERVIOUS
- REMOVE FROM THE FORM BOARD. EXPOSING THE FRESH EDGE OF THE EARLIER PLACEMENT;
- PLACE PERVIOUS CONCRETE UP TO THIS EDGE;
- STRIKE OFF THE FRESHLY PLACED PERVIOUS CONCRETE WITH THE SCREED RIDING ON THE PLYWOOD OR 058;
- CONTINUE WITH CONSOLIDATION AS USUAL; AND
- COVER THE PERVIOUS CONCRETE AS SOON AS POSSIBLE.

17. CONSOLIDATION

IMMEDIATELY AFTER STRIKE-OFF THE FIRST RISER STRIPS ARE REMOVED ON EACH FORM AND THE CONCRETE IS COMPACTED TO THE FORM'S ELEVATION WITH A WEIGHTED ROLLER, A HAND TAMP MAY BE USED ALONG THE EDGES TO FACILITATE COMPACTION ALONG THE FORMS. THE ROLLER IS USED TO COMPACT THE CONCRETE TO CREATE A STRONG CEMENT PASTE BOND BETWEEN AGGREGATE PARTICLES AND TO PROVIDE AN ACCEPTABLE SURFACE SMOOTHNESS. THE ROLLER SHOULD BE OF ADEQUATE WIDTH TO RIDE ON THE FORMS AND SHOULD PROVIDE A MINIMUM OF 10 PSI VERTICAL FORCE.

18. CONTRACTION

CONTRACTION JOINTS SHOULD BE INSTALLED AS INDICATED BY THE CERTIFIED TECHNICIAN. THEY SHALL HAVE A DEPTH OF 1/3 TO).\ OF THE THICKNESS OF THE PAVEMENT, JOINTS SHALL BE INSTALLED IN THE FRESH CONCRETE. A SPECIALLY DESIGNED ROLLING JOINTER WITH A BLADE THAT IS AT LEAST),\(PREFERABLY 1/3) THE THICKNESS OF THE SLAB AND WITH ENOUGH WEIGHT TO FORCE THE BLADE TO CLEANLY CUT THE JOINT SHALL BE USED. IN PLACEMENTS WITH WIDE LANE WIDTHS, A LONGITUDINAL JOINT MAY BE CUT WITH THE COMPACTING ROLLER.

CURING AND PROTECTION

THE COVER MATERIAL SHALL BE A CLEAR, 6 MIL OR THICKER POLYETHYLENE SHEET OF SUFFICIENT DIMENSION TO BE ABLE TO COVER THE ENTIRE WIDTH OF A LANE ALONG A REASONABLE DISTANCE, WOVEN MATERIALS, SUCH AS BURLAP AND GEOTEXTILE FABRIC AND WAX-BASED CURING

THE OPEN PORE STRUCTURE OF PERVIOUS CONCRETE MAKES CURING PARTICULARLY

COMPOUNDS SHALL NOT BE USED. STRIKE-OFF, COMPACTION, AND CURING OPERATIONS SHALL BE KEPT AS CLOSE TOGETHER AS POSSIBLE TO PREVENT DRYING OF THE TOP SURFACE OF THE PERVIOUS CONCRETE, FOLLOWING THE PLACEMENT PROCESS, AS SOON AS THE STRIKE-OFF OPERATION HAS MOVED ON TO A NEW RISER STRIP. THE USED RISER STRIPS SHOULD BE REMOVED AND THE COMPACTION OPERATIONS SHOULD BEGIN. WHEN ADVERSE AMBIENT WEATHER CONDITIONS EXIST, SUCH AS HIGH TEMPERATURE, HIGH WIND, OR LOW HUMIDITY, AN EVAPORATION RETARDANT SHOULD BE LIGHTLY SPRAYED ON THE SURFACE FOLLOWING STRIKE-OFF OPERATIONS AND BEFORE COMPACTION. CURING SHOULD BEGIN WITHIN 20 MINUTES AFTER THE FINAL COMPACTION OPERATIONS. BEFORE COVERING IF THE CONCRETE HAS LOST ITS "SHEEN" IT SHOULD BE LIGHTLY MISTED WITH WATER.

THE POLYETHYLENE COVER SHALL OVERLAP ALL EXPOSED SURFACES SO THAT IT MAY BE SECURED IN PLACE. REINFORCING BAR, LUMBER, OR CONCRETE BLOCKS MAY BE USED TO SECURE THE POLYETHYLENE COVER TO PREVENT IT FROM BEING BLOWN OFF. DIRT, SAND, OR OTHER GRANULAR MATERIAL SHALL NOT BE USED. AS THEY MAY WASH AWAY OR INTO THE PORES OF THE CONCRETE UPON REMOVAL, IF WOODEN FORMS ARE USED, THE RISER STRIPS MAY BE USED TO SECURE THE SHEETS IN PLACE. ALL EDGES OF PAVEMENT SHALL BE COVERED PROPERLY.

FOR PROPER CURING. THE PAVEMENT SHALL REMAIN COVERED FOR 7 DAYS FOR STRAIGHT CEMENT CONCRETE MIXTURES AND 10 DAYS FOR CONCRETE MIXTURES THAT INCORPORATE SUPPUEMENTARY CEMENTITIOUS MATERIALS. STRIPING SHOULD BE APPLIED ONLY AFTER THE CURING PERIOD HAS PASSED. NO TRAFFIC SHALL BE ALLOWED ON THE PAVEMENT DURING CURING. THE GENERAL CONTRACTOR SHALL TAKE MEASURES TO PREVENT DAMAGE TO THE PAVEMENT DUE TO ABUSE FROM CONSTRUCTION OPERATIONS. SPECIFICALLY, THE GENERAL CONTRACTOR SHALL PROHIBIT REMOVAL OF THE CURING MATERIAL AND PREVENT ANY TRAFFIC FROM TRAVELING ON THE PERVIOUS CONCRETE PAVEMENT. ADDITIONALLY, THE GENERAL CONTRACTOR SHALL NOT ALLOW STORAGE OF BUILDING AND LANDSCAPING MATERIALS ON THE PAVEMENT SURFACE AS THESE MATERIALS CAN CLOG THE PORES OR OTHERWISE DAMAGE PERVIOUS PAVEMENTS.

COLD WEATHER PROTECTION - COLD WEATHER MEASURES SHALL BE USED TO PROTECT THE PERVIOUS CONCRETE FROM FREEZING WHILE MAINTAINING MOISTURE FOR THE TIME NECESSARY TO ACHIEVE THE DESIRED PHYSICAL PROPERTIES. CURING BLANKETS WORK SUFFICIENTLY TO SERVE BOTH

HOT WEATHER PROTECTION - IN HOT WEATHER, TRANSPORTING, PLACING, AND COMPACTING SHALL BE DONE AS QUICKLY AS POSSIBLE. EVAPORATION RETARDANT MAY BE APPLIED TO THE SURFACE OF THE CONCRETE FOLLOWING THE STRIKE-OFF PROCESS TO RETARD THE LOSS OF MOISTURE ON THE SURFACE, AFTER CONSOLIDATION AND BEFORE PLACING THE POLYETHYLENE, THE SURFACE MAY BE LIGHTLY MISTED WITH WATER OR AN EVAPORATION RETARDANT IF THE SURFACE APPEARS TO BE LOSING ITS SHEEN APPEARANCE.

20. REPAIRING PERVIOUS CONCRETE PAVEMENTS GRINDING

HIGH SPOTS CAN BE GROUND WITH A WEIGHTED GRINDER. THE GRINDER WILL CUT THROUGH AND EXPOSE THE AGGREGATE IN GROUND AREAS, HOWEVER, CHANGING THE APPEARANCE OF THE PAVEMENT. HOLES OR LOW SPOTS

SMALL HOUES (LOW SPOTS) SHALL BE PATCHED WITH AN AGGREGATE EPOXY BLEND TO MATCH THE APPEARANCE OF THE PAVEMENT SURFACE. THE AGGREGATE SHALL BE COATED WITH WET CEMENT AND CURED BEFORE PATCHING. LARGE HOLES SHALL BE PATCHED WITH PERVIOUS CONCRETE OF THE SAME MIXTURE PROPORTIONS AS THE ORIGINAL SURFACE, WHEN PATCHING. IT IS HIGHLY UNLIKELY THAT THE COLOR OF THE PATCH WILL MATCH THE ORIGINAL SURFACE MATERIAL.

EPOXY BODING AGENTS MAY BE USED TO ENSURE PROPER BONDING BETWEEN THE OLD AND NEW SURFACES. UTILITY CUTS

IN THE EVENT THAT A SECTION OF PERVIOUS CONCRETE IS CUT, A FULL DEPTH REPAIR SHALL BE PERFORMED, THIS WOULD INCLUDE REMOVING A SQUARE SECTION THE WIDTH OF A PLACED PLANE SUCH THAT THE NEW MATERIAL WOULD BE LARGE ENOUGH TO MAINTAIN ITS STRUCTURAL INTEGRITY

UNDER LOADING.

MAINTENANCE

PERVIOUS CONCRETE, POWER VACU MING AND PRESSURE WASHING. THE MOST EFFECTIVE SCHEME, HOWEVER, IS TO COMBINE THE TWO TECHNIQUES. POWER VACUUM AFTER PRESSURE WASHING. DURING PRESSURE WASHING CARE SHOULD BE TAKEN NOT TO USE TOO MUCH PRESSURE, AS THIS WILL DAMAGE THE PERVIOUS CONCRETE. A SMALL SECTION OF THE PAVEMENT SHOULD BE PRESSURE WASHED USING VARYING WATER PRESSURES TO DETERMINE THE APPROPRIATE PRESSURE FOR THE GIVEN PAVEMENT.

THERE ARE TWO COMMONLY ACCEPTED MAINTENANCE METHODS TO MAINTAIN

21. MAINTENANCE A SUGGESTED MAINTENANCE SCHEDULE IS AS FOLLOWS:

ACTIVITY	SCHEDULE
ENSURE THAT PAVING AREA IS CLEAN OF DEBRIS	MONTHLY
 ENSURE THAT THE AREA IS CLEAR OF SEDIMENTS 	MONTHLY
SEED BARE UPLAND AREAS	AS NEEDED
PRESSURE WASH/VACUUM SWEEP SURFACE	TWICE ANNUALLY
 INSPECT THE SURFACE FOR DETERIORATION OR SPALLIN 	IG ANNUALLY

22. PRECONSTRUCTION INSPECTION AND TESTING

DETERMINING THE PERMEABILITY OF THE SUBGRADE AND SOIL ANALYSIS ARE IMPORTANT IN THE DESIGN AND CONSTRUCTION OF THE PROJECT. BASIC TESTS OF THE PROPERTIES OF THE SUBGRADE SHALL INCLUDE A PARTICLE SIZE ANALYSIS (ASTM D 422). SOIL CLASSIFICATION (ASTM 0 2487), AND STANDARD PROCTOR (ASTM D 698), A DOUBLE RING INFILTROMETER (ASTM D 3385) OR OTHER SUITABLE TEST SHALL BE PERFORMED TO ADEQUATELY TEST THE PERMEABILITY. FOR SMALL PROJECTS, THESE TESTS ARE NOT NECESSARY IF OTHER BORINGS AND/OR INFILTRATIONS TESTS HAVE BEEN CONDUCTED AND IN COMBINATION WITH EXPERIENCE WITH THE LOCAL SOILS IF OTHER BORINGS OR INFILTRATION TESTS HAVE BEEN DONE IN THE FACILITY, ESPECIALLY IF THE DESIGNER HAS PREVIOUS EXPERIENCE WITH SIMILAR LOCAL SOILS.

NORMAL TESTING PROCEDURES FOR DENSITY (COMPACTION) IN ACCORDANCE WITH A STANDARD ASTM TEST PROCEDURE SHOULD BE PERFORMED WITHOUT MODIFICATION BEFORE CONCRETE PLACEMENT AS PART OF A NORMAL QUALITY CONTROL PLAN.

DURING CONSTRUCTION: FOR EACH DAYS PLACEMENT, OR WHEN VISUAL INSPECTION INDICATES A CHANGE IN APPEARANCE OF THE FRESH MIXTURE, AT LEAST ONE TEST SHOULD BE CONDUCTED TO VERIFY THE DENSITY OF THE MATERIAL. THE TEST OF THE MIXTURE SHOULD BE CONDUCTED IN ACCORDANCE WITH ASTM C 172 AND C 29, ACCEPTANCE SHOULD BE ON A VALUE OF ± 5 LB/FT3 (80 KG/M3)

AFTER CONSTRUCTION: THE LEVEL OF COMPACTION OF THE FRESH MIXTURE CAN HAVE AN IMPACT ON THE LIFE AND PERMEABILITY OF THE FINISHED PRODUCT. CORING OF THREE SAMPLES OF THE PAVEMENT WILL RESULT IN ACCEPTANCE SAMPLES FOR THICKNESS, VOID CONTENT, AND UNIT WEIGHT, CORE SAMPLES SHOULD BE OBTAINED IN ACCORDANCE WITH ASTM C 42 AND TESTED AT 28 DAYS OF AGE.

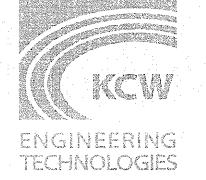
23. FOR ADDITIONAL INFORMATION INCLUDING REFERENCES SEE PERVIOUS CONCRETE, REPORTED BY ACI COMMITTEE 552. ACI 522R-10.

> STANDARD HOWARD COUNTY OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED PERMEABLE PAVEMENT (A-2)

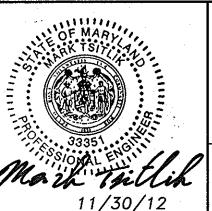
- a. The Owner shall periodically sweep (or vacuum porous concrete pavement) the pavement surfaces to reduce sediment accumulation and ensure continued surface porosity. Sweeping should be performed at least twice annually with a commercial cleaning unit. Washing or compressed air units should not be used to perform surface cleaning.
- b. The Owner shall periodically clean drainage pipes, inlets, stone edge drains and other structures within or draining to the subbase.
- c. The Owner shall use deicers in moderation. Deicers should be non-toxic and be applied either as calcium magnesium acetate or as pretreated salt.

d. The Owner shall ensure snow plowing is performed carefully with blades set one-inch above the surface. Plowed snow piles and snowmelt should not be directed to permeable pavement. melt should not be directed to permeable pavement.

