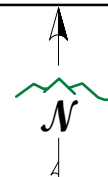
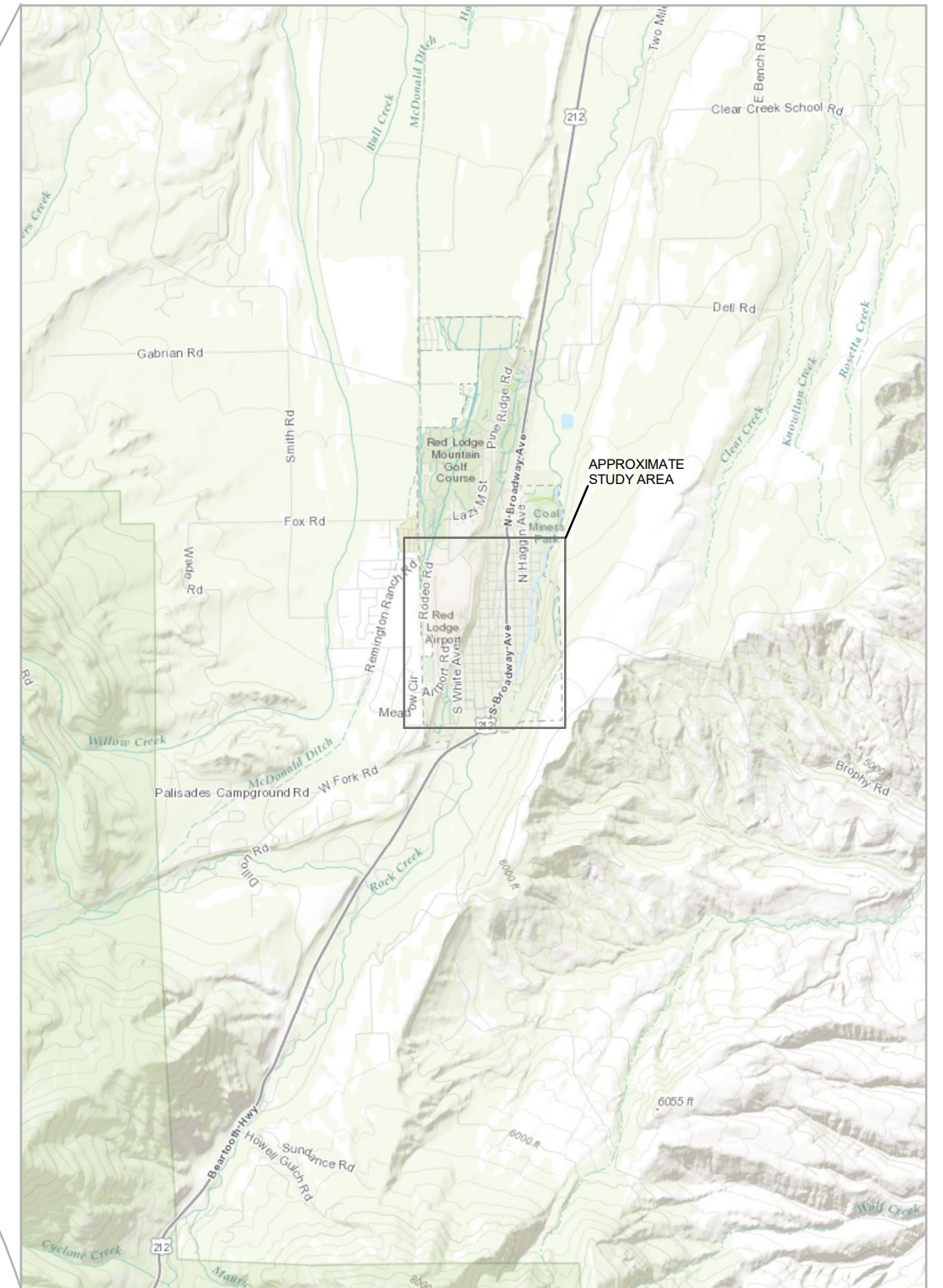


MONTANA

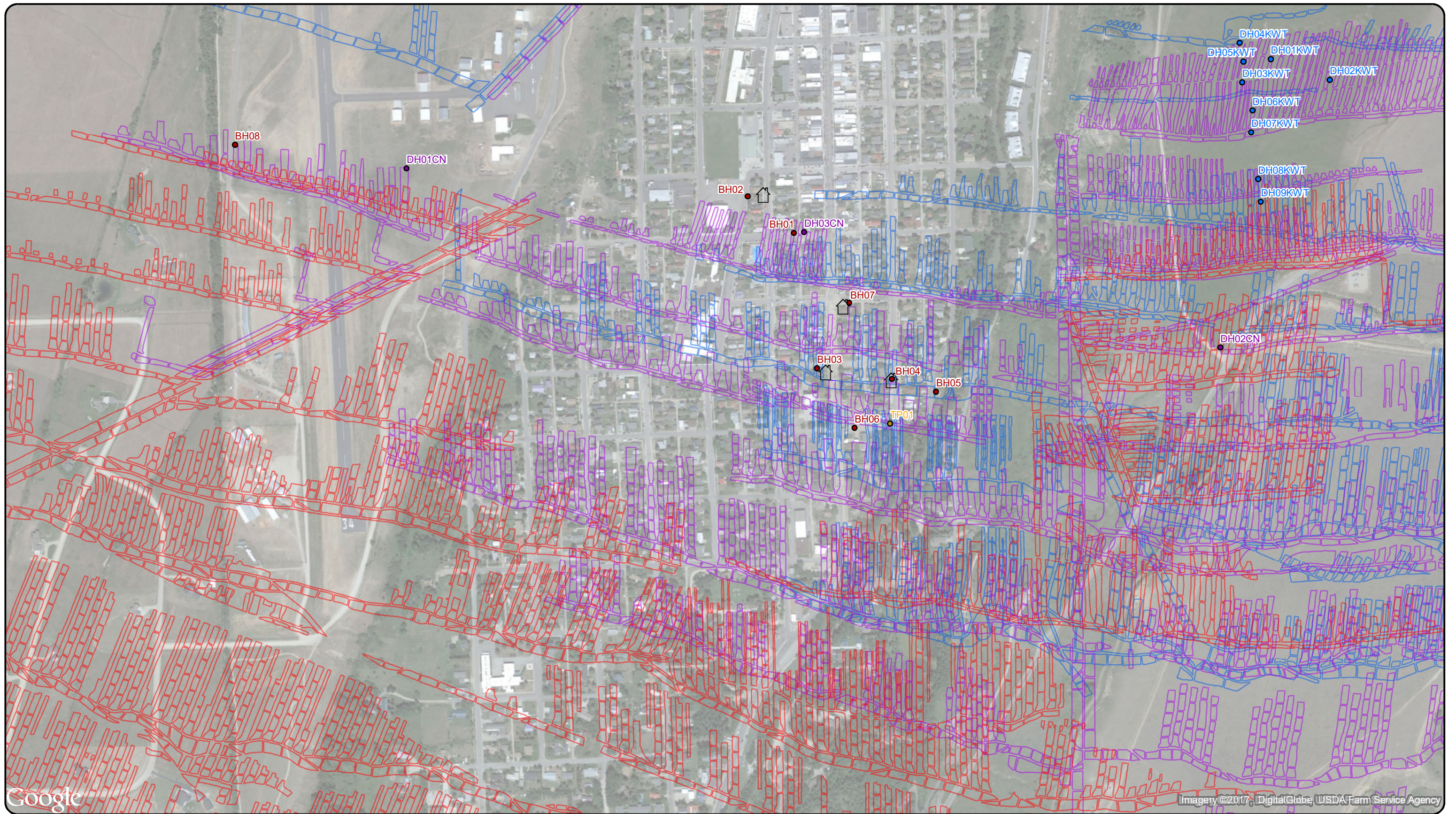


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 DATUM: NA _____
 UNITS: NA _____
 SOURCE: PIONEER/ESRI _____

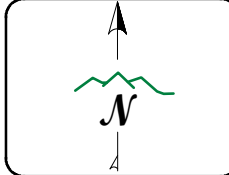


FIGURE 1-1
RED LODGE SUBSIDENCE
MONITORING
PROJECT LOCATION MAP

DATE: 9/26/2017



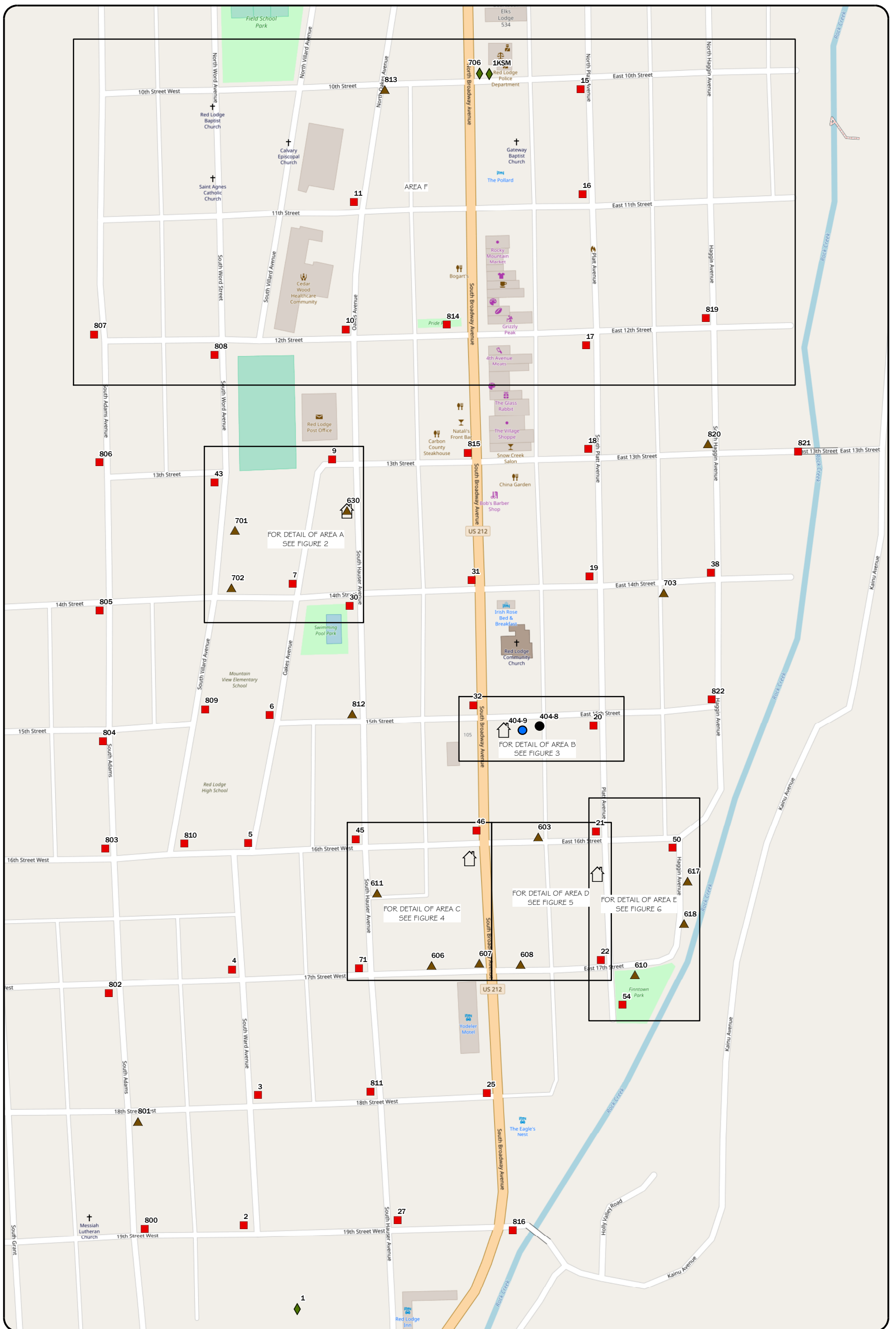
- LEGEND**
- HOUSE OF INTEREST
 - PIONEER TEST PIT
 - KIEWIT BORE HOLE 1983
 - CHEN-NORTHERN BORE HOLE 1987
 - MINES 1 1/2
 - MINE 4
 - MINE 5
 - PIONEER TECHNICAL BORE HOLE 2014



DISPLAYED AS:
 PROJECTION/ZONE: MONTANA STATE PLANE
 DATUM: NAD 1983
 UNITS: INT'L FEET
 SOURCE: PIONEER/CN/KIEWIT

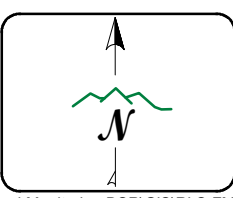
FIGURE 1-2
GENERAL LOCATION OF DOCUMENTED MINE WORKINGS

DATE: 11/22/2017



LEGEND

- FIRE HYDRANT
- MAG NAIL
- ▲ 3FT REBAR WITH ALUMINUM CAP
- ◆ NATIONAL SURVEY MONUMENT
- WELL
- HOUSE OF INTEREST



DISPLAYED AS:
 PROJECTION / ZONE: MONTANA STATE PLANE
 DATUM: NAD 1983
 UNITS: INT'L FEET
 SOURCE: OSM / PIONEER

0 125 250 500
 Feet

FIGURE 2-1 RED LODGE SUBSIDENCE MONITORING INVESTIGATION SURVEY AREA

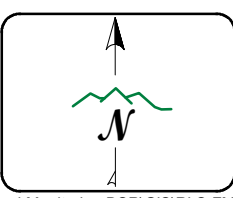
PIONEER
 TECHNICAL SERVICES, INC.

DATE: 10/9/2017



LEGEND

- BENCH TIE
- EXTENSOMETER
- FIRE HYDRANT
- ▲ 3FT REBAR WITH ALUMINUM CAP

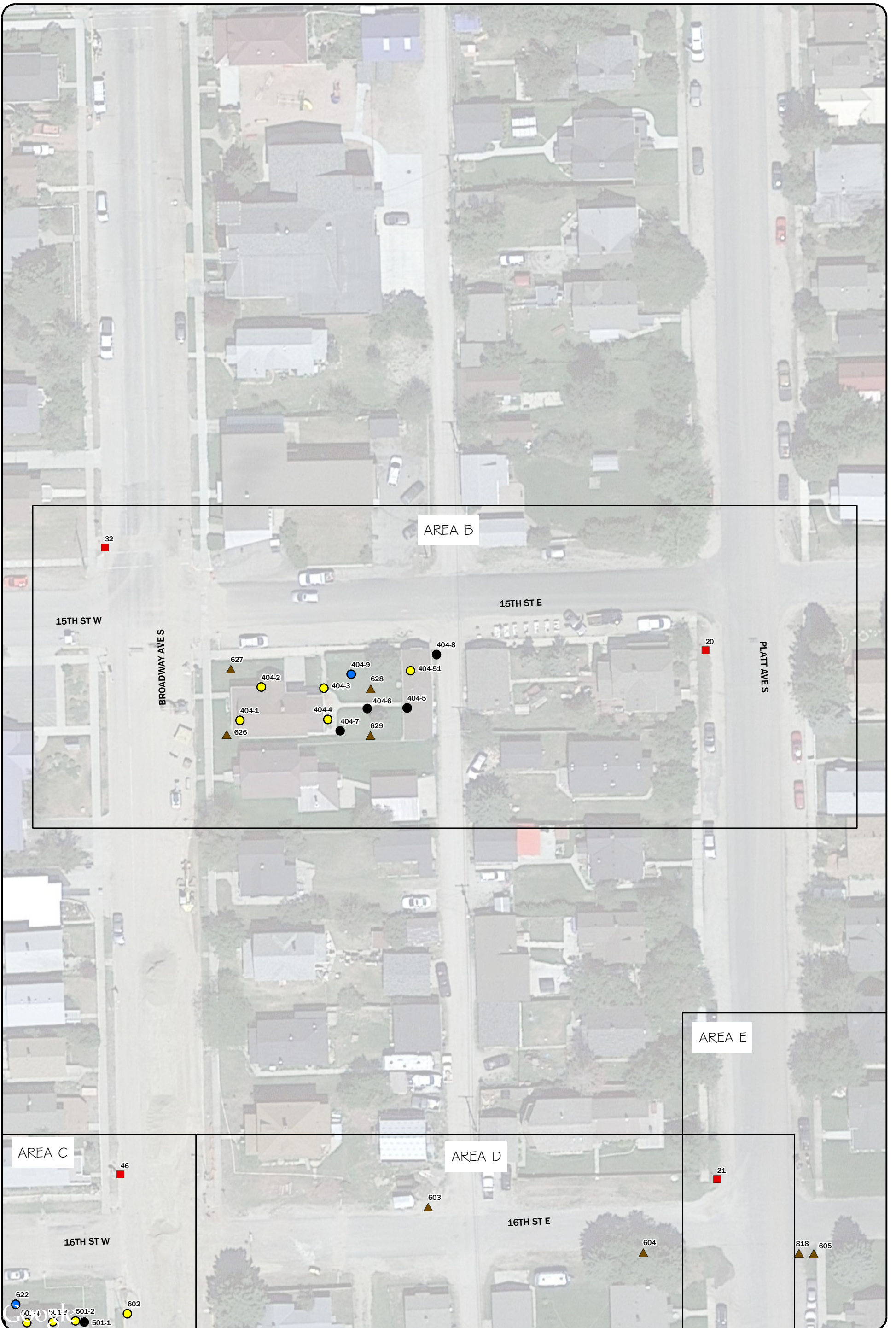


DISPLAYED AS:
 PROJECTION / ZONE: MONTANA STATE PLANE
 DATUM: NAD 1983
 UNITS: INT'L FEET
 SOURCE: GOOGLE/PIONEER

FIGURE 2-2 **RED LODGE SUBSIDENCE**
MONITORING INVESTIGATION
FOCUS AREA A

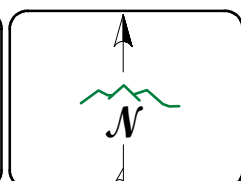
PIONEER
 TECHNICAL SERVICES, INC.

DATE: 9/26/2017



LEGEND

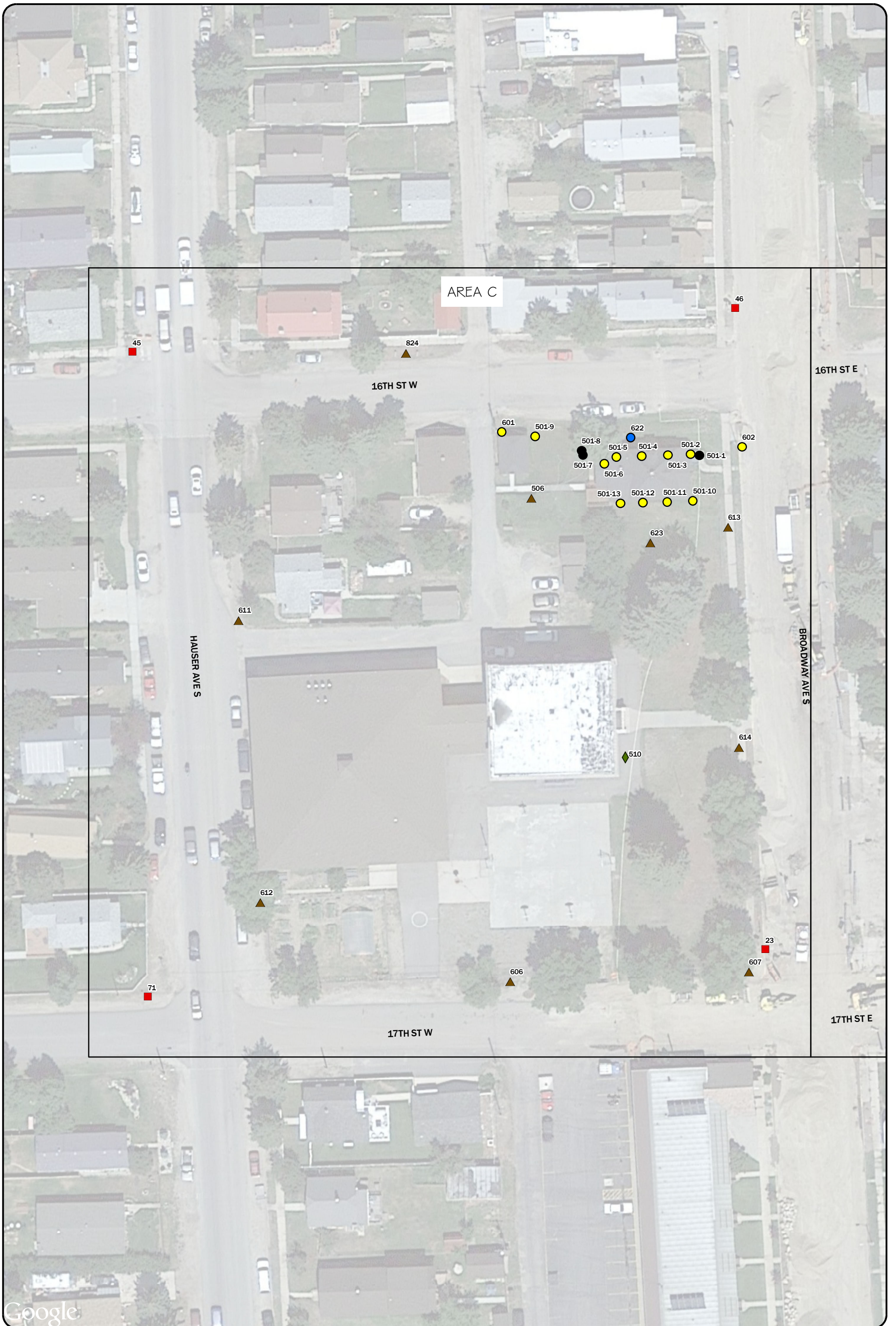
- BENCH TIE
- FIRE HYDRANT
- MAG NAIL
- ▲ 3FT REBAR WITH ALUMINUM CAP
- WELL



DISPLAYED AS: _____
 PROJECTION / ZONE: MONTANA STATE PLANE
 DATUM: NAD 1983
 UNITS: INT'L FEET
 SOURCE: GOOGLE/PIONEER

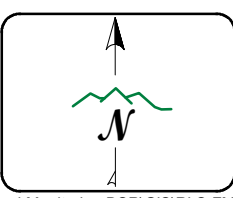
FIGURE 2-3 **RED LODGE SUBSIDENCE**
MONITORING INVESTIGATION
FOCUS AREA B

DATE: 9/26/2017




LEGEND

- BENCH TIE
- FIRE HYDRANT
- MAG NAIL
- ▲ 3FT REBAR WITH ALUMINUM CAP
- NATIONAL SURVEY MONUMENT
- WELL



DISPLAYED AS:
 PROJECTION / ZONE: MONTANA STATE PLANE
 DATUM: NAD 1983
 UNITS: INT'L FEET
 SOURCE: GOOGLE/PIONEER

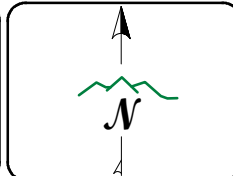
FIGURE 2-4 RED LODGE SUBSIDENCE MONITORING INVESTIGATION FOCUS AREA C



DATE: 9/26/2017



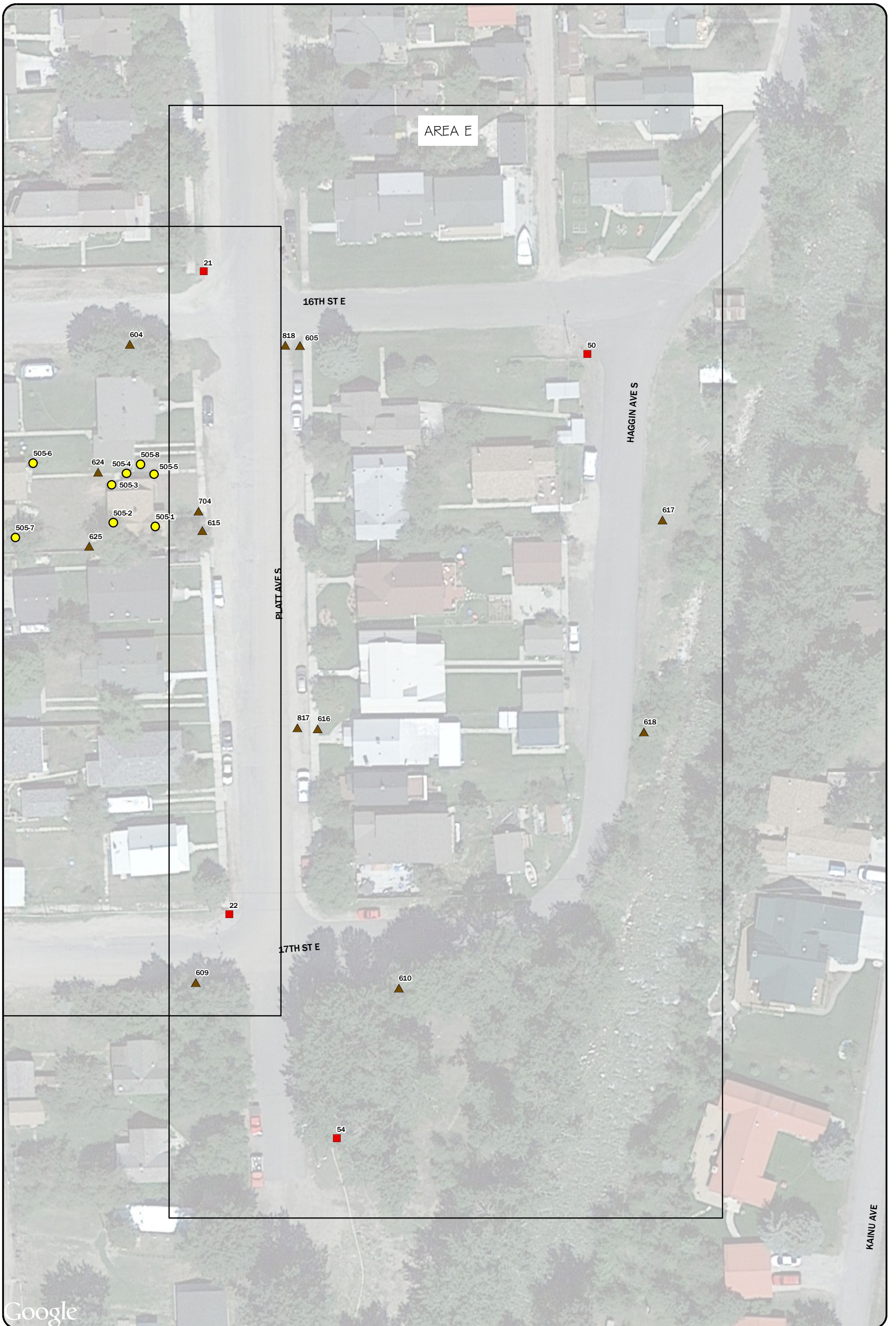
- LEGEND**
- BENCH TIE
 - FIRE HYDRANT
 - ▲ 3FT REBAR WITH ALUMINUM CAP



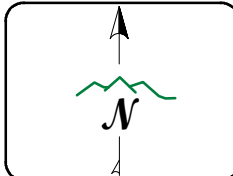
DISPLAYED AS:
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 DATUM: NAD 1983
 UNITS: INT'L FEET
 SOURCE: GOOGLE/PIONEER

FIGURE 2-5 RED LODGE SUBSIDENCE MONITORING INVESTIGATION FOCUS AREA D

DATE: 9/26/2017




- LEGEND**
- BENCH TIE
 - FIRE HYDRANT
 - ▲ 3FT REBAR WITH ALUMINUM CAP

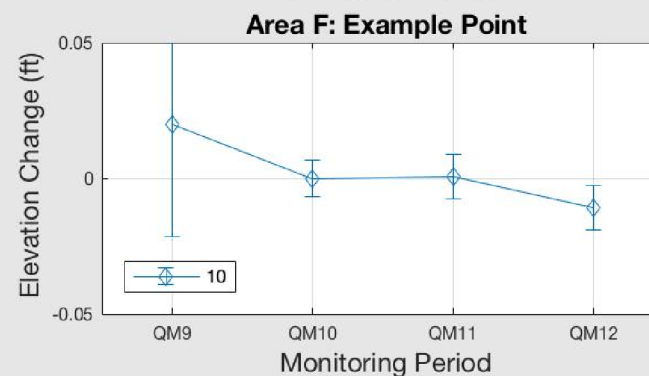
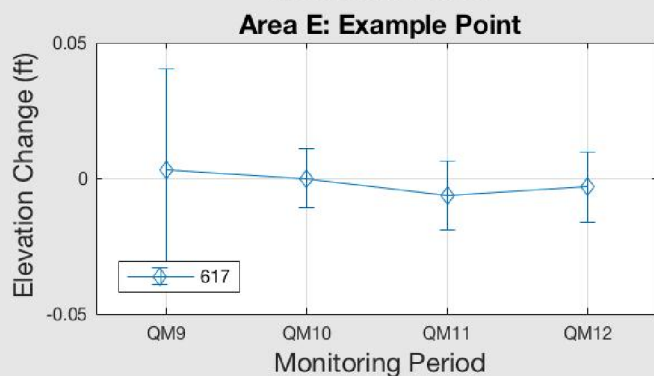
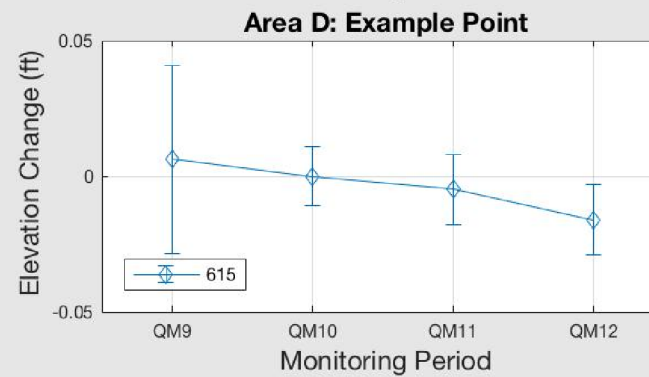
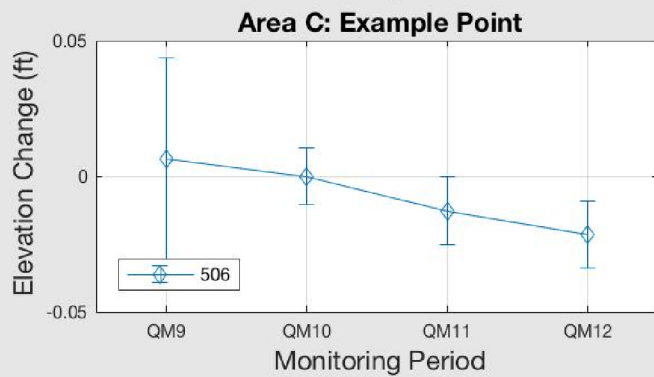
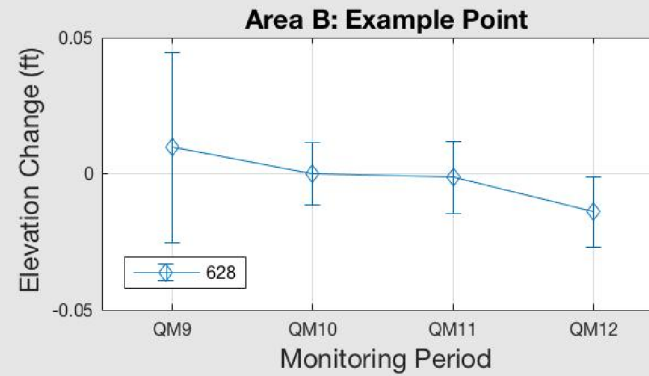
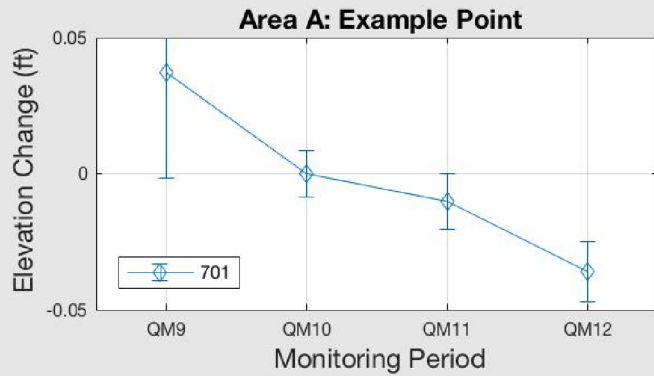


DISPLAYED AS:
 PROJECTION / ZONE: MONTANA STATE PLANE
 DATUM: NAD 1983
 UNITS: INT'L FEET
 SOURCE: GOOGLE/PIONEER

FIGURE 2-6 RED LODGE SUBSIDENCE MONITORING INVESTIGATION FOCUS AREA E



DATE: 9/26/2017



DISPLAYED AS: _____
 PROJECTION/ZONE: NA _____
 DATUM: NA _____
 UNITS: NA _____
 SOURCE: PIONEER



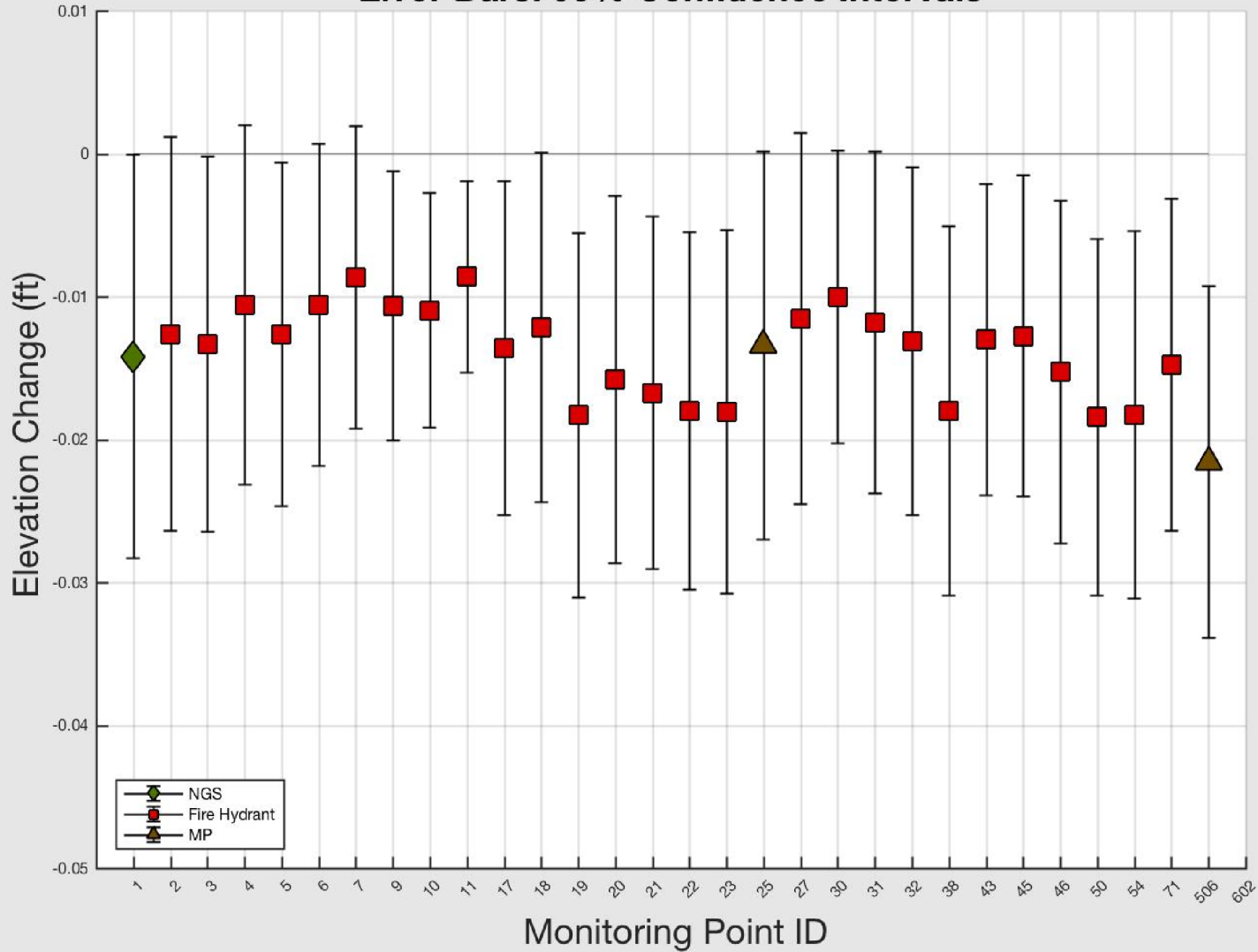
**RED LODGE SUBSIDENCE
 MONITORING INVESTIGATION
 EXAMPLE POINT
 ELEVATION CHANGES**

