



**MEMORANDUM**

TO: Vision Winter, Esq., O'Melveny and Myers LLP  
FROM: Patrick O. Shires, Cotton, Shires and Associates, Inc.  
RE: **Millennium Tower Shoring Wall Exploration August 9 through 17, 2017**  
DATE: August 24, 2017

From August 9 through 17, 2017, the westernmost wall of the podium parking garage Level B3 at 301 Mission Street was cored to explore between the top of the shoring wall behind the garage wall in the area just below the base of the Tower pile cap. Smaller diameter drain holes were drilled below larger diameter exploration holes (where needed) at nine exploration locations (PH-1 through PH-9, with PH-6 being the only location on Level B2 to explore the garage wall to pile cap section) – see attached Figure 1, Garage Level B3 Coring Location Map, for location of cores.

Cotton Shires and Associates, Inc. (CSA) was on site during the coring activities from Wednesday, August 9, 2017 through Thursday, August 17, 2017. Joe Durdella, Certified Engineering Geologist, from CSA was on site during all the coring activities except for Monday, August 14, 2017, when Sam Nolan, Registered Civil Engineer, from CSA observed the coring activities. All of the 3-inch diameter cored drain holes were completed by Friday, August 11, 2017, in order to allow the groundwater behind the garage wall to lower prior to coring the larger diameter (6-inch and 12-inch) holes on Monday, August 14, 2017. In general, many voids were observed in the garage wall shotcrete especially behind structural rebar. In most cases, polymeric foam (presumably used for waterproofing) was observed filling these void spaces. Ports were observed in some of the cores that indicated that at least a portion of this foam was likely injected following placement of the shotcrete rather than as an admixture to the shotcrete mix. In the majority of the cores, a vertical metal stay form was observed on which shotcrete was applied and in some cases the metal stay form was observed one to two inches behind the face of the shoring wall I-beams.

**PH1 Location:** Penhall Concrete Services (Penhall) cored 3-inch diameter PH1.0 at the end of the day on Wednesday, August 9, 2017. CSA was not present during the coring of this hole, but logged the extruded core on Thursday, August 10, 2017. A packer was observed in this 3-inch drain hole when CSA arrived on site Thursday morning and little to no water was flowing from a hose bibbed drain pipe secured by the packer. 3-inch diameter drain holes PH1.1 and PH1.2 were cored and logged on

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Thursday, August 10, 2017. PH1.1 produced approximately 20 gpm of water (visual estimation) immediately following coring and PH1.2 was dry following completion of coring.

PH1 was cored with a 12-inch diameter core barrel on Monday, August 14, 2017, and extended with two, 3-inch diameter cores on Monday, August 14, 2017, and Wednesday, August 16, 2017. No water was observed seeping from these holes following coring.

**PH2 Location:** Penhall cored 3-inch diameter drain holes PH2.0, PH2.1 and PH2.2 on Thursday, August 10, 2017. PH2.2 produced approximately 30 gpm of water (visual estimation) immediately following coring and PH2.0 and PH2.1 were dry following completion of coring.

PH2 was cored with a 6-inch diameter core barrel on Tuesday, August 15, 2017. No water was observed seeping from this hole following coring.

**PH3 Location:** Penhall cored PH3.0 the morning of Wednesday, August 9, 2017. CSA was not present during the coring of this hole, but logged this core on Friday, August 11, 2017. A packer was observed in this 3-inch drain hole when CSA arrived on site Wednesday afternoon and 7.5 gpm (measured with a 5-gallon bucket) was flowing from its hose bibbed drain pipe secured by a packer. 3-inch diameter drain hole PH3.1 was cored on Wednesday, August 9, 2017. PH3.1 was dry following completion of coring.

PH3 was cored with a 12-inch diameter core barrel back to the shoring wall I-beam on Friday, August 11, 2017, and extended with a 3-inch diameter core barrel above and beyond the face of the shoring wall I-beam. No water was observed seeping from this hole following coring.

**PH4 Location:** Penhall cored 3-inch diameter drain holes PH4.0 and PH4.1 on Friday, August 11, 2017. PH4.0 produced approximately 4-6 gpm of water (visual estimation) immediately following coring and PH4. 1 produced less than 1 gpm of water (visual estimation) immediately following coring.

PH4 was cored first with a 12-inch diameter core barrel to the face of the shoring wall I-beam and then with a 6-inch diameter core barrel on Tuesday, August 15, 2017. No water was observed seeping from this hole following coring.

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**PH5 Location:** Penhall cored 3-inch diameter drain holes PH5.0 and PH5.1 on Friday, August 11, 2017. PH5.0 and PH5.1 produced less than 1 gpm of water (visual estimation) immediately following coring.

PH5 was cored with a 6-inch diameter core barrel on Wednesday, August 16, 2017. A minor amount of water was observed seeping from this hole following coring.

**PH6 Location:** Penhall cored 3-inch diameter hole PH6.0 on Monday, August 14, 2017, on parking garage Level B2. PH6.0 consisted of a core through the shotcrete garage wall and into the concrete pile cap below the high-rise portion of the building. An approximately 2-inch thick section of polymeric joint filler was observed between the two sections of concrete. Striations were visible on the surface of this filler. No water was observed flowing from this hole following completion of the coring.

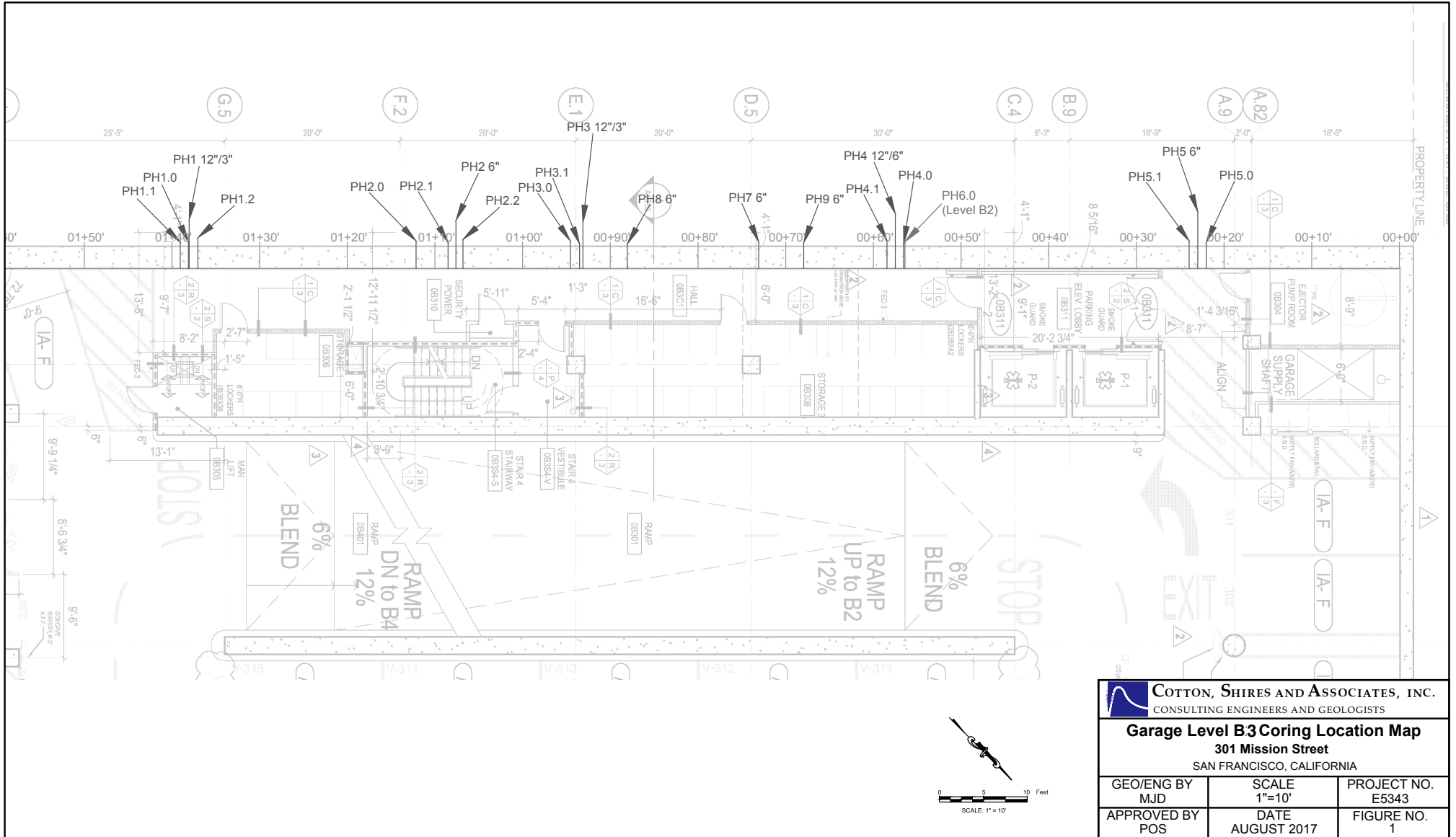
**PH7 Location:** Penhall cored 6-inch diameter hole PH7 on Wednesday, August 16, 2017. The top of the shoring wall I-beam was not observed at the back of this hole. No water was observed flowing from this hole following completion of the coring.

