

Appendix M

Detailed Seaside and Landside Investigation
of the Low Battery Seawall
Photographs, Field Notes, and Sketches



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
In the zone below the horizontal crack and above the mud line,
the concrete was generally of poor quality.



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
In this zone, the concrete was soft, deeply fissured, broken,
and easily removed with pneumatic hand tools.



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
Note the approximately one inch gap between the top of the pile
and the underside of the concrete seawall.



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
The top of the pile is approximately 82 inches (6'-10") below the seawall coping..



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
Four batter piles, one vertical pile, and the top portions of the
timber sheet piles and concrete veil were exposed at the
opening of the cavity.



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
A pair of exposed 5" wide x 12" deep timbers extended approximately
perpendicular to the face of the seawall. The timbers were bolted
to the vertical pile and its adjacent seaward batter pile.



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)

Inconsistent with the archival sketch on page 1 of Appendix F, the seaward edge of the timber deck platform terminated approximately 2 ½ feet landward from the seaward face of the seawall.



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)

The steel bolts, nuts, washers used in the connection of the 5" x 12" timber framing to the support piles were severely corroded. The ends of the bolted connections were heavily encrusted with a ferrous compound.



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
Considering the deep crevices in this localized area of the seaward face
of the concrete seawall, there was remarkably little marine
borer damage to these five exposed timber piles.



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
The ceiling of the cavity sloped irregularly downward from the seaward
opening. Further towards the interior of the seawall and above the
ceiling of the cavity, the concrete was substantially harder.



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)

Inconsistent with the archival sketch on page 1 of Appendix F, the seaward edge of the timber deck platform terminated approximately 2 ½ feet landward from the seaward face of the seawall. The archival sketch clearly indicates that the timber deck was to extend to the seaward face of the seawall to provide support for the full width of the base of the cast-in-place concrete seawall.

02023
FIELD
RPTS

1.8.24 Seawall @ 84 Murray Blvd.
Sheridan/Bennett CRE

3 diver crew

11 am - 5 pm, low @ 2:37 pm

50°, sunny, then cloudy

- exposed additional wood framing to view 5 piles, vertical and battered
- viewed 5x12 brackets, wood deck extremely soft below deck
- wood sheet piles ~~in tact~~ intact
took samples of wood sheet pile, pile hardware in good
- wood sheet piles are uniform, serious batter to slope
assembly
measured/sketches layouts etc.
- no further info needed this site
- ~~re back filled~~ w/ loose stone/rip rap.

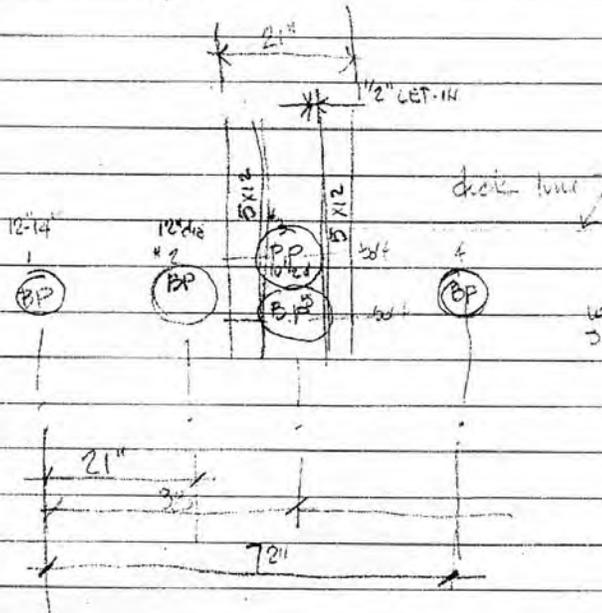
Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
Field Notes and Sketches

