**M E M O R A N D U M**

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Director, Division of Structural Design

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**DATE:** September 19, 2022

**SUBJECT:** **Jefferson County**
**12F0 FD52 056 0264 021-023 D**
**I-264 WB**
**Mars #: 8556402D**
**Fed #: 00STP2641176**
**RECONSTRUCT THE WATTERSON EXPRESSWAY INTERCHANGE @US 42 INCLUDING SLIP RAMP TO KY 22**
**Sound Barrier Wall at I-264 EB Sta. 5074+75.00 to 5096+00.00**
**Item #: 5-804.00**
**Geotechnical Engineering Structure Foundation Report**

## 1.0 LOCATION AND DESCRIPTION

The geotechnical investigation for this structure has been completed. The DGN file for the subsurface data sheet has been made available on ProjectWise and through email for use in development of structure plans. The onsite geotechnical exploration for the project was performed by the consulting firm of Horn and Associates.

The proposed sound barrier wall will be a part of the proposed reconstruction of the Watterson Expressway (I-264) and US 42 interchange in Jefferson County. The proposed structure is located on the east side of I-264 from approximate MP 21.25 to MP 21.68. The structure is located in Louisville, KY.

## 2.0 SITE GEOLOGIC CONDITIONS

This structure is located in the Jeffersonville, New Albany, and Charlestown Geologic Quadrangle (GQ# 1211). The geologic mapping indicates that this site consists of the Sellersburg Limestone Formation.

## 3.0 FIELD INVESTIGATION

Three (3) sample and core holes and three (3) mechanical rockline soundings were taken at this structure's location as part of the structural geotechnical investigation. After drilling, the soil samples and rock cores were delivered to the KYTC Geotechnical Branch in Frankfort, KY where a geologist logged the rock cores and the soil samples were classified and tested in the Branch's soils laboratory.

## 4.0 LABORATORY TESTING

The soil samples obtained from the borings were determined to consist of inorganic low plasticity clays and clayey gravel. The soil samples were designated CL and GC using the Unified Soil Classification System. Unconfined compressive testing was conducting resulting in compressive strength values ranging from 1167 psf to 1254 psf with an average of 1211 psf.

## 5.0 SUBSURFACE CONDITIONS

Depths to rock/refusal vary from 11.3 ft to 12.1 ft. Rock cores from this location indicated that bedrock consists mostly of light gray to dark gray, very fine to fine grained, crystalline, fossiliferous to fossil-fragmental limestone with few vugs and shale partings and laminations. The KY RQD values for the rock cores taken at this proposed bridge location ranged from 46% to 100% and core recoveries ranged from 68% to 100%. Top of rock/auger refusal elevations ranged from 562.6 ft to 571.8 ft.

## 6.0 ENGINEERING ANALYSIS

Use drilled shaft foundations socketed into bedrock for the proposed sound barrier wall. The Idealized Soil and Bedrock Profile sheet and the Drilled Shaft Axial Capacity Tables are attached for use in the design of the drilled shafts.

Because the wall will be founded on bedrock, no settlement analysis is required.

## 7.0 FOUNDATION RECOMMENDATIONS

**7.1** The drilled shaft foundations shall be socketed into sound bedrock a minimum of 3 feet. Lower tip elevations may be necessary in order to satisfy lateral capacity or other structural requirements.

**7.2** For Load & Resistance Factor Design (LRFD), evaluate the total factored axial resistances using the attached Drilled Shaft Axial Resistance Tables considering only the capacity developed in the uncased rock sockets. The total factored resistances must exceed the factored loads at the strength limit state.

**7.3** Perform lateral load analyses using the geotechnical parameters provided in the attached Idealized Soil and Bedrock Profile. These parameters may be used to perform analyses using LPILE or other similar software. Some of the parameters may not be required to input, depending on the version of software utilized. Design the substructure units neglecting any lateral resistance derived from the top 5 feet of overburden soils.

**7.4** The drilled shafts shall be constructed in accordance with the Special Note for Drilled Shafts, current edition, except that the subsurface exploration borings in accordance with Section 3.5 of the Special Note are not required.

