NOTES

A. WORK SHALL CONSIST OF FURNISHING AND CONSTRUCTING A VERDURA SEGMENTAL RETAINING WALL SYSTEM IN ACCORDANCE WITH THESE SPECIFICATIONS AND IN CONFORMITY WITH THE LINES, GRADES, TOLERANCES, DESIGN, AND DIMENSIONS SHOWN ON THESE PLANS.
B. 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.
C. WORK INCLUDES FURNISHING AND INSTALLING GEOSYNTHETIC SOIL REINFORCEMENT OF THE TYPE, SIZE, LOCATION, STRENGTH AND LENGTHS DESIGNATED ON THESE PLANS.
D. WORK INCLUDES FURNISHING AND INSTALLING FOUNDATION DRAIN, SUBDRAIN AND OTHER WALL-RELATED DRAINAGE SYSTEMS THAT MAY BE SHOWN ON THESE PLANS.

REFERENCE DOCUMENTS

A. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
1) ASTM C-1372-SPECIFICATION FOR SEGMENTAL RETAINING WALL UNITS
2) ASTM D-3080-DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS
3) ASTM D-1557-LABORATORY COMPACTION CHARACTERISTICS OF SOIL MODIFIED PROCTOR
4) ASTM D-4318-LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS
5) ASTM D-4595-TENSILE PRIORITIES OF GEOTEXTILES – WIDE WIDTH STRIP
6) ASTM D-5262-UNCONFINED TENSION CREEP BEHAVIOR OF GEOSYNTHETICS
7) ASTM D-3034-POLYVINYL CHLORIDE PIPE (PVC)
8) ASTM D-4829-EXPANSION INDEX OF SOILS
9) ASTM C-140-STD. SPEC. FOR SAMPLING AND TESTING CONCRETE MASONRY UNITS
10) ASTM C-145-STD. SPEC. FOR SOLID LOAD BEARING CONCRETE MASONRY UNITS

B. GEOSYNTHETIC RESEARCH INSTITUTE (GRI)
1) GRI-GG4-DETERMINATION OF LONG TERM DESIGN STRENGTH OF GEOGRIDS
2) GRI-GT7-DETERMINATION OF LONG TERM DESIGN STRENGTH OF GEOTEXTILES
3) GRI-GG5-DETERMINATION OF GEOGRID (SOIL) PULLOUT

C. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
1) NCMA SRWU-1-TEST METHOD FOR DETERMINING CONNECTION STRENGTH OF SEGMENTAL RETAINING WALL UNITS
2) NCMA SRWU-2-TEST METHOD FOR DETERMINING SHEAR STRENGTH OF SRW UNITS
3) "DESIGN MANUAL FOR SEGMENTAL RETAINING WALLS, 2ND EDITION." (1997)

D. ICC EVALUATION SERVICES, INC. (FORMERLY INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO))
1) ICC ES ER-5515-VERDURA AND CANDURA SEGMENTAL RETAINING WALL SYSTEMS (DATED APRIL 1, 2007)

MODULAR CONCRETE RETAINING WALL UNITS

A. MODULAR CONCRETE UNITS SHALL BE VERDURA, AS INDICATED IN TABLE. COLOR-BUFF
B. MODULAR CONCRETE MATERIALS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-1372 – STANDARD SPECIFICATIONS FOR SEGMENTAL RETAINING WALL UNITS.
C. 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 = 4000 PSI MINIMUM AT 28 DAYS;
* MOISTURE ABSORPTION = 8% MAXIMUM 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.

GEOSYNTHETIC-CONCRETE BLOCK CONNECTORS

A. 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 AND BLOCK.
B. CONNECTORS SHALL BE CAPABLE OF HOLDING THE GEOSYNTHETIC SOIL REINFORCEMENT IN THE PROPER DESIGN POSITION DURING GEOSYNTHETIC PRE-TENSIONING AND BACKFILLING PROCEDURES

UNIT FILL

A. UNIT FILL SHALL CONSIST OF SOILS USED FOR WALL BACKFILL OR AS SPECIFIED BY THE PROJECT LANDSCAPE ARCHITECT.

SURFACE CONDITIONS

A. PRIOR TO WORK, CAREFULLY INSPECT PREVIOUS GRADING WORK. VERIFY THAT ALL SUCH WORK IS COMPLETE TO THE POINT WHERE THIS INSTALLATION MAY PROPERLY COMMENCE.
B. VERIFY THAT WORK OF THIS SECTION MAY BE INSTALLED IN STRICT ACCORDANCE WITH THE ORIGINAL DESIGN, ALL PERTINENT CODES AND REGULATIONS.
C. VERIFY WALL DRAINAGE SYSTEM IS COORDINATED WITH POINTS OF CONNECTION TO STORM DRAINAGE SYSTEM OR OTHER PROPER DRAINAGE DEVICE.
D. IN THE EVENT OF DISCREPANCY, IMMEDIATELY NOTIFY THE SDG&E REPRESENTATIVE. DO NOT PROCEED WITH INSTALLATION UNTIL ALL SUCH DISCREPANCIES HAVE BEEN RESOLVED.

