

PORTION OF THE SW 1/4, SECTION 32, T. 21 N., R. 5 E., W.M.

DESIGN NOTES:

A. DESIGN OF THE ROCKERY IS BASED ON A GEOTECHNICAL ENGINEERING STUDY BY GEOTECH CONSULTANTS, INC., DATED JULY 12, 2007, AND PLAN SHEETS SHOWING EXISTING/PROPOSED GRADING AND ROCKERY LOCATIONS PREPARED BY PACIFIC ENGINEERING DESIGN, LLC.

THE FOLLOWING DESIGN VALUES WERE USED:  
 INTERNAL ANGLE OF FRICTION FOR REINFORCED SOIL = 34 DEGREES  
 UNIT WEIGHT OF REINFORCED SOIL = 130 PCF  
 MAXIMUM WALL HEIGHT = 10 FEET  
 BATTER OF WALL = 1H:6V (HORIZONTAL:VERTICAL)  
 EMBEDMENT = 1 FOOT  
 TRAFFIC SURCHARGE = 0 PSF

B. GEOGRID TO BE AS DEFINED IN DETAILS.

C. CONTRACTOR TO VERIFY ALL LOCATIONS, ELEVATIONS, AND DIMENSIONS.

D. FOR BIDDING PURPOSES, THE DESIGN WALL HEIGHT SHALL INCLUDE BOTH THE ABOVE GRADE DIMENSIONS SHOWN ON THE CIVIL PLANS AND THE BELOW GRADE EMBEDDED PORTION OF THE WALL SHOWN ON THESE PLAN SHEETS.

GENERAL:

ROCKERY CONSTRUCTION IS A CRAFT AND DEPENDS LARGELY ON THE SKILL AND EXPERIENCE OF THE BUILDER.

A ROCKERY IS A PROTECTIVE SYSTEM WHICH HELPS RETARD THE WEATHERING AND EROSION PROCESS ON AN EXPOSED SOIL FACE. WHILE BY ITS NATURE (MASS, SIZE, AND SHAPE OF THE ROCKS) IT WILL PROVIDE SOME DEGREE OF RETENTION, IT IS NOT A DESIGNED OR ENGINEERED SYSTEM IN THE SENSE A REINFORCED CONCRETE RETAINING WALL WOULD BE CONSIDERED DESIGNED OR ENGINEERED.

THE DEGREE OF RETENTION ACHIEVED IS DEPENDENT ON THE SIZE OF THE ROCK USED: THAT IS, THE MASS OR WEIGHT, AND THE HEIGHT OF THE WALL BEING CONSTRUCTED. THE LARGER THE ROCK, THE MORE COMPETENT THE ROCKERY SHOULD BE.

ROCKERIES SHOULD BE CONSIDERED MAINTENANCE ITEMS THAT WILL REQUIRE PERIODIC INSPECTION AND REPAIR. THEY SHOULD BE LOCATED SO THAT THEY CAN BE REACHED BY A CONTRACTOR IF REPAIRS BECOME NECESSARY.

MAXIMUM INCLINATION OF THE SLOPES ABOVE AND BEHIND ROCKERIES SHOULD BE 2:1 (HORIZONTAL:VERTICAL).

MINIMUM THICKNESS OF ROCK FILTER LAYER B = 18 INCHES.

ROCKERIES GREATER THAN 8 FEET IN HEIGHT SHOULD BE INSTALLED UNDER PERIODIC OR FULL TIME OBSERVATION OF THE GEOTECHNICAL ENGINEER.

UNLESS OTHERWISE SPECIFIED IN WRITING BY THE ROCKERY "DESIGNER", ALL ROCKS PLACED IN THE LOWER TWO-THIRDS OF THE WALL SHOULD BE 5- TO 6-MAN ROCK, 4000 LB. OR LARGER. ROCKS PLACED ABOVE THIS LEVEL SHOULD GRADUALLY DECREASE IN SIZE WITH INCREASING WALL HEIGHT USING 3- TO 5-MAN ROCK, 700 TO 6000 LB.