**7.5** Sound barrier walls should not be subjected to differential earth loading. Reinforced panels may shift or crack and the entire wall could potentially have an overturning failure if it is subject to earth loads. Special pane and foundation designs are required in order to safely construct a hybrid Retaining/Sound barrier wall. In walls constructed in newly placed fill areas, it should not be assumed that construction will be phased in a manner to avoid imposing earth loads. The walls should either be designed to withstand the maximum potential earth load or construction phasing must be specified to prevent differential loading conditions. Wall design loads should be determined using Soil Type 3 of Exhibit 413 in the Division of Structural Design Guidance Manual.

**7.6** If significant voids are found while drilling for the rock socket, it may be

necessary to extend permanent casing beyond the voids to avoid excessive concrete take.

## 8.0 PLAN NOTES
**(Include the notes below at appropriate locations in the plans, if applicable.)**

**8.1** Permanent casing is not required in the overburden. The contractor may elect to use temporary casing in deeper soil areas. Temporary casing may be omitted if the contractor can demonstrate the ability to maintain an open excavation without collapse of the side walls, fallback of material into the excavation, or fallback into and contamination of freshly placed concrete.

**8.2** Permanent casing may be required in the rock socket if significant voids are found during drilling. If permanent casing is required, the rock socket is to be extended below the casing to provide an uncased rock socket length shown on the plans.

**8.3** Except as permitted by special design, Sound Barrier Walls shall not be subjected to differential earth loading. Temporary or permanent soil loads placed on the sound barrier walls are only permitted as noted in the sound barrier wall plans.

**8.4** Shafts shall have a minimum rock socket depth of 3 feet.

**8.5** The drilled shafts shall be constructed in accordance with the Special Note for Drilled Shafts, current edition, except that the subsurface exploration borings in accordance with Section 3.5 of the Special Note are not required.

The designer should feel free to contact the Geotechnical Branch at 502-564-2374 for further recommendations or if any questions arise pertaining to this project.

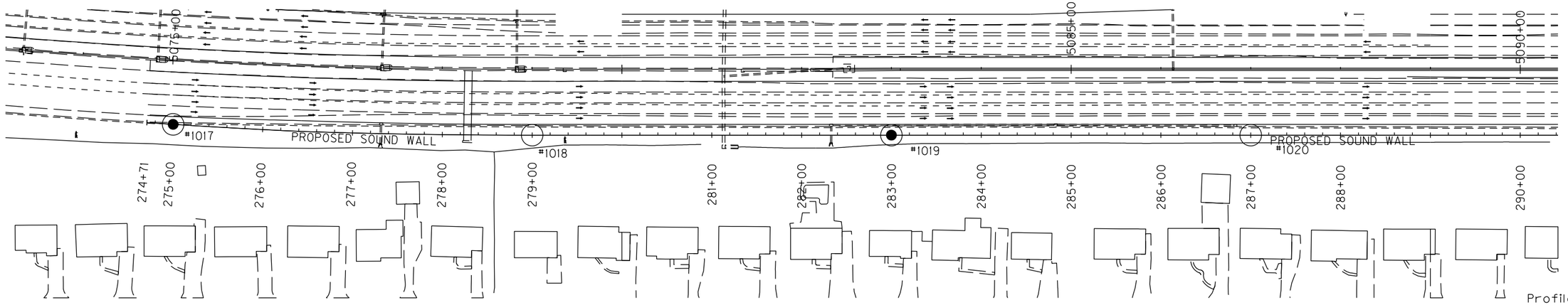
**Attachments:**

- **Structure Location Map**
- **Subsurface Data Sheet**
- **Idealized Soil and Bedrock Profile**
- **Drilled Shaft Axial Resistance Tables**
- **Coordinate Data Sheet**

**Structure Location Map:**
Approximate Lat./Long: 38.273133/-85.629382

# SUBSURFACE DATA

Plan Scale 1" = 20'