**PH8 Location:** Penhall cored 6-inch diameter hole PH8 on Wednesday, August 16, 2017. The top of the shoring wall I-beam was observed at the back of this hole. No water was observed flowing from this hole following completion of the coring.

**PH9 Location:** Penhall cored 6-inch diameter hole PH9 on Wednesday, August 16, 2017. The top of the shoring wall I-beam was observed at the back of this hole. No water was observed flowing from this hole following completion of the coring.

Following the expert committee inspection on Thursday, August 17, 2017, Jason Stone (LERA), Jim Eggers (Nicholson Construction Company), and Joe Durdella (CSA) discussed that larger diameter core holes PH4, PH5, PH8, and PH9 would remain open for potential future purposes and that Nicholson Construction Company (NCC) would install larger diameter packers in these holes to prevent groundwater seepage through the garage wall. It was discussed that larger diameter core holes PH1, PH2, PH3, and PH7 would be closed up using hydraulic cement pumped through a former mounted flush with the garage wall face and pumped through a port until it returns through an escape port on the former. At the request of CSA, Jim Eggers (NCC) agreed to leave the 3-inch diameter drain holes open, but install packers towards the back of the holes for future drainage or pressure monitoring purposes. CSA plans to install vibrating wire piezometers in 3-inch drain holes PH1.1, PH2.2, PH3.0, PH4.0, and PH5.1 either sooner or when it is time to close these holes permanently.

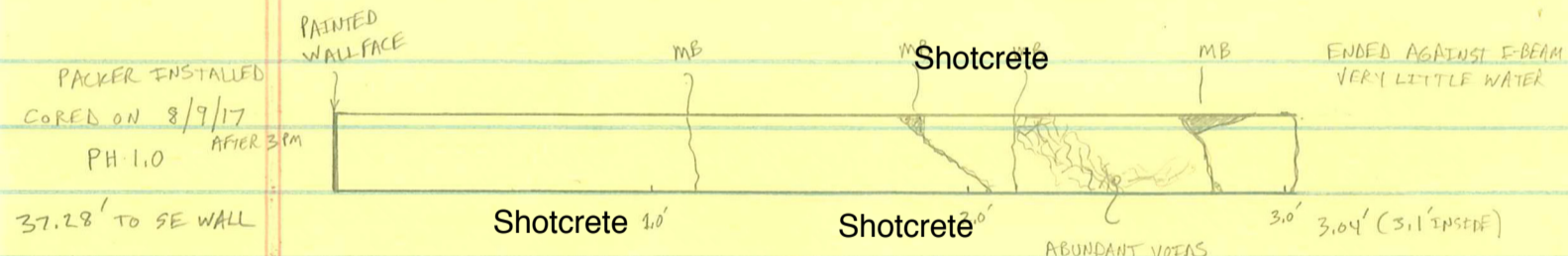
Attached is Figure 1, Garage Level B3 Coring Location Map (which depicts the locations of the exploratory core holes as well as the depth of coring and also shows the location of the core in garage Level B2) as well as CSA's field logs of core/core holes and photographs of the core/core holes.





# PH1.0: 3" Diameter Core Log

Scale: 1" = 0.6'



PACKER INSTALLED  
CORED ON 8/9/17  
PH-1.0 AFTER 3 PM

37.28' TO SE WALL

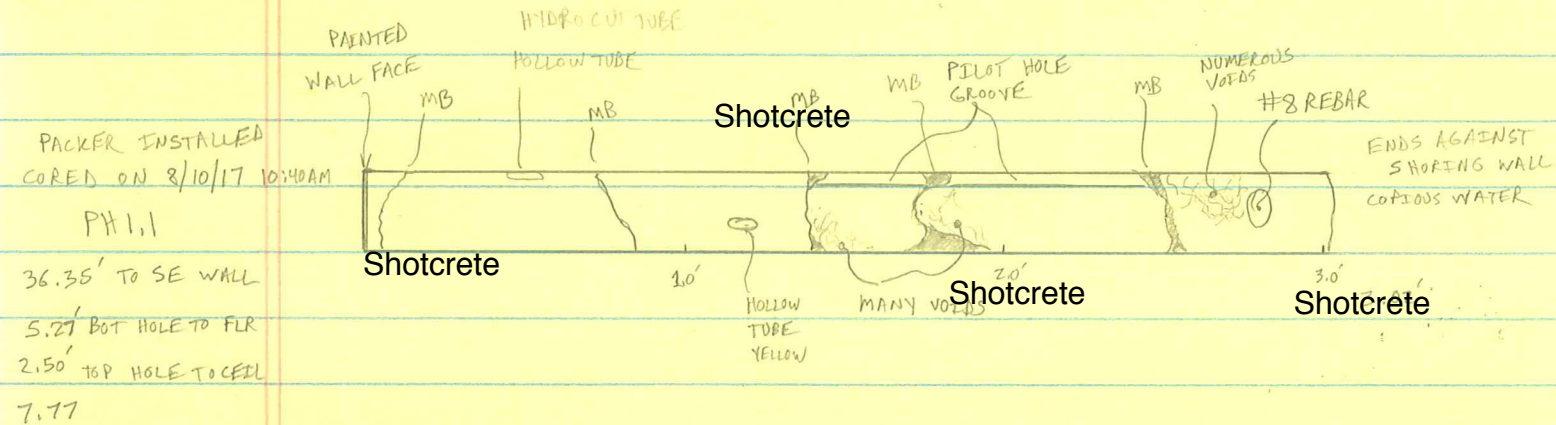
5.05' BOT TO FLR

2.76' TOP TO CEIL

Logged on 8/10/17

# PH1.1: 3" Diameter Core Log

Scale: 1"=0.6'