APPROVED: DEPARTMENT OF PLANNING AND ZONING



KCW Engineering Technologies, Inc. 810 Landmark Drive, Suite 215 Glen Burnie, MD 21061 Phone: 410.768.7700 Fax: 410.768.0200 www.kcw-et.com



Professional Certification hereby certify that these locuments were prepared or approved by me, and that I am a duly licensed professiona engineer under the laws of the State of Maryland. License No. 33351. Expiration Date 06-30-2014.

OWNER:

THE REDEEMED CHRISTIAN CHURCH OF GOD, INC. 13701 ANNAPOLIS ROAD BOWIE, MD 20720

> Attn: Margaret Adeyokunnu, Pastor Tele: (301) 352-0707 Fax: (301) 352-3339

OWNER'S REPRESENTATIVE/ DEVELOPER: TLI DESIGNGROUP INC.

3308 DORCHESTER ROAD BALTIMORE, MD 21215 Attn: Taiwo Iluyomade, President

Toll Free/Fax/Voice mail: (1–866) 616–1497

Mobile: (443) 831-6703

KCW J.O.: 2080018 SCALE: AS SHOWN DESIGNED: MT DRAWN: MT CHECKED: KCA

DATE: NOV. 30, 2012 DRAWING NO. 11 OF 19

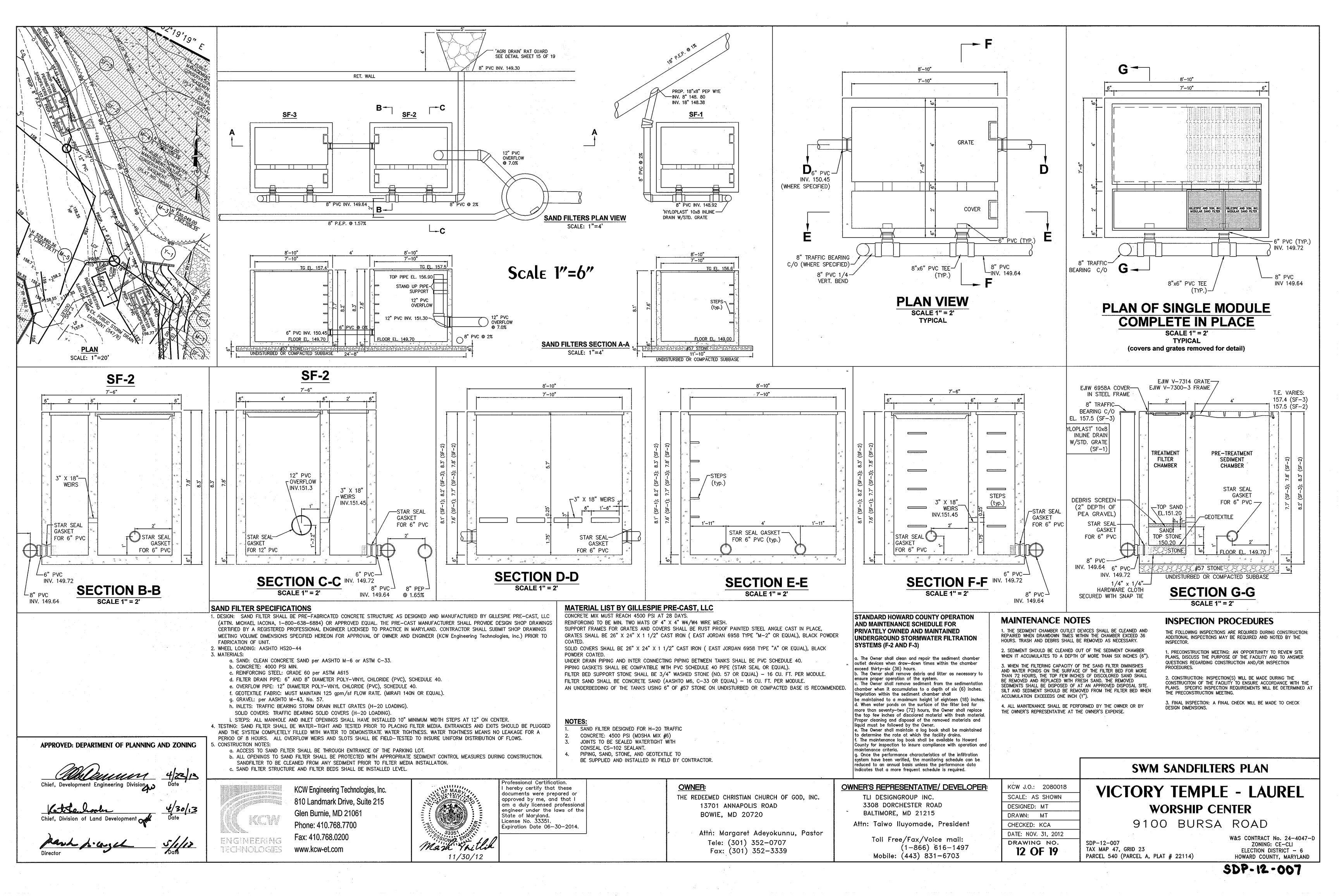
SWM PERVIUOS PAVEMENT II

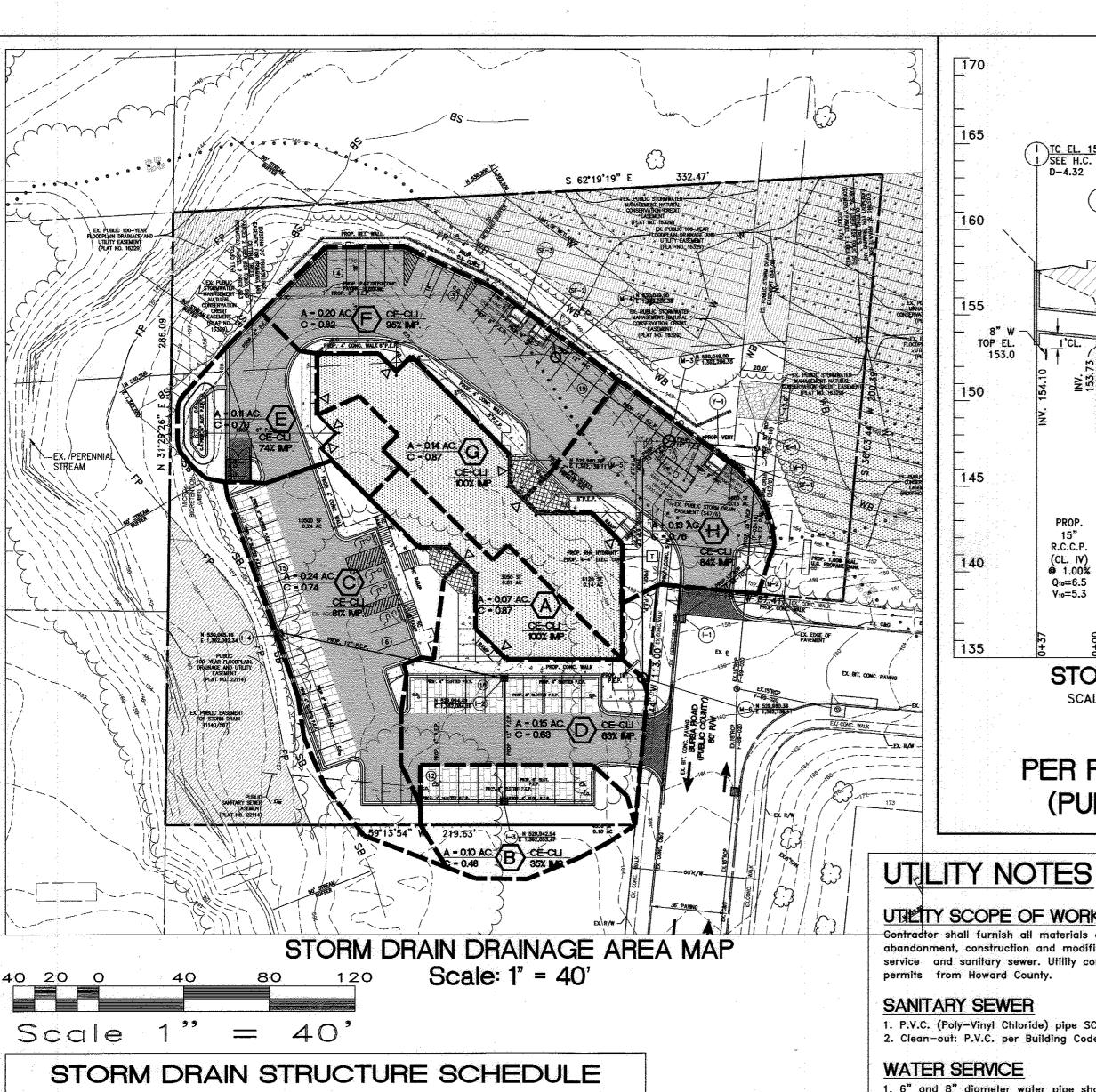
VICTORY TEMPLE - LAUREL WORSHIP CENTER

9100 BURSA ROAD

SDP-12-007 TAX MAP 47, GRID 23 PARCEL 540 (PARCEL A, PLAT # 22114) W&S CONTRACT No. 24-4047-D ZONING: CE-CLI ELECTION DISTRICT - 6 HOWARD COUNTY, MARYLAND

SDP-12-007

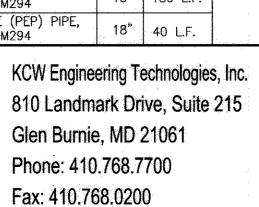




s	STORM DRAIN STRUCTURE SCHEDULE										
NO.	TYPE	STD. DETAIL	INV.IN	INV.OUT	TOP ELEV.						
l-2	SINGLE 'S' GRATE INLET	D-4.22	4"-157.40 4"-157.40 6"-153.50 12"-152.00 12"-152.00	151.80	TG158.4						
1–3	SINGLE 'S' GRATE INLET	D-4.22	4"-158.50 4"-158.50 6"-155.00	153.50	TG159.5						
-4	SINGLE 'S' GRATE INLET	D-4.22	4"-156.60 4"-156.60 6"-154.10 6"-154.10	153.80	TG157.6						
M-3	5' STD. PRE-CAST MANHOLE	G-5.13	6"-150.10 8"-150.10 12"-148.70 15"-148.80	148.60	TE157.26						
M-4	4' STD. PRE-CAST MANHOLE	G-5.12	8"-149.44 12"-150.44	149.24	TE157.70						
M-5	30" NYLOPLAST DRAIN BASIN* WITH SOLID GRATE		15"-149.30	149.10	TE157.74						
M-6	4' STD. PRE-CAST MANHOLE	G-5.12	15"-151.00	150.80	TE159.70						

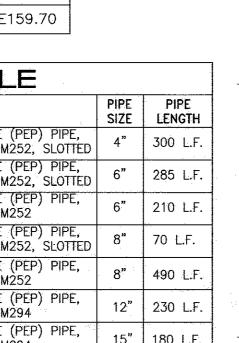
* OR APPROVED EQUAL.

	STORM DRAIN PIPE SCHEDULE										
	PIPE MATERIAL	PIPE SIZE	PIPE LENGTH	\ /	PIPE MATERIAL	PIPE SIZE	PIPE LENGTH				
	POLY-VYNIL CHLORIDE (PVC) PIPE, SCHEDULE 40 per ASTM D-1785	6"	40 L.F.		HIGH DENSITY POLYETHYLENE (PEP) PIPE, SMOOTH LINED per AASHTO M252, SLOTTED	4"	300 L.F.				
	POLY-VYNIL CHLORIDE (PVC) PIPE, SCHEDULE 40 per ASTM D-1785	. 8"	65 L.F.		HIGH DENSITY POLYETHYLENE (PEP) PIPE, SMOOTH LINED per AASHTO M252, SLOTTED	6"	285 L.F.				
	POLY-VYNIL CHLORIDE (PVC) PIPE, SCHEDULE 40 per ASTM D-1785	12"	15 L.F.	$\backslash \setminus$	HIGH DENSITY POLYETHYLENE (PEP) PIPE, SMOOTH LINED per AASHTO M252	6"	210 L.F.				
-	· · · · · · · · · · · · · · · · · · ·				HIGH DENSITY POLYETHYLENE (PEP) PIPE, SMOOTH LINED per AASHTO M252, SLOTTED	8"	70 L.F.				
	randra de la compansión d La compansión de la compa	HIGH DENSITY POLYETHYLENE (PEP) PIPE, SMOOTH LINED per AASHTO M252		490 L.F.							
PRO	PROVED: DEPARTMENT OF PLANNING AND ZONING				HIGH DENSITY POLYETHYLENE (PEP) PIPE, SMOOTH LINED per AASHTO M294	12"	230 L.F.				
					HIGH DENSITY POLYETHYLENE (PEP) PIPE,	. 45"	100 5				



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SMOOTH LINED per AASHTO M294 HIGH DENSITY POLYETHYLENE (PEP) PIPE, SMOOTH LINED per AASHTO M294



PROP. 24"
R.C.C.P. (CL. IV)
9 1.00%
Q₁₀=35.2 R.C.C.P. (CL. IV) **@** 1.00% $Q_{10}=37.1$ V10=7.6 PIPE SCHEDUL **AASHTO** L.F. SIZE TYPE STORM DRAIN PROFILE SCALE: HOR.1" = 50'; VERT.1" = 5' STRUCTURE SCHEDULE DETAIL/ REMARK PER F-02-10 TG157.6 154.10 153.0 148.10 158.1 148.84 STD MANHOLE

' STD MANHOLE

NOTE: EXISTING ENDWALL TO BE REMOVED & REPLACED WITH

BACKFILL PER

—PROP. 30" END SECTION

-CLASS I RIP-RAP W/ FILTER CLOTH UNDERLAY @ 0.0% d50 = 19"

∟EX. GRD.

(12-17-97)

-3 FT. DEEP GROUTED RIPRAP CUT OFF

-PER SDP 12-007

PROPOSED M-2

M TOP EL. 158.1
2 SEE H.C. DETAIL
G-5.13 WITH
GRANITE BLOCK
BOTTOM

PROVIDE GRANITE BLOCK BOTTOM

FOR MH-2

TC EL. 158.1 SEE H.C. DETAIL D-4.32

PROP. 15" R.C.C.P.