Profile Scale:
Vertical 1" = 10'
Horizontal not to scale

| Hole No. | 1017 | 1018 | 1019 | 1020 |
|---|---|---|---|---|
| Station | 275+00.00 | 279+00.00 | 283+00.00 | 287+00.00 |
| Offset | ℄ | ℄ | ℄ | ℄ |
| Elev. (NAVD 88 datum) | 574.60 | 577.40 | 579.80 | 581.30 |

590 580 570 560 550 540 530

**1017**

| $D_{50}$ (mm) | w% | LI | KYROD | REC. | |
|---|---|---|---|---|---|
| 0.027 | 20 | -0.21 | | | N=4, A-6(5),CL,S+C=63(47+16) |
| 0.105 | 24 | 0.21 | | | A-6(5),GC,S+C=49(24+25) |
| | | | 52 | 76 | Limestone: light gray to dark gray, very fine to fine grain, in part crystalline, fossiliferous to fossil fragmental, few stylolites, few vugs, w/shale partings & laminations |
| | | | 46 | 92 | |

Top of rock elev.= 562.60
Base of weathered rock elev.= 561.80

R (565.30)

**1018**

| Qu (psf) | $D_{50}$ (mm) | w% | LI | KYROD | REC. | |
|---|---|---|---|---|---|---|
| | 0.006 | 16 | -0.43 | | | A-6(18),CL,S+C=99(71+28) |
| 1254 | 0.004 | 25 | 0.22 | | | A-6(18),CL,S+C=95(58+37) |
| | | | | 62 | 68 | Cored Overburden w/limestone cobbles |
| | | | | 100 | 100 | Limestone: light gray, very fine to fine grain, crystalline, fossiliferous to fossil fragmental, few vugs, w/shale partings & laminations |

Top of rock elev.= 567.90
No weathered rock

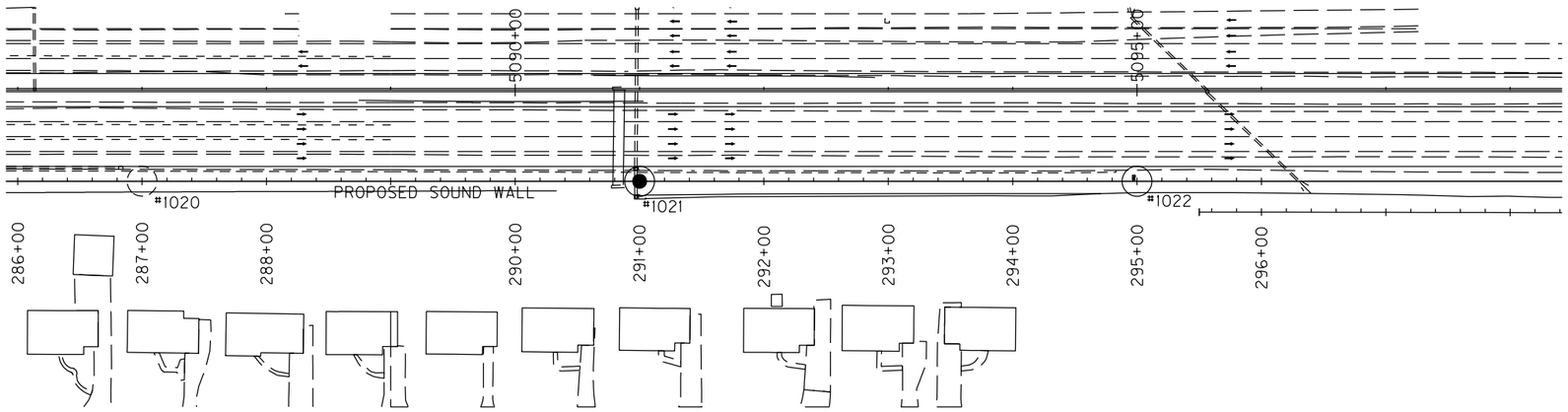
R (570.00)