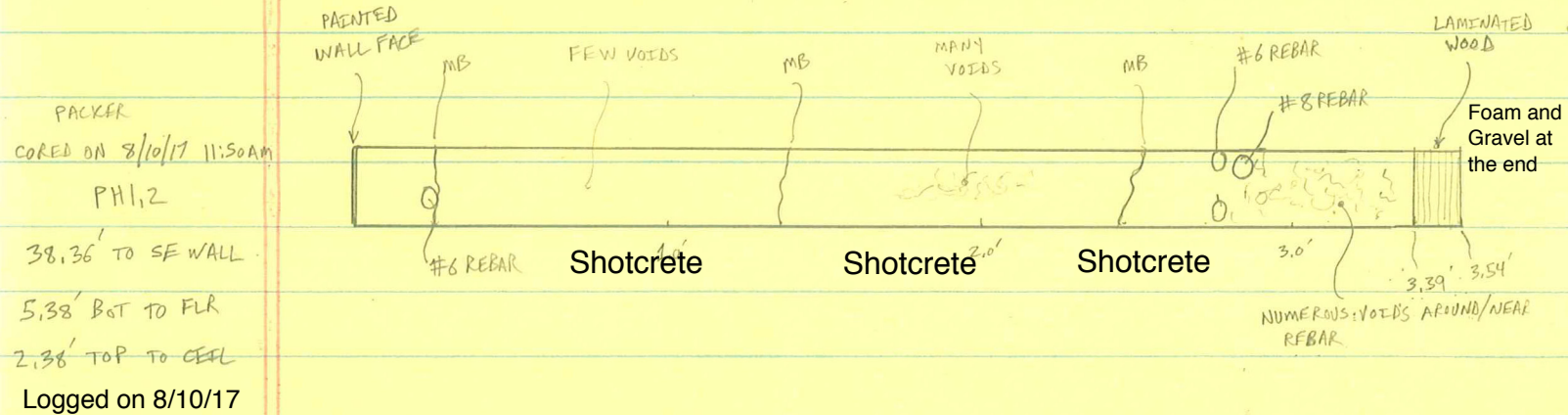


Logged on 8/10/17



# PH1.2: 3" Diameter Core Log

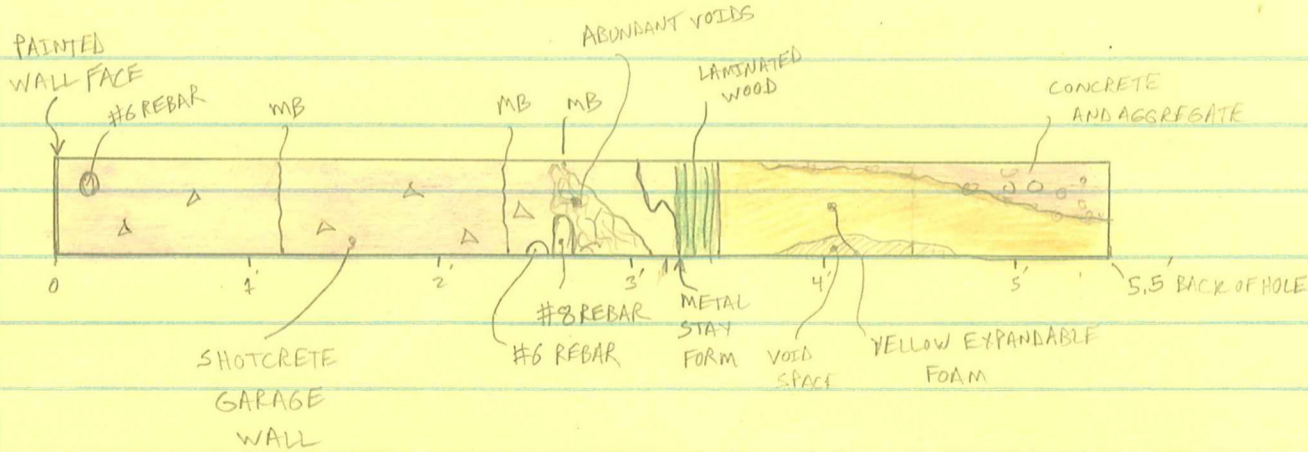
Scale: 1"=0.6'



# PH2: 6" Diameter Core Log

Scale: 1" = 1'

CORED ON 8/15/17  
LOGGED ON 8/16/17  
PH2 6"  $\phi$  CORE  
ANGLED 3° UP





# PH2.1: 3" Diameter Core Log

Scale: 1"=0.6'

NO PACKER

CORED ON 8/10/17 1:37PM

P2.1

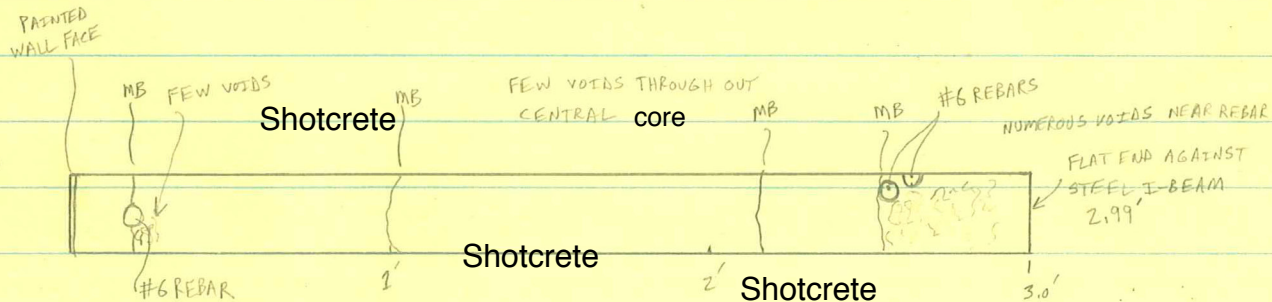
66.9' FROM SE WALL

5.46' BOT HOLE TO FLR

2.29' TOP HOLE TO CEIL

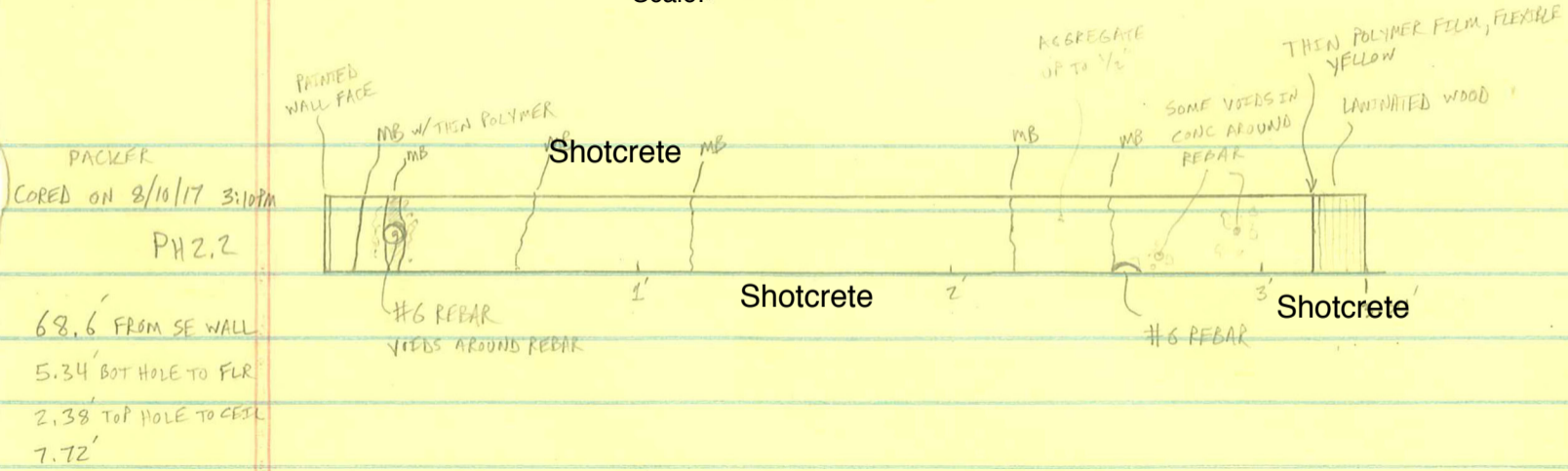
7.75

Logged on 8/11/17



# PH2.2: 3" Diameter Core Log

Scale: 1" = 0.6'