THE LONG DIMENSION OF THE ROCKS SHOULD EXTEND BACK TOWARDS THE CUT OR FILL FENCE TO PROVIDE MAXIMUM STABILITY.

ROCKS SHOULD BE PLACED TO AVOID CONTINUOUS JOINT PLANES IN VERTICAL OR LATERAL DIRECTIONS. EACH ROCK SHOULD BEAR ON TWO OR MORE ROCKS BELOW IT, WITH GOOD FLAT-TO-FLAT CONTACT.

ALL ROCKERIES OVER 4 FEET IN HEIGHT SHOULD BE CONSTRUCTED ON THE BASIS OF WALL MASS, NOT SQUARE FOOTAGE OF THE FACE.

SIZE	APPROXIMATE WEIGHT - LB.	APPROXIMATE DIAMETER
1-Man	50-200	12-18"
2-Man	200-700	18-28"
3-Man	700-2000	28-36"
4-Man	2000-4000	36-48"
5-Man	4000-6000	48-54"
6-Man	6000-8000	54-60"

REFERENCE:

LOCAL QUARRY WEIGHT STUDY USING AVERAGE WEIGHTS OF NO LESS THAN SIX ROCKS OF EACH MAN SIZE CONDUCTED IN JANUARY, 1988.

LEGEND:

DRAINAGE MATERIALS TO CONSIST OF CLEAN, ANGULAR, WELL-GRADED QUARRY SPALLS, WITH 6-INCH MAXIMUM GRAIN SIZE, OR OTHER MATERIAL APPROVED BY ECI.

SURFACE SEAL; MAY CONSIST OF IMPERVIOUS SOIL OR A FINE, FREE-DRAINING GRANULAR MATERIAL.

UNDISTURBED, FIRM NATIVE SOIL.

DRAIN PIPE; 4-INCH MINIMUM DIAMETER, SLOTTED PVC PIPE LAID WITH A POSITIVE GRADIENT TO DISCHARGE UNDER CONTROL WELL AWAY FROM THE WALL.

WHERE THE ROCKERIES WILL RANGE FROM 8 TO 10 FEET HIGH, THE ROCKERY SHOULD BE CONSTRUCTED OF OVERSIZED ROCKS. FOR THIS APPLICATION, THE LOWER TWO COURSES OF ROCK SHOULD CONSIST OF 6-MAN ROCK (6,000 TO 8,000 LB. EACH). THE REMAINDER OF THE ROCKERY SHOULD CONSIST OF 4- TO 5-MAN ROCK (2,000 TO 6,000 LB. EACH). TO FILL VOIDS, 2- AND 3-MAN ROCK MAY BE USED; HOWEVER, THE USE OF 2- AND 3-MAN ROCK SHOULD BE KEPT TO A MINIMUM.

THE ROCKS COMPRISING THE ROCKERIES SHOULD CONSIST OF HARD IGNEOUS OR METAMORPHIC ROCK CONFORMING TO THE ARC GUIDELINES AND WSDOT SPECIFICATIONS FOR ROCK AND GRAVITY BLOCK WALL AND GABION CRIBBING (WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION, SECTION 8-24).

FIELD QUALITY CONTROL:

A. THE ROCKERY CONSTRUCTION SHALL BE OBSERVED BY GEOTECH CONSULTANTS ON A FULL-TIME BASIS. TESTING OF THE COMPACTED BACKFILL SHALL BE PERFORMED BY GEOTECH CONSULTANTS.

B. QUALITY ASSURANCE SHALL INCLUDE FOUNDATION SOIL INSPECTION, SOIL AND BACKFILL TESTING, VERIFICATION OF DESIGN PARAMETERS, AND OBSERVATION OF CONSTRUCTION FOR GENERAL COMPLIANCE WITH DESIGN DRAWINGS AND SPECIFICATION.