Datum

| COMMONWEALTH OF KENTUCKY<br>DEPARTMENT OF HIGHWAYS | REVISION | DATE | PREPARED BY | DATE: 08-SEPTEMBER-2022 | CHECKED BY | | ROUTE | ITEM NO. | COUNTY OF |
|---|---|---|---|---|---|---|---|---|---|
| KENTUCKY TRANSPORTATION CABINET | | | Division of Structural Design<br>Geotechnical Branch | DESIGNED BY: | | CROSSING | I–264 | 5–804.00 | JEFFERSON |
| | | | | DETAILED BY: E. BAILEY | T. SHEFFIELD | Sound Wall @ Sta. 5074+75.00–5096+00.00 | | SHEET NO. | DRAWING NUMBER S–086–2022 |

# SUBSURFACE DATA

Plan Scale 1" = 20'




Profile Scale:
Vertical 1" = 10'
Horizontal not to scale

| Hole No. | 1021 | 1022 |
|---|---|---|
| Station | 291+00.00 | 295+00.00 |
| Offset | ℄ | ℄ |
| Elev. (NAVD 88 datum) | 583.20 | 583.30 |

590 580 570 560 550 540 530

| Qu (psf) | $D_{50}$ (mm) | w% | LI | |
|---|---|---|---|---|
| | 0.005 | 14 | -0.37 | A-6(17),CL,S+C=96(62+34) |
| 1167 | 0.004 | 26 | 0.49 | A-6(17),CL,S+C=90(49+41) |

| KYRQD | REC. | |
|---|---|---|
| 100 | 100 | Limestone: gray to brownish gray, very fine to fine grain, crystalline, fossiliferous to fossil fragmental, few vugs, w/shale partings & laminations |
| 76 | 100 | |

Top of rock elev.= 571.70
No weathered rock

R
(571.80)

Datum

| COMMONWEALTH OF KENTUCKY<br>DEPARTMENT OF HIGHWAYS | REVISION | DATE | PREPARED BY | DATE: 08-SEPTEMBER-2022 | CHECKED BY | | ROUTE | ITEM NO. | COUNTY OF |
|---|---|---|---|---|---|---|---|---|---|
| KENTUCKY TRANSPORTATION CABINET | | | Division of Structural Design<br>Geotechnical Branch | DESIGNED BY: | | CROSSING | I–264 | 5–804.00 | JEFFERSON |
| | | | | DETAILED BY: E. BAILEY | T. SHEFFIELD | Sound Wall @ Sta. 5074+75.00–5096+00.00 | | SHEET NO. | DRAWING NUMBER |
| | | | | | | | | | S–086–2022 |

# IDEALIZED SOIL AND BEDROCK PROFILE

**Jefferson Co., Item# 5-804.00, I-264 and US 42 Interchange**
**S-086-2022: Sound Barrier Wall at I-264 EB Sta. 5074+75.00 to 5096+00.00**

**TQS 8/30/22**

**Elev. (ft.)**

**Top of Shaft**

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**Overburden, Neglect top 5' for Support**

**Stiff Clay w/ Free Water**

| | | |
|---|---|---|
| **Effective Unit Weight,** | **$\gamma_e$ (lb/ft$^3$) =** | **58** |
| **Undrained Cohesion,** | **c (lb/ft$^2$) =** | **600** |
| **Strain Factor,** | **E50 =** | **0.010** |
| **Soil Modulus,** | **k (lb/in$^3$) =** | **100** |

**Top of Rock Socket**

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| **Strata** | | **Parameters for Lateral Load Analyses** | | |
|---|---|---|---|---|
| **Limestone** | | **Strong Rock (Vuggy Limestone)** | | |
| **$\gamma_t$ (lb/ft$^3$) =** | **150** | **Effective Unit Weight,** | **$\gamma_e$ (lb/in$^3$) =** | **0.087** |
| **$q_u$ (psi) =** | **4000** | | | |
| **$q_{eb}$ (ksf) =** | **90** | **Uniaxial Compressive Strength,** | **$q_u$ (psi) =** | **4000** |
| **$f_s$ (ksf) =** | **32.7** | | | |

(Side friction limited by Concrete Strength to fs = 32.7 ksf)

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**Shaft Tip**

* **Elevations vary and are provided in the report body.**

| **ADDITIONAL DATA FOR GEOTECHNICAL CALCULATIONS ONLY:** | |
|---|---|
| **min. f'$_c$ (psi) =** | **3500** |
| **$p_a$ (psi) =** | **14.7** |