(CL. IV) © 1.00% Q₁₀=6.5 V₁₀=5.3

UTILITY SCOPE OF WORK

abandonment, construction and modification to storm drains, water service and sanitary sewer. Utility contractor shall obtain all necessary permits from Howard County.

(PUBLIC)

1. P.V.C. (Poly-Vinyl Chloride) pipe SCH 40.

2. Clean-out: P.V.C. per Building Code criteria

1. 6" and 8" diameter water pipe shall be Class 52 Ductile Iron Pipe (D.I.P.) and appurtenances in accordance with Howard County

> hereby certify that these documents were prepared or

approved by me, and that I am a duly licensed professional engineer under the laws of the

Expiration Date 06-30-2014.

State of Maryland. License No. 33351.

11/30/12

STORM DRAINS

- shall be high density polyethylene (H.D.P.E.) smooth wall interior pipe per ASTM D-3350 and A.A.S.H.T.O. M-252, Type S. All joints to be

.G. 159.5

PROP. 2x4" PEP (2)

INV. 157.40 -

6" PEP

PROP. 8" PEP FOR RD PROP. —

FOR RD

-PROP.

6" PEP

PROP. 12" PEP (ST) @ 2.50%

Q10=0.9 CFS

V10=1.2 FPS

PROP. 2x4" PEP-

6" PEP

INV. 158.5

.G. 158.4

6" PEP PROP. 12" PEP

@ 1.57%

Q10=0.7 CFS

V10=2.0 FPS

INV. 152.00

PROP. 15" PEP (ST) @ 1.25%

Q10=2.9 CFS

V10=2.4 FPS

STORM DRAIN PROFILE SCALE: 1"=20' HORIZ., 1"=5' VERT.

EX. GROUND

- be high density polyethylene (H.D.P.E.) smooth wall interior pipe per ASTM D-3350 and A.A.S.H.T.O. M-294, Type S. All joints to be soiltight (ST) or watertight (WT) as shown on profiles. 4. Inlets:
- Type 'S' single inlet per Howard County detail D-4.22 with Reticular
- Standard Precast Manhole per Howard County details G-5.12, G-5.13. 30" "Nyloplast" Drain Basin with solid grate.

OWNER:

CO $\sqrt{\text{T.E. } 157.80}$ T.E. 153.0 160 E PROP. 30" CONC. 1 PROP. 30" CONC. GRADE (6/06)PROP. 24" RCP 10-YR HGL-~INV. 148.2 (F-02-10)PROP. CLASS 1 RIP-RAP 1 5 - W/FILTER CLOTH UNDERLAY @ 0.0% d50=9.5" PROP. 15" PEP-(F-02-10)o 18" PEP ∞ (WT) 7 @ 1.00% I GROUTED RIP-RAP 145 PROP. 12" PEP (WT) © 0.82% CUT OFF WALL (WT)

Q₁₀=1.9 CFS

V10=2.4 FPS

AASHTO

SCALE: AS SHOWN

PROP. 4-4"_ ELEC. COND.

PROP. 15" PEP (ST)

@ 1.47%

Q10=2.9 CFS

V10=2.4 FPS

AASHTO

T-180

15" PEP

@ 2.00%

Q10=2.9 CFS

V10=2.4 FPS

AASHTO

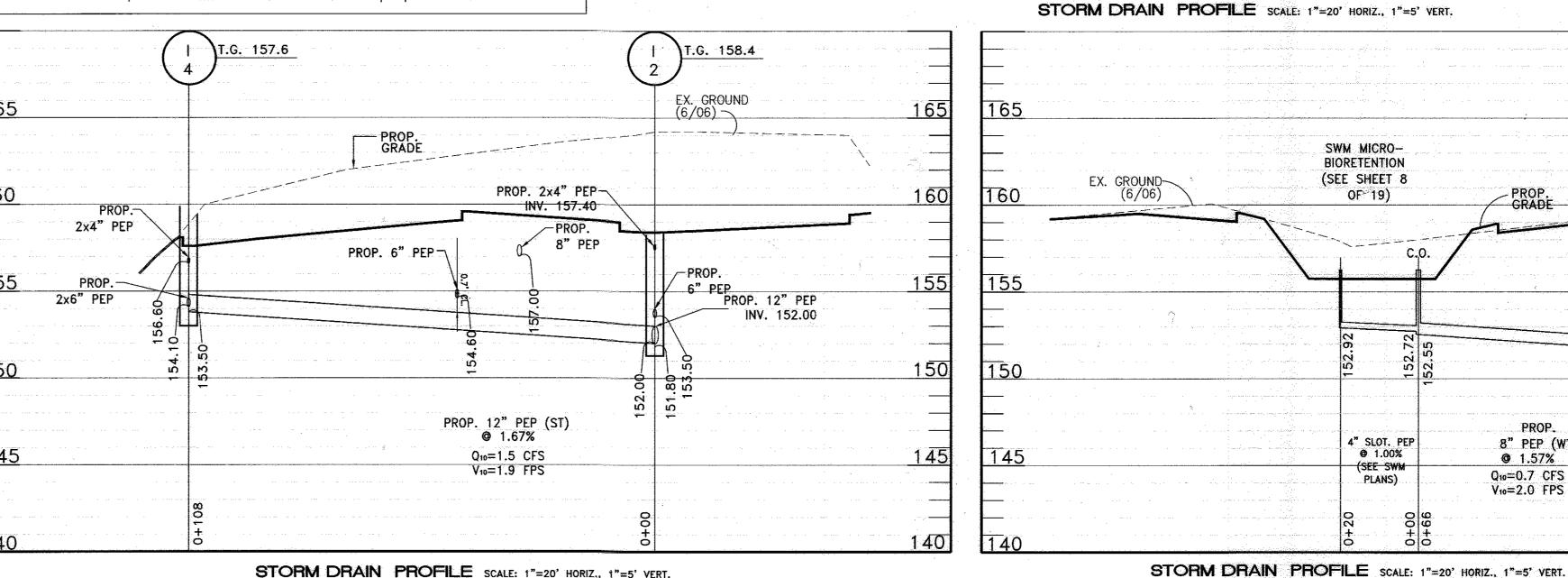
T-180

Q10=6.0 CFS

V10=3.4 FPS

AASHTO

T-180



STORM DRAIN PROFILE SCALE: 1"=20' HORIZ., 1"=5' VERT.

THE REDEEMED CHRISTIAN CHURCH OF GOD, INC.

Tele: (301) 352-0707

Fax: (301) 352-3339

Attn: Margaret Adeyokunnu, Pastor

13701 ANNAPOLIS ROAD

BOWIE, MD 20720

CONSTRUCTION PROFILES I

KCW J.O.: 2080018 **VICTORY TEMPLE - LAUREL**

WORSHIP CENTER 9100 BURSA ROAD

SDP-12-007 TAX MAP 47, GRID 23

PARCEL 540 (PAR. A, PLAT # 22114)

3308 DORCHESTER ROAD DESIGNED: MT BALTIMORE, MD 21215 DRAWN: MT Attn: Taiwo Iluyomade, President CHECKED: KCA DATE: NOV. 30, 2012

Toll Free/Fax/Voice mail: (1-866) 616-1497 Mobile: (443) 831-6703

OWNER'S REPRESENTATIVE/ DEVELOPER:

TLI DESIGNGROUP INC.

DRAWING NO. 13 OF 19

W&S CONTRACT No. 24-4047-D
ZONING: CE-CLI
ELECTION DISTRICT - 6
HOWARD COUNTY, MARYLAND

9 1.00%

– PROP. – GRADE

8" PEP (WT) © 1.57%

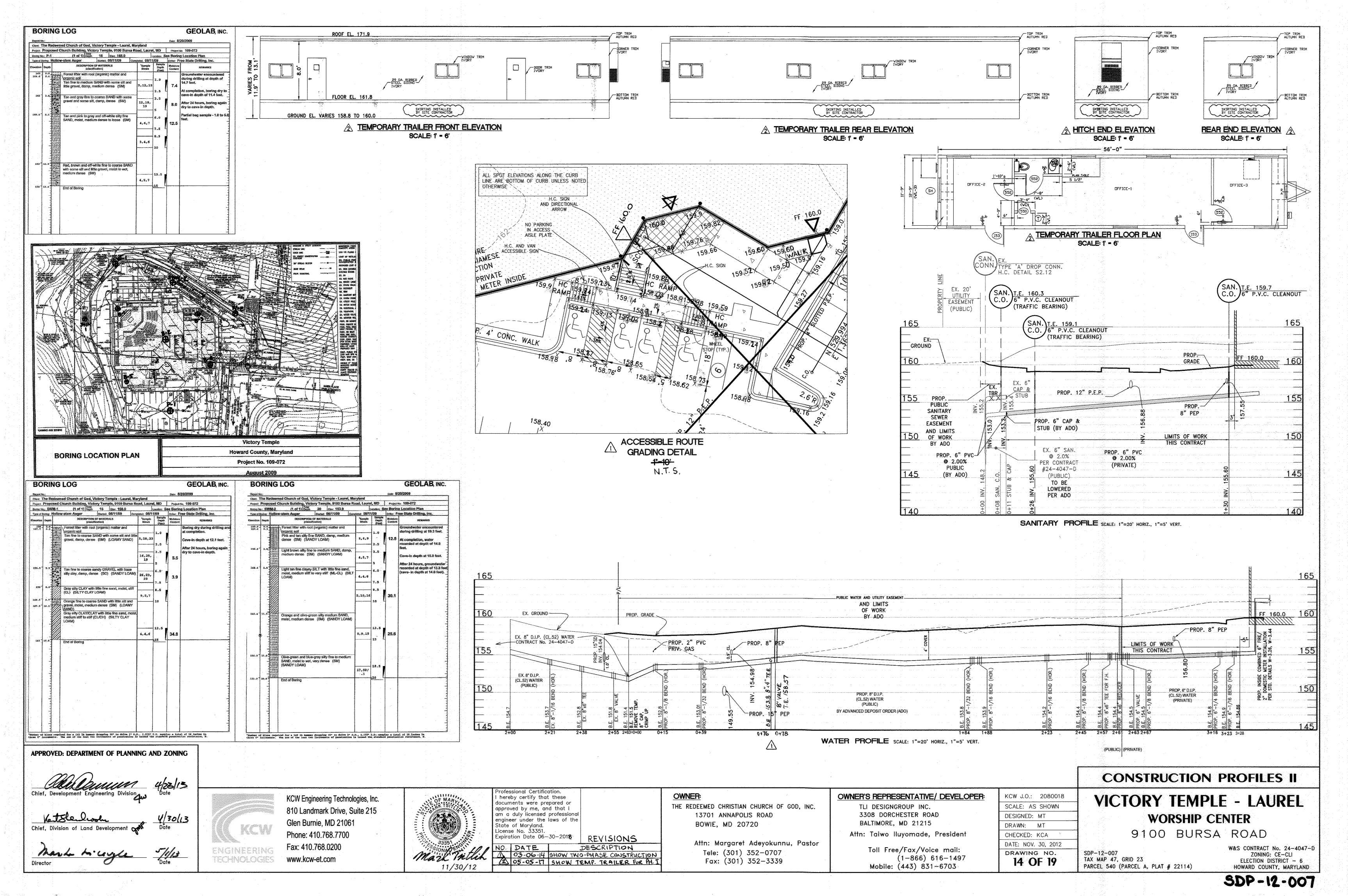
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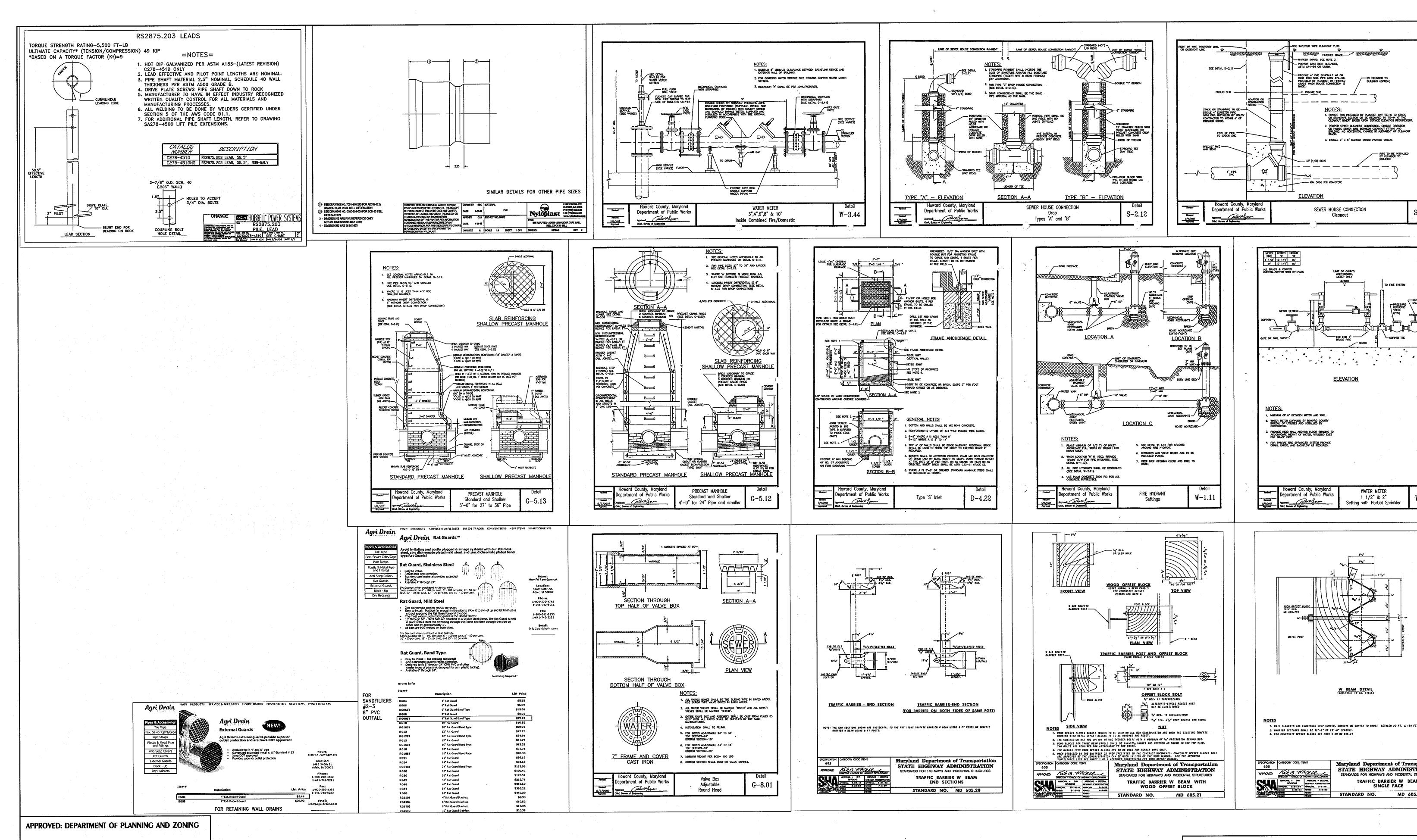
V10=2.0 FPS

(F-02-10)

140

PROP. 12" PEP





hereby certify that these

locuments were prepared or

approved by me, and that I

Expiration Date 06-30-2014.

