

**PART 1: GENERAL**

- 1.01 DESCRIPTION
- WORK SHALL CONSIST OF FURNISHING AND CONSTRUCTING A VERDURA RETAINING WALL SYSTEM IN ACCORDANCE WITH THESE SPECIFICATIONS AND IN REASONABLY CLOSE CONFORMITY WITH THE LINES, GRADES, DESIGN AND DIMENSIONS SHOWN ON THESE PLANS.
  - WORK INCLUDES PREPARING FOUNDATION SOIL, FURNISHING AND INSTALLING LEVELING PAD (IF REQUIRED), PLANTABLE SOIL UNIT FILL, AND BACKFILL TO THE LINES AND GRADES SHOWN ON THE CONSTRUCTION DRAWINGS.
  - WORK INCLUDES FURNISHING AND INSTALLING GEOSYNTHETIC SOIL REINFORCEMENT OF THE TYPE, SIZE, LOCATION, STRENGTH AND LENGTHS DESIGNATED ON THESE PLANS.
  - WORK INCLUDES FURNISHING AND INSTALLING FOUNDATION DRAIN, SUBDRAIN AND OTHER WALL-RELATED DRAINAGE SYSTEMS SHOWN AND SPECIFIED ON THESE PLANS.

- 1.02 REFERENCE DOCUMENTS
- AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
    - ASTM C-1372—SPECIFICATION FOR SEGMENTAL RETAINING WALL UNITS
    - ASTM D-3080—DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS
    - ASTM D-1557—LABORATORY COMPACTION CHARACTERISTICS OF SOIL MODIFIED PROCTOR
    - ASTM D-4318—LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS
    - ASTM D-4595—TENSILE PRIORITIES OF GEOTEXTILES – WIDE WIDTH STRIP
    - ASTM D-5262—UNCONFINED TENSION CREEP BEHAVIOR OF GEOSYNTHETICS
    - ASTM D-3034—POLYVINYL CHLORIDE PIPE (PVC)
    - ASTM D-4829—EXPANSION INDEX OF SOILS
    - ASTM C-140—STD. SPEC. FOR SAMPLING AND TESTING CONCRETE MASONRY UNITS
    - ASTM C-145—STD. SPEC. FOR SOLID LOAD BEARING CONCRETE MASONRY UNITS
  - GEOSYNTHETIC RESEARCH INSTITUTE (GRI)
    - GRI-GG4—DETERMINATION OF LONG TERM DESIGN STRENGTH OF GEOGRIDS
    - GRI-GT7—DETERMINATION OF LONG TERM DESIGN STRENGTH OF GEOTEXTILES
    - GRI-GG5—DETERMINATION OF GEOGRID (SOIL) PULLOUT
  - NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
    - NCMA SRWU-1—TEST METHOD FOR DETERMINING CONNECTION STRENGTH OF SRW UNITS
    - NCMA SRWU-2—TEST METHOD FOR DETERMINING SHEAR STRENGTH OF SRW UNITS
    - "DESIGN MANUAL FOR SEGMENTAL RETAINING WALLS, 3RD EDITION," (2010)
  - ICC EVALUATION SERVICES, INC.
    - ICC-ES EVALUATION REPORT, ESR-3073, VERDURA RETAINING WALL SYSTEM.

