



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

August 23, 2012

MEMORANDUM TO: Allen Raynor, P.E.
Assistant State Structures Engineer

Mohammed Mulla, P.E., C.P.M.
Contracts and Statewide Services Manager

K. J. Kim, Ph.D., P.E.
Eastern Regional Geotechnical Manager

John Pilipchuk, L.G., P.E.
Western Regional Geotechnical Manager

FROM: Njoroge Wainaina, P.E.
State Geotechnical Engineer

SUBJECT: Standard Sound Barrier Wall Foundations

The Technical Support Group of the Support Services Section of the Geotechnical Engineering Unit (GEU) has completed the new standard sound barrier wall foundations based on the 6th Edition of the *AASHTO LRFD Bridge Design Specifications*. These standard foundations update the current sound barrier wall foundation design from ASD to LRFD in accordance with new Section 15 entitled "Design of Sound Barriers" of the AASHTO LRFD specifications. Even though the Structures Management Unit (SMU) standard sound barrier wall panels are designed for 10 ft and 15 ft pile spacing, the standard sound barrier wall foundations are designed for variable pile spacing to allow for alternate panel types. The new standard sound barrier wall foundation tables are based on the following soil parameters, groundwater elevation and geometry.

- Friction angle (ϕ) = 30° or 34°, cohesion (c) = 0 psf and unit weight (γ) = 120 pcf,
- Groundwater elevation below finished grade,
- Front slope/finished grade 2:1 (H:V) or flatter,
- Pile spacing \leq 20 ft,
- Wall height \leq 25 ft and
- Hole diameter = 36" or 30".

The standard foundation tables are also based on an assumed wind pressure of 40 psf per SMU.

The SMU should incorporate the standard foundation tables into sound barrier wall plans as recommended by the GEU unless the standard sound barrier wall foundations are not applicable

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-707-6850
Fax: 919-250-4237

www.ncdot.gov/doh/preconstruct/highway/geotech

LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

August 23, 2012
Allen Raynor, P.E.
Mohammed Mulla, P.E., C.P.M.
K. J. Kim, Ph.D., P.E.
John Pilipchuk, L.G., P.E.
Page 2

and a site specific foundation design is required. The new standard sound barrier wall foundation tables and sound barrier wall foundation recommendations form memo are attached to this memorandum for your reference. If there are any questions, please contact Scott Hidden, P.E. at (919) 707-6856.

Attachments: Standard Sound Barrier Wall Foundation Tables
 Sound Barrier Wall Foundation Recommendations Form Memo

cc: Greg Smith, P.E., Traffic Noise & Air Quality Group Leader
 Rodger Rochelle, P.E., Transportation Program Management Director
 Mike Robinson, P.E., State Bridge Construction Engineer



STANDARD SOUND BARRIER WALL FOUNDATION TABLES
(Pile Excavation Depths, "D" (ft) for 36" Dia. Hole; Add 1 ft to D for 30" Dia. Hole)

Sound Barrier Wall Foundation Table No. 1 ($\phi = 30^\circ$, $c = 0$ psf, $\gamma = 120$ pcf, groundwater between finished grade and bottom of hole with front slope/finished grade 6:1 or flatter or groundwater below bottom of hole with front slope/finished grade 2:1 or flatter and steeper than 3:1) –

Pile Spacing (S)	Wall Height (H)		
	$H \leq 15$ ft	$15 \text{ ft} < H \leq 20$ ft	$20 \text{ ft} < H \leq 25$ ft
$S \leq 10$ ft	10	12	13
$10 \text{ ft} < S \leq 15$ ft	11	13	16
$15 \text{ ft} < S \leq 20$ ft	12	15	18

Sound Barrier Wall Foundation Table No. 2 ($\phi = 30^\circ$, $c = 0$ psf, $\gamma = 120$ pcf, groundwater below bottom of hole with front slope/finished grade 3:1 or flatter and steeper than 6:1) –

Pile Spacing (S)	Wall Height (H)		
	$H \leq 15$ ft	$15 \text{ ft} < H \leq 20$ ft	$20 \text{ ft} < H \leq 25$ ft
$S \leq 10$ ft	8	10	11
$10 \text{ ft} < S \leq 15$ ft	9	11	13
$15 \text{ ft} < S \leq 20$ ft	10	13	15

Sound Barrier Wall Foundation Table No. 3 ($\phi = 30^\circ$, $c = 0$ psf, $\gamma = 120$ pcf, groundwater below bottom of hole with front slope/finished grade 6:1 or flatter) –

Pile Spacing (S)	Wall Height (H)		
	$H \leq 15$ ft	$15 \text{ ft} < H \leq 20$ ft	$20 \text{ ft} < H \leq 25$ ft
$S \leq 10$ ft	7	9	10
$10 \text{ ft} < S \leq 15$ ft	8	10	12
$15 \text{ ft} < S \leq 20$ ft	9	11	13

Sound Barrier Wall Foundation Table No. 4 ($\phi = 34^\circ$, $c = 0$ psf, $\gamma = 120$ pcf, groundwater between finished grade and bottom of hole with front slope/finished grade 6:1 or flatter or groundwater below bottom of hole with front slope/finished grade 2:1 or flatter and steeper than 3:1) –

Pile Spacing (S)	Wall Height (H)		
	$H \leq 15$ ft	$15 \text{ ft} < H \leq 20$ ft	$20 \text{ ft} < H \leq 25$ ft
$S \leq 10$ ft	9	11	12
$10 \text{ ft} < S \leq 15$ ft	10	12	14
$15 \text{ ft} < S \leq 20$ ft	11	13	16

Sound Barrier Wall Foundation Table No. 5 ($\phi = 34^\circ$, $c = 0$ psf, $\gamma = 120$ pcf, groundwater below bottom of hole with front slope/finished grade 3:1 or flatter and steeper than 6:1) –

Pile Spacing (S)	Wall Height (H)		
	$H \leq 15$ ft	$15 \text{ ft} < H \leq 20$ ft	$20 \text{ ft} < H \leq 25$ ft
$S \leq 10$ ft	8	9	10
$10 \text{ ft} < S \leq 15$ ft	8	10	12
$15 \text{ ft} < S \leq 20$ ft	9	11	13

Sound Barrier Wall Foundation Table No. 6 ($\phi = 34^\circ$, $c = 0$ psf, $\gamma = 120$ pcf, groundwater below bottom of hole with front slope/finished grade 6:1 or flatter) –

Pile Spacing (S)	Wall Height (H)		
	$H \leq 15$ ft	$15 \text{ ft} < H \leq 20$ ft	$20 \text{ ft} < H \leq 25$ ft
$S \leq 10$ ft	7	8	9
$10 \text{ ft} < S \leq 15$ ft	7	9	11
$15 \text{ ft} < S \leq 20$ ft	8	10	12