68.6' FROM SE WALL

5.34' BOT HOLE TO FLR

2.38' TOP HOLE TO CEIL

7.72'

Logged on 8/11/17

# PH3: 12"/3" Diameter Core Log

SCALE: 1" = 1'

PAINTED WALL FACE

GARAGE WALL SHOTCRETE

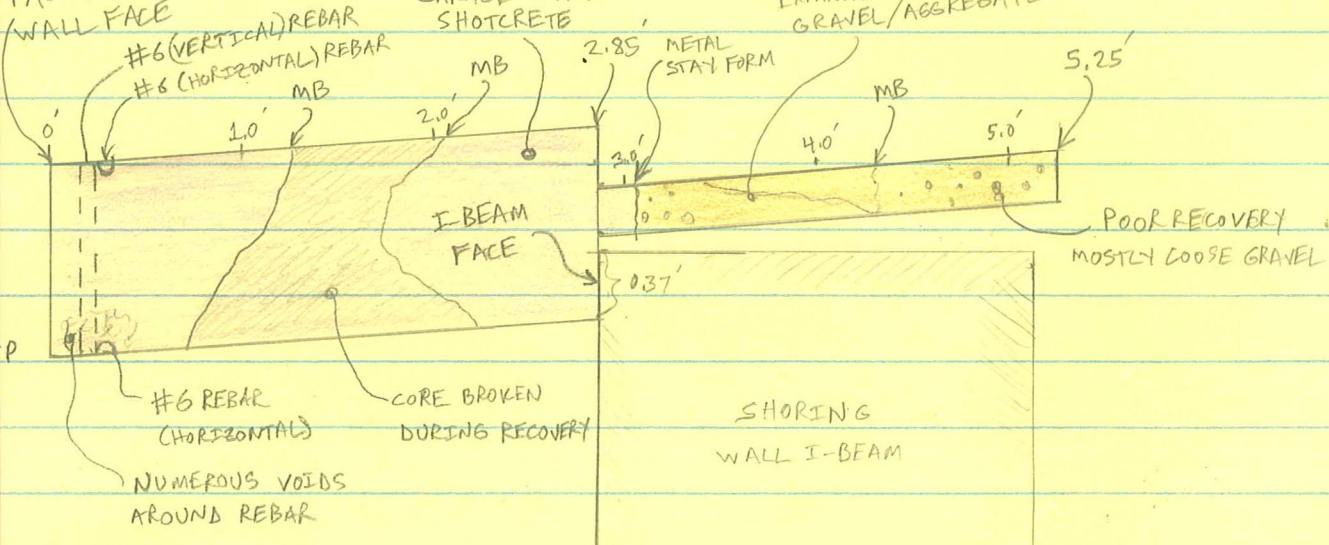
EXPANDABLE MIXED WITH GRAVEL/AGGREGATE

PH 3 12"/3" CORE

CORED ON 8/11/17

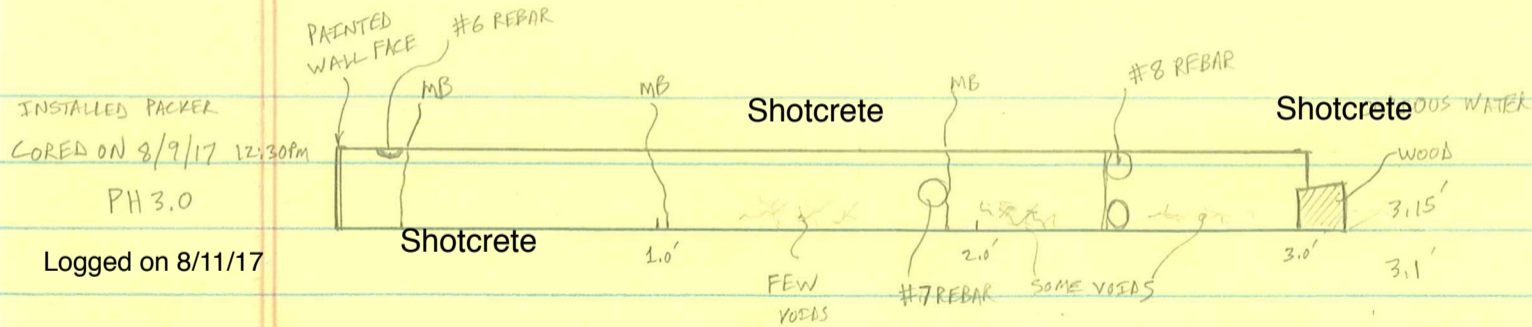
LOGGED ON 8/15/17

CORE INCLINED 4° UP



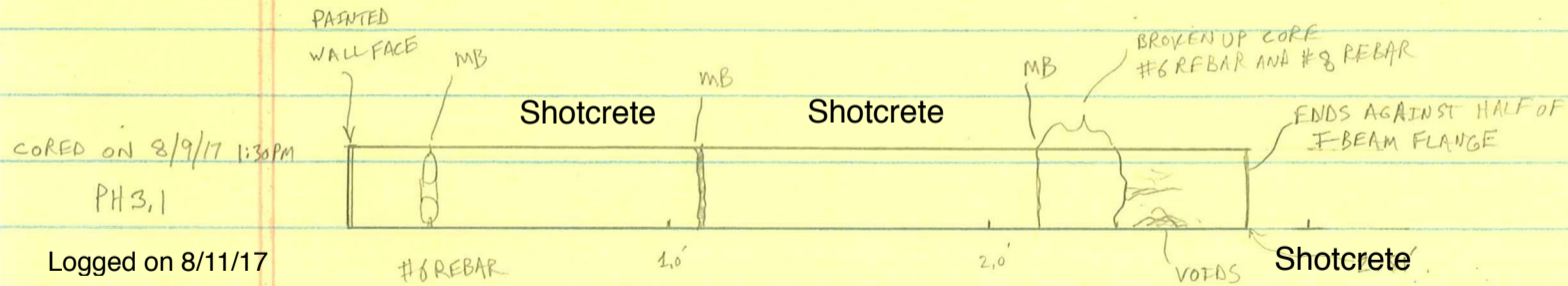
# PH3.0: 3" Diameter Core Log

Scale: 1" = 0.6'

