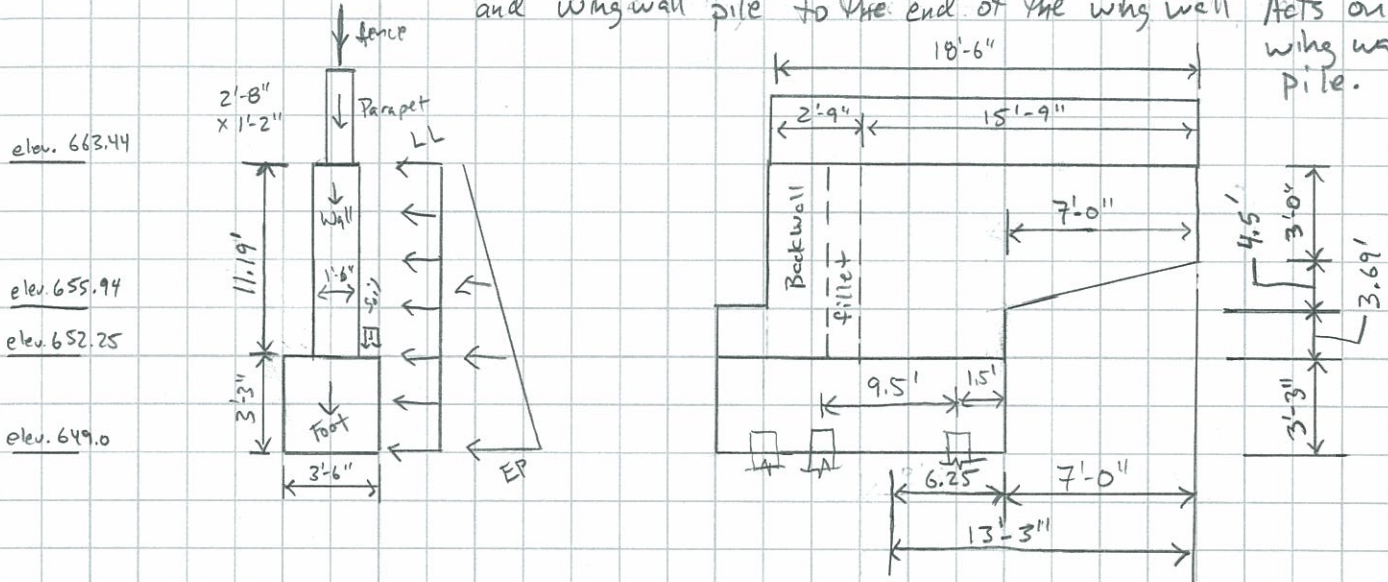


Assume Every thing from half way between the Abut. and wingwall pile to the end of the wing wall Acts on the wing wall pile.



Vertical

$$\downarrow \text{Foot} = (3.25)(3.5)(6.25)(150) = 10,664 \#$$

$$\downarrow \text{Wall} = [(11.19)(1.5)(13.25) - (7)(1.5)(4.50)(\frac{1}{2}) - 3.69(7)(1.5)](150) = 24,005 \#$$

$$\downarrow \text{Parapet} = 2.667(1.167)(13.25)(150) = 6186 \#$$

$$\downarrow \text{Fence} = 13.25(100 \#/\text{ft}) = 1325 \#$$

$$\downarrow \text{Soil on Foot} = (1')(11.19)(6.25)(120 \#/\text{ft}^2) = 8,393 \#$$

$$\text{Total Vertical} = \downarrow 50,573 \#$$

Horizontal

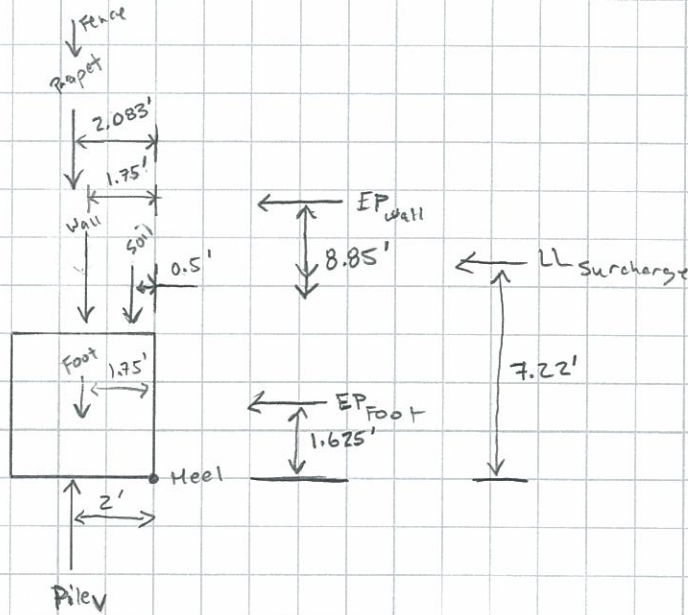
Active EP: $K_a = \tan^2(45 - \frac{30}{2}) = 0.33$; $\sigma_A = 0.33(120) = 40 \#/\text{ft}^2$