- 1.03 SUBMITTALS/CERTIFICATION
- CONTRACTOR SHALL SUBMIT A MANUFACTURER'S CERTIFICATION PRIOR TO START OF WORK THAT THE RETAINING WALL SYSTEM COMPONENTS MEET THE REQUIREMENTS OF THESE SPECIFICATIONS AND STRUCTURE DESIGN PLANS.
  - CONTRACTOR SHALL SUBMIT A TEST REPORT DOCUMENTING STRENGTH OF SPECIFIC MODULAR CONCRETE UNIT AND GEOSYNTHETIC REINFORCEMENT CONNECTION TO VERDURA BLOCKS. THE MAXIMUM DESIGN TENSILE LOAD OF THE GEOSYNTHETIC-FACING UNIT CONNECTION AT A MAXIMUM NORMAL FORCE AS IS APPROPRIATE FOR THE VERTICAL LOCATION OF REINFORCEMENT UNDER CONSIDERATION. THE CONNECTION STRENGTH EVALUATION SHALL BE PERFORMED IN ACCORDANCE WITH NCMA TEST METHOD SRWU-1.
  - GEOGRID SOIL REINFORCEMENT: GEOSYNTHETIC REINFORCEMENT SHALL BE OF THE TYPE SHOWN ON THESE DESIGN PLANS. THE CONTRACTOR, OR THE SUPPLIER AS HIS AGENT, SHALL FURNISH THE GEOTECHNICAL ENGINEER OF RECORD WITH A CERTIFICATE OF COMPLIANCE CERTIFYING THAT THE GEOSYNTHETIC REINFORCEMENT COMPLIES WITH THIS SECTION OF THE SPECIFICATIONS, THE DRAWINGS AND THE DESIGN CALCULATIONS.
- 1.04 QUALITY ASSURANCE
- CONTRACTOR SHALL SUBMIT CERTIFICATION, PRIOR TO START OF WORK, THAT THE RETAINING WALL SYSTEM (MODULAR CONCRETE UNITS AND SPECIFIC GEOSYNTHETIC):
    - HAS BEEN SUCCESSFULLY UTILIZED ON A MINIMUM OF FIVE (5) SIMILAR PROJECTS, I.E., HEIGHT, SOIL FILL TYPES, ERECTION TOLERANCES, ETC.; AND...
    - HAS BEEN SUCCESSFULLY INSTALLED ON A MINIMUM OF 1 MILLION SQUARE FEET OF RETAINING WALLS.
  - CONTRACTOR SHALL SUBMIT A LIST OF FIVE (5) PREVIOUSLY CONSTRUCTED PROJECTS OF SIMILAR SIZE AND MAGNITUDE BY THE WALL INSTALLER WHERE THE SPECIFIC RETAINING WALL SYSTEM HAS BEEN CONSTRUCTED SUCCESSFULLY. CONTACT NAMES AND TELEPHONE NUMBERS SHALL BE LISTED FOR EACH PROJECT.
  - CONTRACTOR SHALL PROVIDE EVIDENCE THAT THE DESIGN ENGINEER HAS A MINIMUM OF FIVE YEARS OF DOCUMENTED EXPERIENCE IN THE DESIGN OF REINFORCED SOIL STRUCTURES.
  - OWNER SHALL PROVIDE SOIL TESTING AND QUALITY ASSURANCE DURING EARTHWORK AND WALL CONSTRUCTION OPERATION. OWNER'S QUALITY ASSURANCE PROGRAM DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR WALL PERFORMANCE.

- 1.05 DELIVERY, STORAGE AND HANDLING
- CONTRACTOR SHALL CHECK ALL MATERIALS UPON DELIVERY TO ASSURE THAT THE PROPER TYPE, GRADE, AND CERTIFICATION HAVE BEEN RECEIVED.
  - CONTRACTOR SHALL PROTECT ALL MATERIALS FROM DAMAGE DUE TO JOBSITE CONDITIONS AND IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. DAMAGED MATERIALS SHALL NOT BE INCORPORATED INTO THE WORK.

**PART 2: PRODUCTS**

- 2.01 MODULAR CONCRETE RETAINING WALL UNITS
- MODULAR CONCRETE UNITS SHALL BE VERDURA, AS INDICATED IN TABLE 2.
  - MODULAR CONCRETE MATERIALS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-1372 – STANDARD SPECIFICATIONS FOR SRW UNITS.
  - MODULAR CONCRETE UNITS SHALL CONFORM TO THE FOLLOWING STRUCTURAL AND GEOMETRIC REQUIREMENTS MEASURED IN ACCORDANCE WITH SECTION 1.03 AND OTHER APPROPRIATE REFERENCES:
    - COMPRESSIBLE STRENGTH = 5000 PSI MINIMUM AT 28 DAYS;
    - MOISTURE ABSORPTION ≤ 8 LBS PER CUBIC FEET FOR STANDARD WEIGHT AGGREGATES;
    - BATTER = AS INDICATED IN TABLE 2;
    - DIMENSIONAL TOLERANCES = ±1/8" FROM NOMINAL UNIT DIMENSIONS (NOT INCLUDING EXPOSED AGGREGATE FACE TEXTURE), ±1/8" UNIT HEIGHT – TOP AND BOTTOM PLANES.
- 2.02 GEOSYNTHETIC-CONCRETE BLOCK CONNECTORS
- CONNECTORS SHALL BE 1 INCH DIAMETER OR GREATER SCHEDULE 80 PIPE OR EQUIVALENT AND MUST BE CAPABLE OF PROVIDING POSITIVE MECHANICAL INTERLOCK BETWEEN GEOSYNTHETIC SOIL REINFORCEMENT MATERIAL (GEOTEXTILE OR GEOGRID) AND BLOCK.
  - CONNECTORS SHALL BE CAPABLE OF HOLDING THE GEOSYNTHETIC SOIL REINFORCEMENT IN THE PROPER DESIGN POSITION DURING GEOSYNTHETIC PRE-TENSIONING AND BACKFILLING PROCEDURES
- 2.03 UNIT FILL
- UNIT FILL SHALL CONSIST OF SOILS USED FOR WALL BACKFILL OR AS SPECIFIED BY THE PROJECT LANDSCAPE ARCHITECT.

