Wilson, Donna

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Sent: Monday, February 11, 2008 11:49 AM
To: 'Nick Marotta'; 'Brian Boutin'; 'Dennis Gehle'; 'Vernon Smith'
Cc: <brian.wooton@ncmail.net>; <donna.wilson@ncmail.net>; elizabeth.werner@ncmail.net
Subject: WCA Brownfield Road Phase 2 Design Hydro
Attachments: Preliminary notes on test boring data.pdf; WCA-D0004C SITE PLAN (1).pdf

Ladies and Gentlemen, here is a first draft test boring layout (drawing) and a summary of conditions as we understand them, with a plan for characterizing the bedrock in pursuit of a blasting program (text). We have performed control blasting in portions of the Phase 1 area with no subgrade damage (deep fracturing), per a careful documentation.

I would like for the Division to entertain the prospects of removing known isolated “caps” of rock along the ridgeline, provided we can characterize these as nested boulders, or something other than true bedrock. The earlier site investigations show an erratic, differential weathering pattern that indicates isolated occurrences of rock-like (hard) materials near the surface that are not continuous with the deeper bedrock.

I wanted to preview everyone in advance of our meeting tomorrow. I have us on the calendar for 1:30 at Oberlin Road (2/12/08). Call me if you cannot attend. Thank you.

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"When you can think of yesterday without regrets and tomorrow without fear, you're on the pathway to happiness" - Anonymous

Preliminary notes on test boring data

Near the old house in the east side of Phase 2, notice there was little to no cut originally planned in the vicinity of B-10. Borings B-10 and B-11 terminated (presumably at Auger Refusal) at approximately 5 feet. Meanwhile, B-12 terminated at 29 feet, less than 100 feet north. To the south of B-10 and B-11 the core boring C-3 exhibits a RQD = 95 percent (indicating competent rock) beginning at a depth of 8 feet, but the nearby borings B-13 and B-14 terminated at 14.5 feet and 30 feet, respectively.

Following the trend line westward to B-16 a similar pattern is seen, where B-16 terminated at 3 feet, while B-5 terminated at 42.5 feet approximately 100 feet north. Then consider the rock core data at C-1, which shows a RQD = 62 percent in the first core run beginning at a depth of 14 feet – this is weathered and fractured rock, experience at the site has taught us this is probably "rippable." Going back south, C-2 exhibits a RQD = 0 and a poor recovery beginning at 19 feet – this is not competent "bedrock", definitely "rippable" – yet nearby B-13 terminated at 14.5 feet (presumably "refusal") and other borings B-2 and B-14 terminated at 34 feet and 30 feet, respectively.

Obviously, the top of rock shows some variable weathering and, in my opinion, represents a ledge or vein of shallow hard material – I am hesitant to call it "bedrock" – that is surrounded by more deeply weathered rock. We need more detailed characterization (the intent of the upcoming investigation), but I can see an opportunity to increase airspace by lowering the grade in the vicinity of the old house if we can establish the shallow "rock" as an isolated "cap" or a "pinnacle", i.e., we need to demonstrate these areas as nested boulders or a ledge of hard material embedded in a matrix of soil or dense saprolite known locally as "partially weathered rock" to the satisfaction of the reviewers.

Division of Waste Management rules stipulate a vertical separation of 4 feet above "bedrock" – typically defined by "auger refusal", but we can see clearly here that the variability in the weathering pattern makes this definition inaccurate. I will suggest a couple of core borings in the vicinity of B-1/B-17 and B-10/B-11 for starters, to see what the RQD values tell us about the competency of the upper rock. We will also sink a core in the vicinity of B-16 to confirm the findings of C-1, located about 100 feet west. Several test pits and/or auger probes will help us define the limits of the "shallow rock" that might require blasting to optimize the airspace. We will focus similar attention on an area north of P-22 which shows a "surface rock exposure".

