HCP POND AS-BUILT REPORT
EAST CONTRA COSTA HABITAT CONSERVANCY
VASCO SOUZA I, HCP POND
VASCO CAVES REGIONAL PARK
BYRON, CALIFORNIA

PROJECT APN #: 005-160-005

September 10, 2009

Prepared For:

East Contra Costa Habitat Conservancy
651 Pine Street, 4th Floor NW
Martinez, CA 94553
(925) 335-1272

Prepared By:

Monk & Associates, Inc.
1136 Saranap Avenue, Suite Q
Walnut Creek, California
(925) 947-4867

TABLE OF CONTENTS

FIGURES

SHEETS

ATTACHMENTS

1. INTRODUCTION

In 2008, Monk & Associates, Inc. (M&A) assisted with the design and construction of a proposed 1.10-acre pond on approximately 2.60-acres of land (the project site) in Vasco Caves Regional Park, Byron, Contra Costa County, California (Figures 1 and 2). The pond was constructed by the East Contra Costa Habitat Conservancy (Conservancy) on land owned and managed by the East Bay Regional Park District (EBRPD) (the Project Team). Pond design specifications were developed by and between the Conservancy, M&A, and Carlson, Barbee Gibson (CBG, Civil Engineers) with input from EBRPD. The proposed pond design is depicted in the original grading plan prepared by CBG Civil Engineers (Attachment A, Sheet 2). Construction of the pond was initiated on September 17, 2008 and was completed on October 24, 2008.

The constructed pond was designed as a component of the East Contra Costa County Habitat Conservation Plan. The objective was to create seasonal wetland. Since the federally listed threatened California tiger salamander (*Ambystoma californiense*) (CTS) is present in Vasco Caves Regional Park, EBRPD wanted to ensure that the pond did not become a “reproductive sink” where CTS could lay eggs, but would not have sufficient ponding duration to allow larvae to metamorphose. Other design considerations included factoring in that the pond site is subject to very high winds over much of the year (the site is in a wind resource area), and is subject to relatively low rainfall rates. Accordingly, it was reasoned that constructing the pond too shallow, in consideration of the high winds and high evaporation rate, may not allow sufficient duration of saturation/ponding to promote colonization of the pond by hydrophytic plant species. Finally, that constructing the pond too deep might also create very long duration ponding which could suppress vegetation growth of herbaceous hydrophytic species. Thus, the Project Team had considerable discussions about how deep the pond should be designed to ensure the following: 1) adequate hydration to support seasonal wetland; 2) shallow enough to promote seasonal wetland vegetation colonization, with deeper areas that can support CTS metamorphosis in the event CTS breed in the pond; and 3) not being so deep that the pond suppresses seasonal wetland vegetation growth.

The Project Team agreed that the most of the pond should only inundate one-foot deep, which would promote hydrophytic species colonization in spite of high evaporation rates and low rainfall. While vegetation suppression from long-term inundation was considered, it was determined that from an experimental standpoint that a one-foot pond was the most desirable ponding depth which would have the greatest likelihood of achieving the overall objective of creating seasonal wetland. In addition, it was agreed that there should be smaller portions of the pond that would inundate two and three feet deep when the pond was full. It was reasoned that if CTS reproduced in the pond that larvae could retreat from the one-foot deep portion of the pond as this area dries, to the deeper areas of the pond allowing sufficient duration of ponding for CTS larvae to successfully metamorphose.

2. REGULATORY BACKGROUND

M&A conducted a project site evaluation in spring 2008. No wetlands or waters of the U.S. or state occurred on the then proposed project site. On behalf of the Conservancy, on August 11, 2008 Monk & Associates (M&A) filed a Planning Survey Report for the then proposed pond as necessary to comply with and receive coverage under the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan. On August 18, 2008 M&A filed a Notice of Intent to use the General Stormwater Permit administered by the State Water Resources Control Board (SWRCB). Grading and pond construction-related activities commenced on September 17, 2008. Finally, M&A also completed a Resource Management Plan for the project site on August 12, 2008.

3. SITE CONDITIONS PRIOR TO CONSTRUCTION OF THE POND

The Vasco Caves Regional Preserve is located in the southeastern corner of the HCP/NCCP inventory area within the Mt. Diablo foothills. The entire preserve is noted for its potential to provide habitat for the HCP covered special-status species, and for its opportunities for stream and wetland restoration projects. Precipitation in the area falls as rain, averaging approximately 12.20-inches per year. Average annual rainfall in the project vicinity was estimated from rainfall data recorded at the Byron Airport (BAP), a California Department of Water Resources station that is located approximately 4.2 miles east of the project site (Latitude: 37.8306 N; Longitude: 121.6225 W).

The Vasco Caves Regional Preserve originated from two, major, private land acquisitions: the Walker and Souza properties. Grazing has occurred for over one hundred years on what is now the project site and surrounding lands. Other land nearby was settled and extensively dry farmed for grain crops[1]. As a consequence, native plants abundance and diversity are generally reduced or eliminated in farmed areas as a result of the continued cultivation/grazing of the soil. Because of the absence of boundary fencing, overall livestock use exceeded acceptable range management standards, which provided cattle with unrestricted, year-round access to the preserve from adjacent private land. Boundary fencing was installed in 1999 and grazing on the site is now controlled.

The project site is located within the southwestern portion of the 100-acre former Souza property parcel (APN 005-160-005), which has been proposed as a conservation area and is now owned and managed by East Bay Regional Park District (EBRPD). The 2.60-acre project site is dominated by non-native annual grassland. Dominant species in the grassland include soft chess (*Bromus hordeaceus*) and foxtail barley (*Hordeum murinum*). The project site is located approximately 400 feet west of an intermittent drainage that drains most of the hills south of the project site.

4. SITE HYDROLOGY

Hydrology for the created pond is provided from multiple sources. Vertical precipitation provides most water entering the created pond. A secondary source of water is provided from uphill stormwater sheet flows that spill over the eastern pond rim and enter the pond. While there is a swale immediately south of the pond site that focuses stormwater flows draining from the hills southwest of the pond site, at the request of EBRPD, this source of water was not diverted

[1] EBRPD 2001. Vasco Caves Resource Management Plant. Adopted March 21, 2000.

to the pond, but could be in the future if more water is required to improve pond hydrology. Another minor swale tributary drains from the northwest of the pond but is truncated in its upper watershed approximately ¼ mile above the created pond by another berm/pond constructed within this tributary. Thus storm water flows to the pond are minor from this source.