1804 SEAWALL
84 Murray

THE JAN 8 / 2004

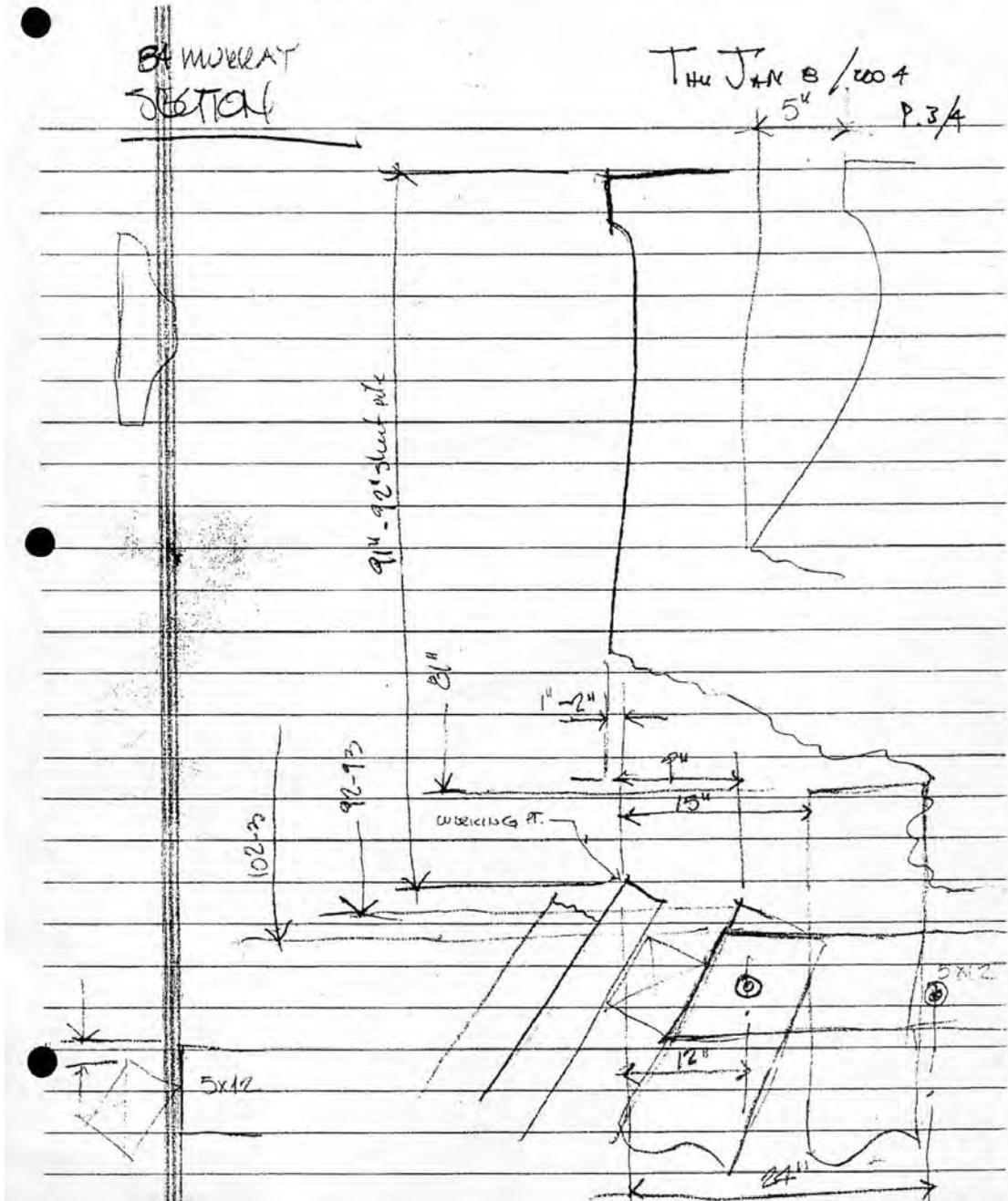
PP plumb pile
BP battered pile

P.2/4



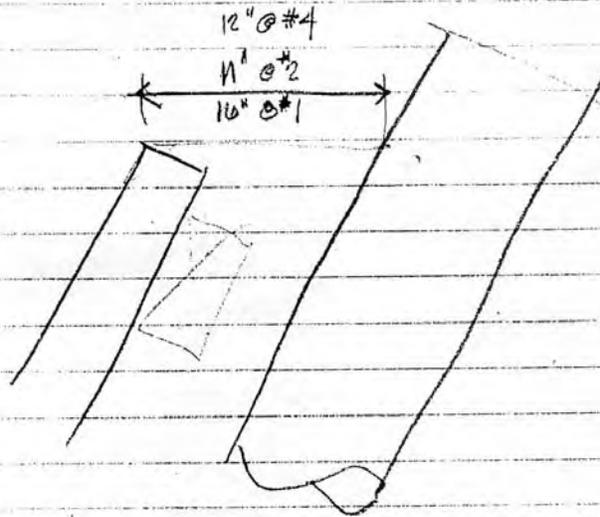
PLAN

Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
Field Notes and Sketches



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
Field Notes and Sketches

THU JAN 8 / 2004
P. 4 / 4



Detailed Seaside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
Field Notes and Sketches



Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)

The inspection revealed that the seawall construction was generally consistent with the archive drawings. The measured step down pattern on the landside closely correlated with the step down pattern indicated in the archive drawings.



Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
The inspection revealed that the seawall construction was generally
consistent with the archive drawings.



Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
The deck timbers appeared well preserved. However, the wood
fibers were very saturated with water and seemed “spongy”.



Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
The deck timbers appeared well preserved. However, the wood fibers were very saturated with water and seemed “spongy”.



Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
The bolts were very severely corroded from the ends with significant loss of metal cross section. A screwdriver shaft could be inserted into the ends of the bolts and pushed several inches into the interior length of the bolts.



Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)

A screwdriver shaft could be inserted into the ends of the bolts and pushed several inches into the interior length of the bolts.



Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)

The bolts were very severely corroded from the ends with significant loss of metal cross section. The remaining cross-section of a bolt was more comparable to a thin walled pipe than a to a solid round rod.



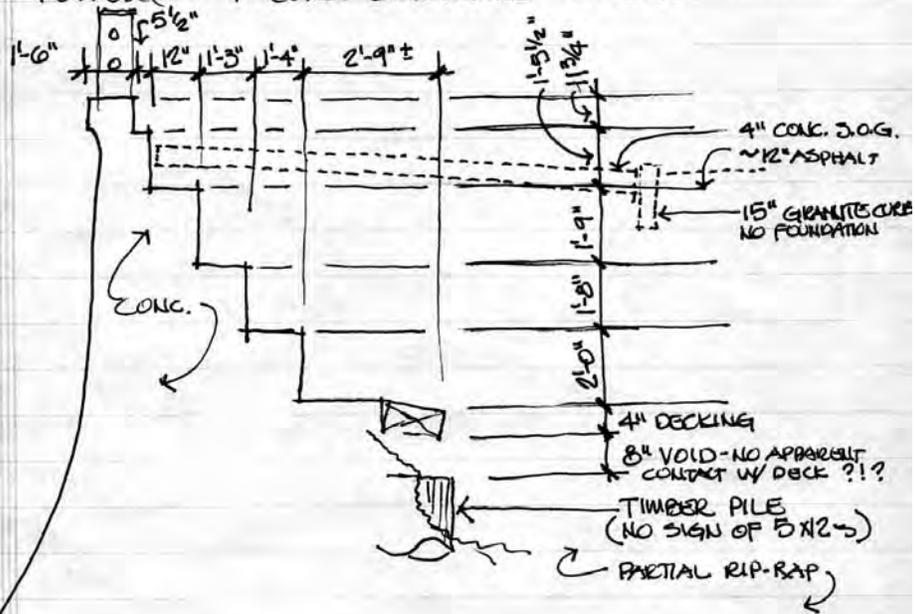
Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)

A pair of 5" wide x 12" deep timbers was bolted into the sides of the pile. The investigation revealed that approximately two inch wide by twelve inch deep notches had been cut into the sides of the piles to provide partial end support for the 5" wide x 12" deep timbers . At present, the ends of the 5" x 12" timbers are primarily supported by the notches cut into the sides of the support piles.