# VERDURA® RETAINING WALL PLANS

- 2.04 SOIL FILL
- ENGINEERED FILL FOR THE REINFORCED/INFILL SOIL AND RETAINED/BACKFILL SOIL ZONES SHALL BE ON-SITE OR IMPORTED SOILS ACCEPTED BY THE GEOTECHNICAL ENGINEER OF RECORD AND HAVING THE SOIL STRENGTH PROPERTIES AS NOTED IN TABLE 3 WHEN COMPACTED TO 90% RELATIVE COMPACTION PER ASTM D-1557.
  - REINFORCED/INFILL SOIL SHALL BE FREE OF DEBRIS AND MEET THE FOLLOWING RECOMMENDATIONS;

GRADATION TESTED IN ACCORDANCE WITH ASTM D-6913:

SIEVE SIZE	PERCENT PASSING
2 INCH (50 MM)	100
3/4 INCH (20 MM)	100-75
NO. 4	100-40
NO. 40	0-60
NO. 200	0-35

EXPANSION INDEX (EI) ≤ 50 PER ASTM D4829

PLASTICITY INDEX (PI) < 20 AND LIQUID LIMIT < 40 PER ASTM D4318

- ENGINEERED FILL MATERIALS FOR THE UPPER ONE (1) FOOT IMMEDIATELY BEHIND THE TOPMOST BLOCK AND ABOVE THE ZONE OF REINFORCED/INFILL SOIL SHALL BE COMPROMISED OF MORE IMPERVIOUS (NO. 200>35%) SOILS.
- MATERIALS CAN BE SITE-EXCAVATED SOILS WHERE THE ABOVE REQUIREMENTS CAN BE MET. UNSUITABLE SOILS (HIGH PLASTIC CLAYS OR ORGANIC SOILS) SHALL NOT BE USED.
- GEOTECHNICAL ENGINEER OF RECORD SHALL PERFORM LABORATORY TESTS ON THE SOIL MATERIAL PROPOSED FOR USE TO ENSURE COMPLIANCE WITH REQUIREMENTS STATED ABOVE PRIOR TO THE PLACEMENT OF THE MATERIALS.

- 2.05 DRAINAGE PIPE
- PROVIDE A PERFORATED AND SOLID PIPING SYSTEM CONSISTING OF 4-INCH-DIAMETER SCHEDULE 40 PVC PIPE AS SHOWN ON THESE PLANS.

- 2.06 FILTER FABRIC
- PROVIDE FILTER FABRIC CONSISTING OF MIRAFI 140N OR EQUIVALENT AS SPECIFIED BY THE GEOTECHNICAL ENGINEER OF RECORD.

**PART 3: EXECUTION**

- 3.01 SURFACE CONDITIONS
- PRIOR TO WORK, CAREFULLY INSPECT PREVIOUS GRADING WORK. VERIFY THAT ALL SUCH WORK IS COMPLETE TO THE POINT WHERE THIS INSTALLATION MAY PROPERLY COMMENCE.
  - VERIFY THAT WORK OF THIS SECTION MAY BE INSTALLED IN STRICT ACCORDANCE WITH THE ORIGINAL DESIGN, ALL PERTINENT CODES AND REGULATIONS.
  - VERIFY WALL DRAINAGE SYSTEM IS COORDINATED WITH POINTS OF CONNECTION TO STORM DRAINAGE SYSTEM OR OTHER APPROVED OUTLET LOCATION.
  - IN THE EVENT OF DISCREPANCY, IMMEDIATELY NOTIFY THE PROJECT CIVIL ENGINEER, \_\_\_\_\_, AT (###) ###-####. DO NOT PROCEED WITH INSTALLATION UNTIL ALL SUCH DISCREPANCIES HAVE BEEN RESOLVED.