The pond was constructed with an armored point of outflow (i.e., a spillway) on the northeast end of the pond. If pond depths reach the invert elevation of the spillway the pond will outflow downhill, northeasterly, where flows would spread out over a large flood plain. Eventually, several hundred-feet northeast of the pond overflow from the created pond will runoff into an existing down-slope tributary.

5. PROJECT SITE SOILS

Based on the National Resources Conservation Service (NRCS, formerly Soils Conservation Service) survey of Contra Costa County (USDA 1977), the soils of the project site are primarily Pescadero Clay Loam series. Pescadero soils consist of nearly level, somewhat poorly drained soils. These soils are in small inland valleys and on rims of basins. They formed in alluvium derived from sedimentary rocks. Permeability is slow in the subsoil and the available water capacity is 5 to 9 inches. Runoff is very slow and erosion is a light hazard. In a representative profile, the surface layer is light brownish-gray clay loam 4 inches thick. The subsoil is gray, grayish-brown, and pale brown clay and clay loam 43 inches thick. A field investigation performed on July 17, 2008 verified the soil series mapped for this area by the NRCS survey.

6. POND DESIGN AND CREATION

6.1 Design Objectives

The pond was designed as a 1.10-acre (measured from the bottom contour of the pond) variably contoured depression (Attachment A, Sheet 2). Three different depths of inundation were designed into the pond. The largest area within the pond fills to only one-foot deep prior to the time the pond spills. Two smaller areas of the pond fill to a two-foot depth and a three foot depth. The three-foot area of the pond fills and spills to the two-foot area of the pond, which fills and spills to the one-foot area of the pond.

The pond acreage calculation is based upon the bottom contour of the pond measured 1-foot below the spillway invert elevation (i.e., the elevation the pond spills over into the spillway). Owing to high winter/spring wind conditions at the site, rain shadow impacts (i.e. low rainfall amount), and increased evaporation potential, the pond was designed to pond water to 1-foot deep over the majority of the pond surface to ensure adequate duration of ponding to support and sustain hydrophytic vegetation. The 2-foot and 3-foot deep portions of the pond were designed to ensure that if the CTS lays eggs and otherwise attempts to reproduce in the pond, that the duration of ponding is sufficiently long enough to allow eggs to hatch and young to successfully metamorphose before the pond dries.

6.2 Pre-Pond Excavation Due Diligence

Prior to grading the new pond, subsurface soil profiles were assessed to determine if suitable soils were present in the subsoil profile (Attachment B, Photograph 1). Four “potholes” were excavated and subsoils were examined to two feet deeper than the design elevation of the pond bottom. Soils were classified by the Soil Conservation Service (now Natural Resource Conservation Service) to be Pescadero Clay Loams. The actual soil profile determined that there were “fat” clays in the first 1 to 3 feet of the soil profile which were deemed suitable for ponding water. Fat clays are expansive and typically have low permeability (thus such soils readily pond water). From 2 feet to deeper than 5 feet soils were determined to consist of a sandy loamy/clay mix with likely moderate to high permeability, and thus were deemed less than desirable for ponding water.

7. POND GRADING

7.1 General Grading Specifications

Initial preparation for grading the pond area included installation survey grade stakes indicating the depth and extent of excavation. Grade stake depths were set so that initial grading would result in a flat pond bottom at predetermined design elevations established for the pond per the grading plan (Attachment A). Upon completion of staking, the top 3 inches of soil containing the “A Horizon” (i.e., organic layer) was removed (scalped) from the pond area and stockpiled for redistribution upon completion of grading (Attachment B, Photograph 2). The A Horizon contains a native “seed bank” and thus has the highest potential for germination with “naturalized ground cover” species. Accordingly redistribution of scalped soils is an effective erosion control method since naturalized seeds in the scalped A Horizon readily germinate with fall rains.

7.2 Berm Construction

Then the pond berm was created by initially digging a 5.0-foot wide by 4 foot deep (below pre-existing grades) keyway (“trench”), and then filling and compacting clay soil in the keyway (Attachment B, Photograph 3). The berm was then constructed with native soils above the keyway. After the berm was configured and compacted, ½ the berm was graded back along he long axis of the berm. This allowed for the installation of an 80 millimeter thick high-density polyethylene (HDPE) liner, which was secured against the vertical cut using soil that was deposited in lifts and a sheep’s foot compactor (Attachment B, Photographs 11 and 12). The removed ½ of the berm was deposited and compacted to achieve the design shape of the berm. The HDPE liner was installed at an elevation that was 1-foot below the over-excavated elevation of the deepest portion of the pond (i.e., one foot below the 3-foot pool area or to 556-feet). The HDPE liner top elevation was set just below the finished grades of the berm (See Sheet 1, Section 2 – Attached).

7.2.1 In-Board Berm Side Slopes

The in-board (in-pond) berm side slope was constructed to conform to the 3:1 slope ratio detailed in the pond design plans (Attachment A, Sheet 2). In addition, 3 to 4-inch riprap was installed on the face of the berm to prevent future erosion of the berm from lapping water (i.e., from “wind fetch”) (Attachment B, Photograph 15). The riprap extends along the entire length of the berm including around the spillway opening on the in-board face of the berm. This riprap was installed in contour (i.e., below finished grades) and buried with native soils to the desired berm shape, slope, and elevation so that it was all but invisible in the finished pond (Attachment B, Photograph 16). While this rock will become exposed where erosion occurs, over the majority of the berm it will remain under soil and vegetated, and thus essentially invisible except in the erosion zone.

7.2.2 Out-Board Berm Side slopes

While the berm on the inboard (pond) side was designed with 3:1 side slopes, the outboard (backside) of the berm was designed with 4:1 side slopes (Attachment A, Sheet 2). However, as pond excavation resulted in an over-supply of soil ("soils were long") it was determined that this over-supply of soil would best be "lost" on the outboard side of the berm. Upon completion of the outboard berm, side slopes went from the design specification of 4:1 to approximately (variable) 8:1 as indicated on Sheet 1. By increasing the slope on the outboard side of the berm it blended into the native topography better providing a more naturalistic appearance.

7.3 Clay Liner and Flipping Native Pond Bottom Soils

The design specifications for the soil in the pond bottom required a two-foot thick "fat clay" layer that would prevent or greatly inhibit vertical and lateral percolation of ponded water. However, preliminary soil investigations showed that there were sandy loam inclusions at elevations 2 feet deep and deeper in the native soil profile that would be exposed when the pond bottom elevation was attained via grading. Thus, these sandy loam soils had to be over-excavated and replaced with fat clays to reach the design specification for a 2-foot thick clay liner in the pond bottom. As there was also a design specification that required capping any installed clay liner with a 6-inch loam soil layer that would inhibit/prevent summer desiccation and cracking of the installed clay liner, and as sandy loam soils were readily available in the soil profile from 2 to 5 deep, these soils were brought to the surface and placed over the installed clay liner. Thus, the native soil profile was essentially "flipped" so that graded exposed sandy loam soils were replaced with fat clays. To accomplish flipping the soils, the subsoils of pond sections were over-excavated to 2.5-feet below finished grades to elevations of 554.5, 555.5, 556.5-feet for the 1-foot, 2-foot, and 3-foot deep sections, respectively (Attachment A, Sheet 2).

