| Supplemental Report of Structure Soundings | | | | | | | | | | | | | | | | | | |
|---|-------------|---|----------------------|-----------------------------|----------------------------------|---------------|--------------------|--|--------------|--------------|---------------|----------------|---------------------|------------------|--------|------------|---------|----|
| Form 610014 (10-15) English Type and Size of Bridg | | Project | NHSX-030-6(231)3H-06 | | | | | Design No. | | 7 | 718 | | 31044 Date Reported | | | 12/16/2016 | | 6 |
| | | e 8' X 8' X 141' Reinforced Box Culvert | | | | | | | | | | Road No. | US 3 | iO | County | / Benton | | |
| Bridge over Local Drainage | | | | | | | | | | at Station | | +94 | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | Core Da | ta | | | | | | | | | |
| Test Hole No. | Layer | *Core Type | Depth From To | | Blows Blows 6 in. Seat 1st 6 in. | | Blows 2nd 6 in. | Blows per foot | Cohesion psf | Friction | **Test tsf | Density pcf | Moisture % | AASHTO Class. | | ! | Remarks | ; |
| RB30-340 | B1 | SH | 0.5 | 2.5 | | | | | 1250 | 0 | UC | 81 | 35 | | | | | |
| | C1 | ST | 3.5 | 5.0 | 2 | 2 | 2 | 4 | | | | | | | | | | |
| | D1 | SH | 8.0 | 10.0 | | _ | _ | | 2390 | 0 | UC | 118 | 13 | | | | | |
| | D2 D3 | ST SH | 13.5 18.0 | 15.0 20.0 | 3 | 5 | 8 | 13 | 2360 | 0 | UC | 119 | 14 | | | | | |
| | D3 | ST | 23.5 | 25.0 | 5 | 8 | 9 | 17 | 2360 | U | UC | 119 | 14 | | | | | |
| | DŦ | - 01 | 20.0 | 20.0 | | U | 3 | - '' | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | |
| All 6 | | | | | 1 | 201 | # ODT ! | | | | | | | | | <u> </u> | | |
| Note: All Star | naara Penet | ration lest | blow counts i | in this borin | g obtained w | rith an autor | matic SPT h | nammer. | | | | | | | | | | |
| Station | | 140 | 0+94 | _Estimated consolidation of | | | 0.17 | feet in | 8 | 8 foot thick | | Percent | 10 | 30 | 50 | 70 | 90 | |
| | | compress | sible layers u | nder the | 18 | | | foot embankment at the following rate: | | | | | | | 4 | 10 | 21 | 45 |

Recommendations:

We recommend placing a granular blanket below the RCB that consists of 12 inches of Special Backfill (Iowa DOT Standard Specifications Section 4132), extending at least 2 feet beyond the RCB perimeter (east and west). We recommend using an at-rest equivalent fluid pressure of 65 pounds per cubic foot (pcf) and an active equivalent fluid pressure of 45 pcf for design of the RCB walls. Design RCB to accommodate a minimum of 2 inches of differential settlement over a distance of 50 feet and total settlement of 2 inches.

* SH - Shelby Tube Core

DC - Density Core

ST - Split Tube Core

UU - Unconsolidated Undrained (Triaxial) CU - Consolidated Undrained (Triaxial)