At best, the remnants of the bolted joint provided some nominal amount of rotational resistance for the connection.

3.1.04 J. SHERIDAN/C. BENNETT/J. ENGLISH @ 84 MURRAY BLV
pty city. ~60°, ~9am, falling tide

- City furnished equip. + personnel (Streets Div.)
backhoe, dump truck ~ 9:45 (Vax. truck later)
- existing drop inlet @ sta. 9+70' ± 9+74 - 9+64
- first seaside excavation was @ sta. 9+73' ±
visually confirmed area of seaside inspection
relative to landside
- removed 4" conc. sidewalk S.O.G.



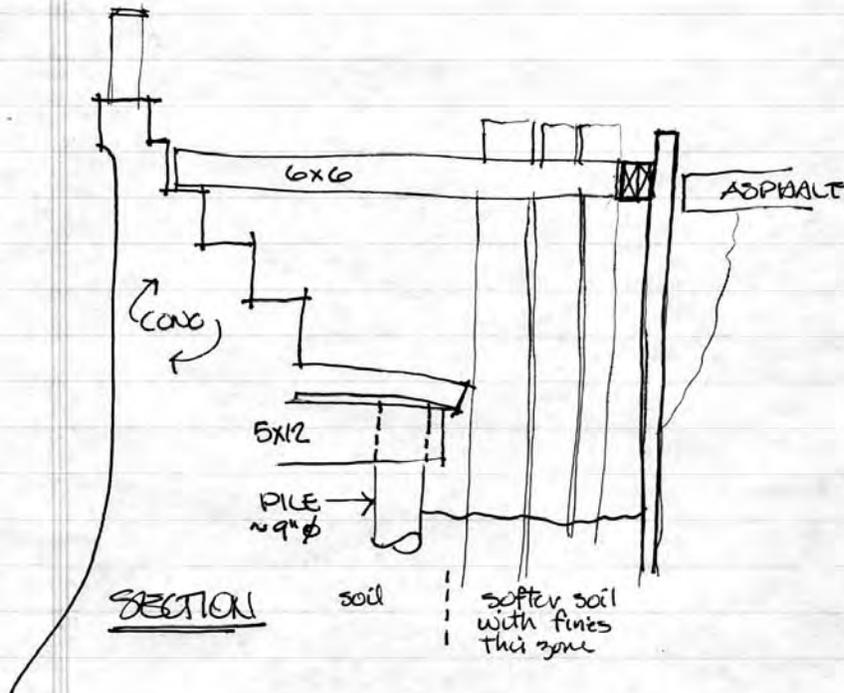
SECTION

- Center of excavation ~ sta. 9+70' ±
- west on inlet box, undisturbed
- removed sidewalk, curb, asphalt undisturbed
- generally good sand/soil under sidewalk,

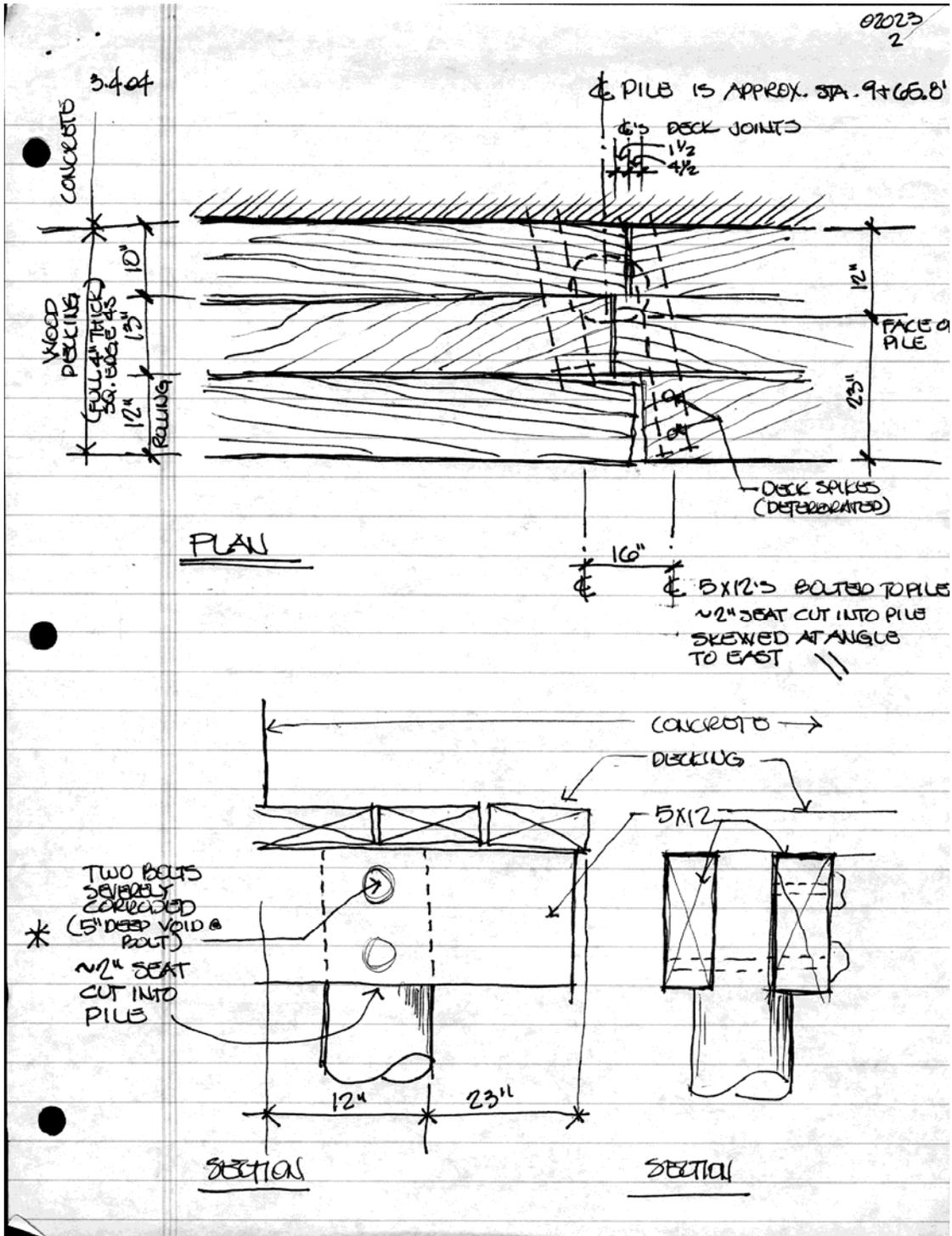
Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
Field Notes and Sketches