- 3.02 LAYOUT
- VERIFY ALL STAKING AND FIELD ENGINEERING REQUIRED TO IMPLEMENT THE WORK AS SHOWN ON THE DRAWINGS.
  - PROTECT ALL STAKES AND BENCHMARKS. REPLACE ALL STAKES AND BENCHMARKS DAMAGED DURING THE COURSE OF CONSTRUCTION AT NO COST TO OWNER.
  - SET GRADE STAKES USING INSTRUMENT TECHNOLOGY, AT 50-FOOT GRID INTERVALS AT AREAS WHERE GRADIENTS ARE LESS THAN 2 PERCENT. SET GRADE STAKES USING INSTRUMENT TECHNOLOGY, 25-FOOT-INTERVALS AT AREAS WHERE GRADES ARE GREATER THAN 2 PERCENT.
  - HAND TRIM EXCAVATIONS TO REQUIRED ELEVATIONS. CORRECT OVER-EXCAVATION WITH FILL MATERIALS APPROVED BY THE GEOTECHNICAL ENGINEER OF RECORD.
  - REMOVE LARGE STONES OR OTHER HARD MATTER WHICH WOULD DAMAGE PIPES OR IMPEDE CONSISTENT BACKFILLING OR COMPACTION.
  - PROVIDE ALL EQUIPMENT OF SUCH TYPE, FUNCTION, AND DESIGN AS REQUIRED TO ACHIEVE SPECIFIC VALUES. WHERE NECESSARY, PROVIDE RUBBER-TIRED AND VIBRATORY SHEEPSFOOT COMPACTION EQUIPMENT.
- 3.03 SUBSURFACE DRAINAGE SYSTEM INSTALLATION
- EXCAVATE TRENCHES FOR DRAINAGE PIPING SHOWN ON DRAWINGS.
  - LAY FILTER FABRIC IN BOTTOM OF EXCAVATION PRIOR TO PLACING PERMEABLE FILL. PLACE MINIMUM 4-INCH-THICK BED OF DRAIN ROCK (3/4" CRUSHED AGGREGATE) OVER FABRIC.
  - INSTALL AND JOIN 4" PVC PIPE AND PIPE FITTINGS IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. INSTALL DRAINAGE PIPING WITH PERFORATIONS DOWN. JOIN PIPE ENDS AND CAP ANY FREE ENDS OF PERFORATED PIPE WITH SOLVENT CEMENT.
  - LAY 4" PVC PIPE TO SLOPE GRADIENTS OF THE WALL FOUNDATION, WITH MAXIMUM VARIATION FROM TRUE SLOPE OF 1/8 INCH IN 10 FEET.
  - BACKFILL PIPE USING DRAIN ROCK (3/4" CRUSHED AGGREGATE).
  - WRAP FILTER FABRIC AROUND AGGREGATE COVER AND TUCK LOOSE EDGE BETWEEN AGGREGATE AND SOIL.
  - INSTALL TRENCH BACKFILL IN ACCORDANCE WITH THE PROVISIONS OF THIS SECTION. DO NOT DISPLACE OR DAMAGE PIPE WHEN COMPACTING.
  - EXTEND NON-PERFORATED 4" PVC DISCHARGE PIPES TO APPROVED OUTLET LOCATION AT LOCATIONS SHOWN ON DRAWINGS OR PER GEOTECH RECOMMENDATIONS. NON PERFORATED 4" PVC DISCHARGE PIPES SHALL SLOPE A MINIMUM OF 2%. PROVIDE TRENCHING, BEDDING, AND BACKFILL AS REQUIRED.

- 3.04 EXCAVATION
- CONTRACTOR SHALL EXCAVATE TO THE LINES AND GRADES SHOWN ON THE CONSTRUCTION DRAWINGS. OWNER'S REPRESENTATIVE SHALL INSPECT THE EXCAVATION AND APPROVE PRIOR TO PLACEMENT OF LEVELING MATERIAL OR FILL SOILS. PROOF ROLL FOUNDATION AREA AS DIRECTED BY THE GEOTECHNICAL ENGINEER OF RECORD TO DETERMINE IF REMEDIAL WORK IS REQUIRED.
  - OVER-EXCAVATION AND REPLACEMENT OF UNSUITABLE FOUNDATION SOILS WITH APPROVED COMPACTED FILL WILL BE COMPENSATED AS AGREED UPON WITH THE OWNER.