Earlier air drilling data in Cells 1B and 1C, and my own observations of the blasted surface in Cell 1B, clearly showed a "cap" or "ledge" of hard material near the surface, extending but a few feet in depth, underlain by softer (non-rock) materials for several more feet. The veins or ledges of hard materials were caused by differential chemistry in the original magma and episodic emplacement during multiple compression-tectonic events (this is late Paleozoic granite). I have observed this pattern of structurally aligned ledges of hard material throughout the region – sometimes they form isolated, often lenticular ridges above the landscape and "caps" in knolls or ridges when weathered out.

Proposed Site Development

Using the new data to delineate and characterize the rock “cap” in the vicinity of the old residence, develop a blasting plan that would allow neat-line cuts of 15 to 20 feet in the highest elevations.

A tentative cutoff criteria for establishing what will be blasted will be a REC and RQD in the 80% range – materials with values greater than that will be considered competent bedrock and, thus, will be subject to vertical separation criteria, except in isolated areas.

Blasting would be generally limited to “caps” and “ledges” within relatively isolated areas – not wide-scale blasting – with careful documentation of all activities.

Tentative Drilling Scope

The data clearly indicate that rock, not water, will be the governing criteria with respect to vertical separation for base grades in the southeastern side (higher elevations) of the Phase 2 site. Water will more likely be a factor in the northwestern side (lower elevations), although at the tentative grades shown in the original work, no ground water separation issues are currently anticipated.

I propose to drill the indicated pattern of proposed borings to refusal, setting piezometers where water is encountered. I anticipate some piezometers will be built in the lower elevations, screened just above refusal depths, regardless of whether water is encountered – we will examine soil staining and compile the historic ground water elevation data to make a determination of the Maximum Long-Term Seasonal High water levels prior to drilling these borings.

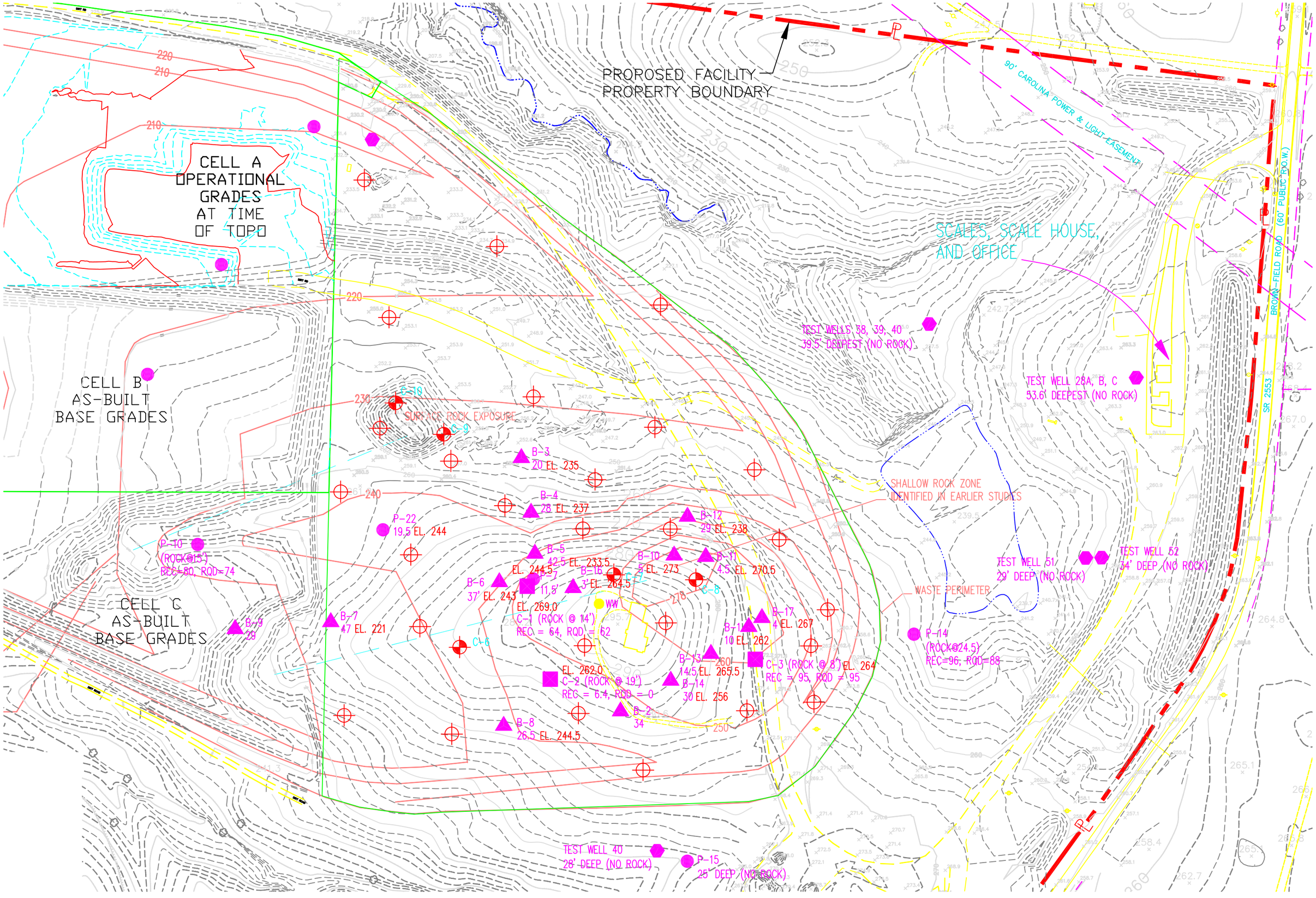
In the higher elevations, where we anticipate shallow rock to govern, I propose to take the borings to refusal but not build a piezometer – these borings will be sampled per ASTM D-1586 and an examination of soil chroma (evidence of ground water) will be performed during the drilling.