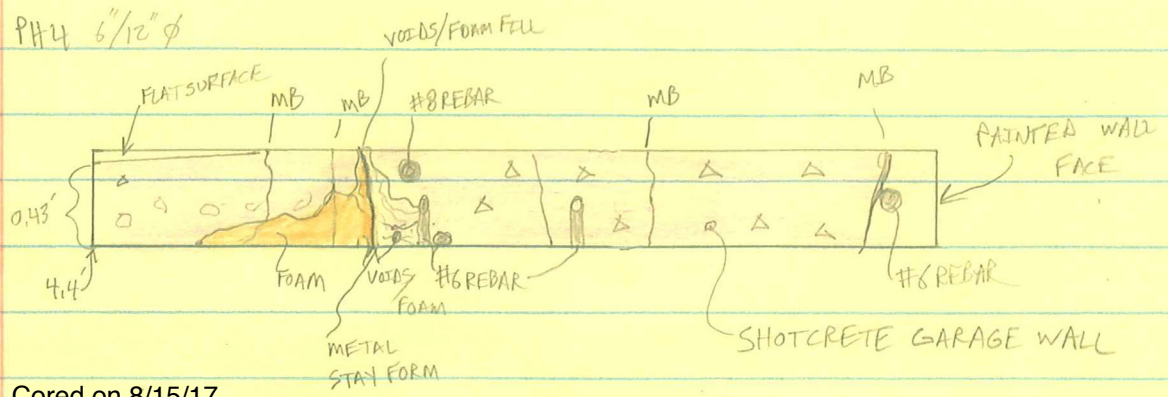


# PH3.1: 3" Diameter Core Log

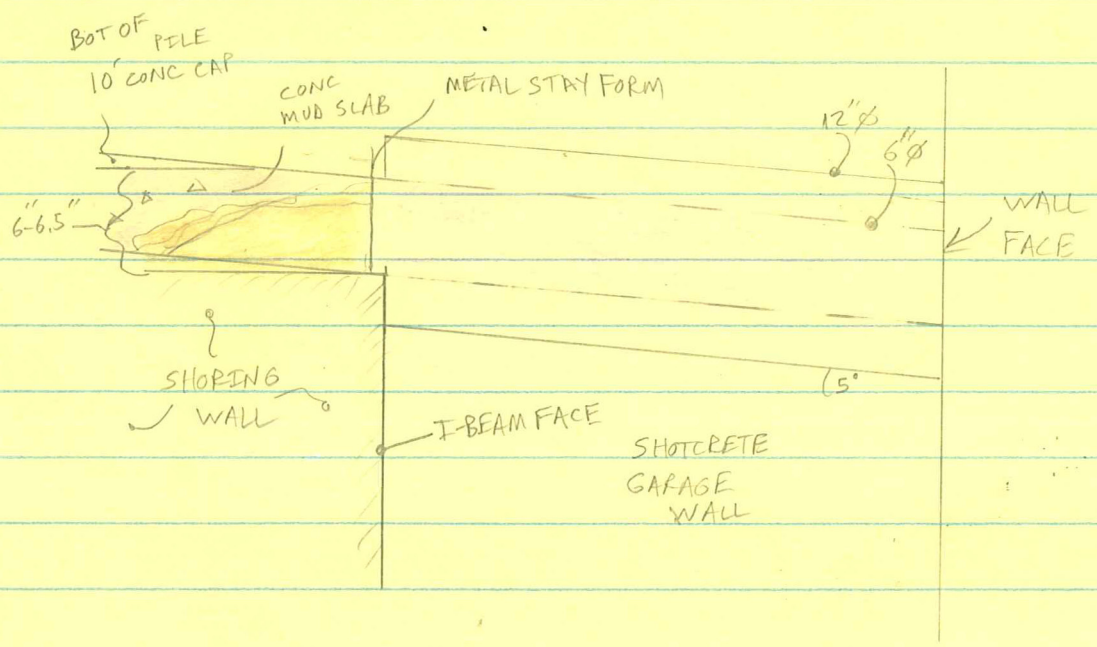
Scale: 1"=0.6'







Cored on 8/15/17  
 Logged on 8/15/17



# PH4.0: 3" Diameter Core Log

Scale: 1"=0.6'

PAINTED  
WALL FACE

Shotcrete

MB

#7 REBAR

Shotcrete

CRACK W/  
EPOXY FILLING

MB

CORE MISSING

CORED ON 8/11/17 10:57AM

PH 4.0

Logged on 8/11/17

1.0'

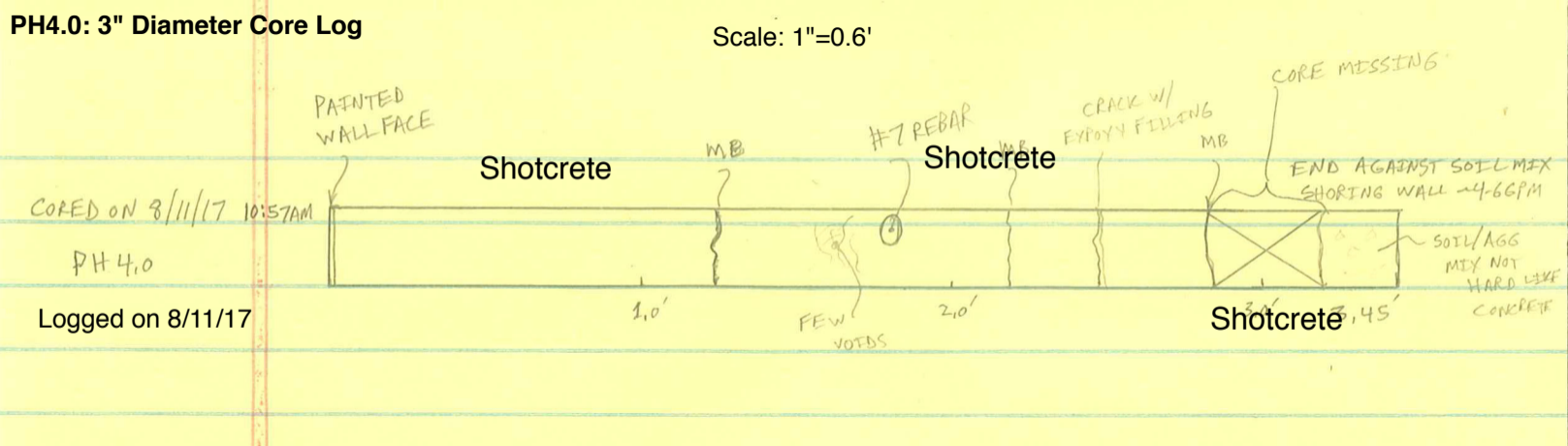
FEW  
VOIDS

2.0'

Shotcrete  
3.0'  
3.45'

END AGAINST SOIL MIX  
SHORING WALL ~4-6GPM

SOIL/AGG  
MIX NOT  
HARD LIKE  
CONCRETE



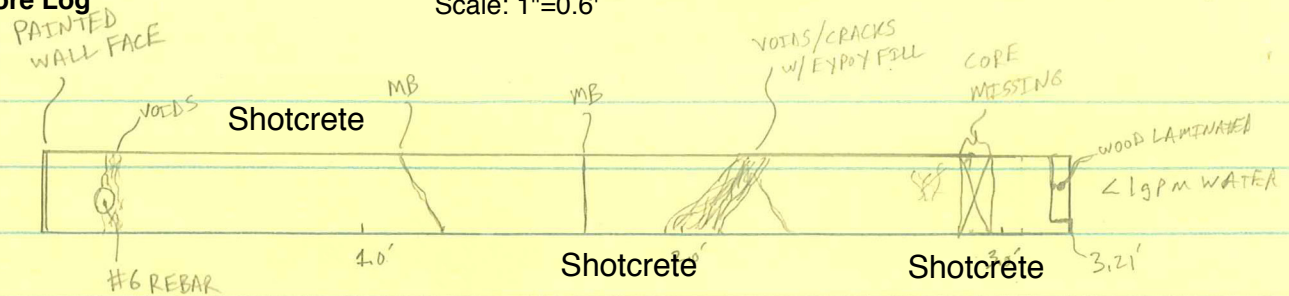
# PH4.1: 3" Diameter Core Log

Scale: 1"=0.6'