The concept of "flipping" native soils only makes sense when one considers that a portion of the pond's native soil profile had to be cut via grading while the other portion of the pond's native soil bottom had to be filled to achieve the design specification for a flat pond bottom (See Attachment A, Sheet 2). Thus, even though fat clays were within 2 feet of the existing soil's surface elevation, to achieve a flat pond bottom on the gently sloping terrain, there were grade cuts that extended down into the sandy loam soils. Accordingly, the native pond bottom soils had to be over-excavated to deeper than the desired pond bottom elevation and replaced with available fat clays that had been removed from the surficial surface layer to achieve the design pond bottom with a 2-foot thick clay liner.

Design soil layer elevations were achieved and verified via use of a laser level (Attachment B, Photograph 5). The actual grading methods used to complete the designed soil profile in the pond bottom included over-excavation of sandy loam soils and replacement with clay soils to design elevations over 20-foot wide grader/scraper passes that were systematically completed over the entire pond bottom (think of mowing a lawn in systematic strips). Upon over-excavation of sandy loam soils, clay was laid down and compacted in overlapping 8-inch lifts (Attachment B, Photographs 6 and 7). GIS technology was used to ensure that graders/scrapers stayed located on precise 20-foot strips through the pond bottom and side slopes. Typically, there was four feet of overlap between strips to ensure that there were no permeable fissures or gaps in the clay liner.

By using the method of soil flipping within localized 20-foot strips, movement ("handling") of native soil was minimized to the maximum extent possible. In other words, native clays and sandy loams did not have to be over-excavated and stockpiled elsewhere and then brought back to the pond for installation per the original grading plan specifications. The over-excavation and flipping of soils "in-place" within 20-foot wide overlapping strips within the pond bottom and side slopes was a method of constructing the pond that the contractor (Grade Tech) insisted upon using in lieu of stockpiling of soils per the grading plan. The contractor stated that to stockpile soils, in consideration of the underlying soil structure, constituted "over-handling" of the site soils which was an unnecessary construction expense.

The clay liner was compacted to provide a "tight" soil profile that upon inundation would minimize the potential for vertical and lateral percolation. To achieve the design compaction specification for the clay liner, upon installation of the 8-inch clay lifts, each lift was moistened and compacted into the pond bottom with a sheep-foot compactor to achieve approximately 90 percent relative compaction or greater (Attachment B, Photograph 8). Compaction testing was completed by the contractor and verified in the field by M&A staff biologists.

After the clay layer was completed (i.e. installed and compacted) the pond bottom was surveyed with a laser level to ensure that the targeted pond bottom was level and at 0.5-feet below the finished grade (i.e., was at 558.5-feet in elevation). These field measurements were taken by the contractor's grade setters and verified in the field by M&A biologists. The tolerances allowed in the bottom of the pond were plus or minus 2 inches. Upon confirming a "flat bottom," a final 6-inch lift of the excavated sandy loam soil was applied to the pond bottom and side slopes to bring the depth of the pond bottom to the design elevations (Attachment B, Photograph 9). The applied sandy clay layer ("cap") was lightly compacted and the final pond bottom elevations were again measured and confirmed by M&A biologists to be in compliance with the designed finished grade elevations (Attachment B, Photograph 10).

7.3.1 Pond Side Slopes

Once the outline of the basin had been achieved and the desired soil layers compacted into place, the side slopes and bottom of the pond basin were further shaped to achieve a uniform bottom and side-slopes which conformed to the 3:1 slope ratio outlined in the pond design plans (Attachment B, Photograph 10). In addition, the disturbed area was "naturalized" so that the graded surface of the pond margin and side-slopes blended with the surrounding upland topography to achieve a naturalistic contour.

7.4 Overflow Spillway

A 22-foot wide by two-foot deep discharge swale (spillway) was created along the northeastern edge of the pond to take overflows from the created pond northeast and eventually to a down-gradient tributary (Sheet1, Section 1). The spillway was designed so that once the created pond reaches capacity (fills), water in the pond will then overflow down the spillway to a naturally occurring topographic swale, which eventually leads to a down-gradient tributary.

To reduce erosion, the overflow spillway was lined with Pyramat®, an erosion control geotextile. This geotextile “channel liner” is designed to trap soil and promote vegetation growth through the material. The geotextile “channel liner” was anchored on 2-foot centers within the created overflow spillway using 12 inch spikes. All outside edges of the Pyramat® were anchored with 12-inch spikes in 12-inch deep toe trenches that were backfilled and compacted. After Pyramat® installation was complete; a thin layer (1 inch) of organic soils was spread over the Pyramat® surfaces to promote vegetation growth (Attachment B, Photograph 14).

7.4.1 Departures In Spillway From Design Plan

It should be noted that the pond spillway, while constructed for the most part per plans, had two major departures from the original grading plan (Attachment A, Sheet 2). Because the design location of the spillway actually was proposed per the grading plan to terminate where a slope from an adjacent hillside met the flatter valley bottom, there would have been hillside cut and steep erosional faces where the spillway was graded into the side slope. By moving the spillway south approximately 20 feet to where the existing terrain is flatter, cut in the adjacent slope was minimized. Sheet1 depicts the as-built location of the spillway. Attachment B, Photograph 16 shows the finished spillway with straw wattles installed to keep flow velocities muted until the spillway vegetates. The second major departure in pond design from the grading plan was that the berm was extended in length to account for the change in the design slope of 4:1 to an as-built slope of ~8:1. Thus, the spillway went from a design length of approximately 20 feet to an as-built length of 85 feet. The entire 85-foot long spillway was armored using Pyramat® channel liner.

8. AS-BUILT POND ACREAGE

GPS data were used to confirm as-built pond acreages to within 1000th of an acre. Field GPS data were further corrected using base station files from the U.S. Forest Service Remote Sensing Laboratory in Sacramento. All spatial data were projected into the California State Plane, NAD 83 coordinate system, Zone 2.