3.4.04 SHERIDAN/BENNETT/ENGLISH @ 84 MURRAY BLVD.
sunny, ~65°, 9a.m. falling tide

- City furnished equipment + personnel
backhoe, dump truck, voc truck, shoring (3x6, 6x6)
barrièades
- Reexcavated hole, expanded westward,
installed shoring along alphalt and
return ends



Detailed Landside Investigation of the Low Battery Seawall
Station 9+73 (84 Murray Boulevard)
Field Notes and Sketches



Detailed Landside Investigation of the Low Battery Seawall
 Station 9+73 (84 Murray Boulevard)
 Field Notes and Sketches

02023
3

3.4.04 NOTES

- material between 5x12's coarse sand w/ little clay, ~ course wet beach sand generally tight to underside of decking
- 4" decking, generally well preserved, but spongy, compressible, no signs of worms underside of decking eroded, very 'cheesy' texture, flush at bearing surface (on 5x12) but very soft. Decking is cut 43
- 5x12's appear solid, but bolts severely corroded, washers appear conical - difficult to confirm - Note 5" deep void at bolt holding 5x12 to pile!
- pile ~ 12" ϕ timber, generally sound, although exterior spongy.

closed opening ~ 4pm



Detailed Seaside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
Signs of deterioration include rust streaks from exposed and corroding steel
reinforcing bars in the coping and horizontal cracks below the coping.



Detailed Seaside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
Signs of deterioration include rust streaks from exposed and corroding steel reinforcing bars in the coping and horizontal cracks below the coping.



Detailed Seaside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
The vertical yellow line highlights the joint between adjacent concrete veil panels. The horizontal yellow line highlights the joint between the bottom of the seawall and the protective concrete veil. The concrete quality was very good and the joint between the bottom of the seawall and the protective concrete veil appeared sound.



Detailed Seaside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)

The yellow circle highlights the original cementitious patch covering the head of one of the steel bolts connecting the concrete veil to the underlying timber sheet pile and the timber waler. The original cementitious patch was removed. The exposed head of the steel bolt was found in very good condition and had very little corrosion.



Detailed Seaside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)

A core sample of the protective concrete veil was taken. The concrete was in very good condition

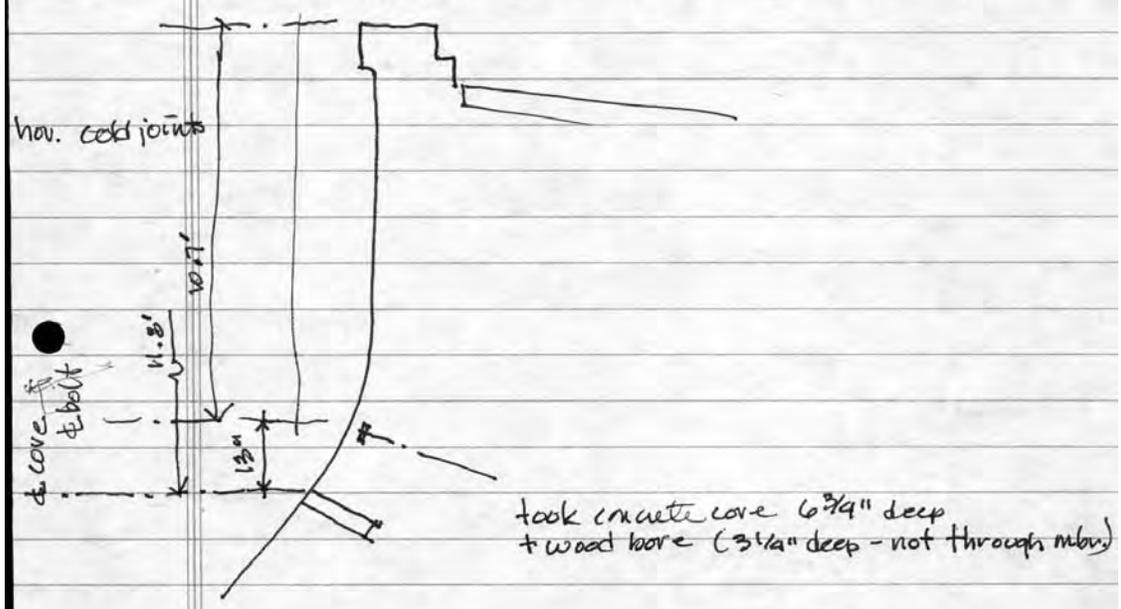


Detailed Seaside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
A core sample of the underlying timber sheet pile structure was taken.
The wood was in very good condition.

