project. It should be noted that for the purposes of this report and our analysis the term 'subgrade' has been assumed to represent soils and/or soil conditions from 1.5 ft below proposed final pavement grades to a depth of 7.5 ft below the proposed pavement grades.

4.1. Core Results

The thicknesses of the cores were measured at the indicated core locations shown on the Boring Location Plan provided in Appendix A. A summary of these measurements along with the material encountered is summarized in Table 2. Laboratory photographs and logs of each of the cores are presented in the Pavement Core Logs included within Appendix C.

Table 2: Pavement Core Summary

Core ID	Alignment	Asphalt Thickness (in)	Concrete Thickness (in)	Total Thickness (in)
X-001-0-22	US-33 EB	10.50	-	10.50
X-002-0-22	US-33 EB	10.25	-	10.25
X-003-0-22	US-33 EB	9.00	-	9.00
X-004-0-22	Ramp 1	11.25	-	11.25
X-005-0-22	US-33 EB	12.00	-	12.00
X-006-0-22	Ramp 1	4.00	9.50	13.50
X-007-0-22	US-33 EB	4.75	9.25	14.00
X-008-0-22	US-33 WB	11.25	-	11.25

4.2. Existing Pavement

The pavement section thicknesses in terms of asphalt, concrete and granular base were measured at representative project subgrade borings during the subsurface exploration for the project and are recorded on the test boring logs provided in Appendix B. A summary of these measurements is provided in Table 3 below.

Table 3: Measured Pavement Thickness at Boring Locations

Boring ID	Proposed Alignment	Drilled Depth (ft)	Asphalt Thickness (in)	Concrete Thickness (in)	Base Thickness (in)	Total Thickness (in)
B-003-0-22	US-33 EB	7.5	8.0	0.0	10.0	18.0
B-004-0-22	Ramp 1	7.5	8.0	0.0	10.0	18.0
B-005-0-22	US-33 EB	10.0	7.0	0.0	11.0	18.0
B-006-0-22	Ramp 1	7.5	9.5	0.0	11.0	20.5
B-007-0-22	Ramp 1	7.5	9.5	0.0	11.0	20.5
B-008-0-22	Ramp 1	7.5	7.0	0.0	11.0	18.0
B-009-0-22	Ramp 3	7.5	10.0	0.0	8.0	18.0
B-010-0-22	Ramp 1	7.5	4.0	7.0	7.0	18.0
B-011-0-22	Ramp 1	7.5	10.0	0.0	8.0	18.0
B-012-0-22	Ramp 1	7.5	4.0	7.0	7.0	18.0
B-013-0-22	Ramp 1A	20.0	4.0	8.0	6.0	18.0
B-014-0-22	Ramp 2	7.5	8.0	0.0	10.0	18.0
B-019-0-22	US-33 EB	7.5	4.0	7.0	7.0	18.0
B-020-0-22	US-33 EB	7.5	3.5	6.0	9.5	19.0
B-021-0-22	US-33 EB	7.5	9.5	0.0	11.0	20.5
B-022-0-22	US-33 EB	7.5	9.5	0.0	8.5	18.0
B-023-0-22	US-33 EB	7.5	2.5	9.5	6.0	18.0
B-027-0-22	Winchester Ramp A	7.5	2.5	11.0	4.5	18.0
B-028-0-22	Winchester Ramp B	7.5	2.5	11.0	4.5	18.0
B-029-0-22	US-33 WB	7.5	4.0	8.0	6.0	18.0
B-030-0-22	US-33 WB	7.5	4.0	7.0	7.0	18.0
B-034-0-22	US-33 WB	7.5	4.0	7.0	7.0	18.0
B-035-0-22	US-33 WB	7.5	4.0	7.0	7.0	18.0
B-036-0-22	US-33 WB	7.5	3.0	10.0	5.0	18.0
B-037-0-22	US-33 WB	7.5	4.0	8.0	6.0	18.0