A few select core borings will be taken to verify the competency of the rock, i.e., the recovery (REC) and the rock quality determination (RQD).

The balance of our drilling program will be spent on auger probes to profile the top of rock (and perhaps a few air borings to gauge the competency of the rock) in the higher elevations.

The resulting investigation will provide much more than the minimum required one boring per acre with respect to the rock characterization, if we consider the earlier work.

The investigation will have less than one piezometer per acre for the twelve months of water level observation, but the piezometer data density will be adequate for the subsurface conditions.


PROPOSED FACILITY PROPERTY BOUNDARY
90' CAROLINA POWER & LIGHT EASEMENT
CELL A OPERATIONAL GRADES AT TIME OF TOPO
SCALES, SCALE HOUSE, AND OFFICE
BROWN FIELD ROAD (60' PUBLIC R.O.W.)
SR 2553
TEST WELLS 38, 39, 40
39.5' DEEPEST (NO ROCK)
TEST WELL 28A, B, C
53.6' DEEPEST (NO ROCK)
CELL B AS-BUILT BASE GRADES
C-10
SURFACE ROCK EXPOSURE
C-9
B-3
20 EL. 235
B-4
28 EL. 237
SHALLOW ROCK ZONE IDENTIFIED IN EARLIER STUDIES
P-22
19.5 EL. 244
B-12
29 EL. 238
P-10
(ROCK@15')
REC=80, RQD=74
B-5
42.5 EL. 233.5
B-10
5 EL. 273
B-11
4.5 EL. 270.5
TEST WELL 51
29' DEEP (NO ROCK)
TEST WELL 52
34' DEEP (NO ROCK)
B-6
37' EL. 243
EL. 244.5
11.5'
B-16
3' EL. 264.5
C-8
WASTE PERIMETER
EL. 269.0
C-1 (ROCK @ 14')
REC = 64, RQD = 62
WW
CELL C AS-BUILT BASE GRADES
B-9
29
B-7
47 EL. 221
C-6
B-17
4 EL. 267
B-1
10 EL. 262
P-14
(ROCK@24.5)
REC=96, RQD=88
B-13
14.5 EL. 265.5
C-3 (ROCK @ 8') EL. 264
REC = 95, RQD = 95
EL. 262.0
C-2 (ROCK @ 19')
REC = 6.4, RQD = 0
B-14
30 EL. 256
B-2
34
B-8
26.5 EL. 244.5
TEST WELL 40
28' DEEP (NO ROCK)
P-15
25' DEEP (NO ROCK)