CORED ON 8/11/17

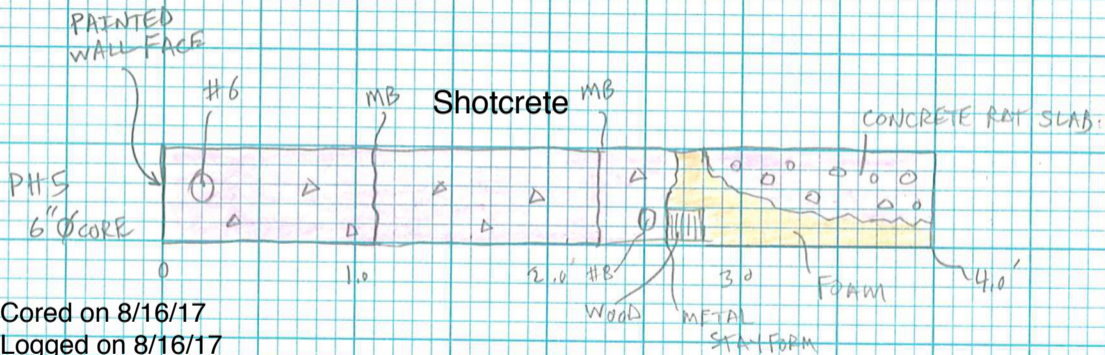
PH 4.1

Logged on 8/11/17



# PH5: 6" Diameter Core Log

Scale: 1" = 1'



Cored on 8/16/17

Logged on 8/16/17

Core Inclined 2.5 Degrees Up

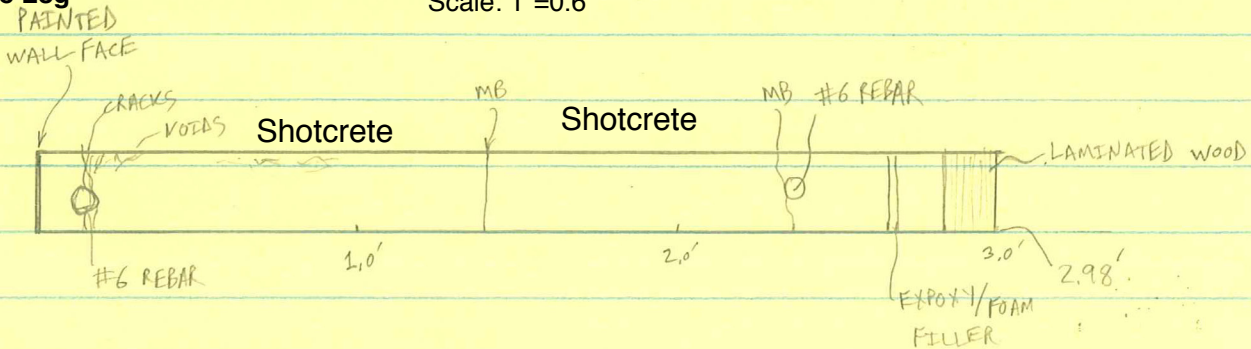
# PH5.0: 3" Diameter Core Log

Scale: 1"=0.6'

CORED ON 8/11/17

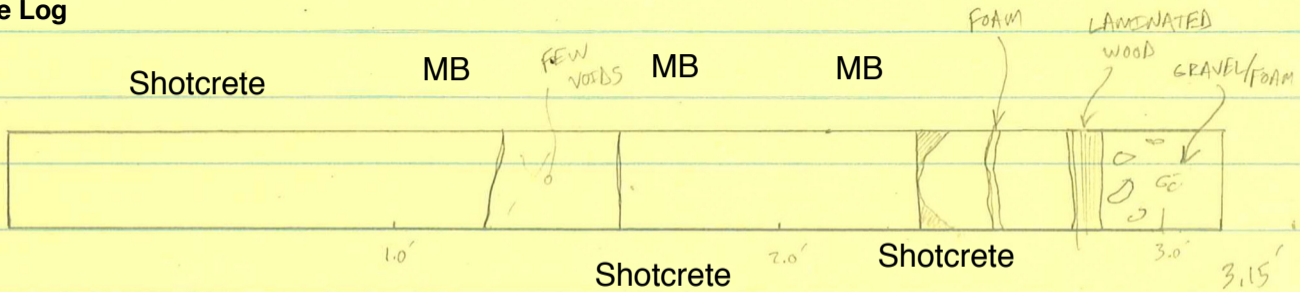
PH5.0

Logged on 8/11/17



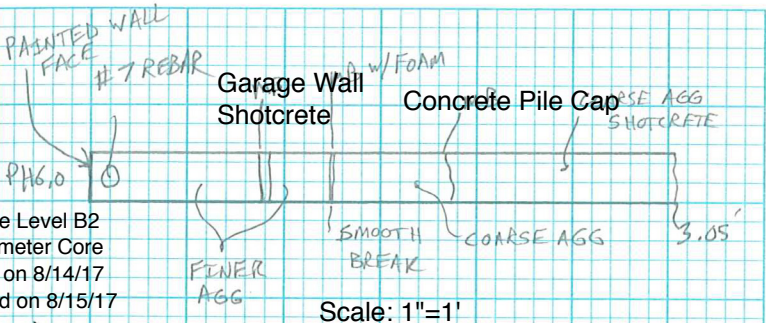
# PH5.1: 3" Diameter Core Log

Cored on 8/11/17  
Logged on 8/16/17



Painted Wall Face

Scale: 1" = 0.5'



Garage Level B2  
 3" Diameter Core  
 Cored on 8/14/17  
 Logged on 8/15/17

Scale: 1"=1'

PH1 Location





11 Down Hole View

Top of I-Beam



# PH1 Core Boxes



PH2 Location



Probe Hole #2

PH 2.1

PH 2.2

Drain Hole

Drain Hole



01 + 7.5  
07.5

01 + 10



# PH2 Location

PH 2.0

Drain Hole



3

01+10

PH 2.1

1



01+7.5  
07.5

PH 2.2

1



12 Down Hole View



# PH2 Core Box

Drain Hole

PH2.2 1.2 PH2.2

PH2.2 2.1 PH2.2 2.55 2.55 PH2.2

PH2.2 2.55 3.34' PH2.2

PH2



# PH2 Core Box

Drain Hole

PH2

PH2.0

PH2.0

PH2.0

PH2.0

PH2.0

3.16

PH2.0

PH2.1

PH2.1

PH2.1

PH2



PH2 Core

Wood Lagging

Rebar

Foam





# PH3 Location



↑  
14.25

TOP BEAM

Soldier Beam

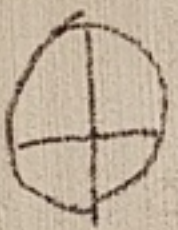
Probe Hole #3  
12" hole  
3" hole

8-9-17



Drain Hole

3"



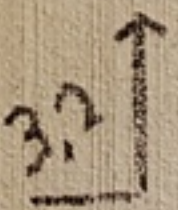
00+90

PH-3.0

Drain Hole

004 97.2

004 93.05



3 Down Hole View



Top of I-Beam

# PH3 Core Box

Probe Hole #3



5.3' FROM WALL FACE

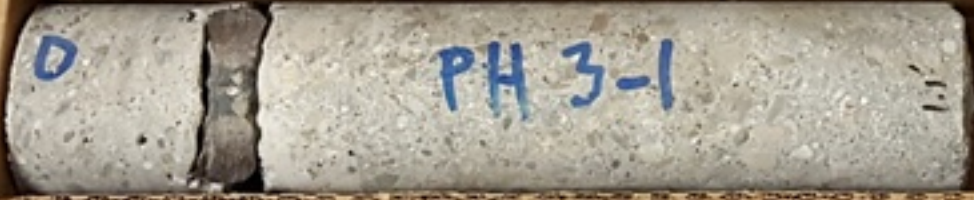


PH-3.0

3" hole



PH3.0



PH 3-1

PH3.1



# PH4 Location



Soldier Beam

Soldier Beam

Probe Hole #4  
12" hole

PH4.0

PH4.1

Drain Hole

Drain Hole

00 + 60'

00 + 57.5



4 Down Hole View

Flat Surface  
(Top of Mud Slab?)