** UC - Unconfined Compression (Cohesion = 1/2 U.C. Strength)

NQ - Diamond Core

Bryan Kumm, PE

Reporting Engineer

Supplemental Report of Structure Soundings

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| Form 610014 English | <u>4 (10-15)</u> | Project | NHSX-030 | D-6(231)3F | H-06 | aota o | - Courre | Design No. 718 | | | '18 | File No. | 31044 Date Reported | | | 1 | 6 | |
|------------------------|------------------|----------------------|---------------|--|--------------|--------------|--|----------------|------------|--------------|-----------------|------------|---------------------|----------|---------|----------|-----------|-------------|
| Type and S | Size of Bridge | e <u>8' X 8' X 8</u> | 34' Reinforce | ed Box Culv | ert | | | | | | | Road No. | US 3 | 30 | County | | Benton | |
| Bridge over | Local Drain | age | | | | | | | | | | at Station | | | 1400- | +94 | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | Core Da | ta | | | | | | | | | |
| Test Hole | Layer | *Core | | epth _ | Blows | Blows | Blows | Blows | Cohesion | Friction | **Test | Density | Moisture | | HTO | | Remarks | |
| No. | , | Type | From | To 5.5 | 6 in. Seat | | 2nd 6 in. | per foot | psf | | tsf | pcf | % | Cla | ass. | | | |
| RB30-341 | B1 C1 | ST ST | 4.0 9.0 | 10.5 | 5 2 | 5 4 | 8 | 13 10 | | | | | 21 | | | | | |
| | D1 | ST | 14.0 | 15.5 | 9 | 15 | 14 | 29 | | | | | 15 | | | | | |
| | E1 | ST | 19.0 | 20.5 | 3 | 5 | 7 | 12 | | | 1 | | 10 | | | | | |
| | E2 | ST | 24.0 | 25.5 | 4 | 6 | 9 | 15 | | | | | 15 | | | | | |
| | E3 | ST | 29.0 | 30.5 | 5 | 9 | 13 | 22 | | | | | | | | | | |
| | E4 | ST | 34.0 | 35.5 | 5 | 9 | 11 | 20 | | | | | 13 | | | | | |
| | G1 | ST | 39.0 | 40.5 | 11 | 18 | 25 | 43 | | | | | | | | | | |
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| | | | Note: All re | eported blov | v counts are | uncorrecte | d. Multiply | blow counts | by 1.46 to | determine N | 160-values. | | | | | | | |
| Nata All Ota | and December | | | to the house | | 20 | ······································ | | | | | | | | | | | |
| Note: All Sta | indard Peneti | ration lest b | now counts i | in this boring | g obtained w | ith an auto | matic SPT r | nammer. | | | | | | | | | | |
| Station | | 1400 | 0+94 | | Estimated | consolidatio | on of | 0.17 | feet in | 8 | foot thick | | Percent | 10 | 30 | 50 | 70 | 90 |
| Clation | | 1700 | 0104 | | _ Louinatea | oonoonaan | 011 01 | 0.17 | _1001111 | | 1001 111101 | | reroent | -10 | - 00 | - 00 | - 10 | - 50 |
| | | | ible levere | under the | 10 | | | | foot embar | demant at th | a a fallausia a | roto | Days | 1 | 4 | 10 | 21 | 45 |
| Recommend | latione: | compress | ible layers u | maer the | 18 | | | | | ikment at tr | ie ioliowing | rate. | | <u> </u> | | | | |
| | | nlooina | o aropul | lar blank | cot halay | u tha Di | CD that | oonoiota | of 10 in | achaa a | f Specie | al Dookfi | II (loveo | ОТ | Stand | ord | | |
| | mmend | | _ | | | | | | | | • | | ` | | | | | |
| Specifica | ations Se | ection 41 | 132), ext | tending | at least : | 2 feet b | eyond t | he RCB | perimet | ter (eas | t and w | est).W | e recom | mend | using | g an a | t-rest | |
| equivale | ent fluid p | ressure | of 65 pc | ounds p | er cubic | foot (po | cf) and a | an active | e equiva | lent flui | d press | ure of 4 | 5 pcf for | desid | ın of t | he RC | CB wa | lls. |
| | RCB to a | | | | | | | | | | | | | | | | | |
| Design r | NOD IO a | CCOITIOU | aic a IIII | ii iii i i i i i i i i i i i i i i i i | 01 2 11101 | ics of a | miciciill | ai settie | IIIGIIL UV | ei a uis | nance 0 | 1 20 166 | i and itt | aı sel | пенне | 111 01 2 | - 1110116 | <i>5</i> 3. |
| | | | | | | | | | | | | | | | | | | |
| * SH - Shelby | v Tube Core | | IIII - Unco | nsolidated | Indrained (| Triavial) | | | | | | | | Brva | an Ku | mm. F | ΣF | |

ST - Split Tube Core DC - Density Core

CU - Consolidated Undrained (Triaxial)

** UC - Unconfined Compression (Cohesion = 1/2 U.C. Strength)

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