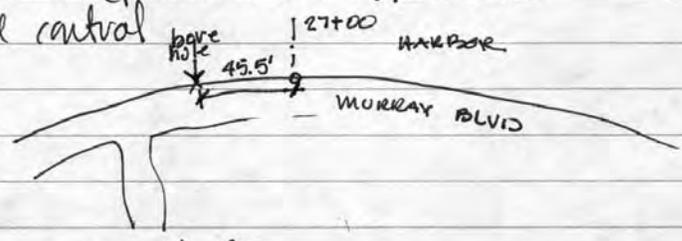
02023
FIELD
REPORT

1.19.04 JS, CMB, JRE/LC @ 34 Murray Blvd.
low tide ~ noon
Salmon - 3 man crew
~55, ptly. cldg.

'control area' no snow face defects



- difficult to see vertical 'veil' joints (design is 4')
- found one bolt (patch over intact), bolt intact
- horizontal control



FAX CMB / JS 1PS 722-1211 / 763-5392

Detailed Seaside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
Field Notes and Sketches



Detailed Landside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)

The landside investigation uncovered two support piles located approximately six feet apart. The associated 5" x 12" timber beams were connected to the sides of the piles near their tops. The construction was consistent with the archive drawings.



Detailed Landside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)

The platform deck timbers, the 5" x 12" timber beams, and the top portions of the piles appeared well preserved. Again, the wood fibers were very saturated with water and seemed "spongy"



Detailed Landside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)

The bolts, washers, and nuts used in the connection of the 5" x 12" timbers to the piles again were severely corroded. A screwdriver shaft was pushed in its full 12 inches into the interior length of one bolt.



Detailed Landside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)

The bolts, washers, and nuts used in the connection of the 5" x 12" timbers to the piles again were severely corroded. A screwdriver shaft was pushed six inches into the interior length of another bolt before any resistance could be felt.



Detailed Landside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
At the landside of the seawall, approximately midway between supporting piles, there was an approximately one inch gap between the underside of the concrete seawall and the timber support platform.



Detailed Landside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
At the landside of the seawall, approximately midway between supporting piles, there was an approximately one inch gap between the underside of the concrete seawall and the timber support platform.

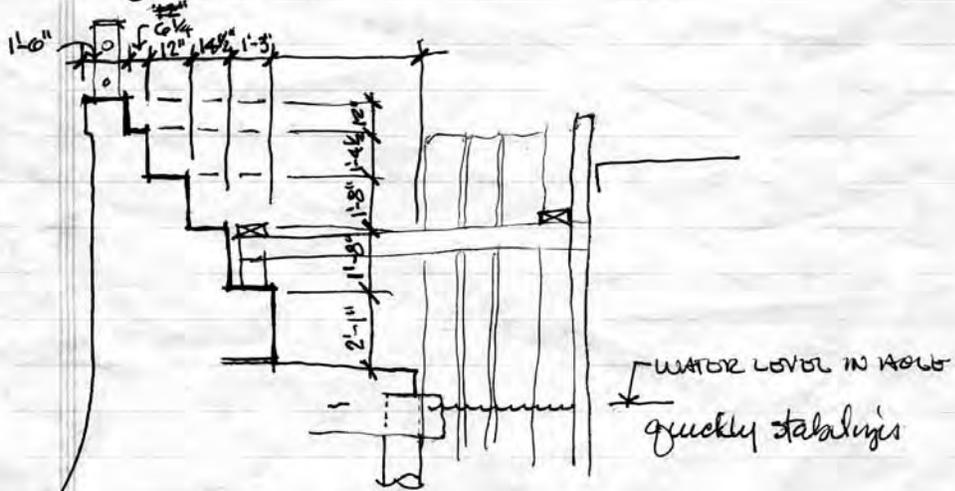
3.5.04

SHERIDAN/BENNETT/ENGLISH @ 32 MURRAY BLVD.

~ NOON, PRTY. CLDS. 70° WINDY, ABOUT LOW TIDES

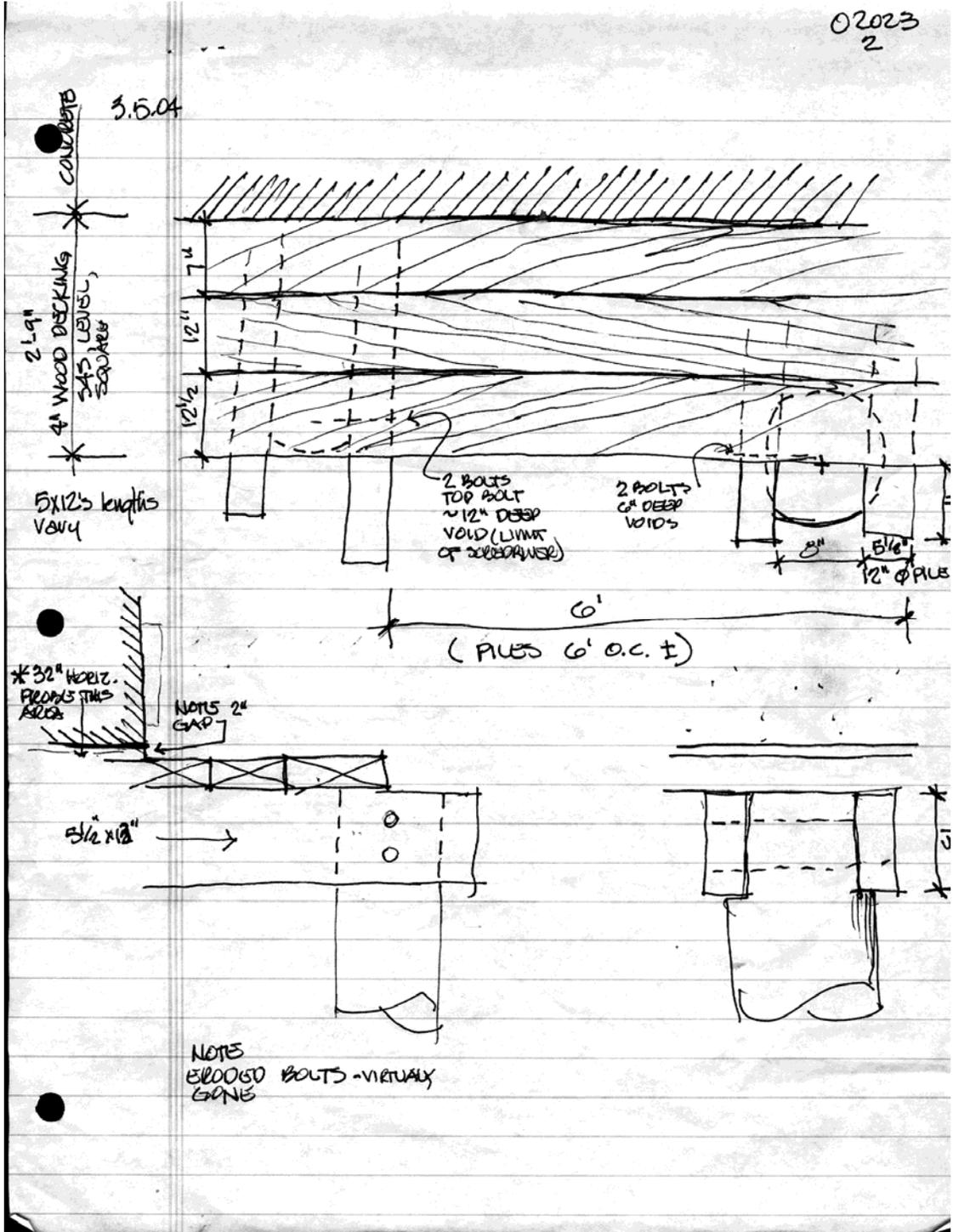
(EXCAVATION STARTED ~ 9 AM)

- City ~~also~~ equipment + personnel (backhoe, dump truck, vac truck, wd. shoring)
City has installed [wood shoring and excavated defined site, removed sidewalk 4" slab and stone curb concrete seawall virtually same as first excavation, virtually same as archived section drawing,
- top ^{tan} sand, then clayey sand
- note water level stabilizes ~ 2'-4" below underside of wood decking very rapidly after Vac Truck lowers level.



Detailed Landside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
Field Notes and Sketches

02023
2



Detailed Landside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
Field Notes and Sketches

02023
3

3.5.04

- sand surrounds 5x12's, potentially providing lateral support
- no large spikes in decking to 5x12's smaller heads visible.
- generally wood is very soft ~~to~~ 2" deep from exterior, note differences in spring/summer wood
- soil generally cokes unless more visually layered
- desire SC staff to view next pit (CMB)
- photos by Bennett & Sheridan
- apparent accretion at heads of bolts into 5x12's at piles - ~~under~~ unable to determine composition - ^{very} dark, rough edges, one mass over both bolts.

Detailed Landside Investigation of the Low Battery Seawall
Station 27+48 (32 Murray Boulevard)
Field Notes and Sketches



Detailed Seaside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)

The investigation was performed at the existing crack opening at the face of the seawall. The crack opening was approximately 6 inches wide and corroded reinforcing bars were exposed to view.



Detailed Seaside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)

In the past, attempts have been made to seal the wider portions of the cracks with patches of bricks and mortar.



Detailed Seaside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)

In this location, the timber sheet pile system extended approximately one foot above the timber platform and the protective concrete veil. The portions of the timber sheet pile system extending above the mud line were actively invested with marine boring organisms.



Detailed Seaside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)

The portions of the timber sheet pile system extending above the mud line were actively invested with marine boring organisms.



Detailed Seaside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)
A section of the timber sheet pile system extending above the mud line was removed. The timber was actively invested with marine boring organisms.



Detailed Seaside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)
A section of the timber sheet pile system extending above the mud line was removed. Note the marine boring organism tunnels and the resultant loss of timber cross section.