$$\leftarrow \text{LL surcharge} = 2'(40 \#/\text{ft}^2)(11.19 + 3.25)(6.25) + 2(40)(3 + \frac{4.5}{2})(7) = 10,160 \#$$

$$\leftarrow \text{EP}_{\text{Foot}} = \frac{1}{2}(11.19(40) + (11.19 + 3.25)(40))(3.25)(6.25) = 10,412 \#$$

$$\leftarrow \text{EP}_{\text{Wall}} = \frac{1}{2}(40)(11.19)(11.19)(6.25) + \frac{1}{2}(40)(3 + \frac{4.50}{2})(3 + \frac{4.50}{2})(7) = 79,511 \#$$

$$\text{Total Horizontal} = 40,083 \# \leftarrow$$



$$\sum \text{Moment about Heel} = 0 = (-10664 - 24005)(1.75) - (6186 + 1325)(2.083) - 8393(0.5) + \text{Pile}_v(2) + (-19511)(8.85) + (-10412)(1.625) + (-10160)(7.22)$$

$$\text{Pile}_v = 343,460 \div 2' = 172 \text{ k}$$

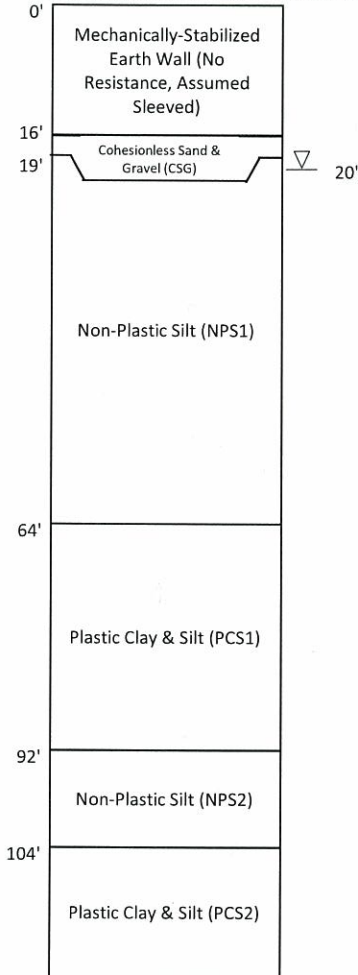
$$172 \div 0.7 = 246 \text{ k UBV}$$

BL13 Rear Abut. Wing Wall Pile

ASSUMED SUBSURFACE PROFILE

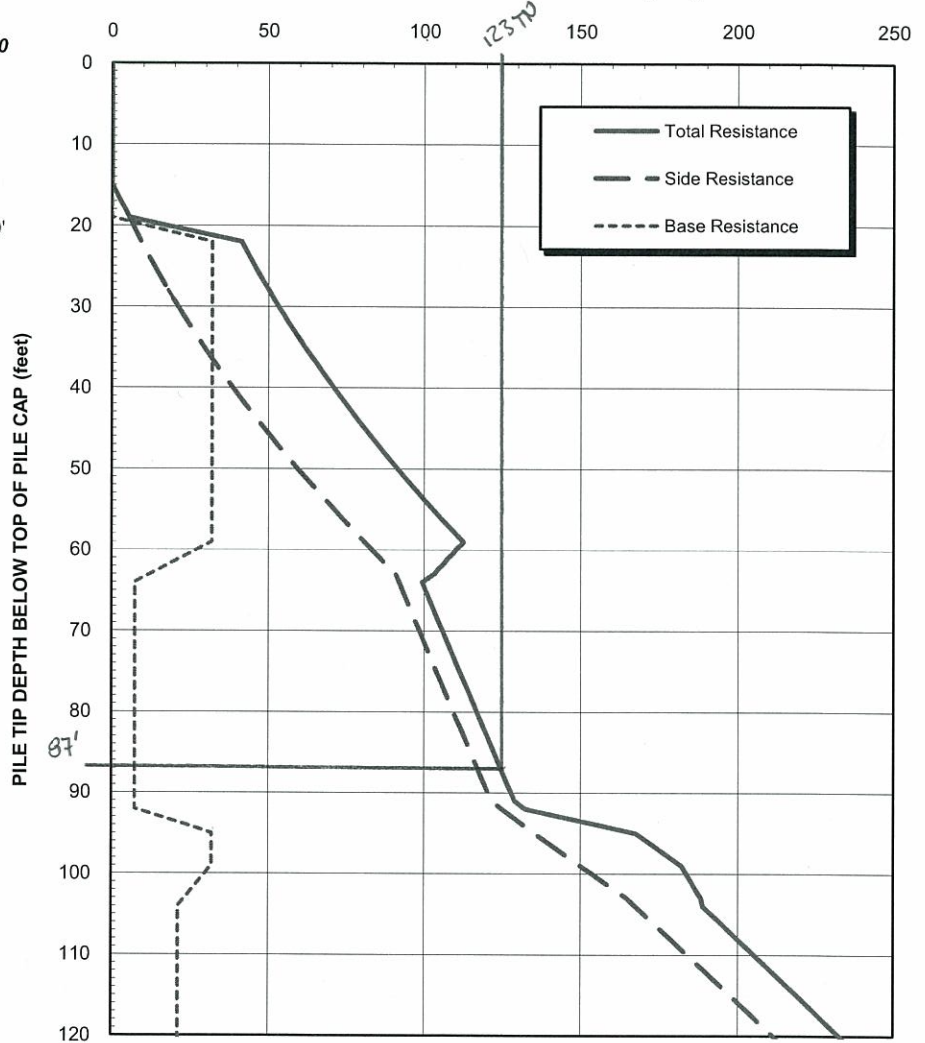
Based on Nearby Explorations:

C-074-2-10, S-028-0-06 & B-074-1-10



Analysis Terminated at 120.0 feet

UNFACTORED NOMINAL RESISTANCE (tons)



NOTES:

- The analyses were performed based on guidelines included in the AASHTO LRFD Bridge Design Specifications (Fifth Ed., 2010), ODOT Bridge Design Manual (2007 w/ updates through 4/16/10) and our experience. Based on the foundation plans dated 1/13/2011 and the soil conditions at the site, the axial resistance of the pile group may be determined by summing the resistances of the individual piles. Group reduction (or efficiency) factors are not required.
- Total pile capacity is a summation of its side and base resistances. Unfactored nominal resistances shown on plots above are to be multiplied by the appropriate resistance factors (RFs). Per the ODOT Bridge Design Manual, a minimum of two dynamic tests are required per each pile size at each structure, and one static load test is required when total pile length for individual structure exceeds 10,000 ft (one additional static test required for every additional 10,000 ft of pile). Assuming that piles are installed according to CMS 507 and CMS 523, a RF of 0.70 may be used. Alternatively, if dynamic testing is performed in accordance with Section 10.5.5.2.3 of AASHTO LRFD Bridge Design Specifications, Strength Limit State RF = 0.65 for side and base resistance is appropriate. Higher RFs may be used with static load testing (See Section 10.5.5.2.3 of LRFD Specifications). Without dynamic or static testing, an RF of 0.45 should be used for side and base resistance at the Strength Limit State. An RF of 0.35 should be used for uplift resistance at the Strength Limit State. For the Extreme Event Limit State, an RF of 1.0 should be used for base and side resistance.
- Analysis does not consider any seismic strength reduction.
- Estimated capacities assume that the piles will be installed after construction of the approach embankments. Downdrag loads due to potential fill embankment settlement have not been included.