The design pond acreage per plan at the bottom contour of the pond was 1.10 acres (Attachment A, Sheet 2). The as-built minimum pond acreage was calculated by creating a GPS polygon along the bottom contour of the pond one foot below the invert elevation of the spillway (elevation 559-feet) (Sheet1). As measured using GPS technology, if the total pond bottom saturates or inundates, the minimum pond wetted acreage of the as-built pond is 1.09 acres. The pond acreage would increase as the inundation area becomes deeper moving the pond surface up pond side slopes to the invert elevation of the spillway. The maximum pond acreage (1.16-acres) was calculated from the invert elevation of the spillway (elevation 560-feet). Sub-basin acreages within the constructed pond were also measured (see Sheet 1, Section 2). Taking the top contours of the two-foot deep (elevation 558-feet) and three-foot deep (elevation 557-feet) sections of the pond these two sub-areas total 0.13-acre and 0.02-acre respectively.

9. POST-CONSTRUTION EROSION CONTROL MEASURES

9.1 Spoils Redistribution

Upon completion of the pond grading and berm construction, scalped top-soils (i.e., the organic horizon taken from the original grade) that were stockpiled during initial pond excavation were redistributed over all disturbed areas to inoculate these areas with the seed bank of the plant community present in the area. The scalped organic soils contain a naturalized seed bank from the plant community that readily germinates with the first fall rains and thus is an excellent erosion control measure.

9.2 HydroSeeding

All disturbed areas around the pond were hydroseeded with a mulch matrix containing a California native seed mix. Separate prescriptions were applied to upland areas vs. the pond bottom. The pond bottom (1.09-acre) was inoculated with a seed mix provided by Pacific Coast Seed (Attachment B, Photographs 19-21). This seed mix included:

Pond *~1.09 acres*

Seed	Lbs. /acre
Eleocharis macrostachya	30
Eryngium vaseyi	20
Downingia pulchella	8
Juncus bufonius	20

Upland ~1.52 acres

Seed	Lbs. /acre
Elymus glaucus	12
Leymus triticoides	6
Nassella pulchra	8
Hordeum brachyantherum californicum	10
Grindelia camporum	4

The upland areas that include the sides of the pond and areas laterally our outside of the pond were hydroseed with the following seed mixture.

10. SUMMARY

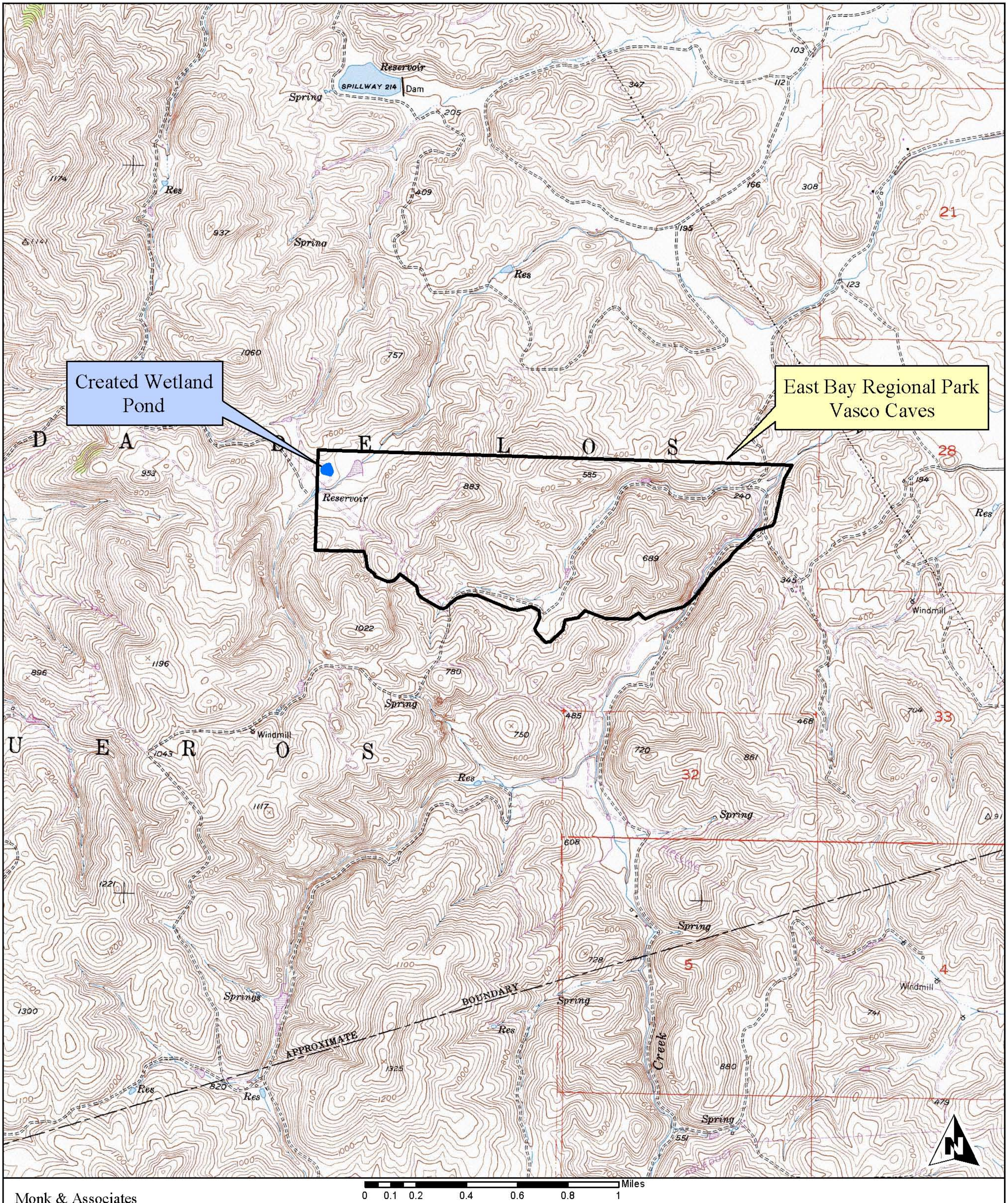
This report was prepared to document the “as-built” conditions of a pond that was constructed in September and October of 2008 in Vasco Caves Regional Park in Byron, Contra Costa County, California. This report verifies that the constructed pond meets the design specifications presented in a grading plan prepared by CBG (2008)(Attachment A, Sheet 2). This as-built report confirms that the minimum acreage of the constructed pond, measured one-foot below the spillway, is 1.09 acres (i.e., is the design acreage). The maximum constructed pond acreage measured at the invert elevation of the spillway (i.e., the maximum fill depth) is 1.16-acres.