LAYOUT

A. VERIFY ALL STAKING AND FIELD ENGINEERING REQUIRED TO IMPLEMENT THE WORK AS SHOWN ON THE DRAWINGS.
B. PROTECT ALL STAKES AND BENCHMARKS. REPLACE ALL STAKES AND BENCHMARKS DAMAGED DURING THE COURSE OF CONSTRUCTION AT NO COST TO OWNER.
C. SET GRADE STAKES AT MAXIMUM 25-FOOT GRID INTERVALS.
D. HAND TRIM EXCAVATIONS TO REQUIRED ELEVATIONS. CORRECT OVER-EXCAVATION WITH FILL MATERIALS APPROVED BY THE GEOTECHNICAL ENGINEER OF RECORD.
E. REMOVE LARGE STONES OR OTHER HARD MATTER WHICH WOULD DAMAGE PIPES OR IMPEDE CONSISTENT BACKFILLING OR COMPACTION.
F. 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.

EXCAVATION

A. CONTRACTOR SHALL EXCAVATE TO THE LINES AND GRADES SHOWN ON THE CONSTRUCTION DRAWINGS. SDG&E'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.
B. OVER-EXCAVATION AND REPLACEMENT OF UNSUITABLE FOUNDATION SOILS AND REPLACEMENT WITH APPROVED COMPACTED FILL WILL BE COMPENSATED AS AGREED UPON WITH THE OWNER.

MODULAR UNIT INSTALLATION

A. FIRST COURSE OF UNITS SHALL BE PLACED ON THE FOUNDATION SOILS OR LEVELING PAD APPROVED 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.
B. 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 AND 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, AND IN ACCORDANCE WITH THE SPECIFICATIONS AND THESE PLANS.
C. PLACE AND COMPACT FILL BEHIND WALL UNITS. AFTER UNIT FILL IS COMPACTED EXCESS UNIT FILL MUST BE SCREEDED (ROD-BOARDED) OFF TO DEVELOP A FLAT BASE UPON WHICH SUBSEQUENT UNITS CAN BE POSITIONED. PLACE AND COMPACT BACKFILL SOIL BEHIND UNITS. FOLLOW WALL ERECTION AND UNIT FILL CLOSELY WITH STRUCTURE BACKFILL.
D. MAXIMUM STACKED VERTICAL HEIGHT OF WALL UNITS PRIOR TO UNIT FILL AND BACKFILL PLACEMENT AND COMPACTION SHALL NOT EXCEED ONE COURSE.
E. CONTRACTOR SHALL VERIFY BY SURVEY THAT WALL LINE AND GRADE TOLERANCES ARE MET AT REGULAR INTERVALS DURING CONSTRUCTION, AND AT LEAST EVERY FOURTH BLOCK COURSE.

GEOSYNTHETIC SOIL REINFORCEMENT INSTALLATION

A. GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE ORIENTED WITH THE HIGHEST STRENGTH AXIS PERPENDICULAR TO THE WALL ALIGNMENT.
B. 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.
C. 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. 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.
D. GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE CONTINUOUS THROUGHOUT THE LENGTH OF EMBEDMENT. SPLICED CONNECTIONS BETWEEN SHORTER PIECES OF GEOSYNTHETIC SOIL REINFORCEMENT WILL NOT BE PERMITTED.

REINFORCED BACKFILL PLACEMENT

A. 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.
B. 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 RELATIVE COMPACTION OF FILL IN REINFORCED ZONE.
C. 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.
D. ONLY LIGHTWEIGHT HAND-OPERATED EQUIPMENT SHALL BE ALLOWED WITHIN 3 FEET FROM THE BACK OF THE MODULAR CONCRETE UNIT.
E. TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY UPON THE GEOSYNTHETIC SOIL REINFORCEMENT. A MINIMUM FILL THICKNESS OF 12 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 FORM DISPLACING THE FILL AND DAMAGING THE GEOSYNTHETIC SOIL REINFORCEMENT.
F. RUBBER TIRED EQUIPMENT SHALL PASS OVER GEOSYNTHETIC SOIL REINFORCEMENT AT SLOW SPEEDS, LESS THAN 10 MPH. SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.
G. 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.
H. CARE SHOULD BE TAKEN DURING EXCAVATION FOR AND CONSTRUCTION OF THE V-DITCH AND ALL OTHER TYPE OF WALL STRUCTURE NOT TO DAMAGE THE UPPER GEOGRID LAYER. IF THE GEOGRID LAYERS ARE DAMAGED, THEY NEED TO BE PROPERLY REPLACED.