4.3. Subgrade Conditions

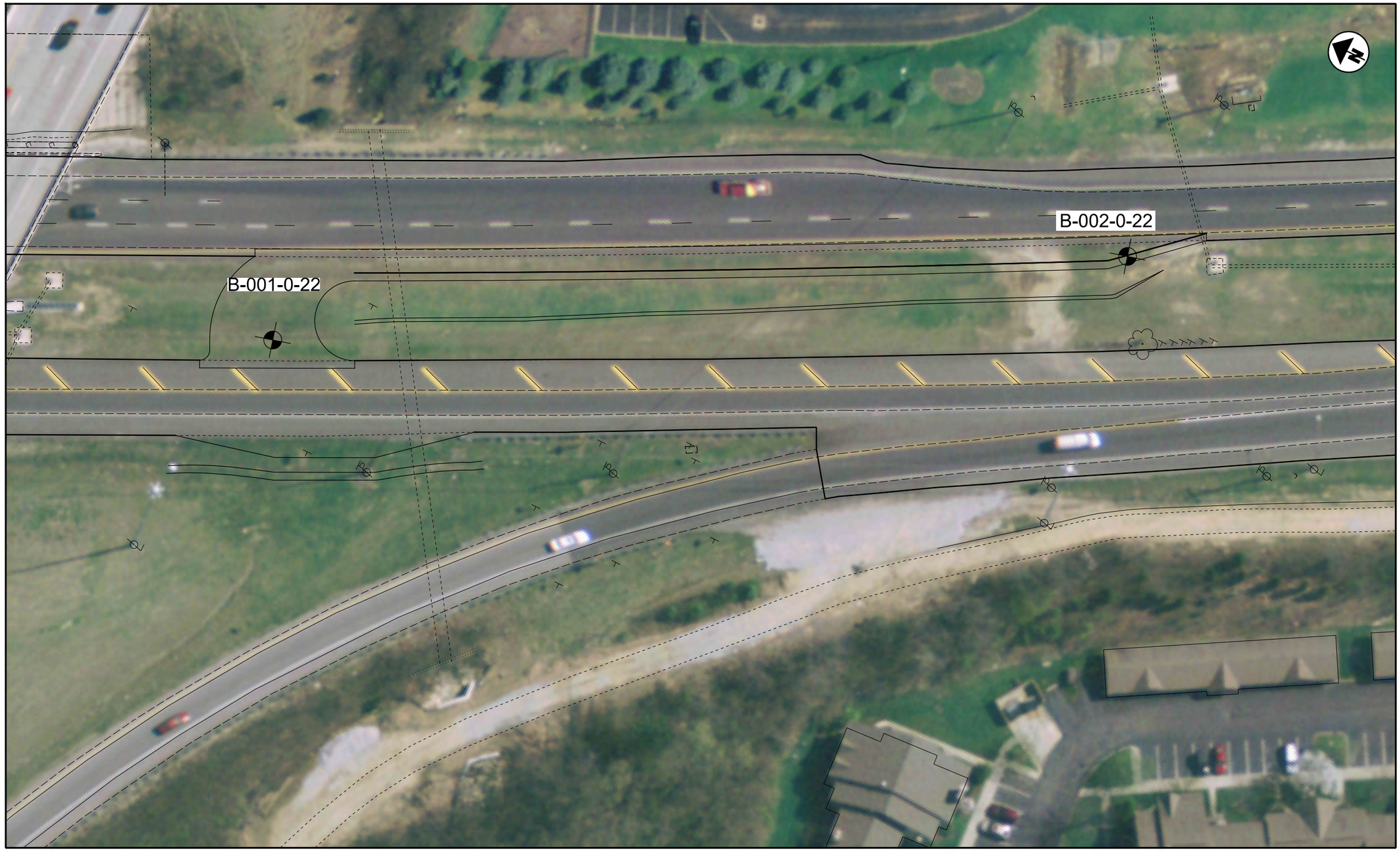
The subgrade conditions within the project limits are relatively consistent and are generally comprised of either fill soils (i.e., embankment fill) or natural soils consisting of gravel, sand and silt, or low to moderately plastic sandy silt and silt/clay combinations. The subgrade soils encountered within the project limits are generally classified as either A-1-a, A-1-b, A-2-4, A-4a, A-4b, A-6a, A-6b or A-7-6 type soils. With respect to sulfate within the subgrade soil, based on the project laboratory testing program, each subgrade soil sample tested was determined to have a sulfate content of less than 5,000 parts per million (ppm) (i.e., the level which ODOT considers high and may prevent the use of chemical stabilization) with the exception of a sample tested from boring B-031-0-22 which was determined to have a sulfate content greater than 8,000 ppm.

The following subsections present a summary of the subsurface conditions by ramp/roadway segment with problem areas highlighted where present.

4.3.1. US-33 Westbound

Project portions of US-33 WB are planned to undergo full depth pavement replacement. The borings performed along this portion of roadway included borings B-029-0-22 and B-030-0-22 as well as borings B-034-0-22 through B-037-0-22.

Along US-33 WB, forty-eight percent (48%) of the soil samples were identified as fine-grained soils and were comprised of cohesive Sandy Silt (A-4a). With respect to the consistency of the fine-grained soils, the descriptions varied from medium stiff to hard correlating to converted SPT-N values (N_{60}) between 7 and 44 blows per foot (bpf). Natural moisture contents ranged from 8 to 12 percent. Based on Atterberg Limit



TARGET BORING LOCATION

HORIZONTAL SCALE IN FEET
0 12.5 25 50

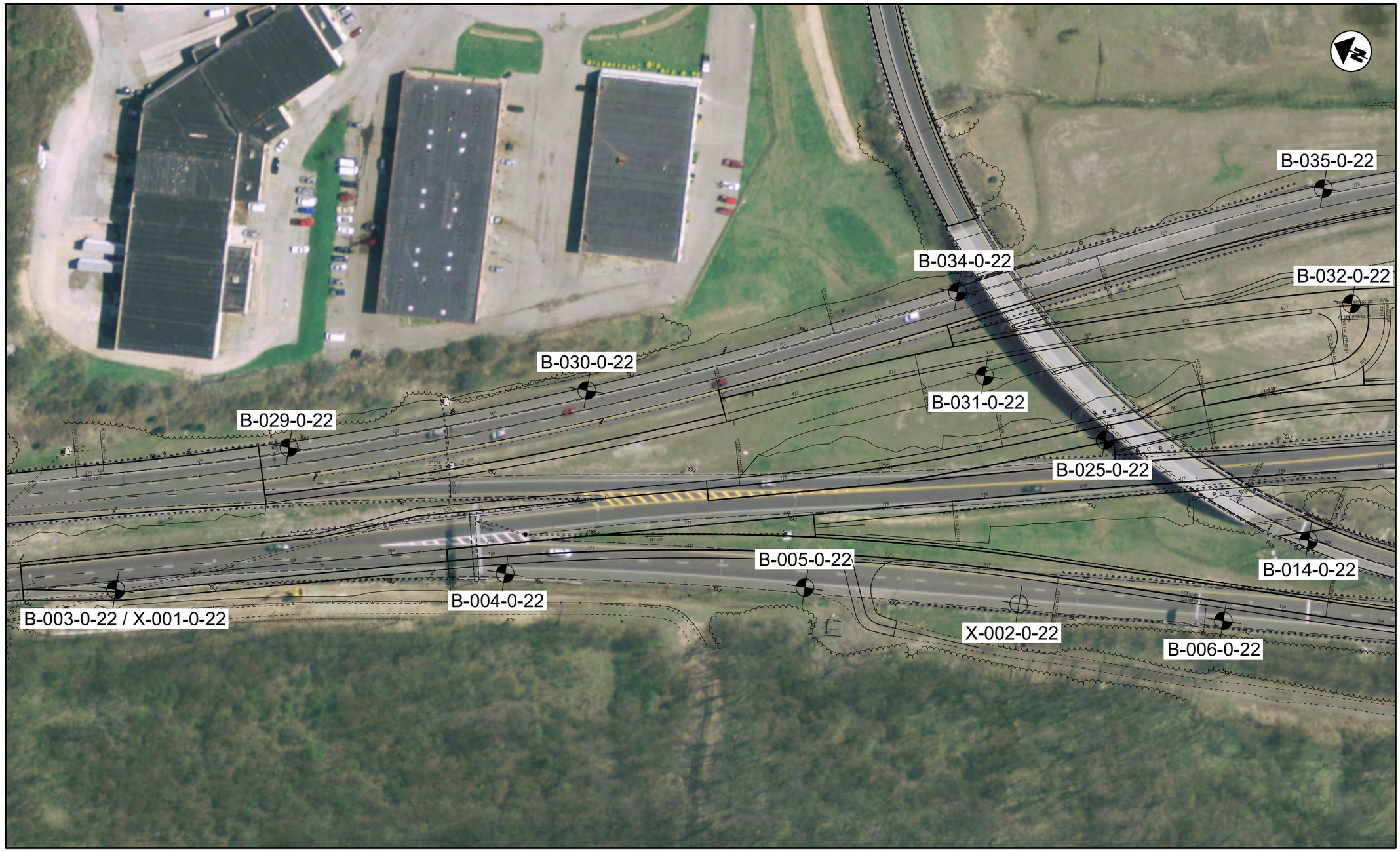
BORING LOCATION PLAN

DESIGN AGENCY
KEA Kleinfelder Engineering & Architectural Services Inc.

DESIGNER	KCA
REVIEWER	BPA 11-09-2022
PROJECT ID	113744
SHEET	1
TOTAL	4

FRA-33-21.71

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TARGET BORING LOCATION
(B-00X-0-22)

TARGET PAVEMENT CORE LOCATION
(X-00X-0-22)

HORIZONTAL
SCALE IN FEET
0 25 50 100

BORING LOCATION PLAN

DESIGN AGENCY
EAS Engineering & Architectural Services Inc.

DESIGNER	KCA
REVIEWER	BPA 11-09-2022
PROJECT ID	113744
SHEET	2
TOTAL	4

FRA-33-21.71

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BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 25 50 100

B-036-0-22
B-037-0-22
X-008-0-22
B-033-0-22
B-028-0-22
B-026-0-22
B-017-0-22
B-027-0-22
B-024-0-22
B-016-0-22
B-018-0-22
B-023-0-22
B-015-0-22
X-005-0-22
B-008-0-22
B-009-0-22
B-010-0-22
X-004-0-22
X-003-0-22
B-007-0-22

TARGET BORING LOCATION
(B-00X-0-22)

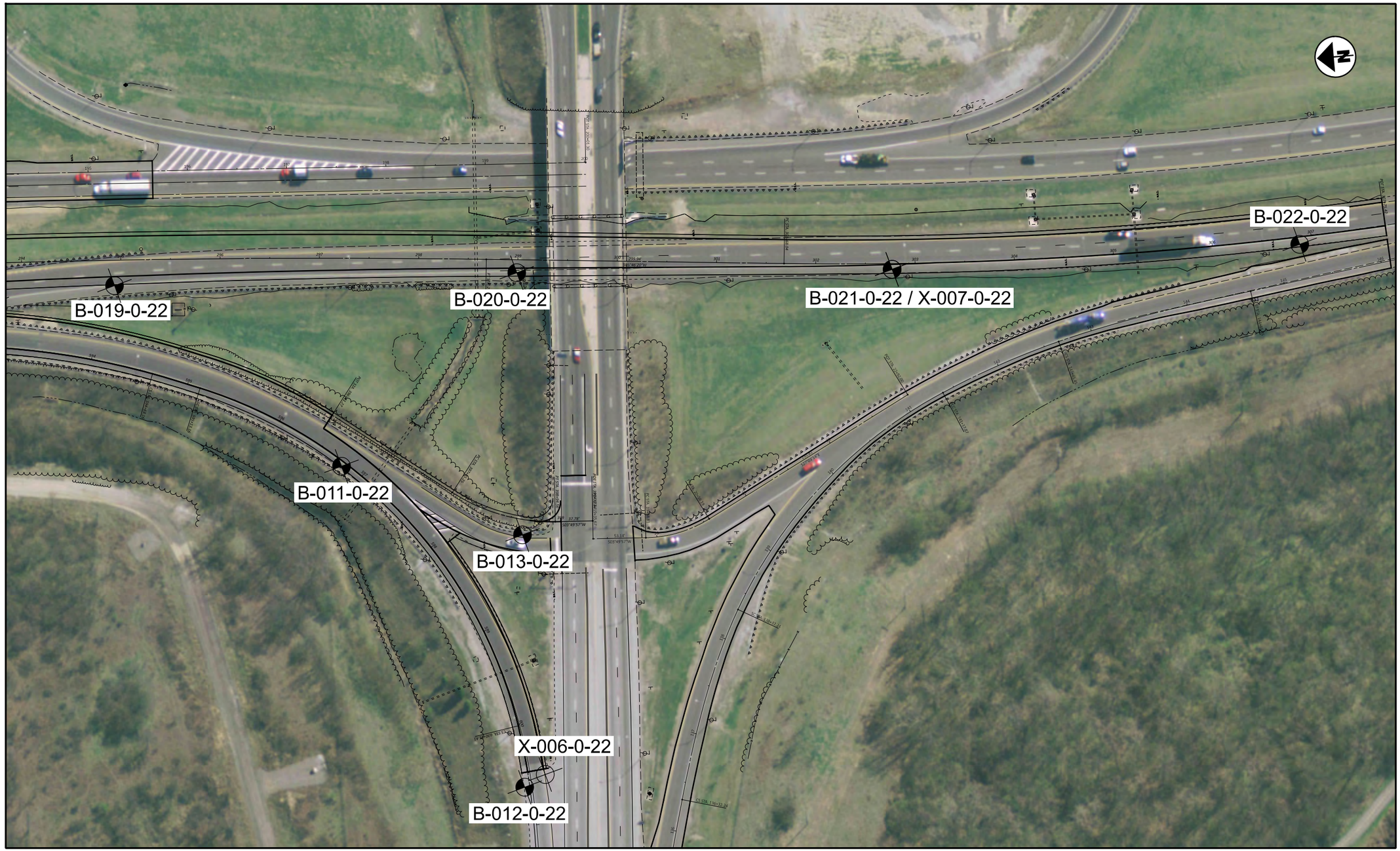
TARGET PAVEMENT CORE LOCATION
(X-00X-0-22)

DESIGN AGENCY
EAS Engineering & Architectural Services Inc.

DESIGNER	KCA
REVIEWER	BPA 11-09-2022
PROJECT ID	113744
SHEET	3
TOTAL	4

FRA-33-21.71

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TARGET BORING LOCATION
(B-00X-0-22)

TARGET PAVEMENT CORE LOCATION
(X-00X-0-22)

HORIZONTAL
SCALE IN FEET
0 25 50 100

BORING LOCATION PLAN

DESIGN AGENCY
KEA Kentucky Engineering & Architectural Services Inc.

DESIGNER	KCA
REVIEWER	BPA 11-09-2022
PROJECT ID	113744
SHEET	4
TOTAL	4

FRA-33-21.71

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