END

Monk & Associates
Environmental Consultants
1136 Saranap Avenue, Suite Q
Walnut Creek, California 94595
(925) 947-4867

Figure 1. Vasco Souza I, HCP Pond
Project Site Regional Map
Contra Costa County, California

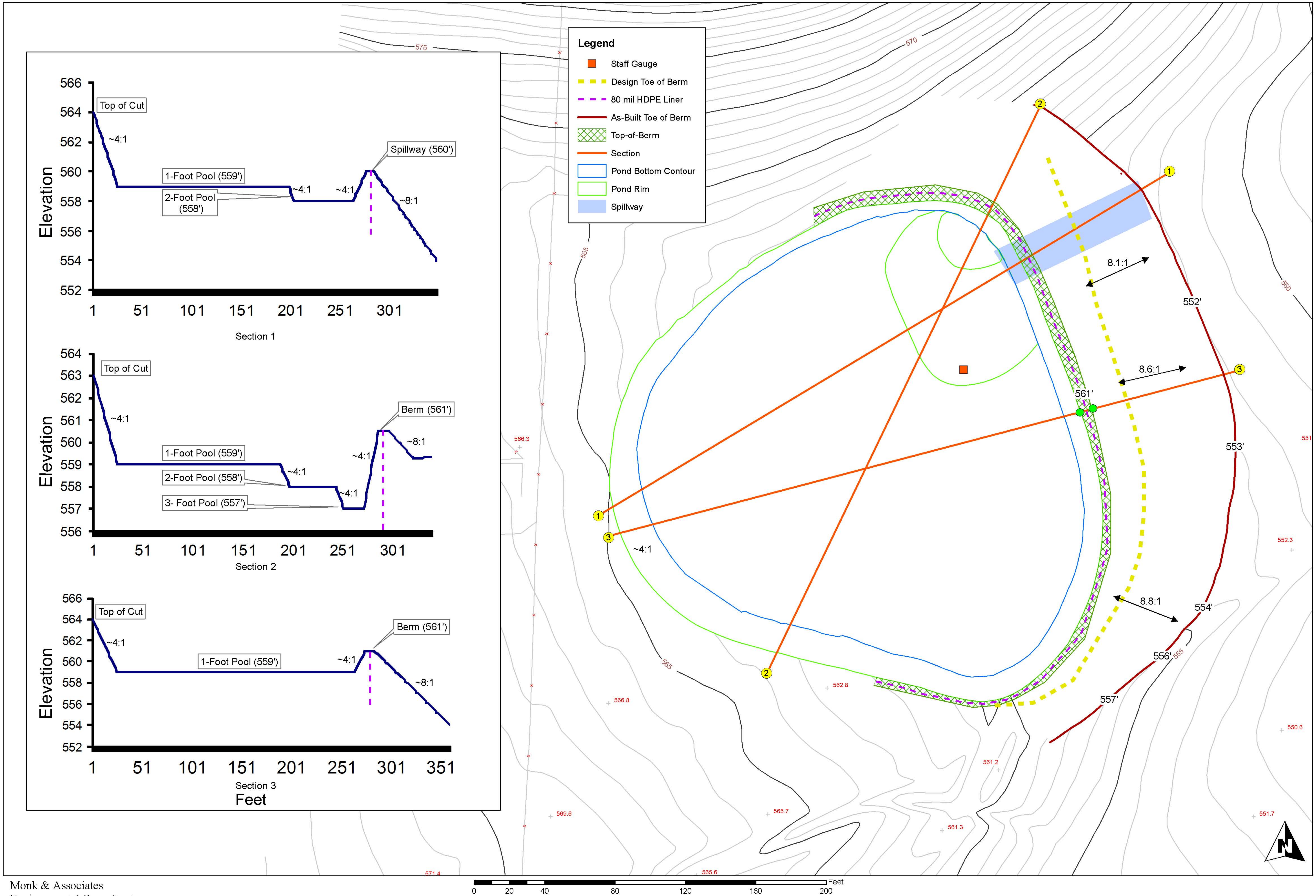
County: Contra Costa
Map Revision Date: June 11, 2009



Monk & Associates
Environmental Consultants
1136 Saranap Avenue, Suite Q
Walnut Creek, California 94595
(925) 947-4867

Figure 2. Vasco Souza I, HCP Pond
Project Site Location Map
Contra Costa County, California

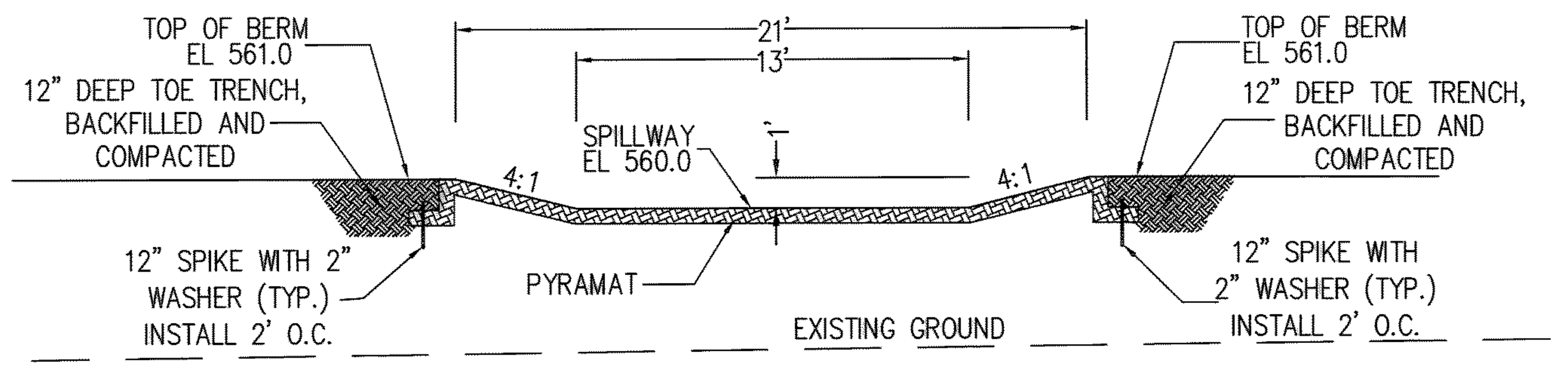
7.5-Minute Byron Hot Springs quadrangle
Topography Source: http://gis.ca.gov
Map Revision Date: November 1, 2010



Monk & Associates
Environmental Consultants
1136 Saranap Avenue, Suite Q
Walnut Creek, California 94595
(925) 947-4867

Sheet 1. As-Built Wetland
Vasco Souza I, HCP Pond

Scale: 1 inch = 40 feet
Map Revision Date: January 24, 2011

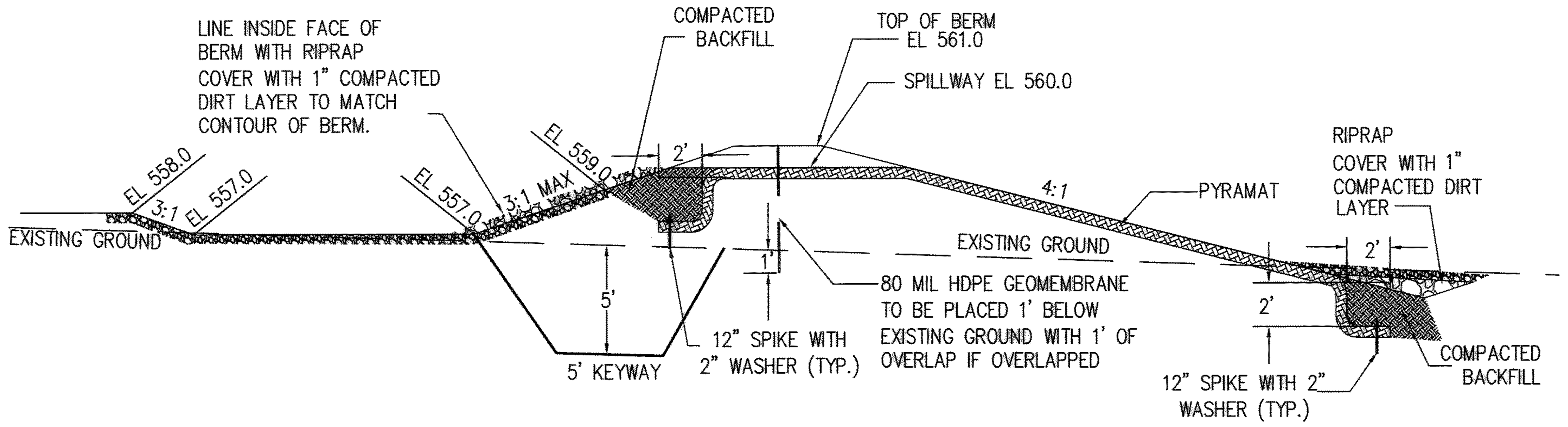


SECTION A-A

SCALE: 1"=5'

PYRAMAT NOTE:

THE GEOTEXTILE PYRAMAT SHALL BE ANCHORED ON 2-FOOT CENTERS WITHIN CREATED SWALES USING 12-INCH SPIKES FURNISHED WITH 2-INCH WASHERS. ALL OUTSIDE EDGES OF THE PYRAMAT SHALL BE ANCHORED WITH 12-INCH SPIKES IN 12-INCH DEEP TOE TRENCHES THAT SHALL BE BACKFILLED AND COMPACTED. AFTER PYRAMAT INSTALLATION IS COMPLETE, A 1-INCH LAYER OF LOAM SOIL SHALL BE SPREAD OVER THE PYRAMAT SURFACE TO FOSTER VEGETATION GROWTH.

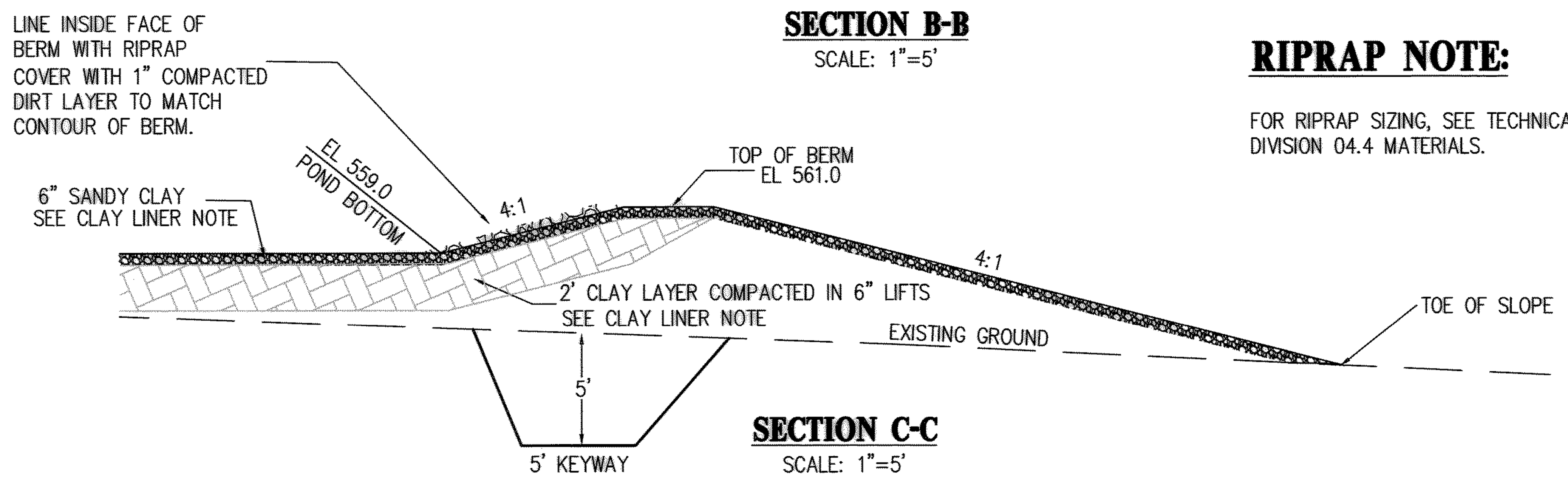


SECTION B-B

SCALE: 1"=5'

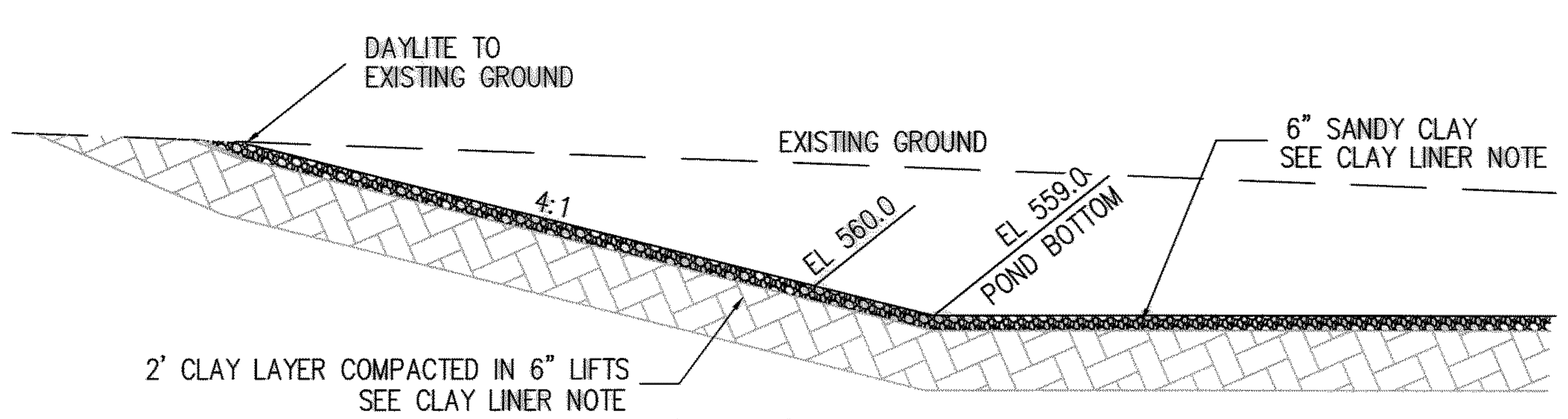
RIPRAP NOTE:

FOR RIPRAP SIZING, SEE TECHNICAL SPECIFICATIONS DIVISION 04.4 MATERIALS.



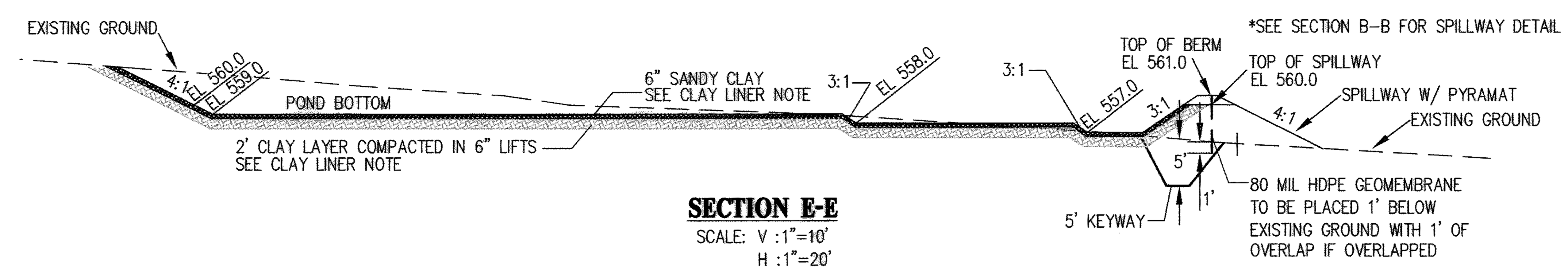
SECTION C-C

SCALE: 1"=5'



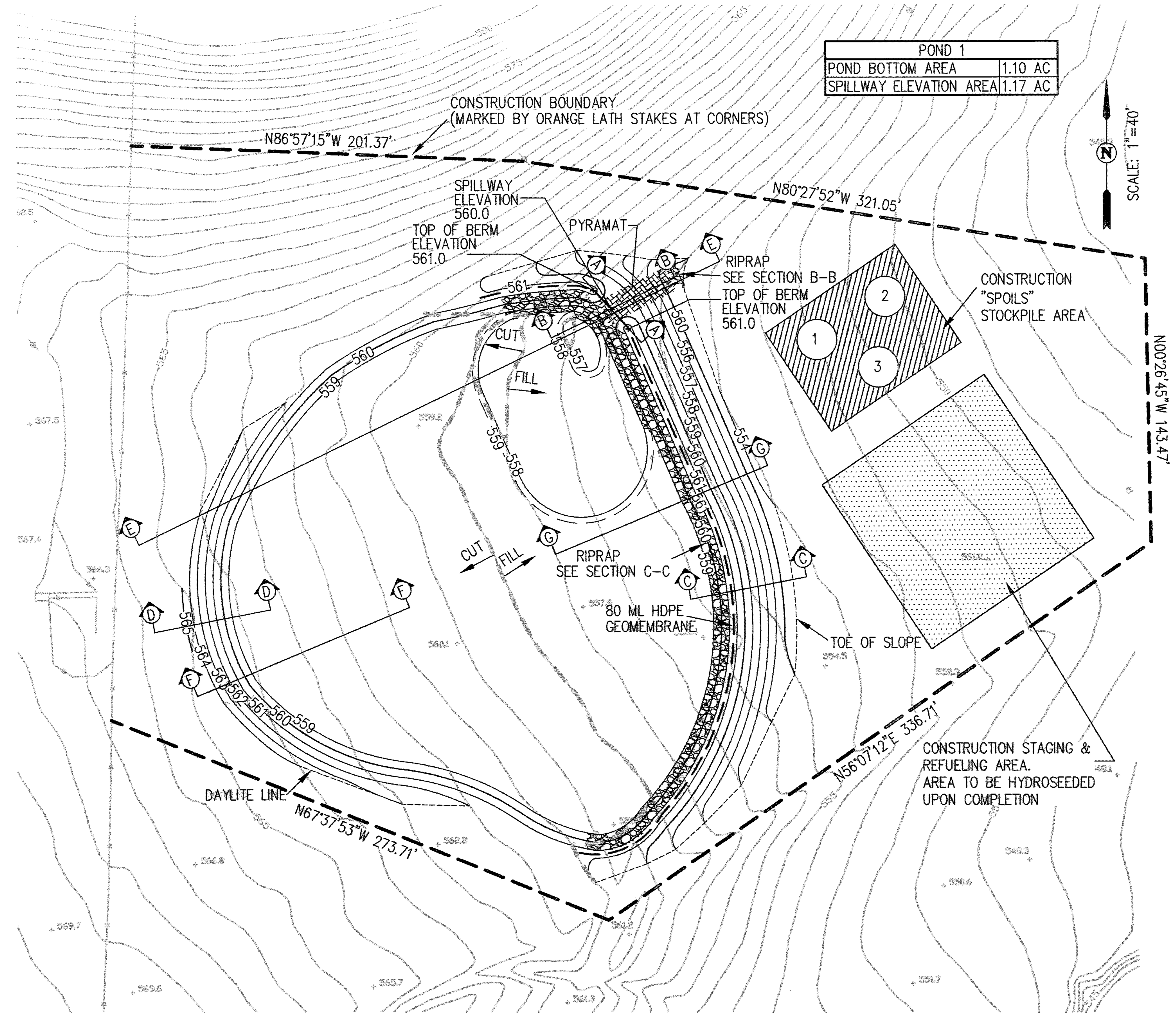
SECTION D-D

SCALE: 1"=5'



SECTION E-E

SCALE: V :1"=10'
H :1"=20'



STOCKPILE NOTE:

(1) 3" ORGANICS
(2) 2' LEAN CLAY
(3) 6" SANDY CLAY

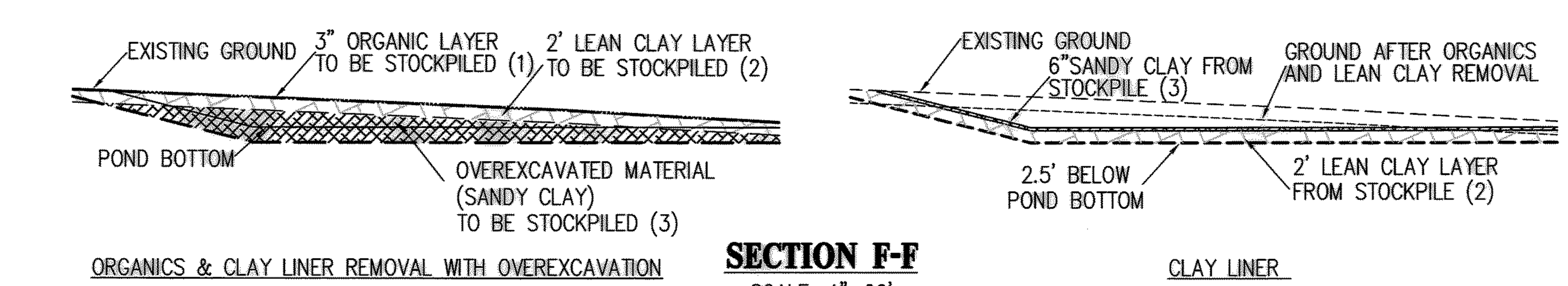
LEGEND

— — HDPE GEOMEMBRANE
RIPRAP
PYRAMAT

CLAY LINER NOTE:

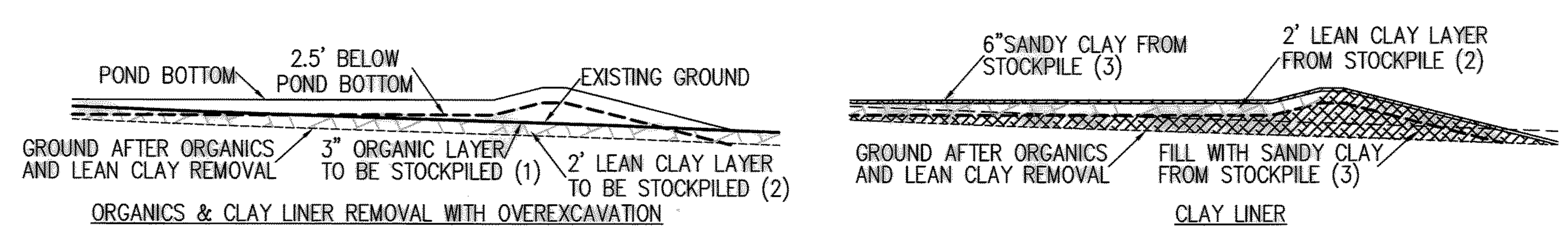
1. SCRAPE 3" ORGANIC LAYER OFF OF POND SITE & STOCKPILE.
2. STOCKPILE IN SEPARATE AREA 2' OF LEAN CLAY FOR CLAY LINER.
3. OVEREXCAVATE TO 2.5' BELOW POND FINISHED GRADE.
4. LINE OVEREXCAVATED POND BOTTOM AND SIDES WITH 2' OF THE STOCKPILED LEAN CLAY. COMPACTED CLAY LINER SHALL BE COMPACTED IN 6" LIFTS TO 90% RELATIVE COMPACTION.
5. COVER CLAY LINER WITH 6" OF SANDY CLAY FROM THE OVEREXCAVATED MATERIALS TO SEAL THE CLAY LINER.

SEE SECTION F-F AND G-G



SECTION F-F

SCALE: 1"=20'



SECTION G-G

SCALE: 1"=20'

EARTHWORK SUMMARY		
DESCRIPTION	CUT	FILL
3" ORGANICS	730 CY	–
2' LEAN CLAY	5870 CY	–
OVEREXCAVATION	2500 CY	–
ROUGH GRADE	–	8270 CY
SHRINKAGE	–	830 CY
TOTAL	9100 CY	9100 CY

NO.	BY	DATE	REVISIONS	APPROVAL

DATE: AUG 7,2008
DRAWN BY: C.I.H.
PROJ. ENGR: C.I.H.
PROJ. MGR: A.J.B.

cbg
Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
6111 Bollinger Canyon Road, Suite 150 • San Ramon, CA 94583
925-866-0322 • fax 925-866-8575
www.cbandg.com

VASCO CAVES SOUZA 1 HCP POND

GRADING PLAN

CONTRA COSTA COUNTY CALIFORNIA

SHEET NUMBER 2 OF 5

JOB NUMBER 1609-00

G:\1609\ACAD\GP\GP02.DWG

Photograph 1. Assessment of soil profiles prior to construction.

Photograph 2. Removal and stockpiling of 3” layer of organic topsoil.

Photograph 3. Keyway creation before installation of HDPE liner.

Photograph 4. Rough grading of pond basin.

Photograph 5. Use of laser level to determine basin elevation.

Photograph 6. Clay layer added in pond bottom.

Photograph 7. Clay layer added to side-slopes.

Photograph 8. Placement of 2-foot compacted clay layer in bottom of pond.

Photograph 9. Placement and compaction of sandy clay layer.

Photograph 10. Verifying slope during grading of side-slope of pond.

Photograph 11. Installation of HDPE liner in berm.

Photograph 12. Compaction of soil along HDPE liner in berm.

Photograph 13. Grading of 2’ and 3’ deep sections of the pond.

Photograph 14. Spreading of soil layer over Pyramat (geotextile) armament in exit spillway.

Photograph 15. Installation of rip-rap in front of berm.

Photograph 16. Finished exit spillway looking west to upper edge of pond.

Photograph 17. Finished pool and spillway looking northwest.

Photograph 18. Finished 1’, 2’ and 3’ foot deep sections looking south.

Photograph 19. Hydroseeding of pond seed mix.

Photograph 20. Spraying of upland seed mix.

Photograph 21. Entire pond after hydroseed mix application.

Photograph 22. Facing south, showing inundated 3' and 2' levels seen during 11/03/2008 site visit.