AS-BUILT CONSTRUCTION TOLERANCES

A. VERTICAL ALIGNMENT: ±.125 FEET VARIATION FROM DESIGN ALIGNMENT OVER ANY 10 FT DISTANCE.
B. WALL BATTER: WITHIN 2 DEGREES OF DESIGN BATTER, AS MEASURED AT ANY 10 FOOT VERTICAL SECTION.
C. OVERALL WALL BATTER: WITHIN 1 DEGREE OF DESIGN BATTER AS MEASURED FROM FINISH GRADE AT BOTTOM OF WALL TO FINISH GRADE AT TOP OF WALL (AT FACE OF WALL).
D. HORIZONTAL ALIGNMENT: ±.125 FEET VARIATION FROM DESIGN ALIGNMENT OVER ANY 10 FT DISTANCE.
E. MAXIMUM HORIZONTAL GAP BETWEEN ERECTED UNITS SHALL BE 9 INCHES.

SPECIAL INSPECTIONS

A. PER ICC-ES REPORT ER-5515, SPECIAL INSPECTIONS DURING INSTALLATION MUST BE PERFORMED IN ACCORDANCE WITH SECTION 1704 OF THE 2007 CBC. THE SPECIAL INSPECTOR MUST BE QUALIFIED BY THE BUILDING OFFICIAL IN ACCORDANCE WITH SECTION 1704 OF THE CBC. THE INSPECTOR'S RESPONSIBILITIES INCLUDE VERIFYING THE FOLLOWING AS DESCRIBED PREVIOUSLY:
1. FOUNDATION PREPARATION.
2. UNIT PLACEMENT, INCLUDING ALIGNMENT AND INCLINATION.
3. GEOSYNTHETIC REINFORCEMENT LENGTH, STRENGTH, AND PLACEMENT WITH RESPECT TO ELEVATION AND ORIENTATION.
4. FILL PLACED AND COMPACTED IN REINFORCED ZONE SOIL ENGINEERING PROPERTIES
5. FILL PLACED AND COMPACTED IN REINFORCED ZONE PLACEMENT AND COMPACTION
6. WALL BACK-CUT DRAINS AND OUTLETS

VERDURA BLOCK PROPERTIES

UNIT TYPE, VERDURA	V40	V60
UNIT SIZE, RAIL HEIGHT, IN.	8	8
UNIT SIZE, CROWN HEIGHT, IN.	11	11
UNIT SIZE, WIDTH, IN.	18	18
UNIT SIZE, DEPTH, IN.	12	12
WEIGHT, (TYPE), LBS.	82	132
BATTER = (DEGREES FROM VERTICAL)	14	14

GEOSYNTHETIC REINFORCEMENT PROPERTIES

TEST	METHOD	UNIT	MIRAGRID 8XT	MIRAGRID 10XT	MIRAGRID 20XT
TENSILE STRENGTH (AT ULTIMATE)	ASTM D6637	LBS/FT	7000	8300	12420
TENSILE STRENGTH (AT 5% STRAIN)	ASTM D6637	LBS/FT	2520	3120	5340
CREEP REDUCED STRENGTH	ASTM D5262	LBS/FT	4200	4980	7221
LONG TERM ALLOWABLE DESIGN LOAD	GRI GC-4	LBS/FT	3636	4312	5968

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER A. RYDER
No. 71833
Exp. 12-31-11
CIVIL
STATE OF CALIFORNIA
3/30/10

NOLTE
BEYOND ENGINEERING

REVISIONS

NO.	WORK DONE	DATE:	BY:	APP'D:	NO.	WORK DONE	DATE:	BY:	APP'D:	NO.	WORK DONE	DATE:	BY:	APP'D:	NO.	WORK DONE	DATE:	BY:	APP'D:

SAN DIEGO GAS & ELECTRIC COMPANY
SAN DIEGO, CALIFORNIA

SUNCREST SUBSTATION

MSE WALL NOTES

DRAWN BY: NS	DATE: 3/24/10	SCALE: AS SHOWN	W.O.: –	REV.: 0	
CHECKED BY: RWM	DATE: –				
APPROVED BY: CR	DATE: –	SHEET 36 OF 66	SCR-C-036		
CAD NO.: GP36	PLOT SCALE: 1=1				

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XREFS: