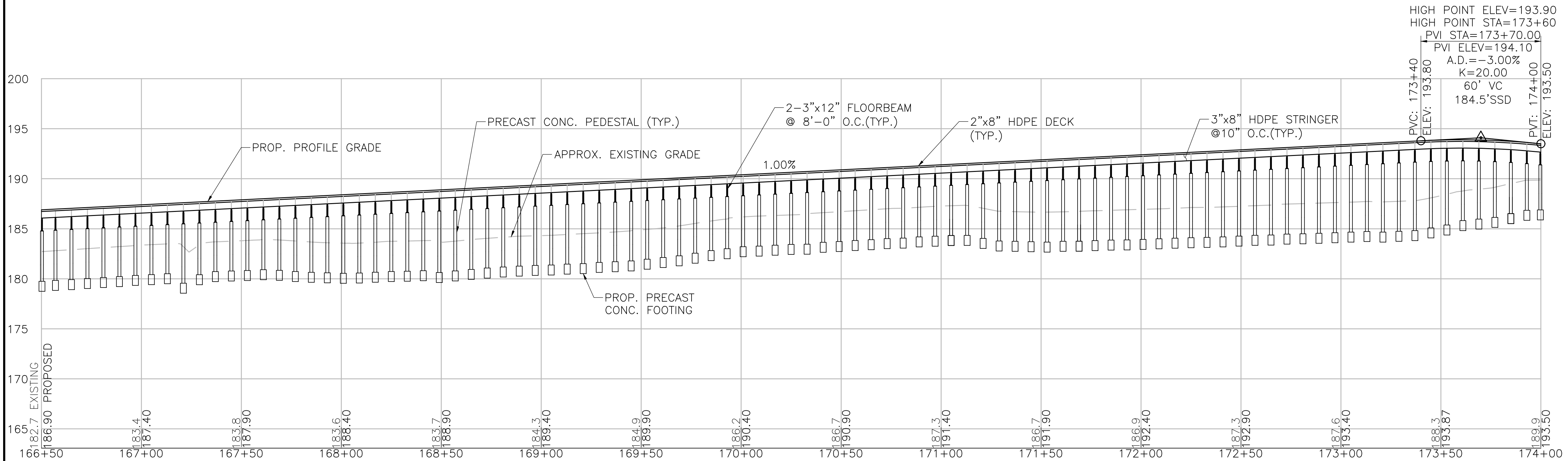
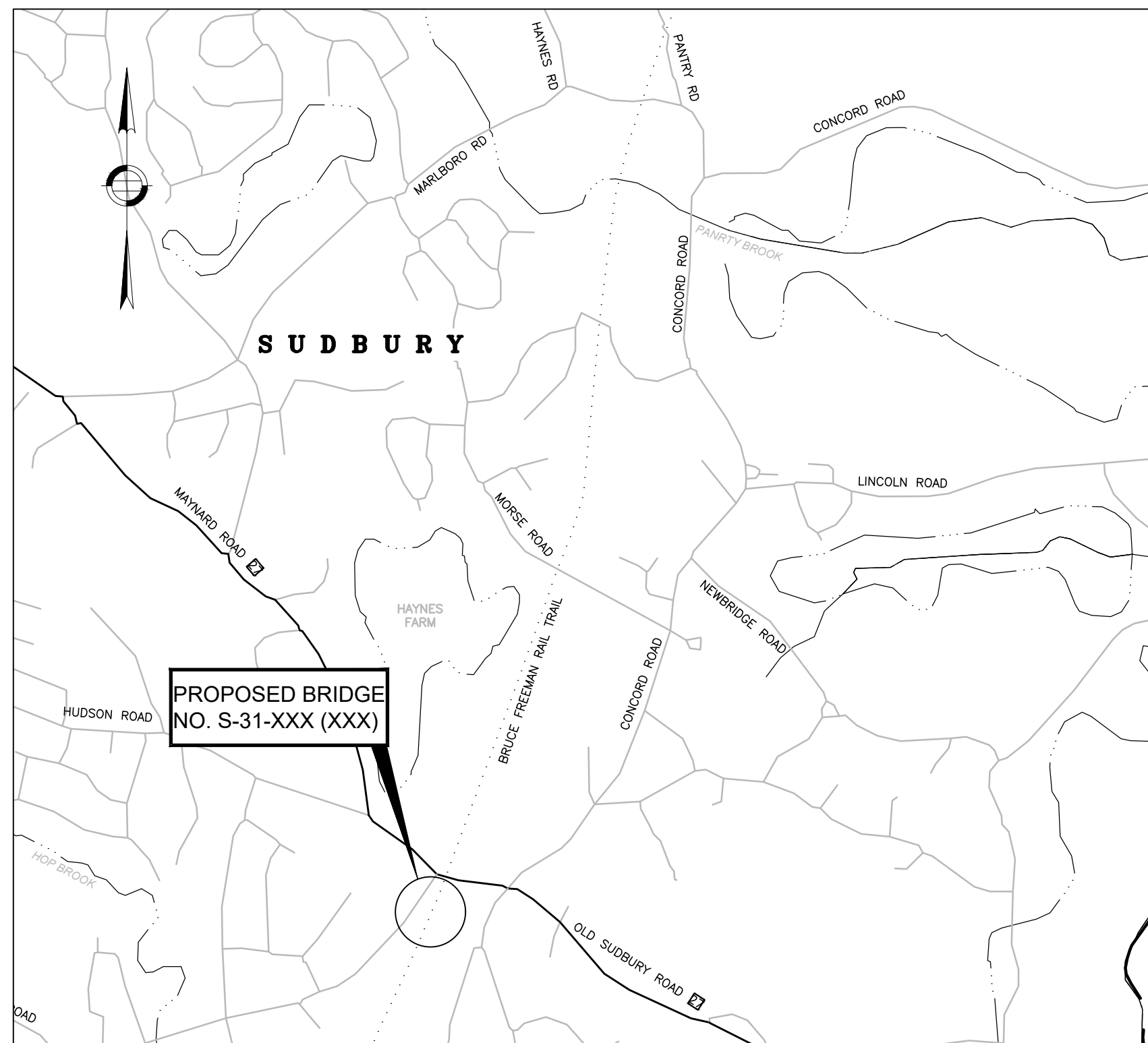


KEY PLAN  
SCALE: 1"=30'-0"



PROFILE ALONG BIKE PATH  
HORIZONTAL SCALE: 1"=30'-0"  
VERTICAL SCALE: 1" = 6'-0"



LOCUS  
SCALE: 1"=1200'-0"

| GENERAL NOTES                                                    |              |               |
|------------------------------------------------------------------|--------------|---------------|
| PROJECT FILE NO.: 608164                                         |              |               |
| PROJECT DESCRIPTION: PROPOSED BRIDGE                             |              |               |
| BRIDGE DESIGN LOADING: H10                                       |              |               |
| SURVEY: SURVEY INFO                                              |              |               |
| ELEVATION REFERENCE: NAVD OF 1988                                |              |               |
| TRAFFIC DATA                                                     |              |               |
|                                                                  | ROADWAY OVER | ROADWAY UNDER |
| DESIGN YEAR                                                      | N/A          |               |
| AVERAGE DAILY TRAFFIC - PRESENT                                  | N/A          |               |
| AVERAGE DAILY TRAFFIC - DESIGN YEAR                              | N/A          |               |
| DESIGN HOURLY VOLUME                                             | N/A          |               |
| DIRECTIONAL DISTRIBUTION                                         | N/A          |               |
| TRUCK PERCENTAGE - AVERAGE DAY                                   | N/A          |               |
| TRUCK PERCENTAGE - PEAK HOUR                                     | N/A          |               |
| DESIGN SPEED                                                     | 18 MPH       |               |
| DIRECTIONAL DESIGN HOURLY VOLUME                                 | N/A          |               |
| BENCH MARK: #45, N: 2964154.656' E: 678868.400' EL=186.844' MRRS |              |               |

#### DESIGN

IN ACCORDANCE WITH THE 2017 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

#### NOTES:

- APPROVAL DOES NOT INCLUDE STRUCTURAL ANALYSIS.
- DIMENSIONS OF STRUCTURAL MEMBERS ARE APPROXIMATE, AND WILL BE FINALIZED DURING THE FINAL DESIGN PHASE.
- SEE GEOTECHNICAL REPORT, DATED OCTOBER 2019.
- SEISMIC DESIGN CRITERIA:  
DESIGN RETURN PERIOD:  
DESIGN SPECTRA:  
 $A_s = 0.11$   
 $S_{ps} = 0.23$   
 $S_{p1} = 0.09$   
SITE CLASS = D  
SEISMIC DESIGN CATEGORY (SDC) = A
- HYDRAULIC REPORT NOT REQUIRED.
- NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.

**JACOBS**  
120 ST. JAMES AVENUE, 5TH FL  
BOSTON MA, 02116

**massDOT**  
Massachusetts Department of Transportation  
Highway Division

SKETCH PLANS OF  
PROPOSED BRIDGE  
**SUDBURY**

PROPOSED BOARDWALK

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION

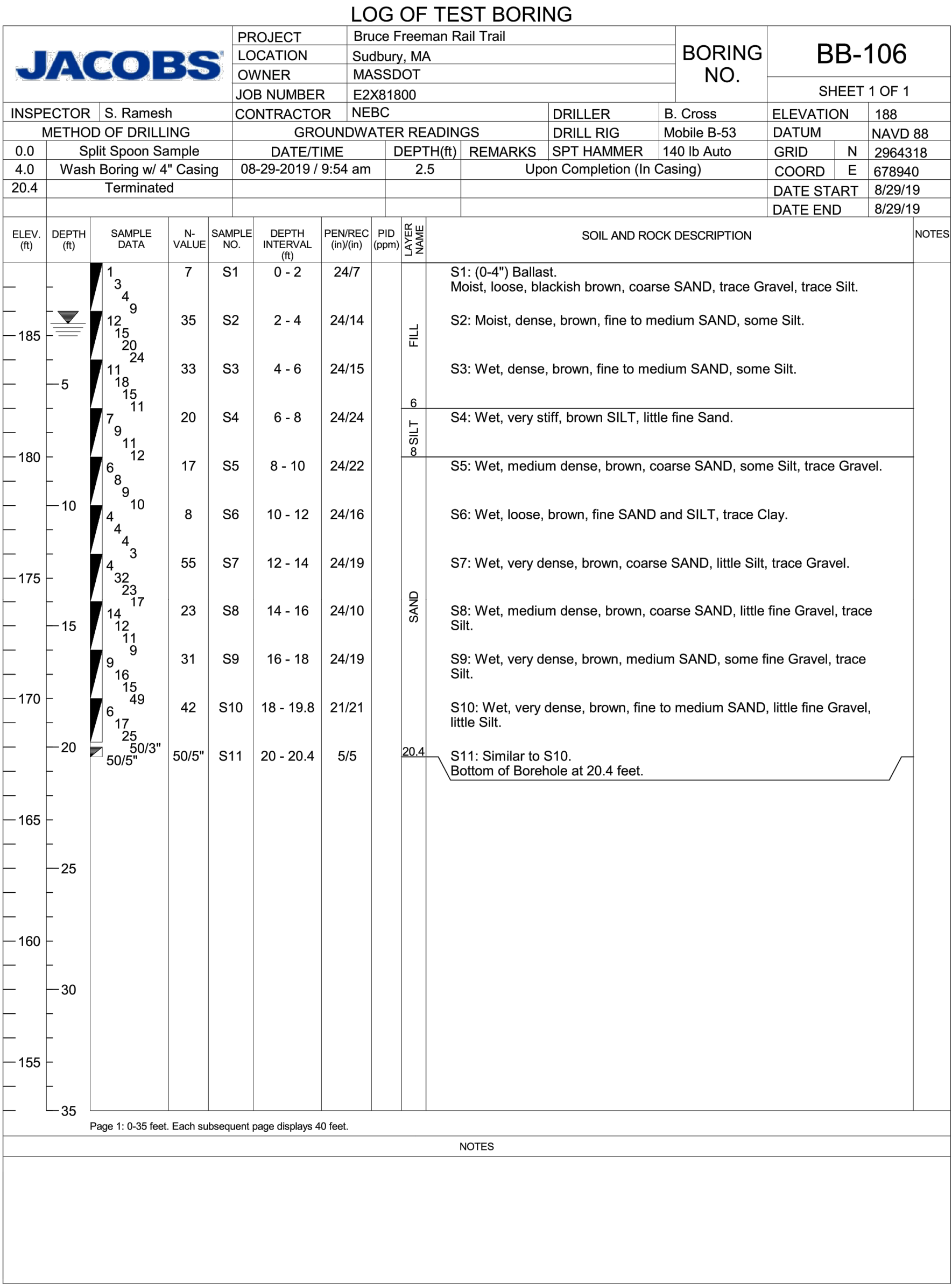
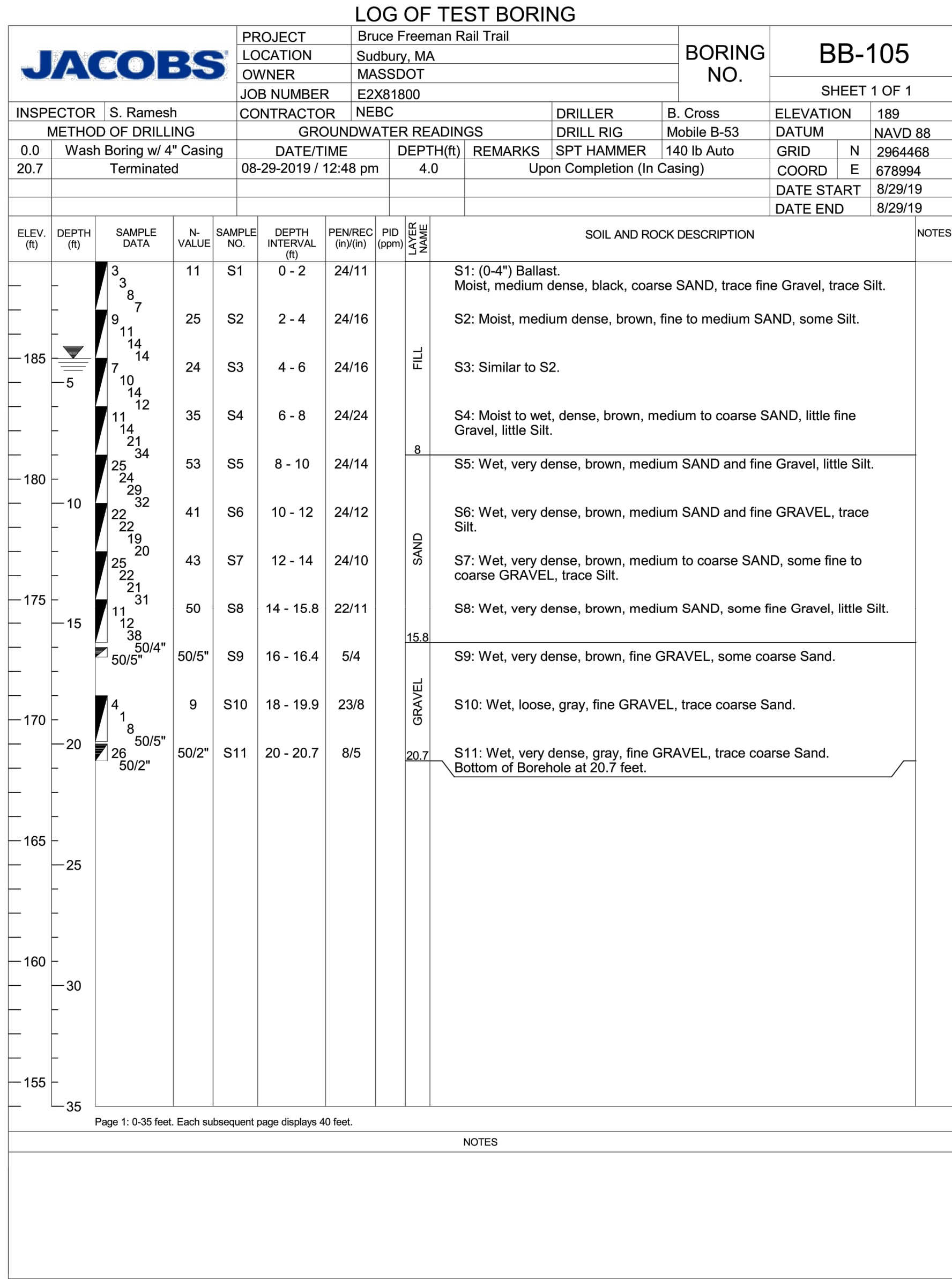
APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

STRUCTURAL ELEMENTS: \_\_\_\_\_

TITLE: \_\_\_\_\_

HIGHWAY ELEMENTS: \_\_\_\_\_

TITLE: \_\_\_\_\_



BORING NOTES:

1. LOCATION OF BORINGS SHOWN ON THE PLANS THUS: BB-#
2. BORINGS ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1 3/8" I.D. SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".
5. BOTTOM OF FOOTING ELEVATION VARIES, BOTTOM OF FOOTING IS 4'-0" MINIMUM TO GROUND.
6. ALL BORINGS WERE MADE IN AUGUST 2019.
7. BORINGS WERE MADE BY NEW ENGLAND BORING CONTRACTOR, INC., P.O. BOX 165, DERRY, NH 03038.
8. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.

3 OF 6 SHEETS BRIDGE NO. S-31-XXX (XXX)

| LOG OF TEST BORING                                        |            |                               |          |            |                     |                             |           |            |                                                                       | BORING NO.   |  | BB-107B |  |
|-----------------------------------------------------------|------------|-------------------------------|----------|------------|---------------------|-----------------------------|-----------|------------|-----------------------------------------------------------------------|--------------|--|---------|--|
| PROJECT                                                   |            | Bruce Freeman Rail Trail      |          |            |                     |                             |           |            |                                                                       | SHEET 1 OF 1 |  |         |  |
| LOCATION                                                  |            | Sudbury, MA                   |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| OWNER                                                     |            | MASSDOT                       |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| JOB NUMBER                                                |            | E2X61800                      |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| CONTRACTOR                                                |            | NEBC                          |          |            |                     |                             |           | DRILLER    |                                                                       | B. Cross     |  |         |  |
| METHOD OF DRILLING                                        |            | GROUNDWATER READINGS          |          |            |                     |                             |           | DRILL RIG  |                                                                       | ELEVATION    |  |         |  |
| 0.0 Wash Boring w/ 4" Casing                              |            |                               |          |            |                     |                             |           | SPT HAMMER |                                                                       | Mobile B-53  |  |         |  |
| 20.0 Terminated                                           |            | DATE/TIME                     |          | DEPTH(ft)  |                     | REMARKS                     |           | GRID       |                                                                       | NAVD 88      |  |         |  |
|                                                           |            | 08-28-2019 / 3:14 pm          |          | 3.0        |                     | Upon Completion (In Casing) |           | N          |                                                                       | 2964165      |  |         |  |
|                                                           |            |                               |          |            |                     |                             |           | COORD      |                                                                       | E 678879     |  |         |  |
|                                                           |            |                               |          |            |                     |                             |           | DATE START |                                                                       | 8/28/19      |  |         |  |
|                                                           |            |                               |          |            |                     |                             |           | DATE END   |                                                                       | 8/28/19      |  |         |  |
| ELEV. (ft)                                                | DEPTH (ft) | SAMPLE DATA                   | N. VALUE | SAMPLE NO. | DEPTH INTERVAL (ft) | PEN/REC (p/ft)              | PID (ppm) | TEST NAME  | SOIL AND ROCK DESCRIPTION                                             |              |  | NOTES   |  |
| 185                                                       |            |                               |          |            |                     |                             |           |            | Drill through.                                                        |              |  |         |  |
| 5                                                         |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| 180                                                       |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| 10                                                        |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| 175                                                       |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| 15                                                        |            | 2<br>3<br>9<br>50/3"<br>50/5" | 12       | S7         | 12.5 - 14.4         | 23/5                        |           |            | S7: Wet, medium dense, gray, fine GRAVEL and coarse SAND, trace Silt. |              |  |         |  |
| 15                                                        |            | 50/3"                         | 50/3"    | S8         | 14.5 - 14.8         | 3/2                         |           | GRAVEL     | S8: Wet, very dense, brown, fine GRAVEL, little coarse Sand.          |              |  |         |  |
| 170                                                       |            | 50/3"                         | 50/3"    | S9         | 16 - 16.3           | 3/3                         |           |            | S9: Similar to S8.                                                    |              |  |         |  |
| 20                                                        |            | 50/2"                         | 50/2"    | S10        | 18 - 18.2           | 2/0                         |           |            | S10: No recovery.                                                     |              |  |         |  |
| 20                                                        |            | 50/0"                         | 50/0"    | S11        | 20 - 20             | 0/0                         |           | 20         | Bottom of Borehole at 20 feet.                                        |              |  |         |  |
| 165                                                       |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| 25                                                        |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| 160                                                       |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| 30                                                        |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| 155                                                       |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| 35                                                        |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| Page 1: 0-35 feet. Each subsequent page displays 40 feet. |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |
| NOTES                                                     |            |                               |          |            |                     |                             |           |            |                                                                       |              |  |         |  |

SEE SHEET 2 FOR BORING NOTES.

**JACOBS**

Page 1: 0-35 feet. Each subsequent page displays 40 feet

## NOTES

SEE SHEET 2 FOR BORING NOTES.

| <b>JACOBS</b>                           |               |                 |             | PROJECT Bruce Freeman Rail Trail |                           |                    |              | <b>BORING<br/>NO.</b> |                                                                                                      | <b>BB-109A</b><br><br>SHEET 1 OF 1 |  |        |
|-----------------------------------------|---------------|-----------------|-------------|----------------------------------|---------------------------|--------------------|--------------|-----------------------|------------------------------------------------------------------------------------------------------|------------------------------------|--|--------|
|                                         |               |                 |             | LOCATION Sudbury, MA             |                           |                    |              |                       |                                                                                                      |                                    |  |        |
|                                         |               |                 |             | OWNER MASSDOT                    |                           |                    |              |                       |                                                                                                      |                                    |  |        |
|                                         |               |                 |             | JOB NUMBER E2X81800              |                           |                    |              |                       |                                                                                                      |                                    |  |        |
| INSPECTOR S. Ramesh                     |               | CONTRACTOR NEBC |             |                                  |                           | DRILLER B. Cross   |              | ELEVATION 184         |                                                                                                      |                                    |  |        |
| METHOD OF DRILLING GROUNDWATER READINGS |               |                 |             | DRILL RIG Mobile B-53            |                           | DATE START 8/26/19 |              | DATE END 8/26/19      |                                                                                                      |                                    |  |        |
| 0.0 Hollow Stem Auger                   |               | DATE/TIME       |             | DEPTH(ft)                        |                           | REMARKS SPT HAMMER |              | GRID N                |                                                                                                      | NAVD 88                            |  |        |
| 9.0 Terminated                          |               |                 |             |                                  |                           |                    |              | COORD E               |                                                                                                      | 2963876                            |  |        |
|                                         |               |                 |             |                                  |                           |                    |              | DATE START 8/26/19    |                                                                                                      |                                    |  |        |
|                                         |               |                 |             |                                  |                           |                    |              | DATE END 8/26/19      |                                                                                                      |                                    |  |        |
| ELEV.<br>(ft)                           | DEPTH<br>(ft) | SAMPLE<br>DATA  | N-<br>VALUE | SAMPLE<br>NO.                    | DEPTH<br>INTERVAL<br>(ft) | PENREC<br>(n)/(n)  | PID<br>(ppm) | LAYER<br>NAME         | SOIL AND ROCK DESCRIPTION                                                                            |                                    |  | NOTES  |
| 180<br><br>5                            | 1             | 8               | 12          | S1                               | 0 - 2                     | 24/16              |              | FILL                  | S1: Dry, medium dense, blackish brown, medium to coarse SAND, little fine Gravel.                    |                                    |  |        |
|                                         | 9             | 10              | 68          | S2                               | 2 - 4                     | 24/18              |              | SAND                  | S2: Dry, very dense, brown, medium SAND, some Silt, trace fine Gravel.                               |                                    |  |        |
|                                         | 14            | 20              | 76          | S3                               | 4 - 6                     | 24/19              |              | SAND                  | S3: Dry, very dense, brown SAND and GRAVEL, some Silt.                                               |                                    |  |        |
|                                         | 18            | 30              | 83          | S4                               | 6 - 7.9                   | 23/16              |              | SAND                  | S4: Wet, very dense, brown, fine to medium SAND, some fine Gravel, some Silt.                        |                                    |  |        |
|                                         | 18            | 30              | 83          | S4                               | 6 - 7.9                   | 23/16              |              | SAND                  | S4: Wet, very dense, brown, fine to medium SAND, some fine Gravel, some Silt.                        |                                    |  |        |
| 175<br><br>10                           | 35            | 50/5"           | 50/5"       | S5                               | 8 - 8.4                   | 5/5                |              | GRAVEL                | S5: Wet, very dense, gray, fine GRAVEL, trace coarse Sand, trace Silt. Bottom of Borehole at 9 feet. |                                    |  | 1<br>2 |

Page 1: 0-35 feet. Each subsequent page displays 40 feet.

NOTES

1. Auger could not drill any further at 9' Terminated boring at 9'.  
 2. Boring offset 4' north and continued. See boring log BB-109B.

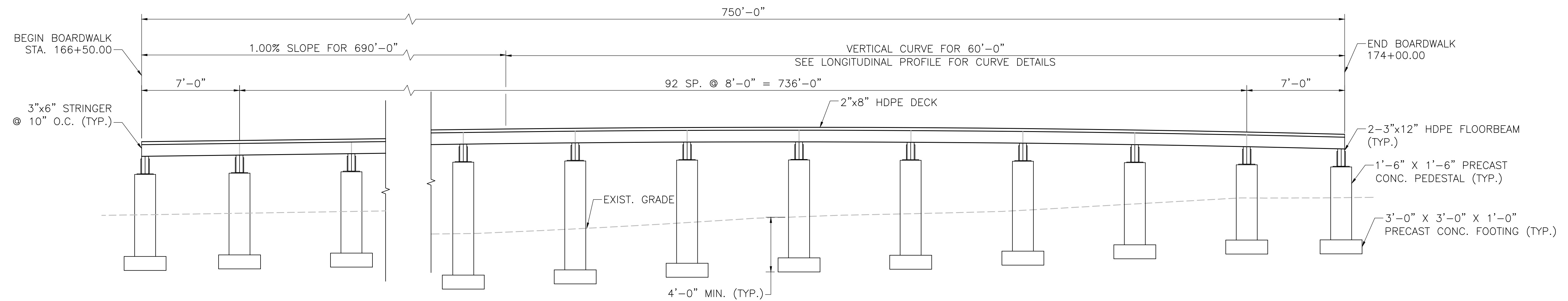
|                              |  |                      |  |           |  |                                            |  |                             |                                                                |             |               |                    |  |         |  |
|------------------------------|--|----------------------|--|-----------|--|--------------------------------------------|--|-----------------------------|----------------------------------------------------------------|-------------|---------------|--------------------|--|---------|--|
| <b>JACOBS</b>                |  |                      |  |           |  | PROJECT<br>LOCATION<br>OWNER<br>JOB NUMBER |  |                             | Bruce Freeman Rail Trail<br>Sudbury, MA<br>MASSDOT<br>E2X81800 |             |               | BORING NO.         |  | BB-109B |  |
| INSPECTOR S. Ramesh          |  |                      |  |           |  | CONTRACTOR NEBC                            |  |                             | DRILLER B. Cross                                               |             | ELEVATION 184 |                    |  |         |  |
| METHOD OF DRILLING           |  |                      |  |           |  | GROUNDWATER READINGS                       |  |                             | DRILL RIG Mobile B-53                                          |             | DATUM NAVD 88 |                    |  |         |  |
| 0.0 Wash Boring w/ 4" Casing |  | DATE/TIME            |  | DEPTH(ft) |  | REMARKS                                    |  | SPT HAMMER                  |                                                                | 140 lb Auto |               | GRID N 2963880     |  |         |  |
| 11.0 NX Rock Core Terminated |  | 08-27-2019 / 7:21 am |  | 2.5       |  |                                            |  | During Drilling (In Casing) |                                                                |             |               | COORD E 678746     |  |         |  |
| 21.0                         |  |                      |  |           |  |                                            |  |                             |                                                                |             |               | DATE START 8/26/19 |  |         |  |
|                              |  |                      |  |           |  |                                            |  |                             |                                                                |             |               | DATE END 8/27/19   |  |         |  |

The graph displays depth in feet on the vertical axis, ranging from 0 at the top to -35 at the bottom. A black vertical bar represents the rock core interval, starting at approximately -11.5 feet and ending at -21 feet. To the left of the bar, three segments are labeled with their respective Rock Quality Designation (RQD) values: RQD=17 for the upper segment, RQD=36 for the middle segment, and RQD=25 for the lower segment. The top of the borehole is marked with a downward-pointing triangle symbol.

| ELEV (ft) | DEPTH (ft) | SAMPLE DATA | N-VALUE | SAMPLE NO. | DEPTH INTERVAL (ft) | PEN(REC (n)/in) | RID (ppm) | WATER ANALYSIS | SOIL AND ROCK DESCRIPTION                                                                                                              | NOTES |
|-----------|------------|-------------|---------|------------|---------------------|-----------------|-----------|----------------|----------------------------------------------------------------------------------------------------------------------------------------|-------|
|           |            |             |         |            |                     |                 |           |                | Drill through.                                                                                                                         |       |
| -180      | -5         |             |         | RC-1       | 11 - 16             | 60/60           |           |                | RC-1: Coring time: 4.5, 4, 4, 2.5, 3.5 (mins/ft)<br>Wet, gray, fine grained, highly fractured, moderately weathered METAVOLCANIC ROCK. |       |
| -175      | -10        |             |         |            |                     |                 |           |                |                                                                                                                                        |       |
| -170      | -15        |             |         | RC-2       | 16 - 19.5           | 42/42           |           |                | RC-2: Coring time: 4.5, 3, 2.5 (mins/ft), 2 (mins/0.5 ft)<br>Similar to RC-1.                                                          |       |
| -165      | -20        |             |         | RC-3       | 19.5 - 21           | 18/18           |           |                | RC-2: Coring time: 1 (min/0.5 ft), 3 (mins/ft).<br>Similar to RC-1.<br>Bottom of Borehole at 21 feet.                                  |       |
| -160      | -25        |             |         |            |                     |                 |           |                |                                                                                                                                        |       |
| -155      | -30        |             |         |            |                     |                 |           |                |                                                                                                                                        |       |
| -150      | -35        |             |         |            |                     |                 |           |                |                                                                                                                                        |       |

Page 1: 0-35 feet. Each subsequent page displays 40 feet.

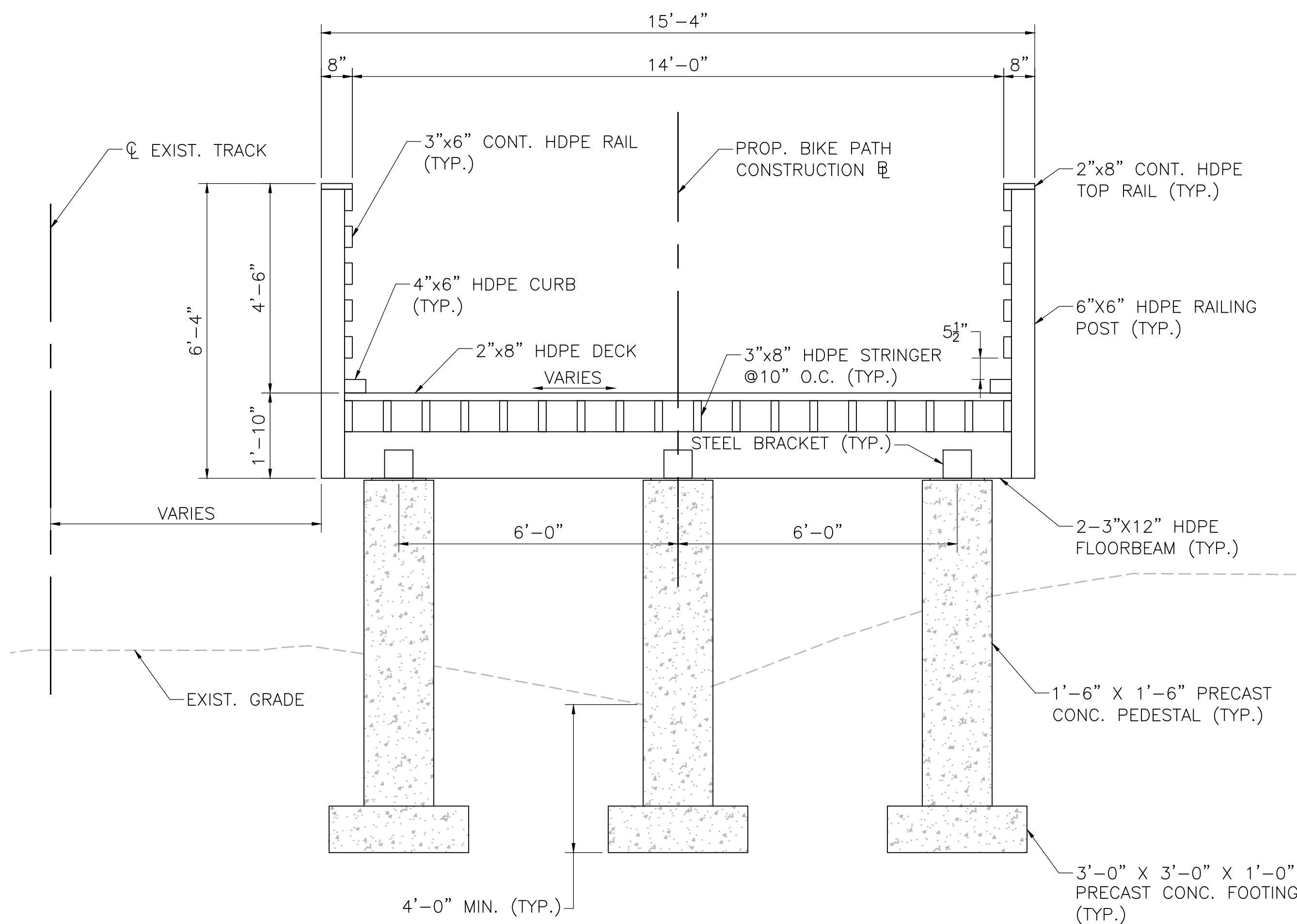
NOTES



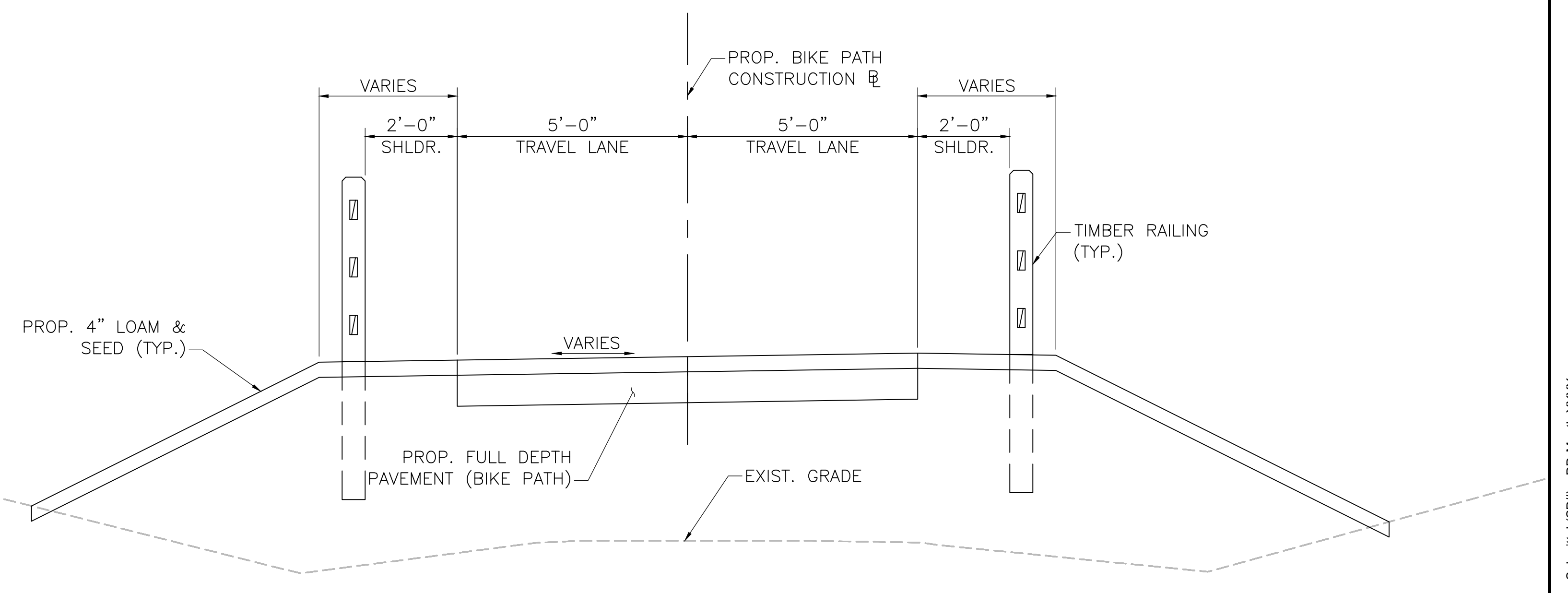
**TYPICAL LONGITUDINAL SECTION**  
SCALE: 1/4"=1'-0"

**NOTES:**

1. THE FACTORED BEARING PRESSURE = 2.9 KSF PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS STRENGTH I LOAD COMBINATION.
2. FACTORED BEARING RESISTANCE = 3.5 KSF. FACTORED BEARING RESISTANCE IS THE PRODUCT OF THE NOMINAL BEARING RESISTANCE AND A RESISTANCE FACTOR OF 0.45.



**TYPICAL BOARDWALK SECTION**  
SCALE: 1/2"=1'-0"



**TYPICAL APPROACH SECTION**  
SCALE: 1/2"=1'-0"