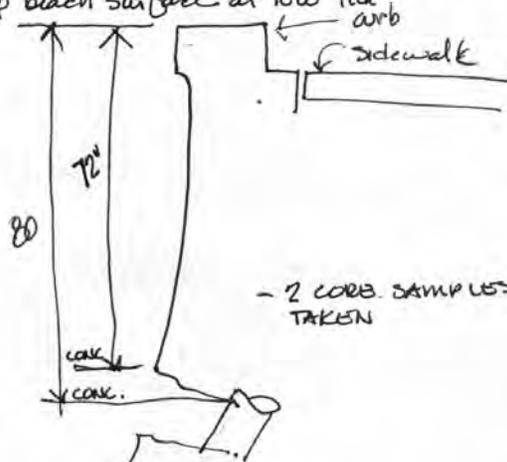


Detailed Seaside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)

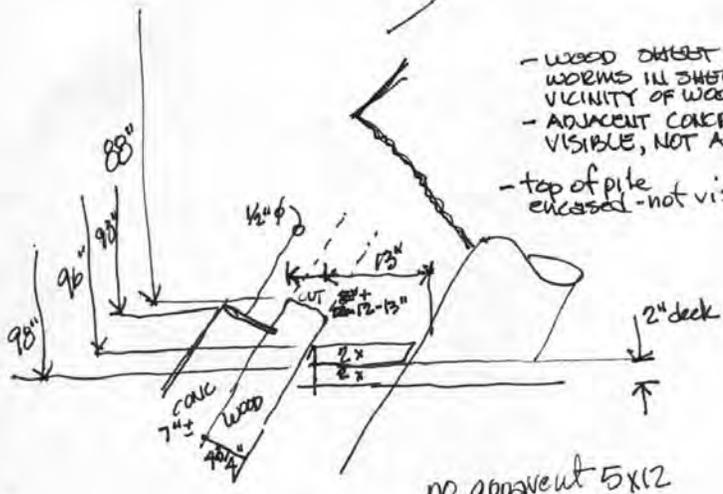
Where exposed to view, the perimeters of the top portion of the batter piles were soft and the exterior one inch of wood fiber was easily scrapped away. There was no apparent marine borer damage to the two batter piles. The timber platform deck, located just below the surface of the mud, had no apparent marine borer damage.

1.20.04 JS, CMB, HRS + Salmons D. Co. E crew
 sunny 45° low @ 12:00 pm
 tide

- station 43+50 (King + pt.)
- existing failed face
- adjacent area of concrete w/ brick patch, bulging
- aggregate generally uniform, ~ 2" sharp edged stone
- shell and rip rap beach surface at low tide

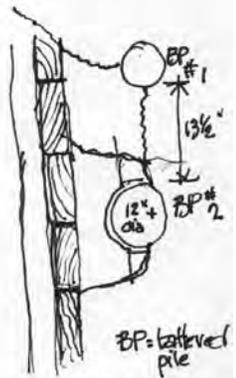


- 2 CORB. SAMPLES OF PILES
 TAKEN



- wood sheet pile top visible, bloody worms in sheet piles and mud in vicinity of wood
- adjacent concrete sheet piles' tops visible, not at uniform elevation
- top of pile encased - not visible

no apparent 5x12 frame thru pile



PLAN

SECTION

- backfilled opening with material from site, rip rap etc prior to high tide.

Detailed Seaside Investigation of the Low Battery Seawall
 Station 43+50 (near White Point Garden)
 Field Notes and Sketches



Detailed Landside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)
“The Boulevard Extension” also appears to have been constructed to the
dimensions and configuration presented in the archival design
sketch on page 1 of Appendix F.



Detailed Landside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)

The landside excavation exposed the timber support platform and the top portion of a vertical support pile connected to a pair of 5" wide x 12" deep timber beams.



Detailed Landside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)

The underside of the timber platform had considerable marine borer damage believed to have occurred during the original construction phase when the platform extended over then-open water.



Detailed Landside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)
It was noted that the topside of the timber platform did not have any marine
borer damage.



Detailed Landside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)
Again, the 5" x 12" timber beams and the top portion of the pile were saturated
with water and seemed "spongy". The spongy fibers extended approximately
an inch inward from the faces of the timbers before solid resistance could be felt.



Detailed Landside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)
Similar to the other landside investigations, the steel bolts, nuts, and washers used in the connection of the 5" x 12" timber framing to the support piles were severely corroded. The ends of the bolted connections were heavily encrusted by a ferrous compound.



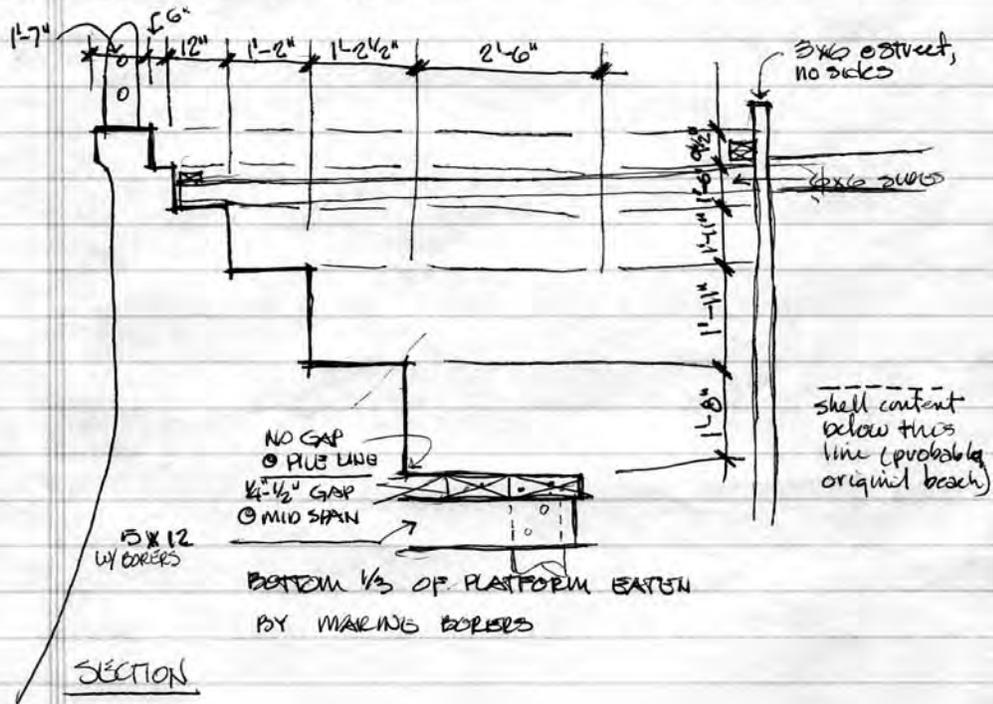
Detailed Landside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)
The interior of the lengths of the bolts had corroded deeply inward from the ends. Here also, a shaft of a screw driver could be inserted into the ends of the bolts and pushed several inches into the interior length of the bolt.

02023
FIELD
NOTES
1

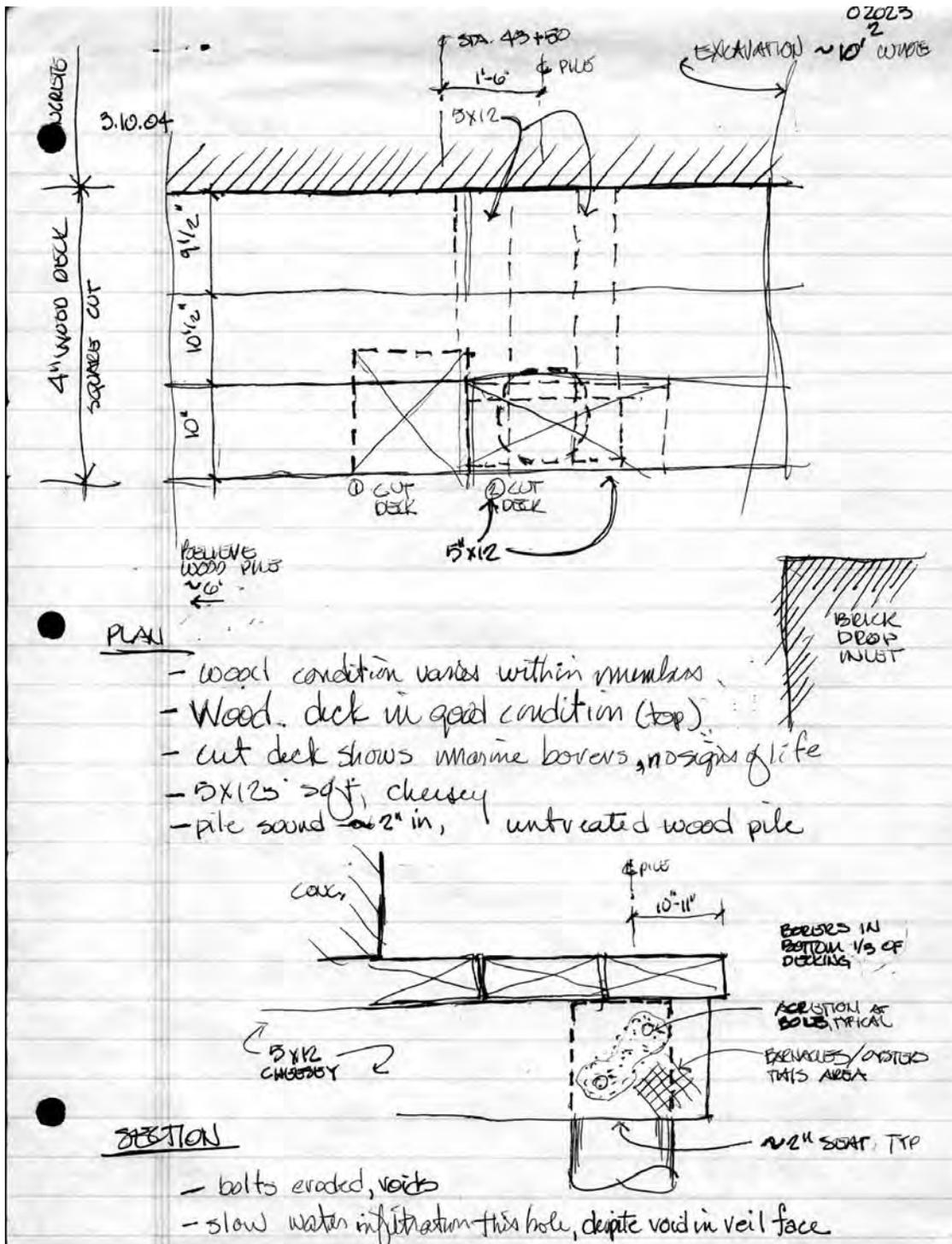
3.10.04 C. BARNETT, J. SHERIDAN, URIS @ STA. 43+50
12 NOON, SUNNY, ~55-60, HIGH TIDES, FALLING

- City provided equipment (backhoe, back truck, dump truck, shoring) and personnel - hole partially excavated, wood shoring being installed

- dark soil, ^{sandy (fine) CL or SC} clayey - trace shell @ inlet box (snail)
- operator indicated just few inches sand under 4" conc. sidewalk
- curbstone with foundation



Detailed Landside Investigation of the Low Battery Seawall
Station 43+50 (near White Point Garden)
Field Notes and Sketches



Detailed Landside Investigation of the Low Battery Seawall
 Station 43+50 (near White Point Garden)
 Field Notes and Sketches