Top of I-Beam



# PH4 Core Box

Drain Hole

PH4.0  
1.25

PH4.0

PH4.0

PH4.1  
3" hole

PH4.1  
1.70'

PH4.1

PH4.1  
1.25

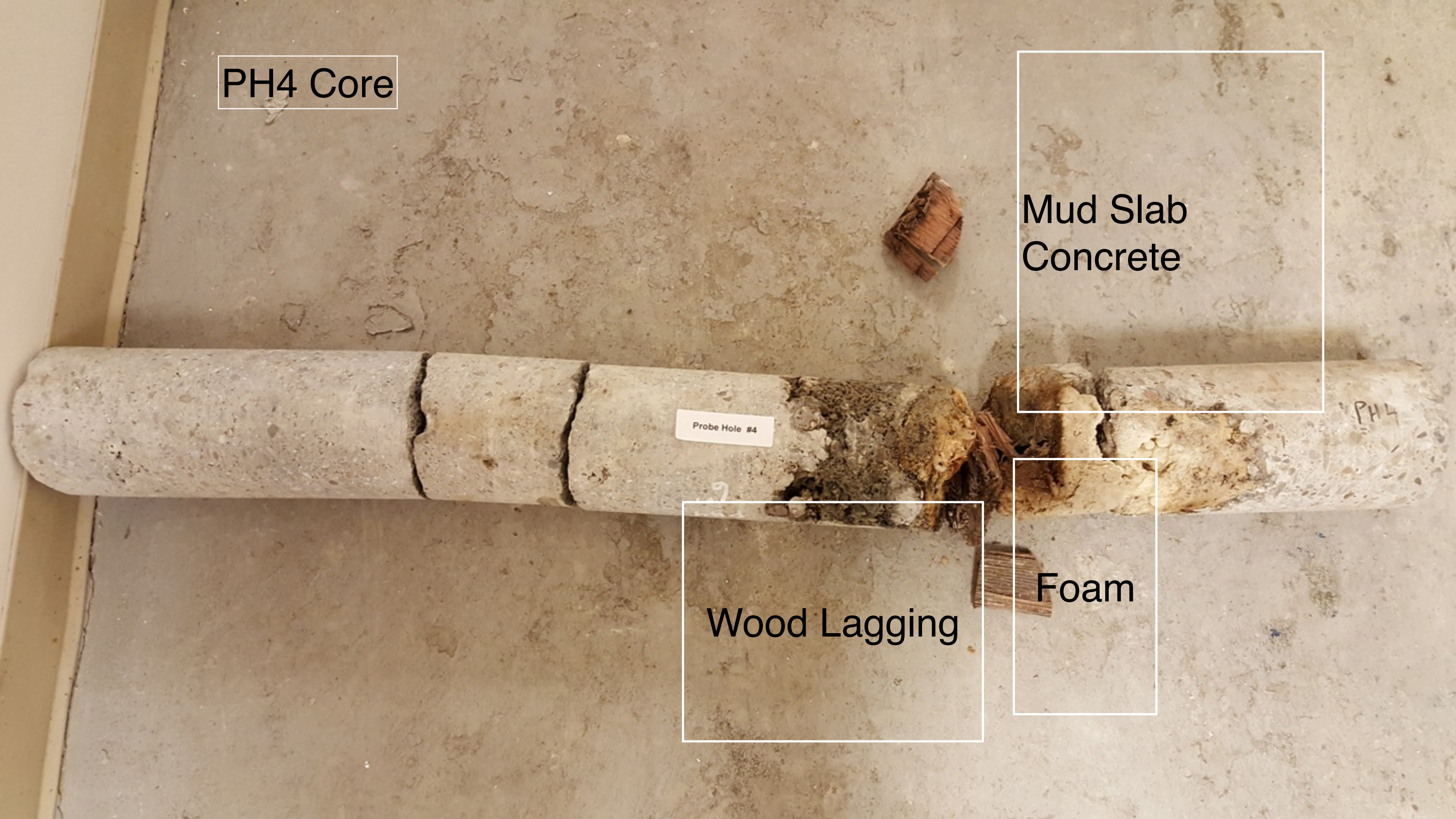
PH4 Core

Mud Slab  
Concrete

Probe Hole #4

Wood Lagging

Foam



nd Piece of PH4 Core

Flat Surface  
(Top of Mud Slab?)





PH5 Location

6"  
+

Hole 5.0



P-Hole  
5.1

00+23'

P-Hole  
5.2



5 Down Hole View



# PH5 Core Box

Drain Hole

PH5.0  
Drain Hole

PH5.0  
1.49'

PH5.0

PH5.0  
2.98'

PH5.1  
1.25' 1.58'

PH5.1  
1.58'

PH5.1  
Drain Hole  
2.37'

2.56'