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

### Jefferson Co., Item# 5-804.00, I-264 and US 42 Interchange
### S-086-2022: Sound Barrier Wall at I-264 EB Sta. 5074+75.00 to 5096+00.00

**Rock Socket Diameter = 1.5 feet**
**Rock Socket Diameter = 18 inches** **TQS 8/30/22**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 32.7 | 90 | 154 | 159 | 77 | 80 | 157 | 62 |
| | 2.0 | 32.7 | 90 | 308 | 159 | 154 | 80 | 234 | 123 |
| >>> | 3.0 | 32.7 | 90 | 462 | 159 | 231 | 80 | 311 | 185 |
| | 4.0 | 32.7 | 90 | 616 | 159 | 308 | 80 | 388 | 246 |
| | 5.0 | 32.7 | 90 | 770 | 159 | 385 | 80 | 465 | 308 |
| | 6.0 | 32.7 | 90 | 924 | 159 | 462 | 80 | 542 | 370 |
| | 7.0 | 32.7 | 90 | 1078 | 159 | 539 | 80 | 619 | 431 |
| | 8.0 | 32.7 | 90 | 1232 | 159 | 616 | 80 | 696 | 493 |
| | 9.0 | 32.7 | 90 | 1386 | 159 | 693 | 80 | 773 | 555 |
| | 10.0 | 32.7 | 90 | 1540 | 159 | 770 | 80 | 850 | 616 |
| | 11.0 | 32.7 | 90 | 1694 | 159 | 847 | 80 | 927 | 678 |
| | 12.0 | 32.7 | 90 | 1848 | 159 | 924 | 80 | 1004 | 739 |
| | 13.0 | 32.7 | 90 | 2002 | 159 | 1001 | 80 | 1081 | 801 |
| | 14.0 | 32.7 | 90 | 2157 | 159 | 1078 | 80 | 1158 | 863 |
| | 15.0 | 32.7 | 90 | 2311 | 159 | 1155 | 80 | 1235 | 924 |
| | 16.0 | 32.7 | 90 | 2465 | 159 | 1232 | 80 | 1312 | 986 |
| | 17.0 | 32.7 | 90 | 2619 | 159 | 1309 | 80 | 1389 | 1047 |
| | 18.0 | 32.7 | 90 | 2773 | 159 | 1386 | 80 | 1466 | 1109 |
| | 19.0 | 32.7 | 90 | 2927 | 159 | 1463 | 80 | 1543 | 1171 |
| | 20.0 | 32.7 | 90 | 3081 | 159 | 1540 | 80 | 1620 | 1232 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | Resistance Factor, $\phi$ | | 0.50 | 0.50 | | 0.40 |

| | |
|---|---|
| >>> = Min. Socket Length | D (ft.) = 1.5 |

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

### Jefferson Co., Item# 5-804.00, I-264 and US 42 Interchange
### S-086-2022: Sound Barrier Wall at I-264 EB Sta. 5074+75.00 to 5096+00.00