DATE: 10/9/2017

Red Lodge Subsidence Survey

Elevation Change From QM10 through QM12

Error Bars: 95% Confidence Intervals



DISPLAYED AS: _____
 PROJECTION/ZONE: NA _____
 DATUM: NA _____
 UNITS: NA _____
 SOURCE: PIONEER



RED LODGE SUBSIDENCE
MONITORING INVESTIGATION
ELEVATION CHANGES
QM9 THROUGH QM12

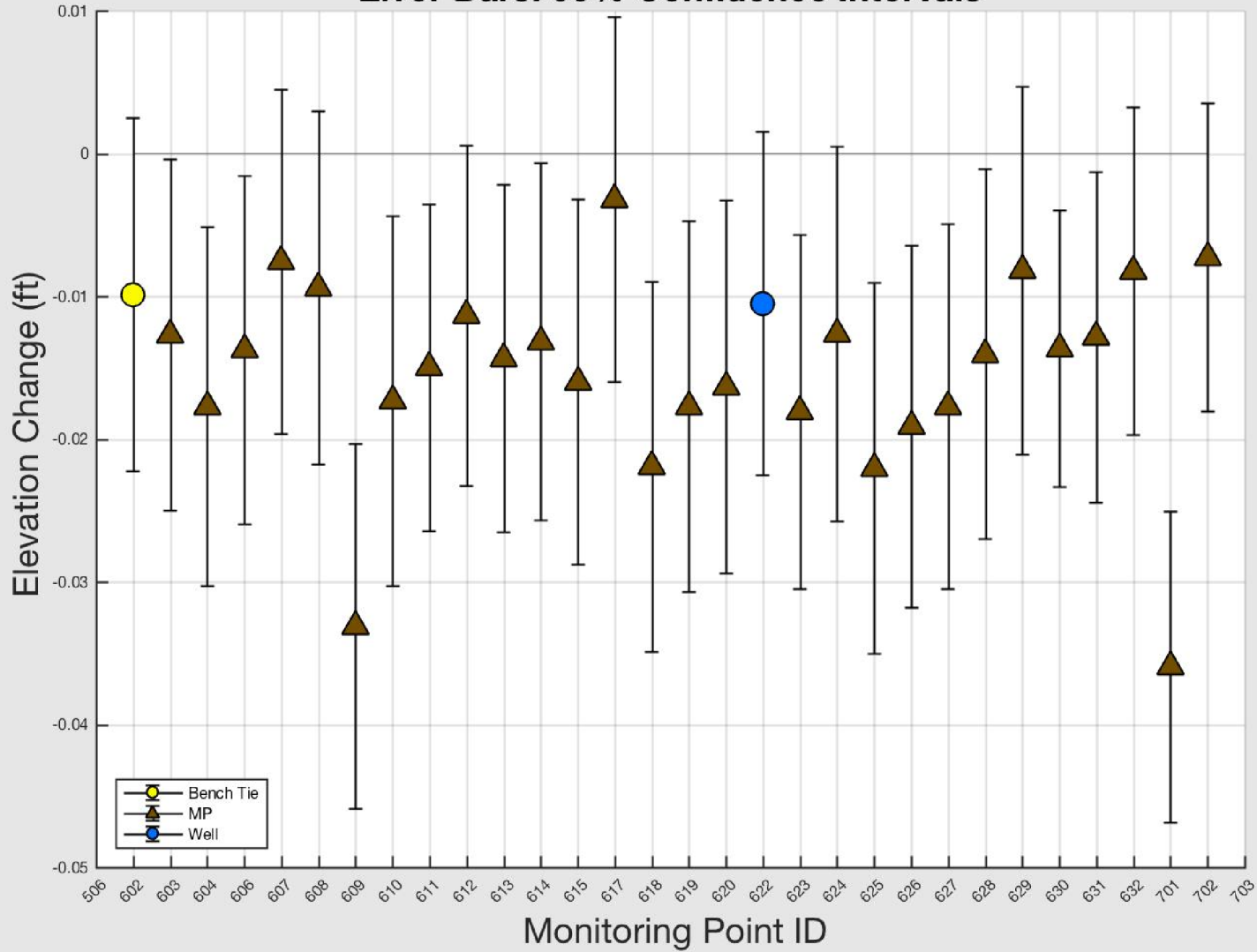
DATE: 10/9/2017

1 OF 4

Red Lodge Subsidence Survey

Elevation Change From QM10 through QM12

Error Bars: 95% Confidence Intervals



DISPLAYED AS:
 PROJECTION/ZONE: NA
 DATUM: NA
 UNITS: NA
 SOURCE: PIONEER



FIGURE 2-9
RED LODGE SUBSIDENCE
MONITORING INVESTIGATION
ELEVATION CHANGES
QM9 THROUGH QM12