- 3.05 MODULAR UNIT INSTALLATION
- FIRST COURSE OF UNITS SHALL BE PLACED ON THE FOUNDATION SOILS OR LEVELING PAD, AS DIRECTED BY THE GEOTECHNICAL ENGINEER OF RECORD, AT THE APPROPRIATE LINES AND GRADES. MOLDED SURFACE OF MODULAR UNITS SHALL BE USED FOR ALIGNMENT. ALIGNMENT AND LEVEL SHALL BE CHECKED IN ALL DIRECTIONS AND ENSURE THAT ALL UNITS ARE IN FULL CONTACT WITH THE BASE AND PROPERLY SEATED.
  - UNITS SHALL BE PLACED ON THE FOUNDATION SOILS WITH A MAXIMUM DISTANCE OF 9 INCHES BETWEEN ADJACENT UNITS. THE SPACING BETWEEN UNITS INSTALLED IN CURVED REGIONS (CONCAVE OR CONVEX) MUST BE ADJUSTED ACCORDINGLY SUCH THAT THE RUNNING BOND LAYOUT IS MAINTAINED. VERTICALLY ADJACENT UNITS SHALL BE CENTERED ON UNITS ABOVE AND BELOW. ALL BLOCK LAYOUT AND PLACEMENT SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
  - MODULAR UNITS MAY BE INSTALLED HORIZONTALLY WITH RESPECT TO THE PROFILE WALL ALIGNMENT OR MAY BE MADE TO FOLLOW THE BOTTOM OF WALL CONTOURS ("RUN WITH THE GRADE"). WHERE BOTTOM OF WALL CONTOURS ARE USED TO SET THE FIRST ROW OF MODULAR BLOCKS, GRADES MAY NOT SLOPE MORE THAN 15% WITH RESPECT TO THE WALL PROFILE BASE.
  - PLACE AND COMPACT REINFORCED AND RETAINED FILL BEHIND WALL UNITS. AFTER UNIT FILL (AS DEFINED IN 2.03) IS COMPACTED EXCESS UNIT FILL MUST BE SCREEDED (ROD-BOARDED) OFF TO DEVELOP A FLAT BASE UPON WHICH SUBSEQUENT UNITS CAN BE POSITIONED. FOLLOW WALL ERECTION AND UNIT FILL CLOSELY WITH REINFORCED FILL.
  - MAXIMUM STACKED VERTICAL HEIGHT OF WALL UNITS PRIOR TO UNIT FILL AND REINFORCED/RETAINED FILL PLACEMENT AND COMPACTION SHALL NOT EXCEED ONE COURSE.

- 3.06 GEOSYNTHETIC SOIL REINFORCEMENT INSTALLATION
- GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE ORIENTED WITH THE HIGHEST STRENGTH AXIS PERPENDICULAR TO THE WALL ALIGNMENT.
  - GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE PLACED AT THE STRENGTHS, LENGTHS, AND ELEVATIONS SHOWN ON THESE DRAWINGS. WHERE GEOSYNTHETIC PLACEMENT ELEVATIONS VARY FROM FACING UNIT INCREMENTS, GEOSYNTHETIC ELEVATIONS MAY BE ADJUSTED UP OR DOWN BY 4 INCHES MAXIMUM.
  - THE GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE LAID HORIZONTALLY ON COMPACTED BACKFILL AND ATTACHED TO THE MODULAR WALL UNITS IN ACCORDANCE WITH THE DETAILS OF THESE PLANS AND SPECIFICATIONS. A TOLERANCE FROM FACE TO TAIL OF REINFORCEMENT OF 6" IN 10' IS ACCEPTABLE RELATIVE TO HORIZONTAL GEOSYNTHETIC ORIENTATION. PLACE THE NEXT COURSE OF MODULAR CONCRETE UNITS OVER THE GEOSYNTHETIC SOIL REINFORCEMENT. THE GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE LAID FLAT PRIOR TO BACKFILL PLACEMENT ON THE GEOSYNTHETIC SOIL REINFORCEMENT.
  - GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE CONTINUOUS THROUGHOUT THE LENGTH OF EMBEDMENT. SPLICED CONNECTIONS BETWEEN SHORTER PIECES OF GEOSYNTHETIC SOIL REINFORCEMENT WILL NOT BE PERMITTED.

- 3.07 REINFORCED BACKFILL PLACEMENT
- REINFORCED BACKFILL SHALL BE PLACED, SPREAD AND COMPACTED IN SUCH A MANNER THAT MINIMIZES THE DEVELOPMENT OF SLACK IN THE GEOSYNTHETIC SOIL REINFORCEMENT AND INSTALLATION DAMAGE.
  - REINFORCED SOIL BACKFILL SHALL BE PLACED AND COMPACTED IN LIFTS NOT TO EXCEED THE "RAIL HEIGHT" OF THE UNITS BEING PLACED. LIFT THICKNESSES SHALL BE DECREASED TO ACHIEVE THE REQUIRED DENSITY AS REQUIRED.
  - REINFORCED BACKFILL SHALL BE COMPACTED TO 90% RELATIVE COMPACTION AS DETERMINED BY ASTM D-1557. THE MOISTURE CONTENT OF THE BACKFILL MATERIAL PRIOR TO AND DURING COMPACTION SHALL BE UNIFORMLY DISTRIBUTED THROUGHOUT EACH LAYER.
  - ONLY LIGHTWEIGHT HAND-OPERATED EQUIPMENT SHALL BE ALLOWED WITHIN 1 FOOT FROM THE BACK OF THE MODULAR CONCRETE UNIT.
  - TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY UPON THE GEOSYNTHETIC SOIL REINFORCEMENT. A MINIMUM FILL THICKNESS OF 6 INCHES IS REQUIRED PRIOR TO OPERATION OF TRACKED VEHICLES OVER THE GEOSYNTHETIC SOIL REINFORCEMENT. TRACKED VEHICLE TURNING SHOULD BE KEPT TO A MINIMUM TO PREVENT TRACKS FROM DISPLACING THE FILL AND DAMAGING THE GEOSYNTHETIC SOIL REINFORCEMENT.
  - RUBBER TIRED EQUIPMENT SHALL PASS OVER GEOSYNTHETIC SOIL REINFORCEMENT AT SLOW SPEEDS, LESS THAN 10 MPH. SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.
  - AT THE END OF EACH DAY'S OPERATION, THE CONTRACTOR SHALL SLOPE THE LAST LIFT OF REINFORCED BACKFILL AWAY FROM THE WALL UNITS TO DIRECT RUNOFF AWAY FROM THE WALL FACE. THE CONTRACTOR SHALL NOT ALLOW SURFACE RUN-OFF FROM ADJACENT AREAS TO ENTER THE WALL CONSTRUCTION SITE.
  - CARE SHOULD BE TAKEN DURING EXCAVATION FOR AND CONSTRUCTION OF THE V-DITCH AND ALL OTHER SURFACE IMPROVEMENTS ADJACENT TO THE WALL STRUCTURE TO PREVENT DAMAGE TO THE UPPER GEOGRID LAYER. IF THE GEOGRID LAYERS ARE DAMAGED, THEY NEED TO BE PROPERLY REPLACED.

- 3.08 EROSION CONTROL
- PROVIDE DUST AND EROSION CONTROL PROTECTION PLAN IN ACCORDANCE WITH CONTACT DOCUMENTS.

- 3.09 AS-BUILT CONSTRUCTION TOLERANCES
- VERTICAL ALIGNMENT: ±1.5 INCHES OVER ANY 10 FT DISTANCE.
  - WALL BATTER: WITHIN 2 DEGREES OF DESIGN BATTER.
  - HORIZONTAL ALIGNMENT: ±1.5 INCHES OVER ANY 10 FT DISTANCE.
  - CORNERS, BENDS, CURVES: ±1 FT TO DESIGN LOCATIONS.
  - MAXIMUM HORIZONTAL GAP BETWEEN ERECTED UNITS SHALL BE 9 INCHES.

- 3.10 FIELD QUALITY CONTROL
- THE OWNER SHALL ENGAGE INSPECTION AND TESTING SERVICES, INCLUDING INDEPENDENT LABORATORIES, TO PROVIDE QUALITY ASSURANCE AND TESTING SERVICES DURING CONSTRUCTION. THIS DOES NOT RELIEVE THE CONTRACTOR FROM SECURING THE NECESSARY CONSTRUCTION CONTROL TESTING DURING CONSTRUCTION.
  - QUALIFIED AND EXPERIENCED TECHNICIANS AND ENGINEERS SHALL PERFORM TESTING AND INSPECTION SERVICES.
  - AS A MINIMUM, QUALITY ASSURANCE TESTING SHOULD INCLUDE FOUNDATION SOIL INSPECTION, SOIL AND BACKFILL TESTING, VERIFICATION OF DESIGN PARAMETERS, AND OBSERVATION OF CONSTRUCTION FOR GENERAL COMPLIANCE WITH DESIGN DRAWINGS AND SPECIFICATIONS.
  - FIELD INSPECTION AND TESTING SHALL BE PERFORMED BY THE GEOTECHNICAL ENGINEER OF RECORD.

- 3.11 SPECIAL INSPECTION
- PER ICC-ES EVALUATION REPORT ESR-3073, SPECIAL INSPECTION DURING INSTALLATION MUST BE PROVIDED IN ACCORDANCE WITH THE 2013 CALIFORNIA BUILDING CODE (CBC) SECTIONS 1705.1.1, 1705.4 AND 1705.6. AT A MINIMUM BUT NOT LIMITED TO, THE INSPECTOR'S RESPONSIBILITIES INCLUDE VERIFYING THE FOLLOWING:
    - BLOCK TYPE AND UNIT DIMENSIONS.
    - VERIFICATION OF BLOCK UNIT FOR COMPLIANCE WITH ASTM C1372, INCLUDING COMPRESSIVE STRENGTH AND WATER ABSORPTION, AS DESCRIBED IN SECTION 3.2.1 OF ESR-3073.
    - PRODUCT IDENTIFICATION, INCLUDING EVALUATION REPORT NUMBER (ESR-3073).
    - FOUNDATION PREPARATION.
    - VERDURA BLOCK UNIT PLACEMENT, INCLUDING PROPER ALIGNMENT AND INCLINATION WITHIN DESIGN TOLERANCES.
    - PVC PIPE CONNECTIONS, INCLUDING INSTALLATION LOCATIONS, PROPER FIT WITHIN THE BLOCKS, AND INSTALLATION SEQUENCE WITH RESPECT TO THE GEOGRID PLACEMENT.
    - GEOGRID REINFORCEMENT TYPE (SEE TABLES 2 AND 3 IN ESR-3073), LOCATION AND PLACEMENT.
    - PLACEMENT OF APPROVED BACKFILL AND COMPACTION.
    - DRAINAGE PROVISIONS.

**TABLE 1 – REFERENCED DOCUMENTATION:**

- ROUGH GRADING PLANS, PROJECT NAME, PREPARED BY COMPANY, DATED XX/XX/2015.
- VERDURA WALL DESIGN PARAMETERS, PROJECT NAME, PREPARED BY COMPANY, DATED XX/XX/2015.
- VERDURA RETAINING WALL DESIGN REPORT, PROJECT NAME, PREPARED BY COMPANY, DATED XX/XX/2015.

**TABLE 2 – VERDURA BLOCK PROPERTIES**

UNIT TYPE, VERDURA	V40
UNIT SIZE, RAIL HEIGHT, IN.	8
UNIT SIZE, CROWN HEIGHT, IN.	10.75
UNIT SIZE, WIDTH, IN.	18.25
UNIT SIZE, DEPTH, IN.	12.25
WEIGHT, LBS.	89
BATTER = (DEGREES FROM VERTICAL)	14

**TABLE 3 – SOIL STRENGTH REQUIREMENTS**

MATERIAL	SHEAR STRENGTH		UNIT WEIGHT (pcf)
	FRICTION ANGLE	COHESION (psf)	
REINFORCED/INFILL SOIL*	0	0	0
RETAINED/BACKFILL SOIL	0	0	0
FOUNDATION SOIL	0	0	0
SEISMICITY	.0g		

\* REINFORCED/INFILL SOIL SHALL HAVE MAXIMUM FINE SOIL FRACTION (% PASSING #200 SIEVE) OF 35%. THE MAXIMUM PLASTICITY INDEX (PI) OF THE FINE SOIL FRACTION SHALL BE 20.

**TABLE 4 – GEOSYNTHETIC REINFORCEMENT PROPERTIES**

MIRAGRID							
TEST METHOD	UNIT	TEST					
		5XT	8XT	10XT	20XT	22XT	
TENSILE STRENGTH (AT ULTIMATE)	ASTM D6637	lbs/ft	4700	7400	9500	13705	20559
LONG TERM ALLOWABLE DESIGN LOAD	GRI GG-4	lbs/ft	2575	4055	5206	7510	10754