3.15' PH5.1

PH5 Core

Metal Stay Form

Wood Lagging

Mud Slab Concrete

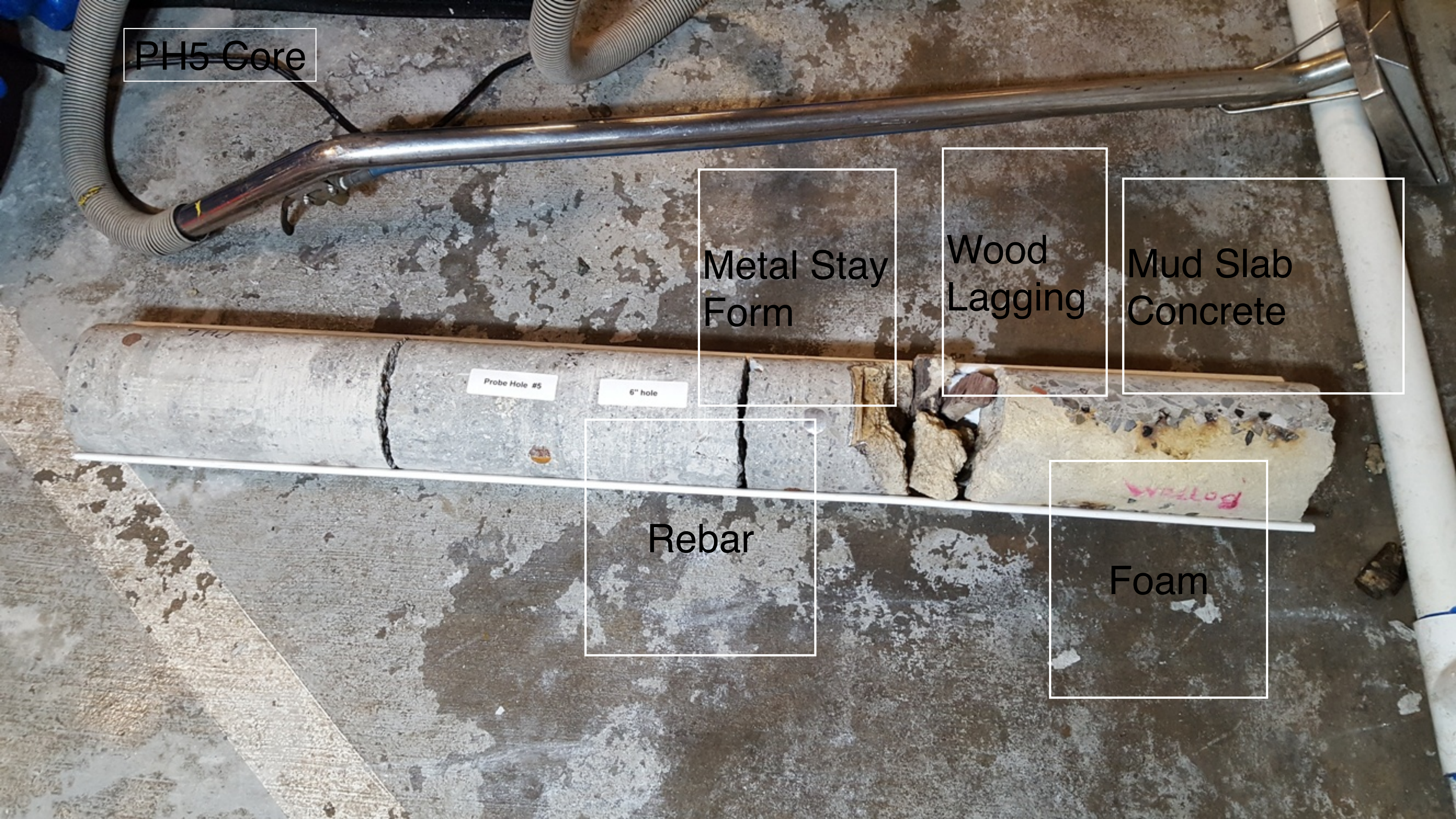
Rebar

Foam

Probe Hole #5

6" hole

Bottom



# PH6 Location

LEVEL  
TW 0  
PH = 6.0



Down Hole View



PH6 Core

Garage  
Wall  
Shotcrete

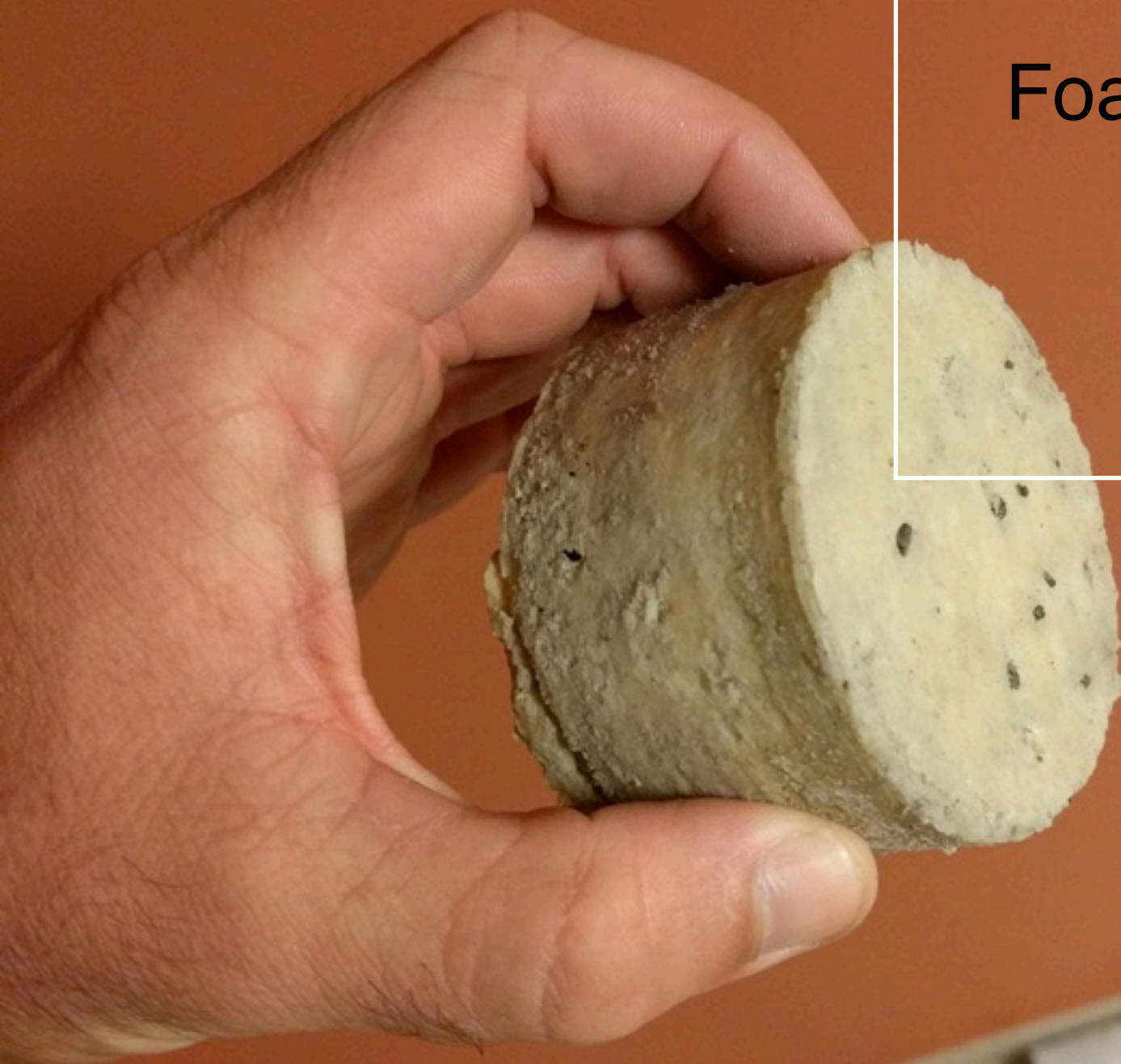
Location of  
Foam

Concrete  
Pile Cap



PH6 Core

Foam





**STRIATIONS ON JOINT FILLER**

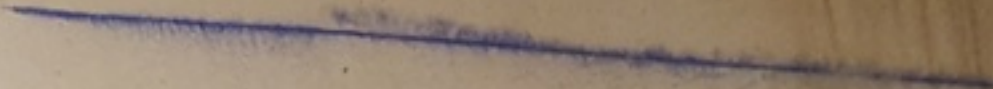


PH7 Location



Probe Hole #7  
6" hole

PH  
7.0



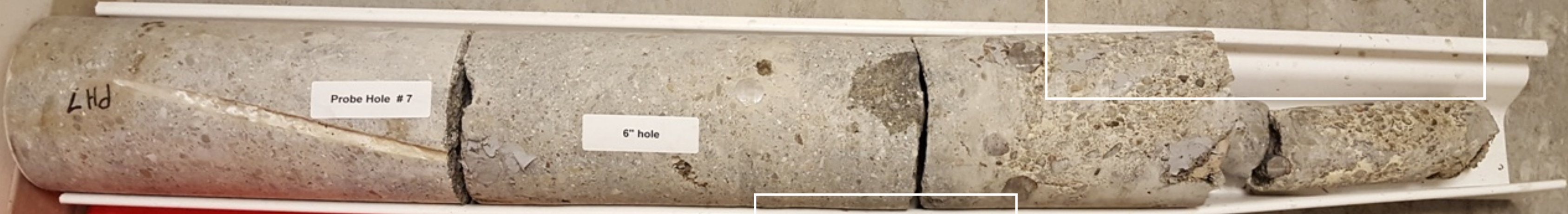
7 Down Hole View

Metal Stay Form



PH7 Core

Garage Wall  
Shotcrete with Foam  
Filled Spaces



Probe Hole # 7

6" hole

Rebar

PH8 Location



PH8

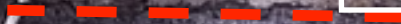
1

+



3 Down Hole View

Top of I-Beam



PH8 Core

Rebar

Garage Wall  
Shotcrete with Foam  
Filled Spaces

PH8.

Probe Hole # 8

6" hole



# PH9 Location



Probe Hole # 9

PH9





Down Hole View

Top of I-Beam



PH9 Core