**Rock Socket Diameter = 2.0 feet**
**Rock Socket Diameter = 24 inches** **TQS 8/30/22**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 32.7 | 90 | 205 | 283 | 103 | 141 | 244 | 82 |
| | 2.0 | 32.7 | 90 | 411 | 283 | 205 | 141 | 347 | 164 |
| >>> | 3.0 | 32.7 | 90 | 616 | 283 | 308 | 141 | 449 | 246 |
| | 4.0 | 32.7 | 90 | 822 | 283 | 411 | 141 | 552 | 329 |
| | 5.0 | 32.7 | 90 | 1027 | 283 | 513 | 141 | 655 | 411 |
| | 6.0 | 32.7 | 90 | 1232 | 283 | 616 | 141 | 758 | 493 |
| | 7.0 | 32.7 | 90 | 1438 | 283 | 719 | 141 | 860 | 575 |
| | 8.0 | 32.7 | 90 | 1643 | 283 | 822 | 141 | 963 | 657 |
| | 9.0 | 32.7 | 90 | 1848 | 283 | 924 | 141 | 1066 | 739 |
| | 10.0 | 32.7 | 90 | 2054 | 283 | 1027 | 141 | 1168 | 822 |
| | 11.0 | 32.7 | 90 | 2259 | 283 | 1130 | 141 | 1271 | 904 |
| | 12.0 | 32.7 | 90 | 2465 | 283 | 1232 | 141 | 1374 | 986 |
| | 13.0 | 32.7 | 90 | 2670 | 283 | 1335 | 141 | 1476 | 1068 |
| | 14.0 | 32.7 | 90 | 2875 | 283 | 1438 | 141 | 1579 | 1150 |
| | 15.0 | 32.7 | 90 | 3081 | 283 | 1540 | 141 | 1682 | 1232 |
| | 16.0 | 32.7 | 90 | 3286 | 283 | 1643 | 141 | 1784 | 1314 |
| | 17.0 | 32.7 | 90 | 3491 | 283 | 1746 | 141 | 1887 | 1397 |
| | 18.0 | 32.7 | 90 | 3697 | 283 | 1848 | 141 | 1990 | 1479 |
| | 19.0 | 32.7 | 90 | 3902 | 283 | 1951 | 141 | 2093 | 1561 |
| | 20.0 | 32.7 | 90 | 4108 | 283 | 2054 | 141 | 2195 | 1643 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | Resistance Factor, $\phi$ | | 0.50 | 0.50 | | 0.40 |

| | |
|---|---|
| >>> = Min. Socket Length | D (ft.) = 2.0 |

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

### Jefferson Co., Item# 5-804.00, I-264 and US 42 Interchange
### S-086-2022: Sound Barrier Wall at I-264 EB Sta. 5074+75.00 to 5096+00.00

**Rock Socket Diameter = 2.5 feet**
**Rock Socket Diameter = 30 inches** **TQS 8/30/22**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 32.7 | 90 | 257 | 442 | 128 | 221 | 349 | 103 |
| | 2.0 | 32.7 | 90 | 513 | 442 | 257 | 221 | 478 | 205 |
| >>> | 3.0 | 32.7 | 90 | 770 | 442 | 385 | 221 | 606 | 308 |
| | 4.0 | 32.7 | 90 | 1027 | 442 | 513 | 221 | 734 | 411 |
| | 5.0 | 32.7 | 90 | 1284 | 442 | 642 | 221 | 863 | 513 |
| | 6.0 | 32.7 | 90 | 1540 | 442 | 770 | 221 | 991 | 616 |
| | 7.0 | 32.7 | 90 | 1797 | 442 | 899 | 221 | 1119 | 719 |
| | 8.0 | 32.7 | 90 | 2054 | 442 | 1027 | 221 | 1248 | 822 |
| | 9.0 | 32.7 | 90 | 2311 | 442 | 1155 | 221 | 1376 | 924 |
| | 10.0 | 32.7 | 90 | 2567 | 442 | 1284 | 221 | 1505 | 1027 |
| | 11.0 | 32.7 | 90 | 2824 | 442 | 1412 | 221 | 1633 | 1130 |
| | 12.0 | 32.7 | 90 | 3081 | 442 | 1540 | 221 | 1761 | 1232 |
| | 13.0 | 32.7 | 90 | 3337 | 442 | 1669 | 221 | 1890 | 1335 |
| | 14.0 | 32.7 | 90 | 3594 | 442 | 1797 | 221 | 2018 | 1438 |
| | 15.0 | 32.7 | 90 | 3851 | 442 | 1925 | 221 | 2146 | 1540 |
| | 16.0 | 32.7 | 90 | 4108 | 442 | 2054 | 221 | 2275 | 1643 |
| | 17.0 | 32.7 | 90 | 4364 | 442 | 2182 | 221 | 2403 | 1746 |
| | 18.0 | 32.7 | 90 | 4621 | 442 | 2311 | 221 | 2531 | 1848 |
| | 19.0 | 32.7 | 90 | 4878 | 442 | 2439 | 221 | 2660 | 1951 |
| | 20.0 | 32.7 | 90 | 5135 | 442 | 2567 | 221 | 2788 | 2054 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | Resistance Factor, $\phi$ | | 0.50 | 0.50 | | 0.40 |

