

TO: All Design Section Staff
FROM: Bijan Khaleghi
DATE: November 26, 2016
SUBJECT: Foundation Design Parameters in the Contract Plan General Notes

This design memorandum allows the deletion of foundation design load parameters/criteria in the General Notes of Bridge Contract Plans except for pile foundations.

For pile foundations, it is current convention to specify the minimum tip elevations in the Special Provisions by GSP, and to specify the minimum load resistance in the Plans. Both items will be placed in the Contract Plans General Notes under direct control of the Engineer of record. This revision will be added as a revision to appropriate sections of the BDM.

Background:

At a meeting on 10/26/2016 between HQ Geotechnical Division and the Bridge and Structures Office to discuss the merits of placing generic summary descriptions of foundation design load parameters/criteria in the General Notes of Bridge Sheets, it was determined that such information need not be in the Plans except for pile foundations.

For pile foundations, it is current convention to specify the minimum tip elevations in the Special Provisions by GSP, and to specify the minimum load resistance in the Plans. The conclusion of today's discussion is that both items should be specified in one place, and that placement in the Plans under direct control of the EOR is a better place for both.

This criteria will be added as a revision to appropriate sections of the BDM.

In the meantime, GSP 6-05.3(11)D.OPT1.FB6 will be deleted as part of the January 2017 Amendment/GSP package.

If you have any questions regarding this policy memorandum, please contact Michael.Bauer@wsdot.wa.gov at 360-705-7190 or Bijan.Khaleghi@wsdot.wa.gov at 360-705-7181 or.

cc: Mark Gaines, Construction Office – 47354
Craig Boone, Bridge and Structures – 47340

Example of Contract Plan General Notes for foundation:

Where a minimum tip is not required:

Piles shall be driven to an ultimate bearing resistance as follows: ~~(to be kept)~~

PIER NO.	ULTIMATE BEARING CAPACITY
1	300 TONS
2	510 TONS

Where a minimum tip is required:

Piles shall be driven to an ultimate bearing resistance and minimum tip as follows:

PIER NO.	ULTIMATE BEARING RESISTANCE	MINIMUM TIP ELEVATION
1	==== TONS	XX.X
2	==== TONS	XX.X

The nominal bearing capacity of spread footings shall be taken as follows: ~~(To be deleted)~~

PIER NO.	SERVICE LIMIT STATE	STRENGTH AND EXTREME EVENT LIMIT STATES
1	24.0 KSF	24.0 KSF
2	24.0 KSF	24.0 KSF

The nominal bearing resistance of box culvert bottom slab shall be taken as stated in the geotech report, the factored bearing resistance values are as follows: ~~(To be deleted)~~

SERVICE LIMIT STATE	STRENGTH LIMIT STATE	EXTREME LIMIT STATE	EXTREME LIMIT STATE (LIQUEFIED)
7.90 KSF	14.15 KSF	28.26 KSF	6.21 KSF

The nominal shaft resistance shall be taken as follows: ~~(To be deleted)~~

SERVICE LIMIT STATE		
PIER NO.	SKIN FRICTION CAPACITY	END BEARING CAPACITY
1	3100 KIPS	2300 KIPS
2	1500 KIPS	3180 KIPS
3	2750 KIPS	1600 KIPS

STRENGTH AND EXTREME LIMIT STATES		
PIER NO.	SKIN FRICTION CAPACITY	END BEARING CAPACITY
1	3700 KIPS	4600 KIPS
2	1900 KIPS	8000 KIPS
3	3350 KIPS	3200 KIPS

Attachment A: Bridge Design Manual Revisions

BDM Section 7.7.3 shall be revised as follows:

A. Plan Detailing

The bridge plans shall include the nominal bearing resistance in the General Notes as shown in ~~Figure 7.7.3-1~~. This information is included in the Plans for future reference by the Bridge and Structures Office.

Nominal Bearing Resistance of the Spread Footings Shall Be Taken As, In KSF:			
Pier No.	Service-I Limit State	Strength Limit States	Extreme Event Limit States
1	====	====	====
2	====	====	====

Figure 7.7.3-1

BDM Section 7.8.1 shall be revised as follows:

4. Extreme Event I Limit State (special case - no liquefaction)

Subtract the skin friction lost within the scour depth (i.e., in this case 25 percent of the scour depth for the 100 year design flood) from the shaft axial resistance plots provided by the Geotechnical Engineer, to estimate the shaft depth required to resist the Extreme Event I limit state demands.

The bridge plans shall include the end bearing and skin friction nominal shaft resistance for the service, strength, and extreme event limit states in the General Notes, as shown in ~~Figure 7.8-1-1~~. The nominal shaft resistances presented in ~~Figure 7.8-1-1~~ are not factored by resistance factors.

The Nominal Shaft Resistance shall be taken as, in kips:

Service-I Limit State		
Pier No.	Skin Friction Resistance	End Bearing Resistance
1	=====	=====
2	=====	=====

Strength Limit State		
Pier No.	Skin Friction Resistance	End Bearing Resistance
1	=====	=====
2	=====	=====

Extreme Event-I Limit State		
Pier No.	Skin Friction Resistance	End Bearing Resistance
1	=====	=====
2	=====	=====

Figure 7.8.1-1

BDM Section 7.9.10 shall be appended with the following:

If a minimum tip elevation is required, it shall be shown in the contract plans.