State of Maryland.

License No. 33351.

11/30/12

am a duly licensed professional engineer under the laws of the

KCW Engineering Technologies, Inc.

810 Landmark Drive, Suite 215

Glen Burnie, MD 21061

Phone: 410.768.7700

Fax: 410.768.0200

www.kcw-et.com

OWNER:

THE REDEEMED CHRISTIAN CHURCH OF GOD, INC.

Tele: (301) 352-0707

Fax: (301) 352-3339

Attn: Margaret Adeyokunnu, Pastor

13701 ANNAPOLIS ROAD

BOWIE, MD 20720

UTILITY DETAILS

THISTED GRUCE VILLE IN THE PROPERTY OF THE PRO

ELEVATION

3. INSTALL 2" x 5" MARKER BOARD PAINTED GREEN

S-2.22

TO TIRE SYSTEM

1 1/2" & 2"

Setting with Partial Sprinkle

SEWER HOUSE CONNECTION

VICTORY TEMPLE - LAUREL **WORSHIP CENTER**

9100 BURSA ROAD

SDP-12-007 TAX MAP 47, GRID 23

PARCEL 540 (PARCEL A, PLAT # 22114)

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(1-866) 616-1497

TLI DESIGNGROUP INC.

BALTIMORE, MD 21215

3308 DORCHESTER ROAD

KCW J.O.: 2080018

SCALE: AS SHOWN

DATE: NOV. 30, 2012

DRAWING NO.

15 OF 19

DESIGNED: MT

DRAWN: MT

CHECKED: KCA

W&S CONTRACT No. 24-4047-D ZONING: CE-CLI

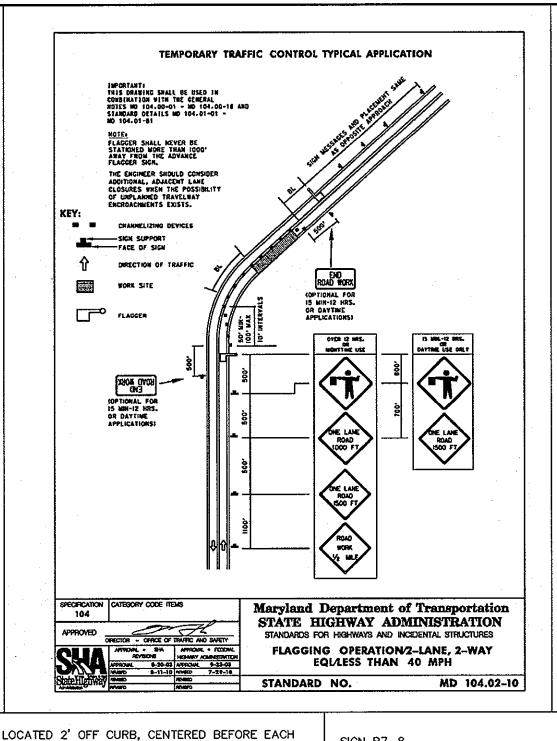
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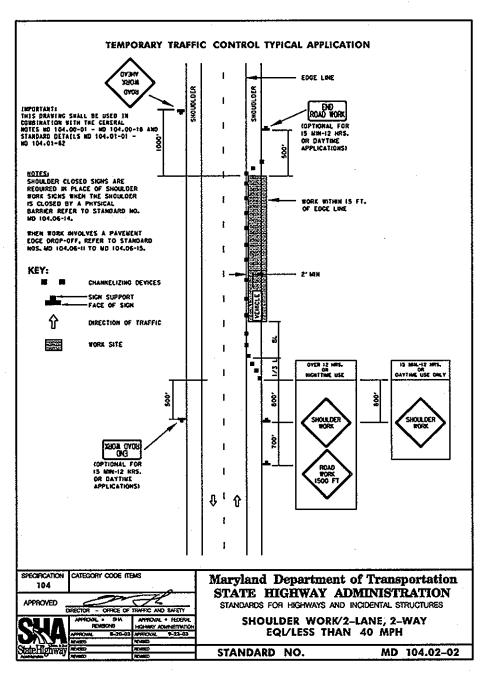
ELECTION DISTRICT - 6

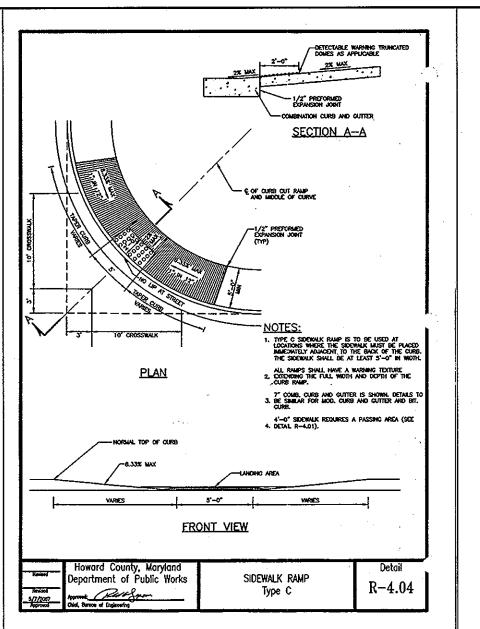
Maryland Department of Transportation

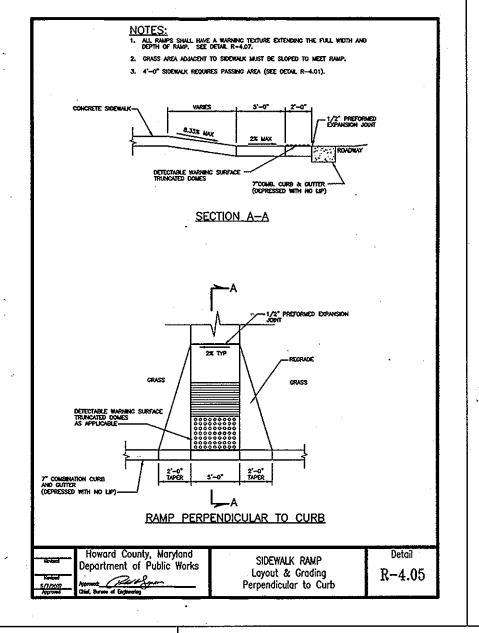
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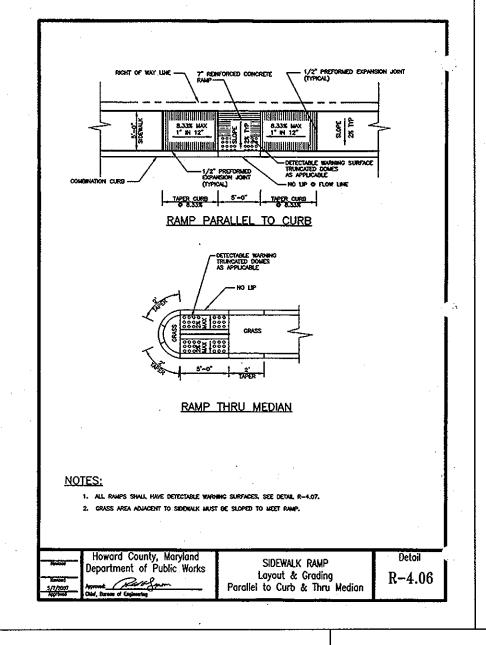
TRAFFIC BARRIER W BEAM SINGLE FACE

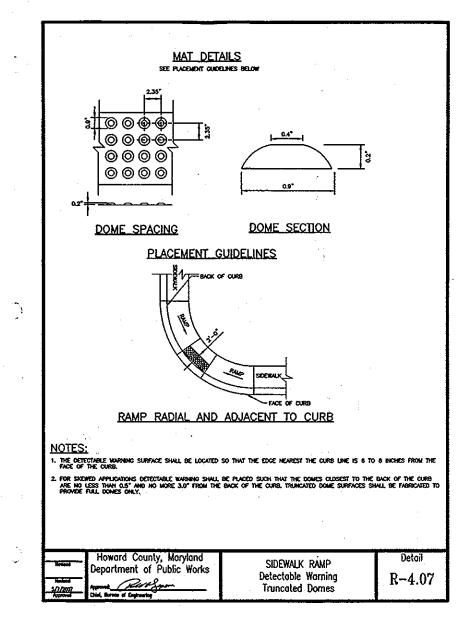


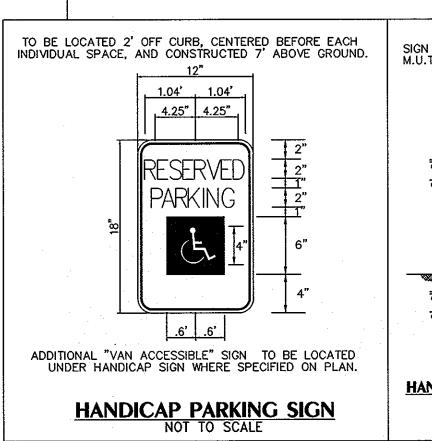




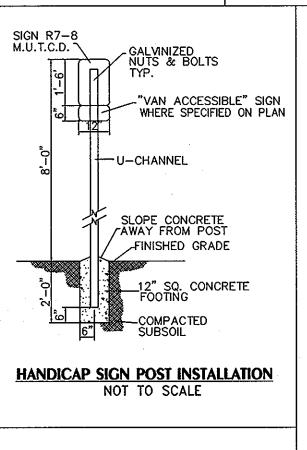


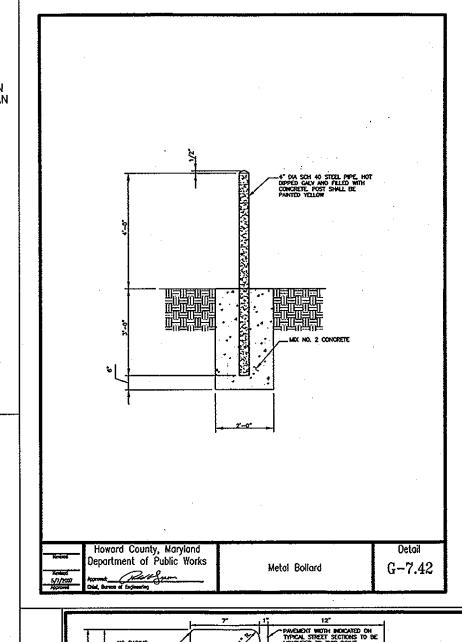


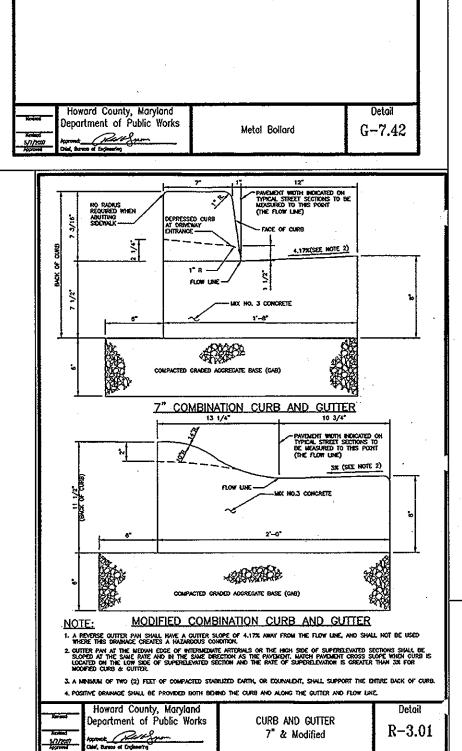


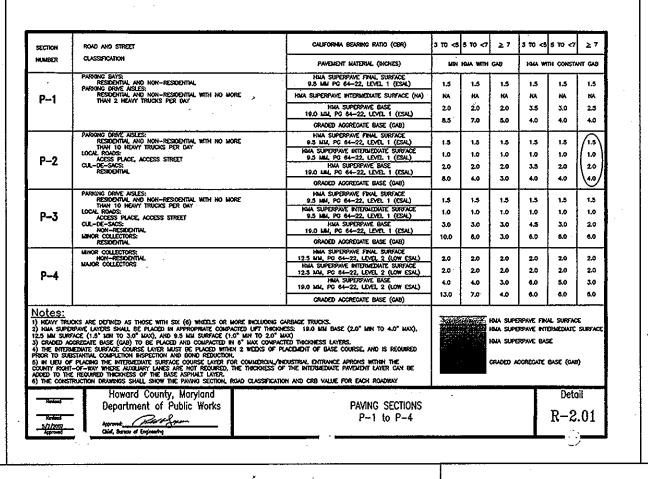


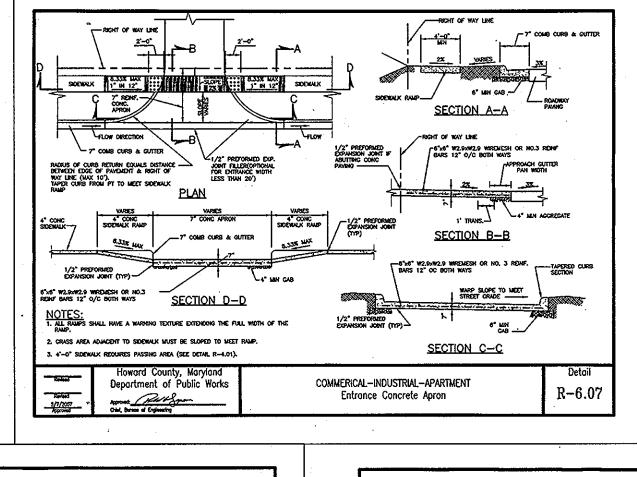
4" DIA. CONC. FILLED -PIPE BOLLARD. (TYP.)

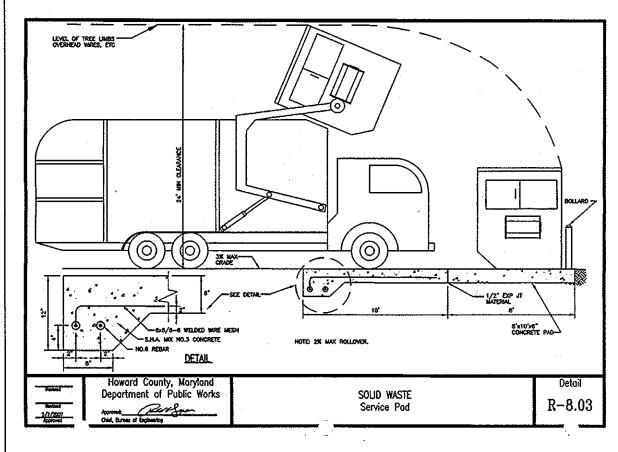


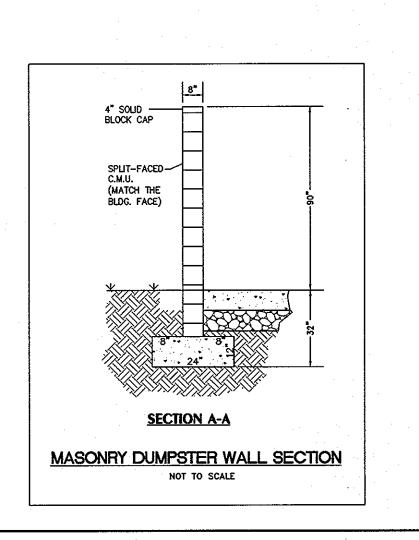


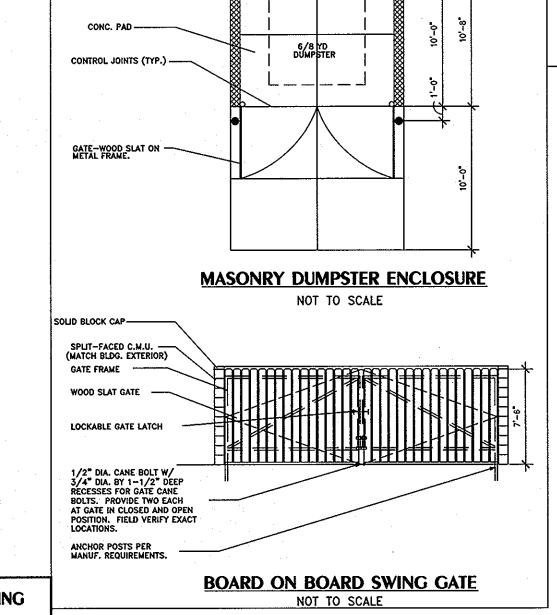


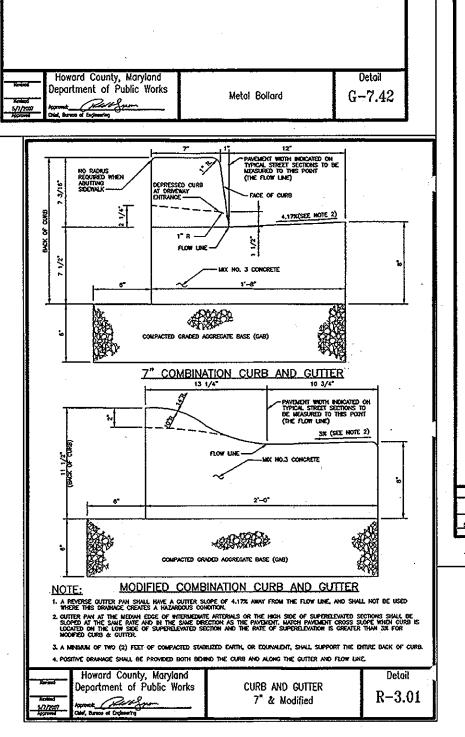


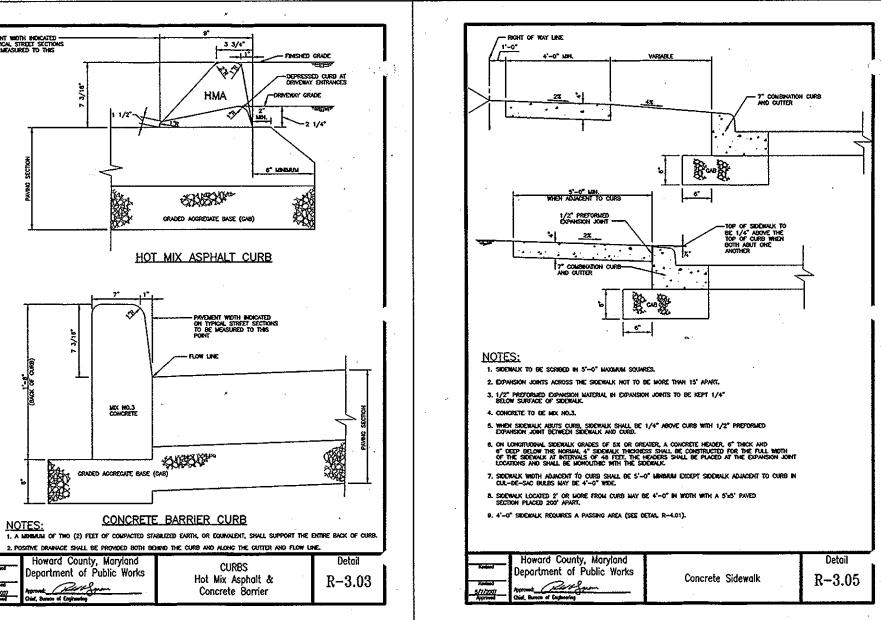


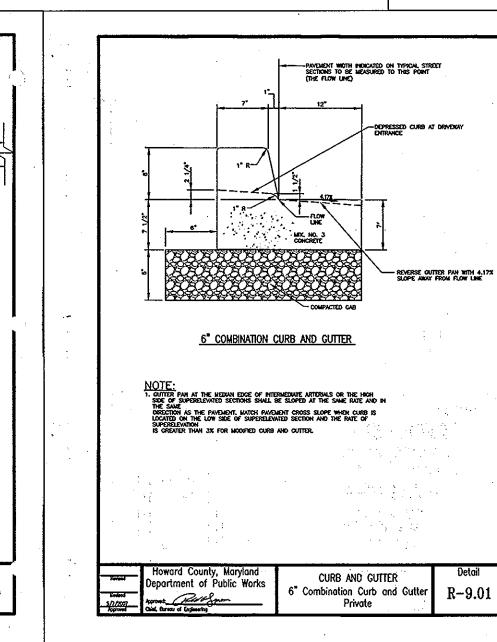


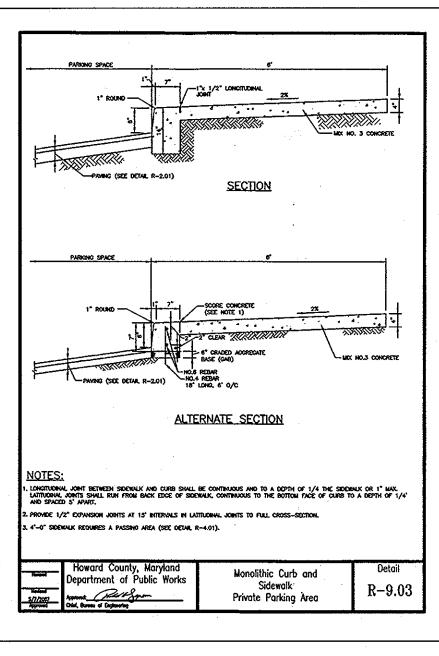




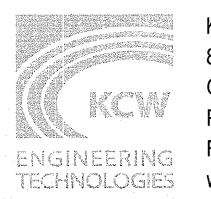


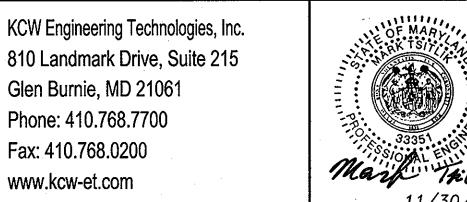






APPROVED: DEPARTMENT OF PLANNING AND ZONING







hereby certify that these locuments were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. 33351. Expiration Date 06-30-2014.

OWNER:

THE REDEEMED CHRISTIAN CHURCH OF GOD, INC. 13701 ANNAPOLIS ROAD BOWIE, MD 20720

> Attn: Margaret Adeyokunnu, Pastor Tele: (301) 352-0707 Fax: (301) 352-3339

OWNER'S REPRESENTATIVE/ DEVELOPER:

TLI DESIGNGROUP INC. 3308 DORCHESTER ROAD BALTIMORE, MD 21215 Attn: Taiwo Iluyomade, President

> Toll Free/Fax/Voice mail: (1-866) 616-1497 Mobile: (443) 831-6703

KCW J.O.: 2080018

SCALE: AS SHOWN DESIGNED: MT DRAWN: MT CHECKED: KCA DATE: NOV. 30, 2012 DRAWING NO.

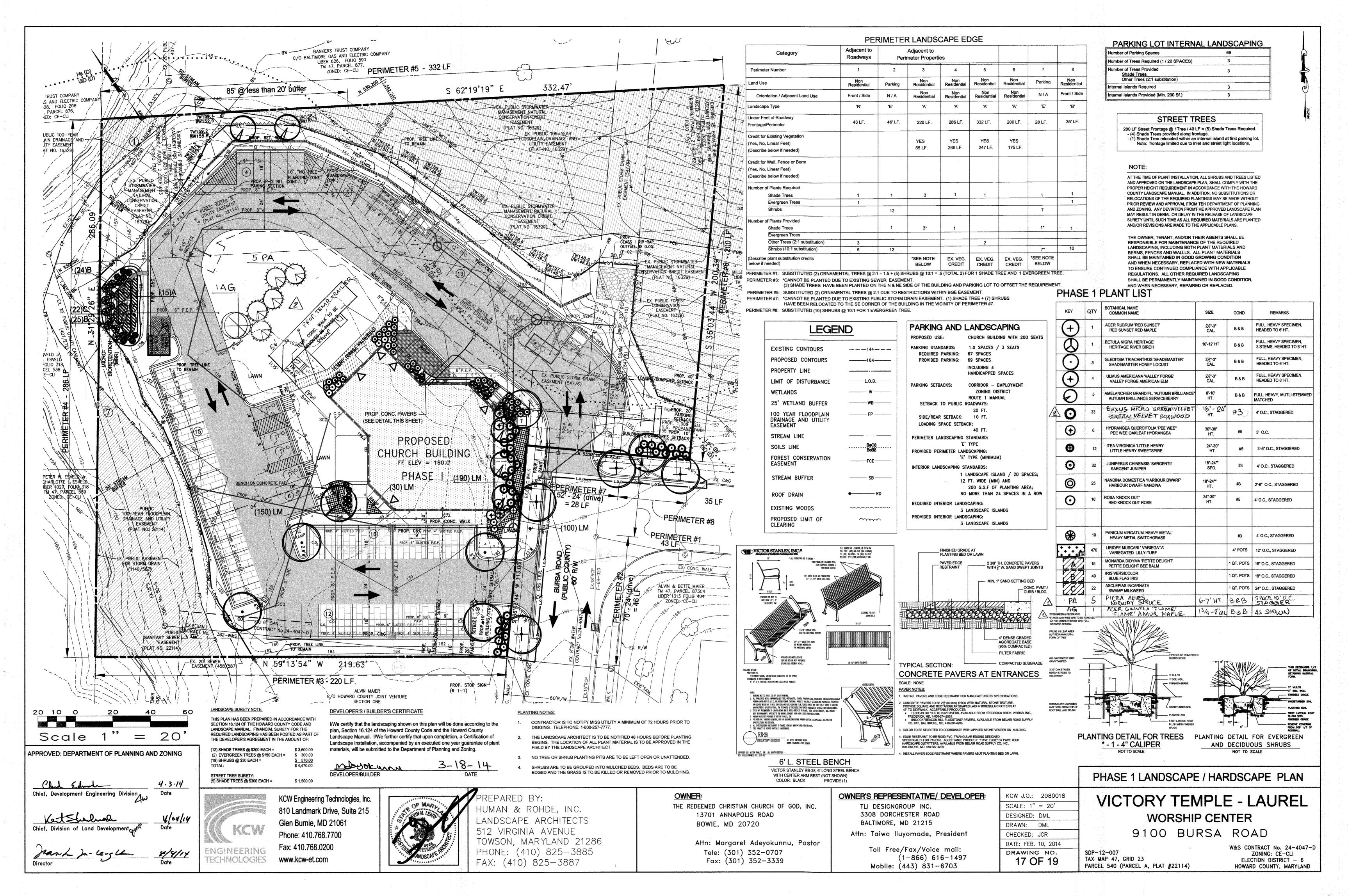
16 OF 19

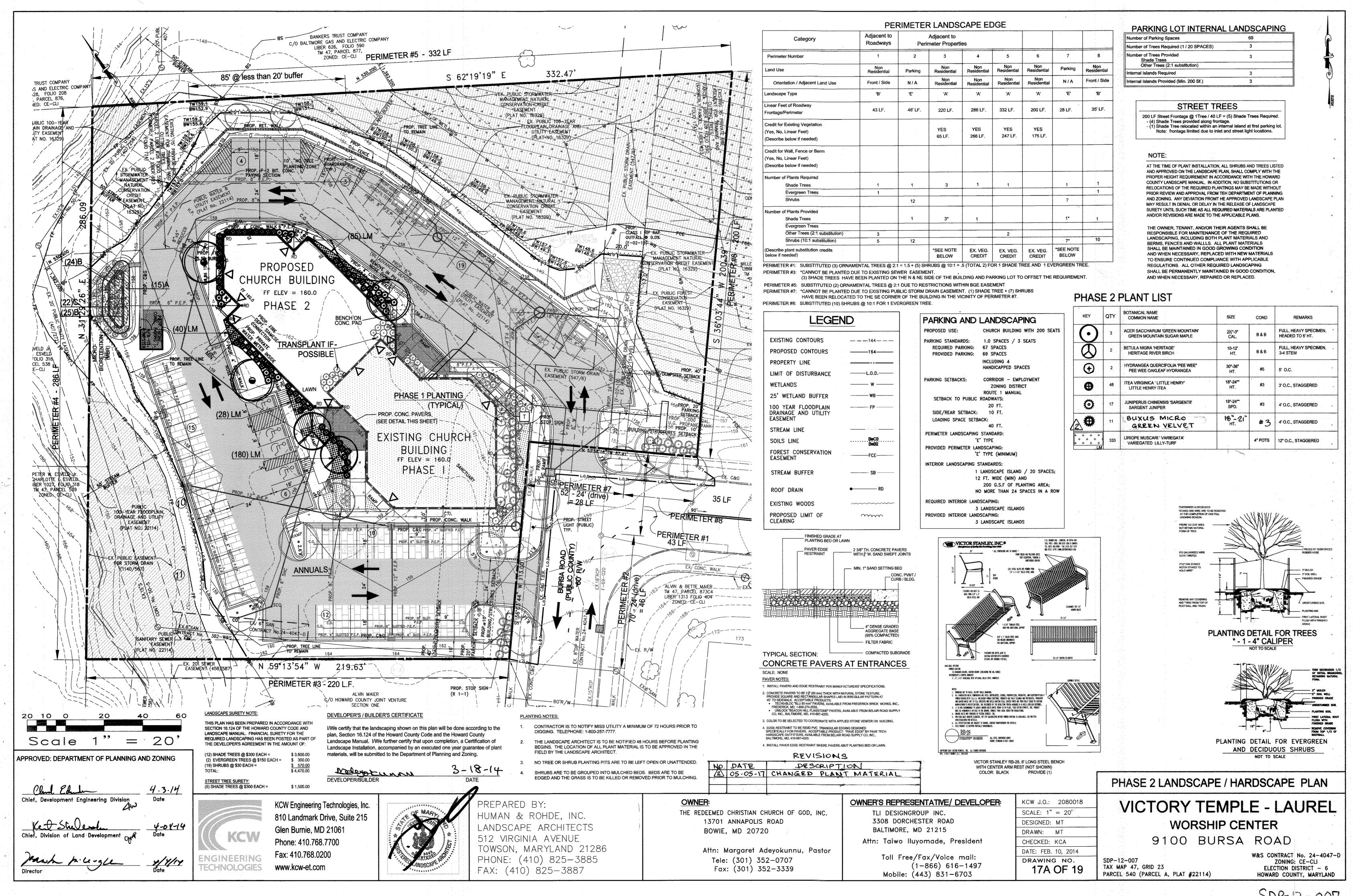
CONSTRUCTION DETAILS

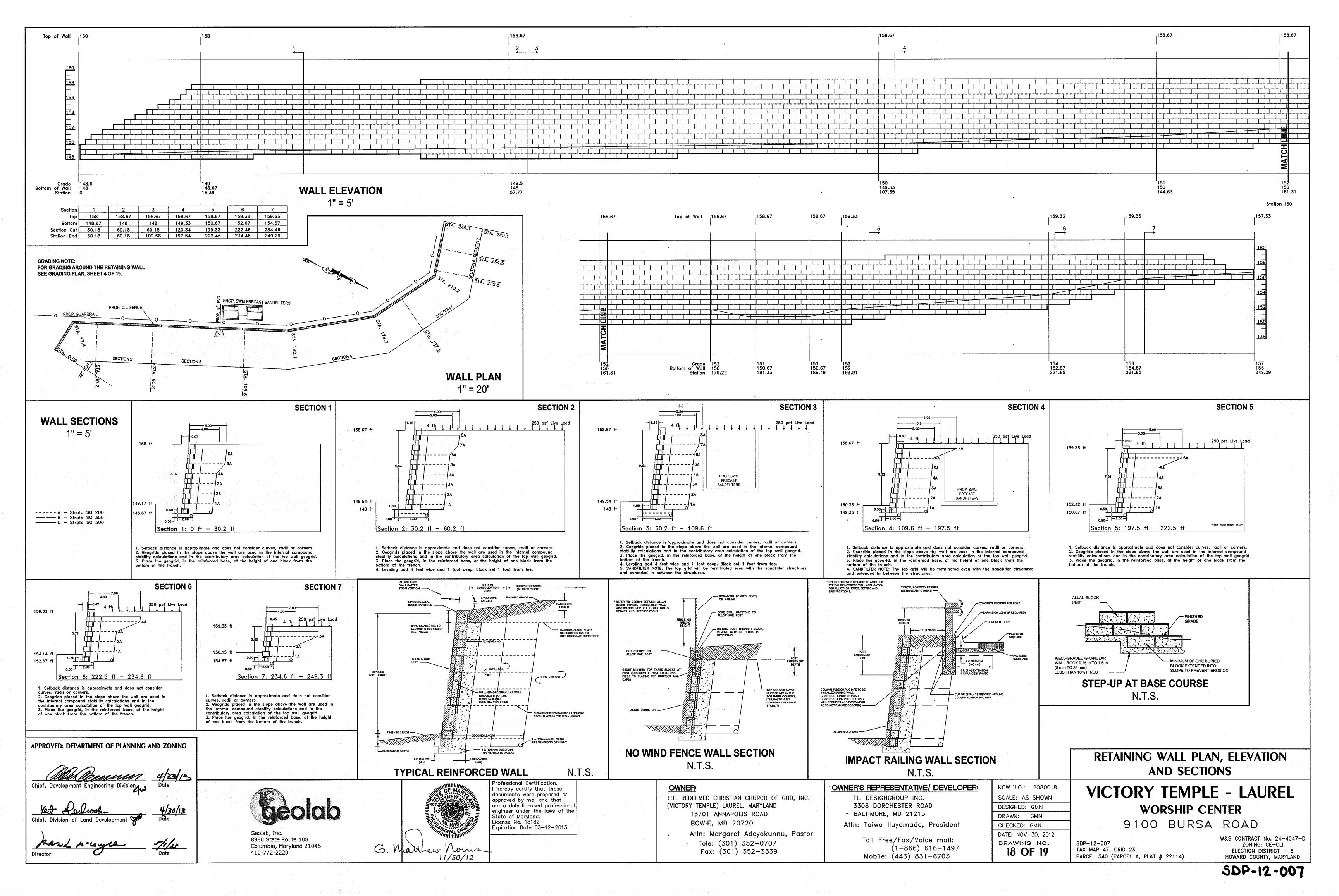
VICTORY TEMPLE - LAUREL WORSHIP CENTER

9100 BURSA ROAD

SDP-12-007 TAX MAP 47, GRID 23 PARCEL 540 (PARCEL A, PLAT # 22114) W&S CONTRACT No. 24-4047-D ZONING: CE-CLI
ELECTION DISTRICT - 6
HOWARD COUNTY, MARYLAND







Specification Guidelines: Allan Block Modular **Retaining Wall Systems**

SECTION 1: ALLAN BLOCK MODULAR RETAINING WALL SYSTEMS

PART 1: GENERAL

1.1 Scope
Work includes furnishing and installing modular concrete block retaining wall units to the lines and grades designated on 1.2 Applicable Sections of Related Work Section 2: Geogrid Wall Reinforcement

- 1.3 Reference Standards
 A. ASTM C1372 Standard Specification for Segmental Retaining Wall Units.
 B. ASTM C1262 Evaluating the Freeze thaw Durability of Manufactured CMUs and Related concrete Units C. ASTM D698 Moisture Density Relationship for Soils, Standard Method
- D. ASTM D422 Gradation of Soils E. ASTM C140 Sample and Testing concrete Masonry Units
- 1.4 Delivery, Storage, and Handling
 A. Contractor shall check the materials upon delivery to assure proper material has been received
 B. Contractor shall prevent excessive mud, cementitious material, and like construction debris from coming in contact C. Contractor shall protect the materials from damage. Damaged material shall not be incorporated in the project (ASTM C1372). PART 2: MATERIALS
- 2.1 Modular Wall Units

 A. Wall units shall be Allan Block Retaining Wall units as produced by a licensed manufacturer.

 B. Wall units shall have minimum 28 day compressive strength of 3000 psi (20.7 MPa) in accordance with ASTM C1372. The concrete units shall have adequate freeze-thaw protection with an average absorption rate in accordance with ASTM C1372 or an average absorption rate of 7.5 lb/ft^3 (120 kg/m^3) for northern climates and 10 lb/ft3 (160 kg/m^3). Exterior dimensions shall be uniform and consistent. Maximum dimensional deviations on the height of any two units shall be 0.125 in. (3 mm).

 D. Wall units shall provide a minimum of 110 lbs total weight per square foot of wall face area (555 kg/m^2). Fill contained within the units may be considered 80% effective weight.

 E. Exterior face shall be textured. Color as specified by owner.
- A. Material must be well-graded compactable aggregate, 0.25 in. to 1.5 in., (6 mm 38 mm) with no more than 10% passing the #200 sieve. (ASTM D422)

 B. Material behind and within the blocks may be the same material.
- A. Intill material shall be site excavated soils when approved by the on-site soils engineer unless otherwise specified in the drawings. Unsuitable soils for backfill (heavy clays or organic soils) shall not be used in the reinforced soil mass. Fine grained cohesive soils (f<31) may be used in wall construction, but additional backfilling, compaction and water management efforts are required. Poorly graded sands, expansive clays and/or soils with a plasticity index (PI) >20 or a liquid limit (LL) >40 should not be used in wall construction.

 B. The infill soil used must meet or exceed the designed friction angle and description noted on the design cross sections, and must be free of debris and consist of one of the following inorganic USCS soil types: GP, GW, SW, SP meeting the following gradation as determined in accordance with ASTM D422.

 Sieve Size Percent Passing A. Infill material shall be site excavated soils when approved by the on-site soils engineer unless otherwise specified in
- Sieve Size Percent Passing
 4 inch (100 mm) 100 75
 No. 4 (4.75 mm) 100 20
 No. 40 (0.425 mm) 0 60
 No. 200 (0.075 mm) 0 35
 Where additional fill is required.
- C. Where additional fill is required, contractor shall submit sample and specifications to the wall design engineer or the onsite soils engineer for approval and the approving engineer must certify that the soils proposed for use has properties meeting or exceeding original design standards. PART 3: WALL CONSTRUCTION
- 3.1 Excavation A. Contractor shall excavate to the lines and grades shown on the construction drawings. Contractor shall use caution not to over-excavate beyond the lines shown, or to disturb the base elevations beyond those shown.

 B. Contractor shall verify locations of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation.
- 3.2 Foundation Soil Preparation

 A. Foundation soil shall be defined as any soils located beneath a wall. B. Foundation soil shall be excavated as dimensioned on the plans and compacted to a minimum of 95% of Standard Proctor (ASTM D698) prior to placement of the base material. C. Foundation soil shall be examined by the on-site soils engineer to ensure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength shall be removed and replaced with
- 3.3 BaseA. The base material shall be the same as the Wall Rock material (Section 2.2) or a low permeable granular material. B. Base material shall be placed as shown on the construction drawing. Top of base shall be located to allow bottom wall units to be buried to proper depths as per wall heights and specifications.

 C. Base material shall be installed on undisturbed native soils or suitable replacement fills compacted to a minimum of 95% Standard Proctor (ASTM D698).

 D. Base shall be compacted at 95% Standard Proctor (ASTM D698) to provide a level hard surface on which to place the first course of blocks. The base shall be constructed to ensure proper wall embedment and the final elevation shown on the plans. Well-graded sand can be used to smooth the top 1/2 in. (13 mm) on the base material. E. Base material shall be a 4 in. (100 mm) minimum depth for walls under 4 ft (1.2 m) and a 6 in. (150 mm) minimum depth for walls over 4 ft (1.2 m).
- 3.4 Unit Installation
 A. The first course of wall units shall be placed on the prepared base with the raised lip facing up and out and the front edges tight together. The units shall be checked for level and alignment as they are placed.
 B. Ensure that units are in full contact with base. Proper care shall be taken to develop straight lines and smooth turves on base course as per wall layout. C. Fill all cores and cavities and a minimum of 12 in. (300 mm) behind the base course with wall rock. Use infill soils behind the wall rock and approved soils in front of the base course to firmly lock in place. Check again for level and alignment. Use a plate compactor to consolidate the area behind the base course. All excess material shall be swept rom top of units. D. Install next course of wall units on top of base course. Position blocks to be offset from seams of blocks below. Perfect running bond is not essential, but a 3 in. (75 mm) minimum offset is recommended. Check each block for
- proper alignment and level. Fill all cavities in and around wall units and to a minimum of 12 in. (300 mm) depth behind block with wall rock. For taller wall application the depth of wall rock behind the block should be increased; walls from 15 ft (4.57 m) to 25 ft (7.62 m) should have a minimum of 2 ft (0.61 m) and walls above 25ft (7.62 m) should have a minimum of 3 ft (0.9 m). Spread infill soil in uniform lifts not exceeding 8 in. (200 mm) in uncompacted thickness and compact to 95% of Standard Proctor (ASTM D698) behind the consolidation zone. . The consolidation zone shall be defined as 3 ft (0.9 m) behind the wall. Compaction within the consolidation zone
- shall be accomplished by using a hand operated plate compactor and shall begin by running the plate compactor directly on the block and then compacting in parallel paths from the wall face until the entire consolidation zone has been compacted. A minimum of two passes of the plate compactor are required with maximum lifts of 8 in. (200 mm). Expansive or fine-grained soils may require additional compaction passes and/or specific compaction equipment such as a sheepsfoot roller. Maximum lifts of 4 inches (100 mm) may be required to achieve adequate compaction within the consolidation zone. Employ methods using lightweight compaction equipment that will not disrupt the stability or batter of the wall. Final compaction requirements in the consolidation zone shall be established by the engineer of
- record.

 F. As with any construction work, some deviation from construction drawing alignments will occur. Variability in construction of SRWs is approximately equal to that of cast-in-place concrete retaining walls. As opposed to cast-in-place concrete walls, alignment of SRWs can be simply corrected or modified during construction. Based upon examination of numerous completed SRWs, the following recommended minimum tolerances can be achieved with
- good construction techniques.

 Vertical Control +-1.25 in. (32 mm) max. over 10 ft (3 m) distance

 Horizontal Location Control straight lines +-1.25 in. (32 mm) over a 10 ft (3 m) distance.

 Rotation from established plan wall batter: 2.0 Deg.

 Bulging 1.0 in. (25 mm) over a 10 ft (3.0 m) distance

APPROVED: DEPARTMENT OF PLANNING AND ZONING

- A. When one wall branches into two terraced walls, it is important to note that the soil behind the lower wall is also the foundation soil beneath the upper wall. This soil shall be compacted to a minimum of 95% of Standard Proctor the foundation soil beneath the upper wall. This soil shall be compacted to a minimum of 95% of Standard Proctor (ASTM D698) prior to placement of the base material. Achieving proper compaction in the soil beneath an upper terrace prevents settlement and deformation of the upper wall. One way is to replace the soil with wall rock and compact in 8 in. (200 mm) lifts. When using on-site soils, compact in maximum lifts of 4 in. (100 mm) or as required compact in 8 in. (200 mm) lifts. When using on-site soils, compact in maximum lifts of 4 in. (100 mm) or as required to achieve specified compaction.

 B. Filter fabric use is not suggested for use with cohesive soils. Clogging of such fabric creates unacceptable hydrostatic pressures in soil reinforced structures. When filtration is deemed necessary in cohesive soils, use a three dimensional filtration system of clean sand or filtration aggregate.

 C. Embankment protection fabric is used to stabilize rip rap and foundation soils in water applications and to separate infill materials from the retained soils. This fabric should permit the passage of fines to preclude clogging of the material. Embankment protection fabric shall be a high strength polypropylene monofilament material designed to meet or exceed typical Corps of Engineers plastic filter fabric specifications (CW-02215); stabilized against ultraviolet (UV) degradation and typically exceeding the values in Table 1, page 8 of the AB Spec Book.
- D. Water management is of extreme concern during and after construction. Steps must be taken to ensure that drain pipes are properly installed and vented to daylight and a grading plan has been developed that routes water away from the retaining wall location. Site water management is required both during construction of the wall and after

Specification Guidelines: Geogrid Reinforcement

The following specifications provide Allan Block Corporation's typical requirements and recommendations. At the engineer of record's discretion these specifications may be revised to accommodate site specific design requirements.

SECTION 2 **PART 1: GENERAL**

1.1 ScopeWork includes furnishings and installing geogrid reinforcement, wall block, and backfill to the lines and grades designated on the construction drawings and as specified herein.

1.2 Applicable Sections of Related Work Section 1: Allan Block Modular Retaining Wall Systems.

- 1.3 Reference Standards
 See specific geogrid manufacturer's reference standards. Additional Standards:
 A. ASTM D4595 Tensile Properties of Geotextiles by the Wide-Width Strip Method
 B. ASTM D5262 Test Method for Evaluating the Unconfined Creep Behavior of Geogrids
 C. ASTM D6638 Grid Connection Strength (SRW-U1)
 D. ASTM D6916 SRW Block Shear Strength (SRW-U2)
 E. GRI-GG4 Grid Long Term Allowable Design Strength (LTADS)
 F. ASTM D6706 Grid Pullout of Soil
- 1.4 Delivery, Storage, and Handling
 A. Contractor shall check the geogrid upon delivery to assure that the proper material has been received.
 B. Geogrid shall be stored above -10 F (-23 C).
 C. Contractor shall prevent excessive mud, cementitious material, or other foreign materials from coming in contact with the according material.

PART 2: MATERIALS

- 2.1 Definitions
 A. Geogrid products shall be of high density polyethylene or polyester yarms encapsulated in a protective coating specifically fabricated for use as a soil reinforcement material.
 B. Concrete retaining wall units are as detailed on the drawings and shall be Allan Block Retaining Wall Units.
- Drainage material is free draining granular material as defined in Section 1, 2.2 Wall Rock. Infill soil is the soil used as fill for the reinforced soil mass. Foundation soil is the in-situ soil.

2.2 Products
Geogrid shall be the type as shown on the drawings having the property requirements as described within the

2.3 Acceptable Manufacturers

A manufacturer's product shall be approved by the wall design engineer.

PART 3: WALL CONSTRUCTION

3.1 Foundation Soil Preparation

A. Foundation soil shall be excavated to the lines and grades as shown on the construction drawings, or as directed by the on-site soils enaineer Foundation soil shall be examined by the on-site soils engineer to assure that the actual foundation soil strength meets or exceeds assumed design strength.

C. Over-excavated areas shall be filled with compacted backfill material approved by on-site soils engineer.

D. Contractor shall verify locations of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation.

3.2 Wall Construction
Wall construction shall be as specified under Section 1, Part 3, Wall Construction.

- 3.3 Geogrid Installation

 A. Install Alian Block wall to designated height of first geogrid layer. Backfill and compact the wall rock and infill soil in layers not to exceed 8 in. (200 mm) lifts behind wall to depth equal to designed grid length before grid is installed. B. Cut geogrid to designed embedment length and place on top of Allan Block to back edge of lip. Extend away from wall approximately 3% above horizontal on compacted infili soils.

 C. Lay geogrid at the proper elevation and orientations shown on the construction drawings or as directed by the wall design engineer.

 D. Correct orientation of the geogrid shall be verified by the contractor and on-site soils engineer. Strength direction is b. Correct orientation of the geogrid shall be verified by the contractor and on-site soils engineer. Strength direction is typically perpendicular to wall face.

 E. Follow manufacturer's guidelines for overlap requirements. In curves and corners, layout shall be as specified in Design Detail 9-12: Using Grid with Corners and Curves, see page 15 of the AB Spec Book.

 F. Place next course of Allan Block on top of grid and fill block cores with wall rock to lock in place. Remove slack and folds in grid and stake to hold in place.

 G. Adjacent sheets of geogrid shall be builted applied as a later at the set of the same and stake to hold in place.
- G. Adjacent sheets of geogrid shall be butted against each other at the wall face to achieve 100 percent coverage. H. Geogrid lengths shall be continuous. Splicing parallel to the wall face is not allowed. A. Infill soil shall be placed in lifts and compacted as specified under Section 1, Part 3.4, Unit Installation. B. Infill soil shall be placed, spread and compacted in such a manner that minimizes the development of slack or
- movement of the geogrid.

 C. Only hand-operated compaction equipment shall be allowed within 3 ft (0.9 m) behind the wall. This area shall be defined as the consolidation zone. Compaction in this zone shall begin by running the plate compactor directly on the block and then compacting in parallel paths to the wall face until the entire consolidation zone has been compacted. A ninimum of two passes of the plate compactor are required with maximum lifts of 8 in. (200 mm). Section 1, Part 3.4 minimum of two passes of the plate compactor are required with maximum lifts of 8 in. (200 mm). Section 1, Part 3.4 E, Page 4.

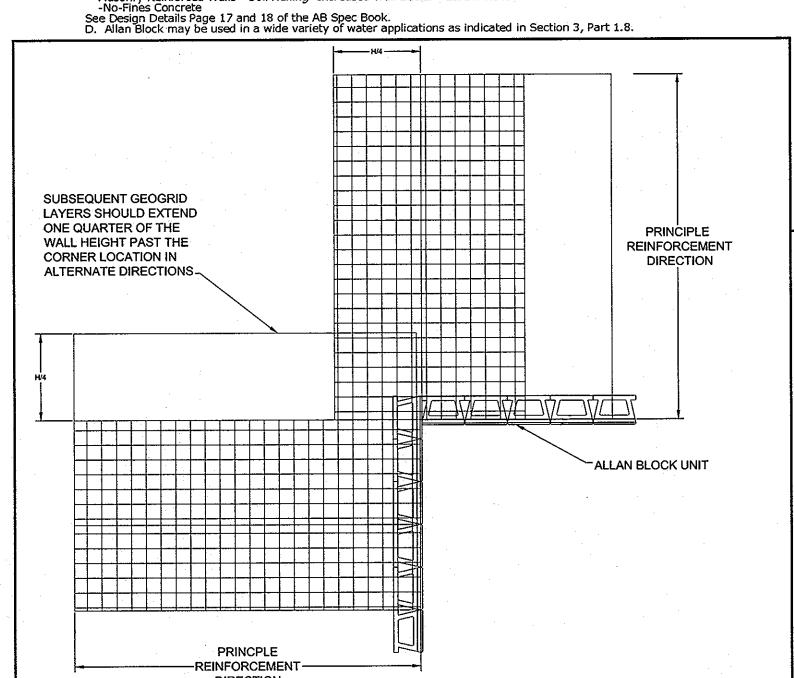
 D. When fill is placed and compaction cannot be defined in terms of Standard Proctor Density, then compaction shall be performed using ordinary compaction process and compacted so that no deformation is observed from the compaction equipment or to the satisfaction of the engineer of record or the site soils engineer.

 E. Tracked construction equipment shall not be operated directly on the geogrid. A minimum fill thickness of 6 in. (150 mm) is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.

 F. Rubber-tired equipment may pass over the geogrid reinforcement at slow speeds, less than 10 mph (16 Km/h). Sudden braking and sharp turning shall be avoided.

 G. The infill soil shall be compacted to achieve 95% Standard Proctor (ASTM D698). Compaction tests shall be taken at 3 ft (0.9 m) behind the block and at the back of the reinforced zone. The frequency shall be as determined by the on-site soils engineer or as specified on the plan. Soil tests of the infill soil shall be submitted to the on-site soils on-site soils engineer or as specified on the plan. Soil tests of the infill soil shall be submitted to the on-site soils engineer for review and approval prior to the placement of any material. The contractor is responsible for achieving the specified compaction requirements. The on-site soils engineer may direct the contractor to remove, correct or
- amend any soil found not in compliance with these written specifications 3.5 Special Considerations
 A. Geogrid can be interrupted by periodic penetration of a column, pier or footing structure.
 B. Allan Block walls will accept vertical and horizontal reinforcing with rebar and grout.
 C. If site conditions will not allow geogrid embedment length, consider the following alternatives:

 Masonry Reinforced Walls - Soil Nailing - Increased Wall Batter - Earth Anchors - Double Allan Block Wall - Rock Bolts



TYPICAL INSIDE CORNER

8980 State Route 108

410-772-2220

Columbia, Maryland 21045

N.T.S.

rofessional Certification.

State of Marviand.

License No. 18182.

www

11/30/12

hereby certify that these locuments were prepared or

approved by me, and that I

Expiration Date 03-12-2013.

am a duly licensed professional naineer under the laws of the

Specification Guidelines: Water Management

The following specifications provide Allan Block Corporation's typical requirements and recommendations. At the engineer of record's discretion these specifications may be revised to accommodate site specific design requirements

PART 1: GENERAL DRAINAGE

- Rainfall or other water sources such as imigation activities collected by the ground surface atop the retaining wall can be defined as surface water. Retaining wall design shall take into consideration the management of this water.

 A. At the end of each day's construction and at final completion, grade the backfill to avoid water accumulation behind the wall or in the reinforced zone. B. Surface water must not be allowed to pond or be trapped in the area above the wall or at the toe of the wall. C. Existing slopes adjacent to retaining wall or slopes created during the grading process shall include drainage details so that surface water will not be allowed to drain over the top of the slope face and/or wall. This may require a combination of berms and surface drainage ditches. D. Irrigation activities at the site shall be done in a controlled and reasonable manner. If an irrigation system is employed, the design engineer or irrigation manufacture shall provide details and specification for required equipment to ensure against over irrigation which could damage the structural integrity of the retaining wall system.
- E. Surface water that cannot be diverted from the wall must be collected with surface drainage swales and drained laterally in order to disperse the water around the wall structure. Construction of a typical swale system shall be in accordance with Design Detail 5: Swales, of the AB Spec Book.
- **1.2 Grading**The shaping and recontouring of land in order to prepare it for site development is grading. Site grading shall be designed to route water around the walls.

 A. Establish final grade with a positive gradient away from the wall structure. Concentrations of surface water runoff shall be managed by providing necessary structures, such as paved ditches, drainage swales, catch basins, etc B. Grading designs must divert sources of concentrated surface flow, such as parking lots, away from the wall
- 1.3 Drainage System
 The internal drainage systems of the retaining wall can be described as the means of eliminating the buildup of incidental water which infiltrates the soils behind the wall. Drainage system design will be a function of the water conditions on the site. Possible drainage facilities include Toe and Heel drainage collection pipes and blanket or chimney rock drains or others. Design engineer shall determine the required drainage facilities to completely drain the retaining wall structure for each particular site condition. A. All walls will be constructed with a minimum of 12 in. (300 mm) of wall rock directly behind the wall facing. The material shall meet or exceed the specification for wall rock outlined in Section 1, 2.2 Wall Rock.

 B. The drainage collection pipe, drain pipe, shall be a 4 in. (100 mm) perforated or slotted PVC, or corrugated HDPE pipe as approved by engineer of record.

 C. All walls will be constructed with a 4 in. (100 mm) diameter drain pipe placed at the lowest possible elevation within the 12 in. (300 mm) of wall rock. This drain pipe is referred to as a toe drain, Section 3, 1.4 Toe Drain. D. Geogrid Reinforced Walls shall be constructed with an additional 4 in. (100 mm) drain pipe at the back bottom of the reinforced soil mass. This drain pipe is referred to as a heel drain, Section 3, 1.5 Heel Drain
- A toe drain pipe should be located at the back of the wall rock behind the wall as close to the bottom of the wall as A toe drain pipe should be located at the back of the wall rock behind the wall as close to the bottom of the wall as allowed while still maintaining a positive gradient for drainage to daylight, or a storm water management system. Toe drains are installed for incidental water management not as a primary drainage system.

 A. For site configurations with bottoms of the base on a level plane it is recommended that a minimum one percent gradient be maintained on the placement of the pipe with outlets on 50 ft (15 m) centers, or 100 ft (30 m) centers if pipe is crowned between the outlets. This would provide for a maximum height above the bottom of the base in a flat configuration of no more than 6 in. (150 mm).

 B. For rigid drain pipes with drain holes the pipes should be positioned with the holes located down. Allan Block does not require that toe drain pipes be wrapped when installed into base rock complying with the specified wall rock material. C. Pipes shall be routed to storm drains where appropriate or through or under the wall at low points when the job site a grading and site layout allows for routing. Appropriate details shall be included to prevent pipes from being crushed, olugged, or infested with rodents.

 On sites where the natural drop in grade exceeds the one percent minimum, drain pipes outlets shall be on 100 foot (30 m) centers maximum. This will provide outlets in the event that excessive water flow exceeds the capacity of pipe
- When the drain pipe must be raised to accommodate outlets through the wall face, refer to the Design Detail 4: Alternate Drain, Page 14 of the AB Spec Book The purpose of the heel drain is to pick up any water that migrates from behind the retaining wall structure at the cut and route the water away from the reinforced mass during the construction process and for incidental water for the life
- A. The piping used at the back of the reinforced mass shall have a one percent minimum gradient over the length, but it is not critical for it to be positioned at the very bottom of the cut. Additionally the entire length of the pipe may be vented at one point and should not be tied into the toe drain. B. The pipe may be a rigid pipe with holes at the bottom with an integral sock encasing the pipe or a corrugated perforated flexible pipe with a sock to filter out fines when required based on soil conditions. For infill soils with a high percentage of sand and/or gravel the heel drain pipe does not need to be surrounded by drainage rock. When working with soils containing more than fifty percent clay, one cubic foot of drainage rock is required for each foot of pipe.
- 1.6 Ground Water Ground water can be defined as water that occurs within the soil. It may be present because of surface infiltration or water table fluctuation. Ground water movement must not be allowed to come in contact with the retaining wall.

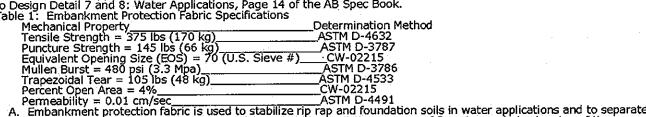
 A. If water is encountered in the area of the wall during excavation or construction, a drainage system (chimney, A. It water is encountered in the area of the wall during excavation or construction, a drainage system (chimney, composite or blanket) must be installed as directed by the wall design engineer.

 B. Standard retaining wall designs do not include hydrostatic forces associated with the presence of ground water. If adequate drainage is not provided the retaining wall design must consider the presence of the water.

 C. When non-free draining soils are used in the retained zone, the incorporation of a chimney and blanket drain should be added to minimize the water penetration into the reinforced mass. Refer to Design Detail 6: Chimney and Blanket Drain, Page 14 of the AB Spec Book.
- 1.7 Concentrated Water Sources All collection devices such as roof downspouts, storm sewers, and curb gutters are concentrated water sources. They must be designed to accommodate maximum flow rates and to vent outside of the wall area.

 A. All roof downspouts of nearby structures shall be sized with adequate capacity to carry storm water from the roof away from the wall area. They shall be connected to a drainage system in closed pipe and routed around the retaining wall area. B. Site layout must take into account locations of retaining wall structures and all site drainage paths. Drainage paths inould always be away from retaining wall structures. . Storm sewers and catch basins shall be located away from retaining wall structures and designed so as not to ntroduce any incidental water into the reinforced soil mass.

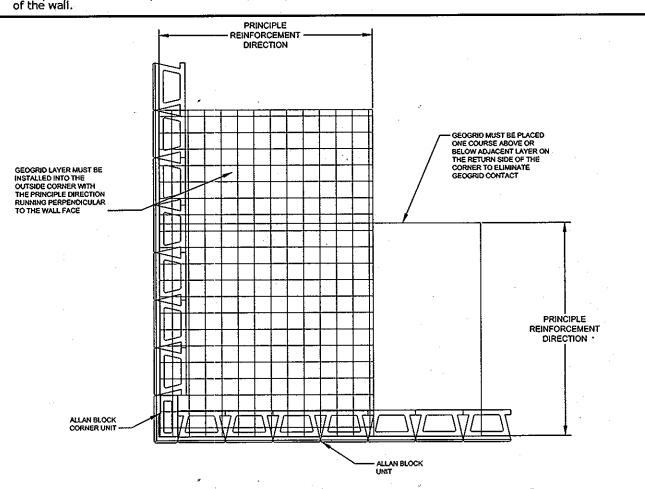
 A path to route storm sewer overflow must be incorporated into the site layout to direct water away from the
- 1.8 Water Application
 Retaining walls constructed in conditions that allow standing or moving water to come in contact with the wall face are considered water applications. These walls require specific design and construction steps to ensure performance. Refer to Design Detail 7 and 8: Water Applications, Page 14 of the AB Spec Book.
 Table 1: Embankment Protection Fabric Specifications



infill materials from the retained soils. This fabric should permit the passage of fines to preclude clogging of the material. Embankment protection fabric shall be a high strength polypropylene monofilament material designed to meet or exceed typical Corps of Engineers plastic filter fabric specifications (CW-02215); stabilized against ultraviolet (UV) degradation and typically exceeding the values in Table 1.

B. Infill material shall be free draining to meet the site requirements based on wave action and rapid draw down conditions.

C. Rip rap or alternative products such as (Trilock) may be required as a toe protector to eliminate scour at the base of the wall.



TYPICAL OUTSIDE CORNER

13701 ANNAPOLIS ROAD

OWNER: THE REDEEMED CHRISTIAN CHURCH OF GOD, INC. (VICTORY TEMPLE) LAUREL, MARYLAND

BOWIE, MD 20720 Attn: Margaret Adeyokunnu, Pastor Tele: (301) 352-0707

Fax: (301) 352-3339

OWNER'S REPRESENTATIVE/ DEVELOPER

N.T.S.

TLI DESIGNGROUP INC. 3308 DORCHESTER ROAD BALTIMORE, MD 21215

Attn: Taiwo Iluyomade, President

Toll Free/Fax/Voice mail: (1-866) 616-1497 Mobile: (443) 831-6703

KCW J.O.: 2080018 SCALE: AS SHOWN

DESIGNED: GMN DRAWN: GMN CHECKED: GMN DATE: NOV. 30, 2012

DRAWING NO. 19 OF 19

EXPOSED WALL HEIGH EMBEDMENT DEPTH 4 in (100 mm) — **TYPICAL GRAVITY WALL**

ALLAN BLOCK WALL BATTER FROM VERTICAL —

than 32 degrees) with low plasticity (PI less than 20) may be used in wall construction, but additional backfilling and compaction efforts are required. Allan Block Corporation has not verified these design conditions, and if required the soil parameters shall be confirmed by the Site Geotechnical Engineer or others prior to wall construction. 2 - Substitution of Infill Soils are strictly prohibited unless approved by the engineer of record.

Well compacted silty Sand

Well compacted silty, sandy clay

0 120 - 125 Well compacted silty, sandy clay

3 - In this analysis, the effective friction angle without the addition of cohesion is used to determine the design strength of the soil when calculating lateral forces. At the discretion of the engineer of record, cohesion may be used when calculating the ultimate bearing capacity even though it is typically ignored. 4 - Global stability and seismic loading are not considered in this design.

1 - Actual soil parameters must meet or exceed these listed conditions to be used in wall construction. In general, Granular soils

(Friction angle greater than or equal to 32 degrees) are recommended as infill soil. Fine grained cohesive soils (Friction angle less

1 - Soil loading considered in this design and calculations are based on the following parameters:

28 - 32

- 5 Hydrostatic loading is not considered in this analysis. Sufficient drainage must be provided such that hydrostatic loading (pore pressure) does not develop in the reinforced zone. 6 - Analysis assumes fill placement in 8 inch (200 mm) lifts compacted to 95% standard proctor. For any wall over 10 feet (3 meters),
- with a surcharge or contains cohesive soils, compaction test frequency and location shall be determined by the engineer of record or as otherwise specified. 7 - All fill placed above walls shall be placed and compacted in accordance with the requirements for all other reinforced material. 8 - Retaining wall units and installation shall conform to the Allan Block Modular Retaining Wall Systems Specification Guidelines,
- Geogrid Reinforcement Systems Specification Guidelines, and Water Management Specification Guidelines as published in the AB Spec Book and the AB Engineering Manual. 9 - Retaining walls must be installed and constructed according to the contract drawings. The retaining wall plan view is for wall identification only.
- 10 Geogrid spacing is determined by structural cross-section design requirements. To insure proper geogrid placement, contractor must review both elevation view and cross sections prior to wall construction. 11 - Suggested Quality Assurance Requirements: A qualified engineer or technician shall supervise the wall construction to verify field and site soil conditions. In the event that the Site Geotechnical Engineer does not perform this work, a qualified Geotechnical
- Engineer/Technician shall be consulted to assure the Allan Block Wall is constructed with proper soil parameters. 12 - Retaining walls shall only be constructed under the observation of a Registered Professional Engineer and a (NICET, WACEL or equivalent) certified soils technician. 13 - The required bearing pressure beneath the footing of the wall shall be verified in the field by a certified soils technician. Testing documentation must be provided to the Howard County Inspector prior to the start of construction. The required test procedure shall be
- the Dynamic Cone Penetrometer Test ASTM STP-399. 14 - The suitability of fill material shall be confermed by the on-site soils technician. Each eight (8) inch lift must be compacted to a minimum of 95% Standart Proctor Density and the testing report shall be made available to the Howard County Inspector upon completion of construction.
- 15 If no surcharge loads are considered add a note to the cross section details stating, "THIS WALL NOT DESIGNED FOR SURCHARGE

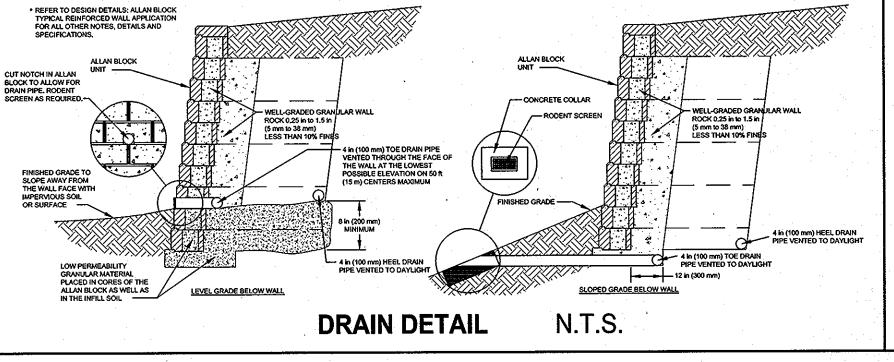
General Notes

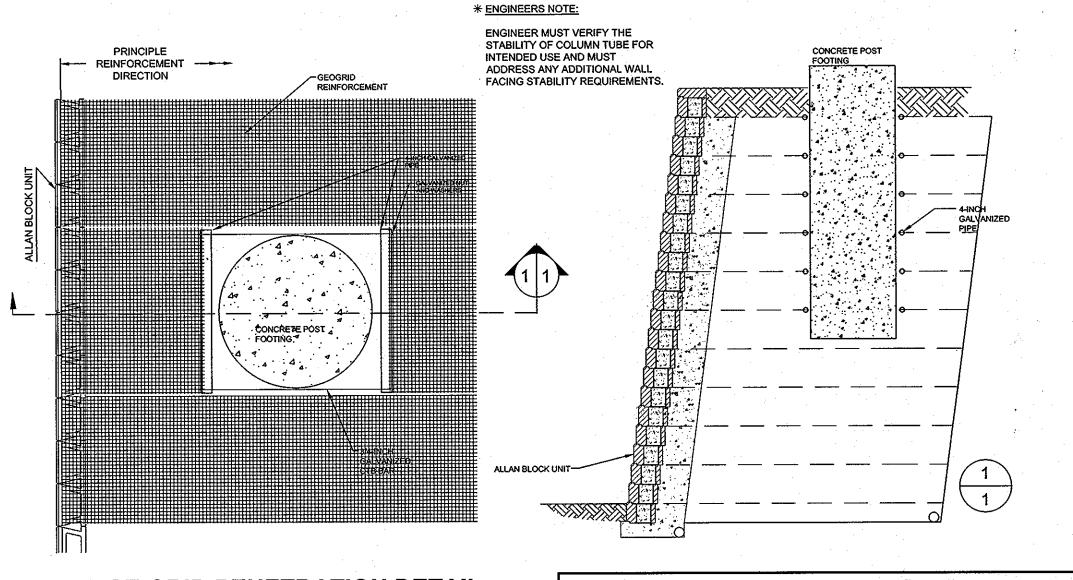
Foundation Soil

Construction Notes

Soil Notes

- 1 Rainfall and other water sources such as irrigation activities can be defined as surface water. The retaining wall design shall take into consideration the management of this water. 2 - Site grading shall be designed to route surface water around and away from the wall.
- 3 The internal drainage system of the retaining wall is designed to remove incidental water that infiltrates into the soil behind the wall. Adequate storm water drainage systems are required to completely drain the area around the retaining wall structure. 4 - Drain piping, toe drain, should be located at the back of the rock drain field behind the wall as close to the bottom of the wall as allowed while still maintaining a positive gradient for drainage to daylight, or to a storm water management system. 5 - A heel drain may be required at back of the cut to route water away from the reinforced soil mass during the construction process. 6 - Ground water can be present within the soil due to surface infiltration or water table fluctuation. If ground water is encountered during construction, an adequate drainage system must be installed or the wall design must consider the presence of water within the
- 7 All water collection devices such as roof downspouts, storm sewers, and curb gutters must be designed to accommodate maximum flow rates and outlet outside the retaining wall area. 8 - Retaining walls in conditions that allow standing water to overlap the wall face are considered water applications. These walls require specific design and construction steps to ensure performance.





LARGE GRID PENETRATION DETAIL

RETAINING WALL SPECIFICATIONS AND DETAILS

VICTORY TEMPLE - LAUREL WORSHIP CENTER

9100 BURSA ROAD

SDP-12-007 TAX MAP 47, GRID 23 PARCEL 540 (PARCEL A, PLAT # 22114) W&S CONTRACT No. 24-4047-D ZONING: CE-CLI ELECTION DISTRICT - 6 HOWARD COUNTY, MARYLAND

SDP-12-007