>>> = Min. Socket Length

D (ft.) = 2.5

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

### Jefferson Co., Item# 5-804.00, I-264 and US 42 Interchange
### S-086-2022: Sound Barrier Wall at I-264 EB Sta. 5074+75.00 to 5096+00.00

**Rock Socket Diameter = 3.0 feet**
**Rock Socket Diameter = 36 inches** **TQS 8/30/22**

| Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | |
| 1.0 | 32.7 | 90 | 308 | 636 | 154 | 318 | 472 | 123 |
| 2.0 | 32.7 | 90 | 616 | 636 | 308 | 318 | 626 | 246 |
| >>> 3.0 | 32.7 | 90 | 924 | 636 | 462 | 318 | 780 | 370 |
| 4.0 | 32.7 | 90 | 1232 | 636 | 616 | 318 | 934 | 493 |
| 5.0 | 32.7 | 90 | 1540 | 636 | 770 | 318 | 1088 | 616 |
| 6.0 | 32.7 | 90 | 1848 | 636 | 924 | 318 | 1242 | 739 |
| 7.0 | 32.7 | 90 | 2157 | 636 | 1078 | 318 | 1396 | 863 |
| 8.0 | 32.7 | 90 | 2465 | 636 | 1232 | 318 | 1550 | 986 |
| 9.0 | 32.7 | 90 | 2773 | 636 | 1386 | 318 | 1704 | 1109 |
| 10.0 | 32.7 | 90 | 3081 | 636 | 1540 | 318 | 1858 | 1232 |
| 11.0 | 32.7 | 90 | 3389 | 636 | 1694 | 318 | 2012 | 1356 |
| 12.0 | 32.7 | 90 | 3697 | 636 | 1848 | 318 | 2167 | 1479 |
| 13.0 | 32.7 | 90 | 4005 | 636 | 2002 | 318 | 2321 | 1602 |
| 14.0 | 32.7 | 90 | 4313 | 636 | 2157 | 318 | 2475 | 1725 |
| 15.0 | 32.7 | 90 | 4621 | 636 | 2311 | 318 | 2629 | 1848 |
| 16.0 | 32.7 | 90 | 4929 | 636 | 2465 | 318 | 2783 | 1972 |
| 17.0 | 32.7 | 90 | 5237 | 636 | 2619 | 318 | 2937 | 2095 |
| 18.0 | 32.7 | 90 | 5545 | 636 | 2773 | 318 | 3091 | 2218 |
| 19.0 | 32.7 | 90 | 5853 | 636 | 2927 | 318 | 3245 | 2341 |
| 20.0 | 32.7 | 90 | 6161 | 636 | 3081 | 318 | 3399 | 2465 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | Resistance Factor, $\phi$ | | 0.50 | 0.50 | | 0.40 |

| | |
|---|---|
| >>> = Min. Socket Length | D (ft.) = 3.0 |

S-086-2022 05-0804.00 Kentucky Transportation Cabinet

| ID | Latitude | Longitude | Hole | Station | Offset | Elevation(ft) | Comments |
|---|---|---|---|---|---|---|---|
| 1 | 38.2704559 | -85.6270284 | 1017 | 275+00 | 0 | 574.56 | |
| 2 | 38.2713633 | -85.6278132 | 1018 | 279+00 | 0 | 577.413 | First rock @ 11.8 |
| 3 | 38.2722518 | -85.6286324 | 1019 | 283+00 | 0 | 579.772 | |
| 4 | 38.2731404 | -85.6294516 | 1020 | 287+00 | 0 | 581.313 | First rock @ 10.9 |
| 5 | 38.2740289 | -85.6302708 | 1021 | 291+00 | 0 | 583.164 | |
| 6 | 38.2749174 | -85.6310901 | 1022 | 295+00 | 0 | 583.283 | First rock @ 11.1 |