I-90 Innerbelt CCG1
HNTB/Walsh Construction
Cleveland, Ohio

ESTIMATED AXIAL PILE RESISTANCE
14-IN. DIA. CIP PILE, CLOSED-END CASING
S. ABUTMENT, E. 9TH ST. OVER GCRTA

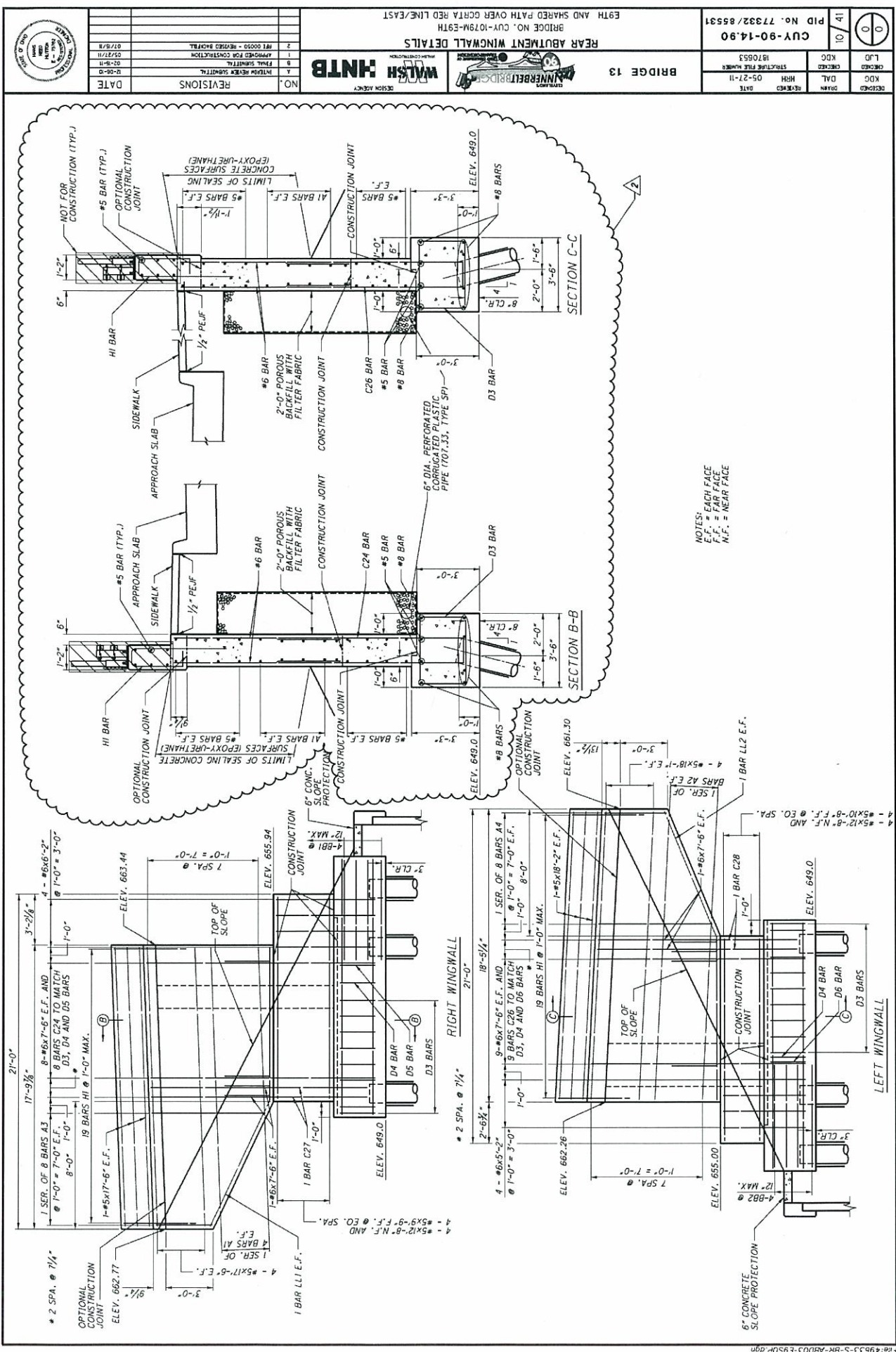
March 2011

21-1-21361-300

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. GD-20-4

For I_nFor Matten



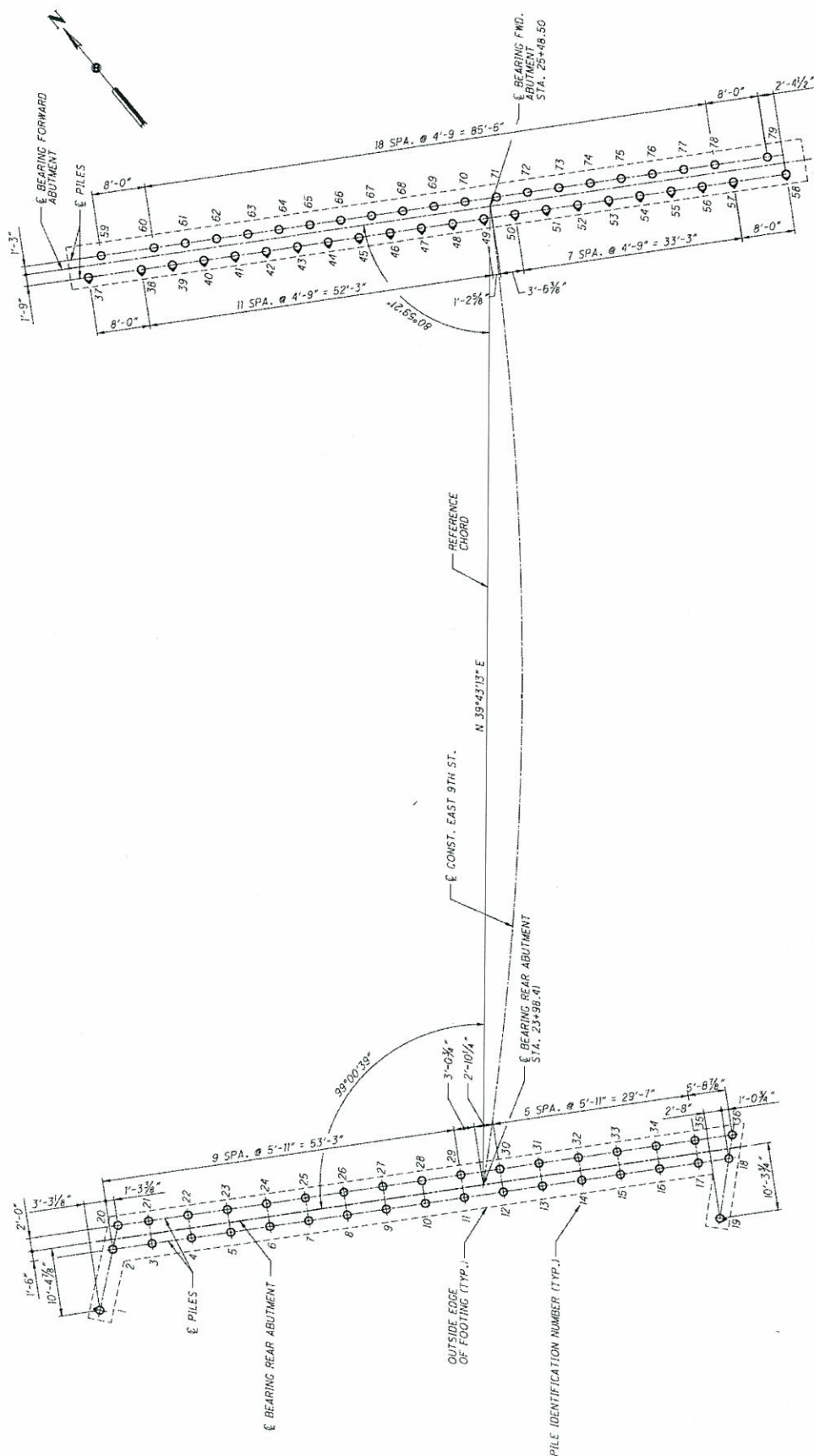
DESIGNED	DATE	REVISIONS	NO.
CHECKED	DATE	REVISIONS	NO.
DATE	DATE	REVISIONS	NO.
DATE	DATE	REVISIONS	NO.
DATE	DATE	REVISIONS	NO.
DATE	DATE	REVISIONS	NO.

BRIDGE 13
 REAR ABUTMENT WINGWALL DETAILS
 BRIDGE NO. CUY-1079M-89TH
 PID No. 77332/85531
 CUY-90-14.90
 10/41

FOR INFORMATION

DESIGNED	DATE	REVISIONS	NO.
DRAWN	05-27-11	1. INTERNAL REVISIONS	
CHECKED		2. FINAL CHECK FOR CONSTRUCTION	
KOC	1870653		
PROJECT FILE NUMBER			
CUV-90-14.90			
PID No. 77332/85931			

BRIDGE 13	FOUNDATION PLAN	BRIDGE NO. CUV-10794-E91H
MINNERBELL BRIDGES	WMSH HNTB	



NOTES:

- ALL PILES ARE 12" DIA. CAST-IN-PLACE REINFORCED CONCRETE PILE WITH AN ULTIMATE BEARING VALUE OF 100 TONS PER PILE. THE BEARING VALUE OF 119 TON/PILE FOR THE FORWARD ABUTMENT.

LEGEND

- - INDICATES VERTICAL PILE
- ◊ - INDICATES BATTERED PILE (1:4 BATTER TYP.)

PILE LAYOUT DIAGRAM