FILL SECTION ROCKERY:

GEOGRID SOIL REINFORCEMENT

A. GEOSYNTHETIC REINFORCEMENT SHALL CONSIST OF GEOGRIDS MANUFACTURED SPECIFICALLY FOR SOIL REINFORCEMENT APPLICATIONS AND SHALL BE MANUFACTURED FROM HIGH TENACITY POLYESTER YARN OR HIGH DENSITY POLYETHYLENE. POLYESTER GEOGRID SHALL BE KNOTTED FROM HIGH TENACITY POLYESTER FILAMENT YARN WITH A MOLECULAR WEIGHT EXCEEDING 25,000 MEG/M AND A CARBOXYL END GROUP VALUE LESS THAN 300. POLYESTER GEOGRID SHALL BE COATED WITH AN IMPREGNATED PVC COATING THAT RESISTS PEELING, CRACKING, AND STRIPPING.

B. TENSAR UX1400HS, MIRAGRID 5XT, OR APPROVED EQUIVALENT SHALL BE USED FOR THE REINFORCED FILL CONSTRUCTION. IF AN EQUIVALENT MATERIAL IS USED, THE LONG TERM DESIGN STRENGTH OF THE EQUIVALENT GEOGRID SHALL BE 1068 LB./FT.

C. MANUFACTURING QUALITY CONTROL  
 THE GEOGRID MANUFACTURER SHALL HAVE A MANUFACTURING QUALITY CONTROL PROGRAM THAT INCLUDES QC TESTING BY AN INDEPENDENT LABORATORY.

THE QC TESTING SHALL INCLUDE:  
 TENSILE STRENGTH TESTING  
 MELT FLOW INDEX (HDPE)  
 MOLECULAR WEIGHT (POLYESTER)

STRUCTURAL GEOGRID INSTALLATION

A. GEOGRID SHALL BE ORIENTED WITH THE HIGHEST STRENGTH AXIS PERPENDICULAR TO THE ROCKERY ALIGNMENT.

B. GEOGRID REINFORCEMENT SHALL BE PLACED AT THE STRENGTHS, LENGTHS, AND ELEVATIONS SHOWN ON THE CONSTRUCTION DESIGN DRAWINGS OR AS DIRECTED BY GEOTECH CONSULTANTS.

C. THE GEOGRID SHALL BE LAID HORIZONTALLY ON COMPACTED BACKFILL AND EXTEND TO THE BACK OF THE ROCKERY DRAINAGE ZONE, AS SHOWN ON DETAIL 1, FILL ROCKERY DETAIL. THE GEOGRID SHALL BE PULLED TAUT, AND ANCHORED AT BOTH ENDS PRIOR TO BACKFILL PLACEMENT ON THE GEOGRID.

D. GEOGRID REINFORCEMENTS SHALL BE CONTINUOUS THROUGHOUT THEIR EMBEDMENT LENGTHS AND PLACED SIDE-BY-SIDE TO PROVIDE 100% COVERAGE AT EACH LEVEL. SPLICED CONNECTIONS BETWEEN SHORTER PIECES OF GEOGRID OR GAPS BETWEEN ADJACENT PIECES OF GEOGRID ARE NOT PERMITTED.

E. A 4-INCH DIAMETER PERFORATED DRAIN PIPE AND DRAINAGE ROCK SHALL BE INSTALLED BEHIND THE ROCKERY, AS INDICATED ON THE PLANS. THE DRAINAGE PIPE SHALL BE RIGID PERFORATED PVC PIPE MANUFACTURED IN ACCORDANCE WITH ASTM D-3034.

REINFORCED BACKFILL PLACEMENT

A. REINFORCED BACKFILL SHALL BE PLACED, SPREAD, AND COMPACTED IN SUCH A MANNER THAT MINIMIZES THE DEVELOPMENT OF SLACK IN THE GEOGRID AND INSTALLATION DAMAGE.

B. REINFORCED BACKFILL SHALL BE PLACED AND COMPACTED IN LIFTS NOT TO EXCEED 6 INCHES WHERE HAND COMPACTION IS USED, OR 8 TO 10 INCHES WHERE HEAVY COMPACTION EQUIPMENT IS USED. LIFT THICKNESS SHALL BE DECREASED TO ACHIEVE THE REQUIRED DENSITY AS REQUIRED.

C. REINFORCED BACKFILL SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY AS DETERMINED BY ASTM D-1557 (MODIFIED PROCTOR). THE MOISTURE CONTENT OF THE BACKFILL MATERIAL PRIOR TO AND DURING COMPACTION SHALL BE AT OR NEAR THE OPTIMUM MOISTURE CONTENT.

D. TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY UPON THE GEOGRID REINFORCEMENT. A MINIMUM FILL THICKNESS OF 6 INCHES IS REQUIRED PRIOR TO OPERATION OF TRACKED VEHICLES OVER THE GEOGRID. TRACKED VEHICLE TURNING SHOULD BE KEPT TO A MINIMUM TO PREVENT TRACKS FROM DISPLACING THE FILL AND DAMAGING THE GEOGRID.

E. RUBBER Tired EQUIPMENT MAY PASS OVER GEOGRID REINFORCEMENT AT SLOW SPEED, LESS THAN 10 MPH. SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.

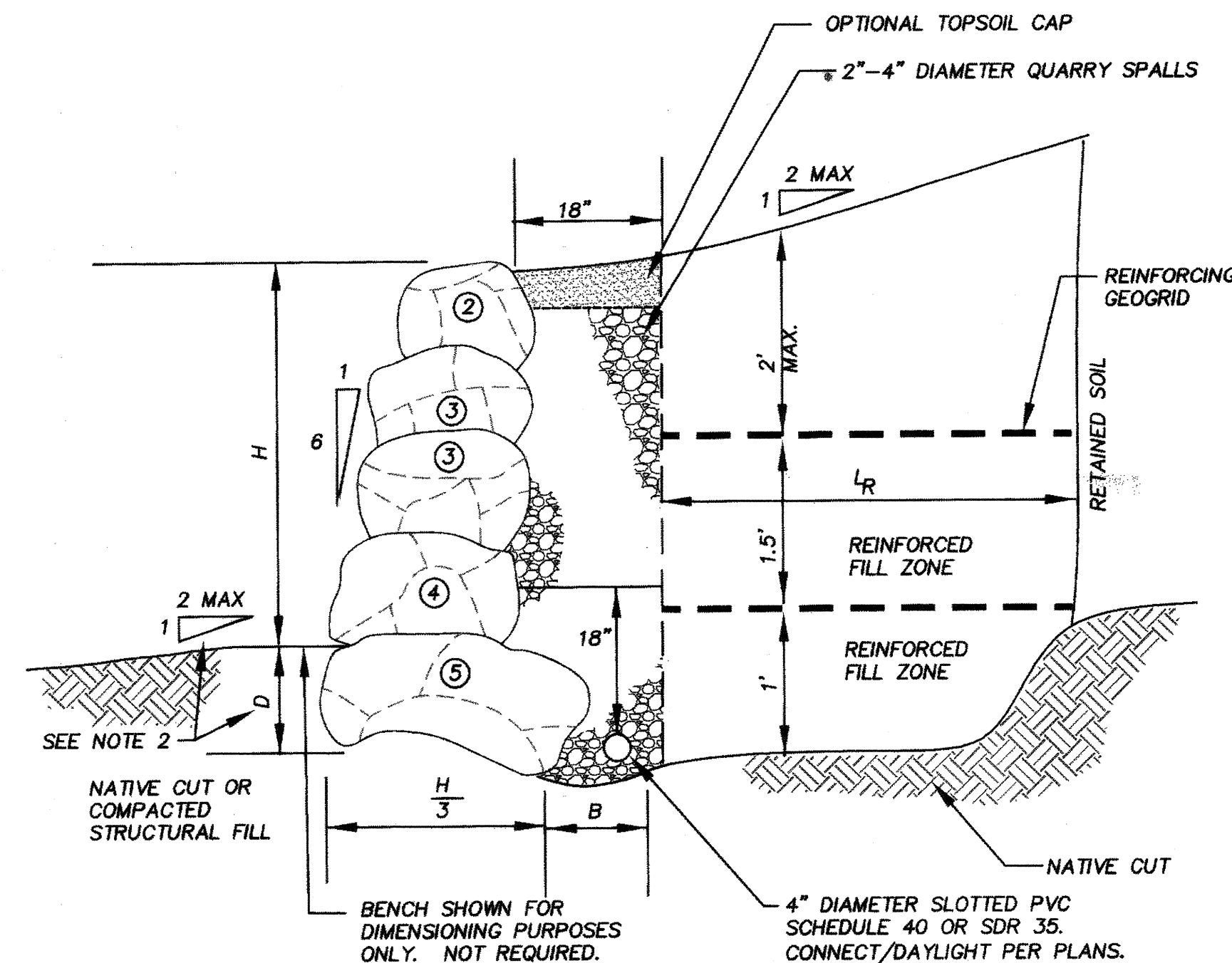
NATIVE CUT SECTION ROCKERY:

A. ROCKERY CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE ASSOCIATED ROCKERY CONTRACTOR (ARC) ROCKERY CONSTRUCTION GUIDELINES.

B. GEOTECH CONSULTANTS SHALL OBSERVE CUTS FOR THE ROCKERY. ADDITIONAL FLATTENING OF CUTS MAY BE RECOMMENDED DEPENDING ON THE SOIL AND GROUNDWATER CONDITIONS OBSERVED.

C. A 4-INCH DIAMETER SLOTTED DRAIN PIPE AND DRAINAGE ROCK SHALL BE INSTALLED BEHIND THE ROCKERY, AS INDICATED ON THE PLANS. THE DRAINAGE PIPE SHALL BE RIGID SLOTTED PVC PIPE MANUFACTURED IN ACCORDANCE WITH ASTM D-3034.

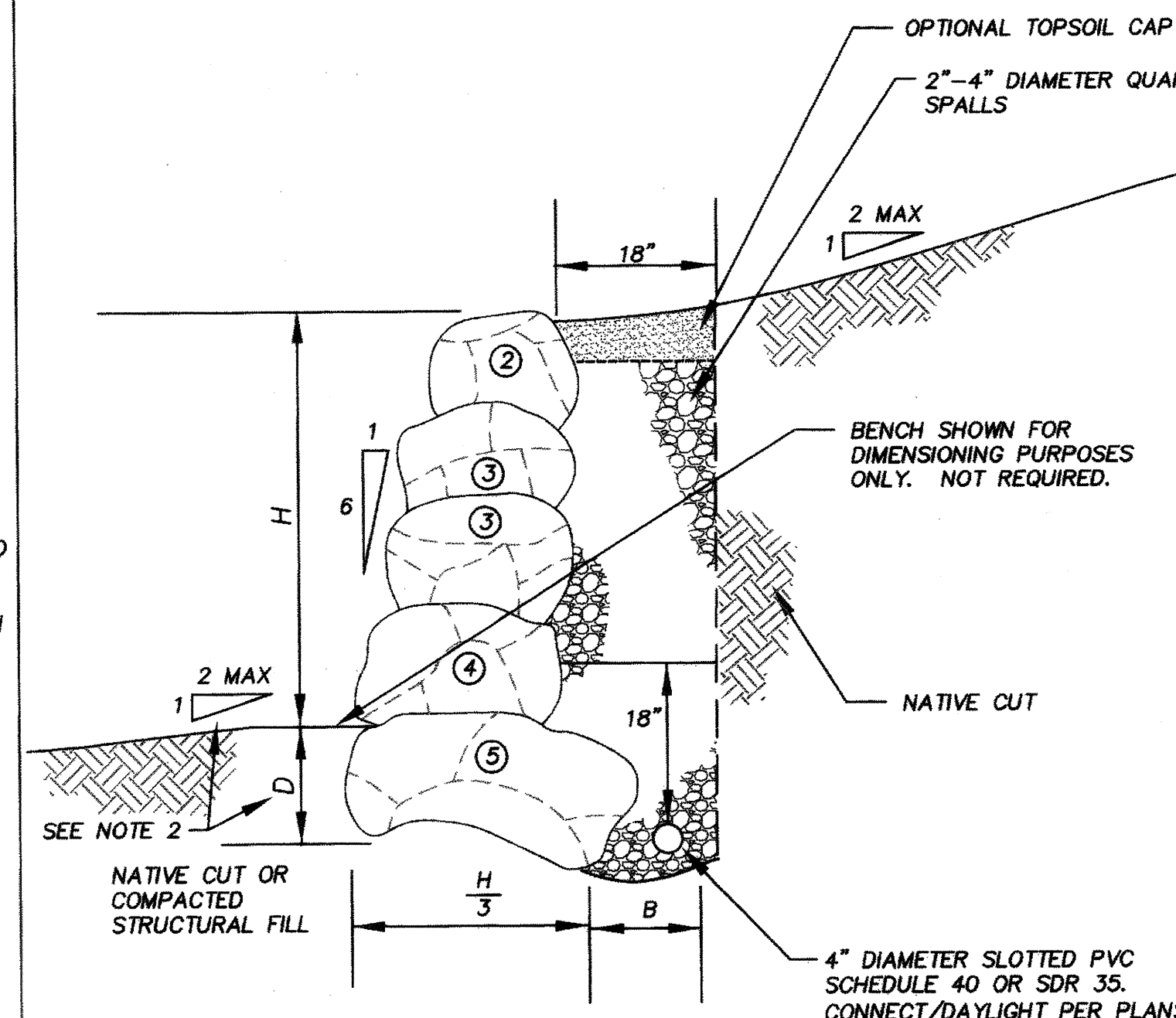
GEOGRID LENGTHS TENSAR UX1400HS, MIRAGRID 5XT, OR APPROVED EQUIVALENT	
WALL HEIGHT (FEET) H	LENGTH OF REINFORCING (FEET) L <sub>R</sub>
10	8
8	6.5
6	5
4	4



1 FILL ROCKERY DETAIL  
NOT TO SCALE

NOTES:

1. MAXIMUM ROCKERY HEIGHT H = 8 FEET
2. EMBEDMENT DEPTH D = 1 FOOT (2 FEET IF 2H:1V SLOPE)
3. MINIMUM DRAINAGE ZONE B = 18 INCHES



2 CUT ROCKERY DETAIL  
NOT TO SCALE

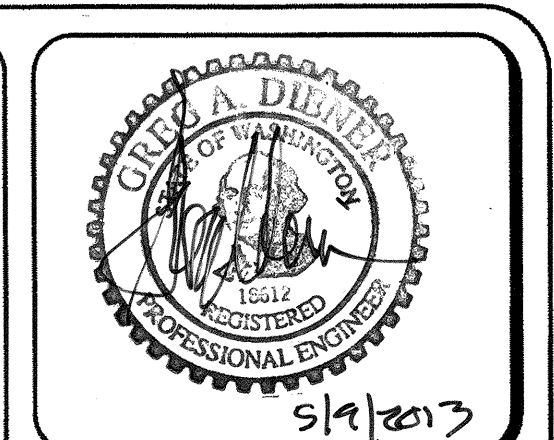
NOTES:

1. MAXIMUM ROCKERY HEIGHT H = 8 FEET
2. EMBEDMENT DEPTH D = 1 FOOT (2 FEET IF 2H:1V SLOPE)
3. MINIMUM DRAINAGE ZONE B = 18 INCHES

3 ROCKERY ELEVATION  
NOT TO SCALE

RECORD DRAWING CERTIFICATION  
 THESE DRAWINGS CONFORM TO THE CONTRACTOR'S  
 CONSTRUCTION RECORDS.  
 BY: \_\_\_\_\_ DATE \_\_\_\_\_  
 TITLE/POSITION: \_\_\_\_\_  
 CONFIRMED BY CITY: \_\_\_\_\_ DATE \_\_\_\_\_

PROJECT REF: FAC07-0016  
 H5 May 10, 2013  
 THESE PLANS ARE "APPROVED" FOR CONFORMANCE WITH  
 THE CITY OF AUBURN'S ENGINEERING DIVISION  
 REQUIREMENTS.  
 APPROVED BY: *Dennis Soble*  
 DATE APPROVED: 5/15/13



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PROJECT NO.: 12022  
 DRAWN BY: ENM  
 ISSUE DATE: 07-17-07  
 SHEET REV.: 3-20-2013

**ROCKERY AND DETAILS**

050560T01-C18.DWG  
**C31**  
 SHEET 31 OF 55