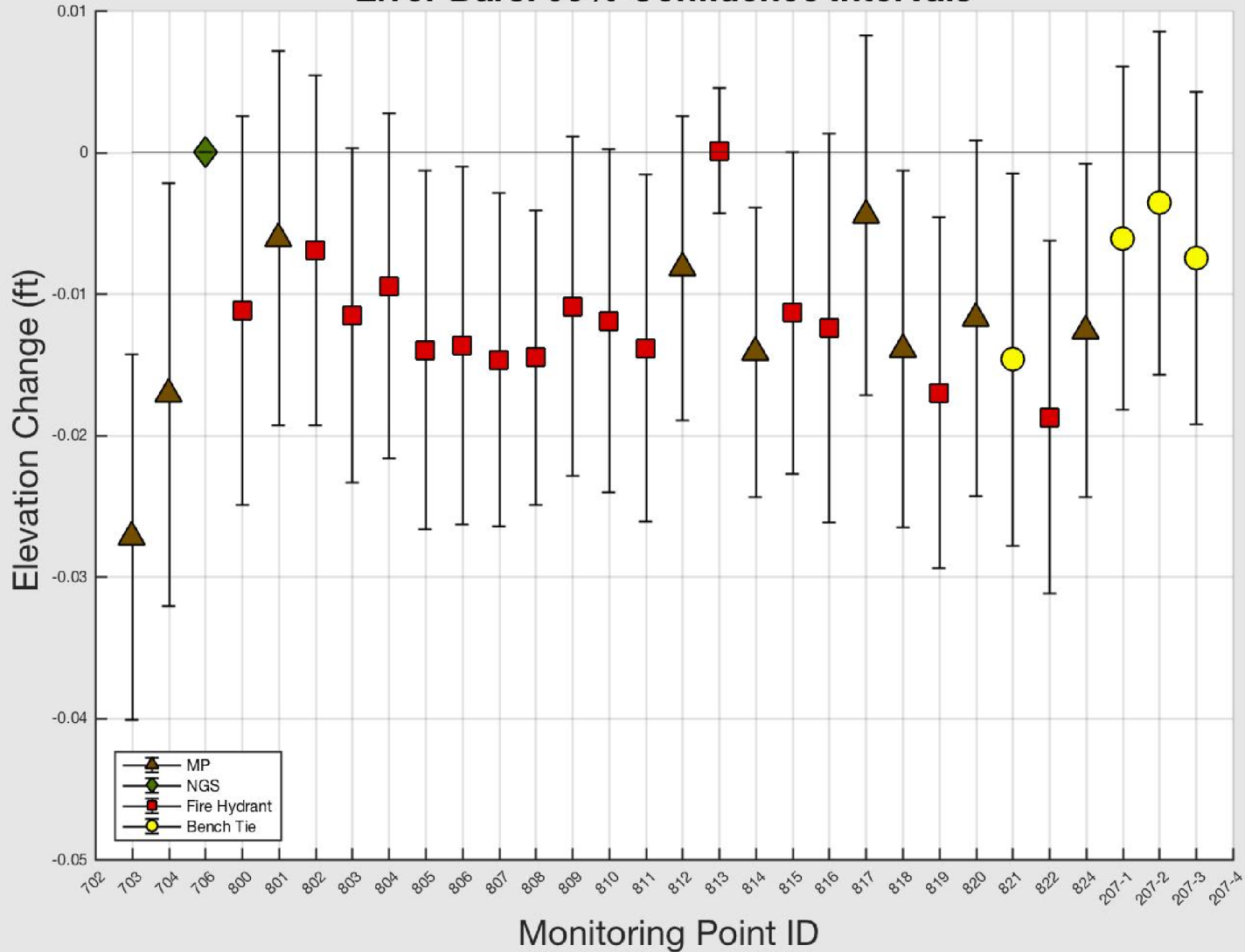
DATE: 10/9/2017

2 OF 4

Red Lodge Subsidence Survey

Elevation Change From QM10 through QM12

Error Bars: 95% Confidence Intervals



DISPLAYED AS: _____
 PROJECTION/ZONE: NA _____
 DATUM: NA _____
 UNITS: NA _____
 SOURCE: PIONEER _____

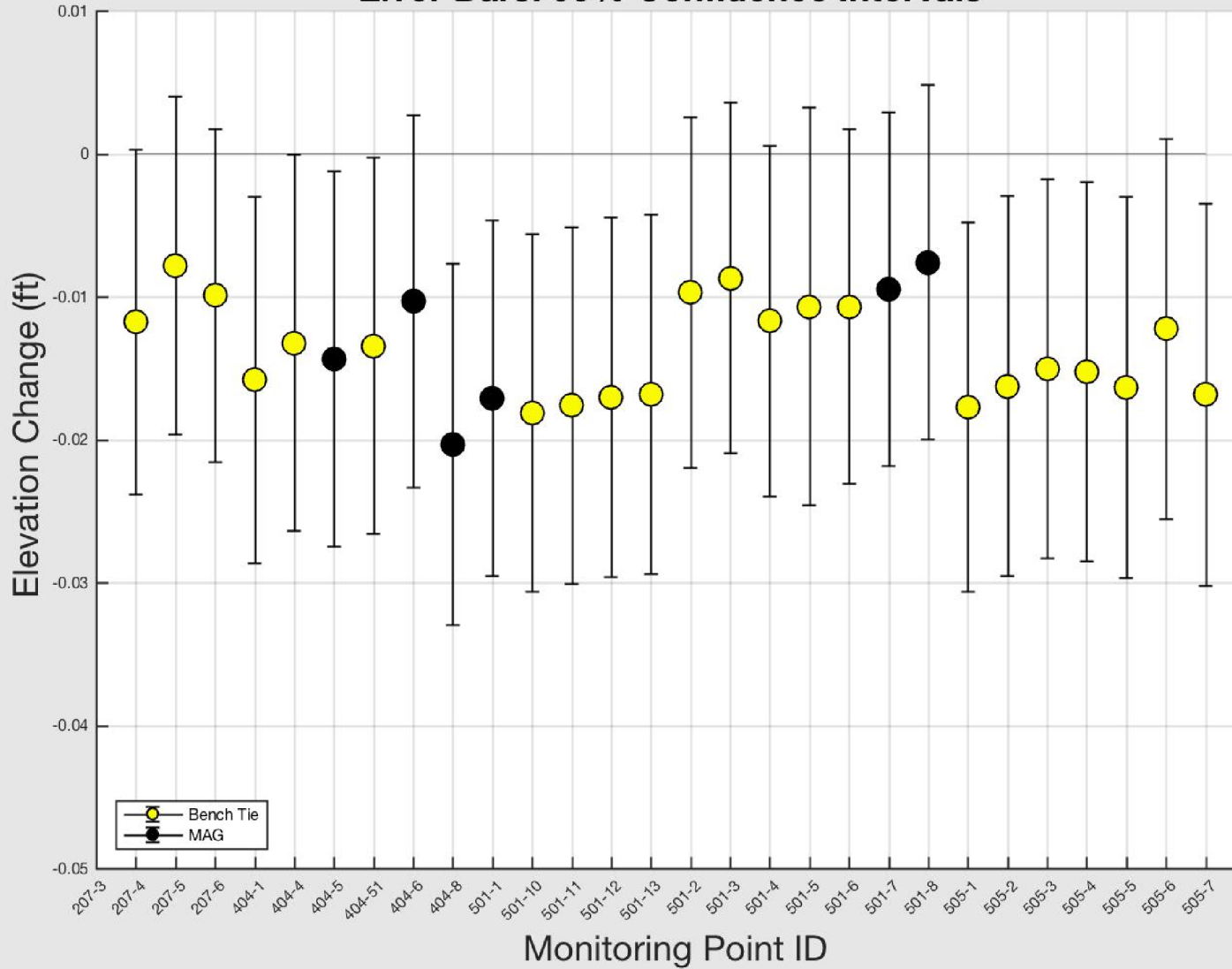


RED LODGE SUBSIDENCE
MONITORING INVESTIGATION
ELEVATION CHANGES
QM9 THROUGH QM12

DATE: 10/9/2017

3 OF 4

**Red Lodge Subsidence Survey
Elevation Change From QM10 through QM12
Error Bars: 95% Confidence Intervals**



DISPLAYED AS:
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 DATUM: NA
 UNITS: NA
 SOURCE: PIONEER

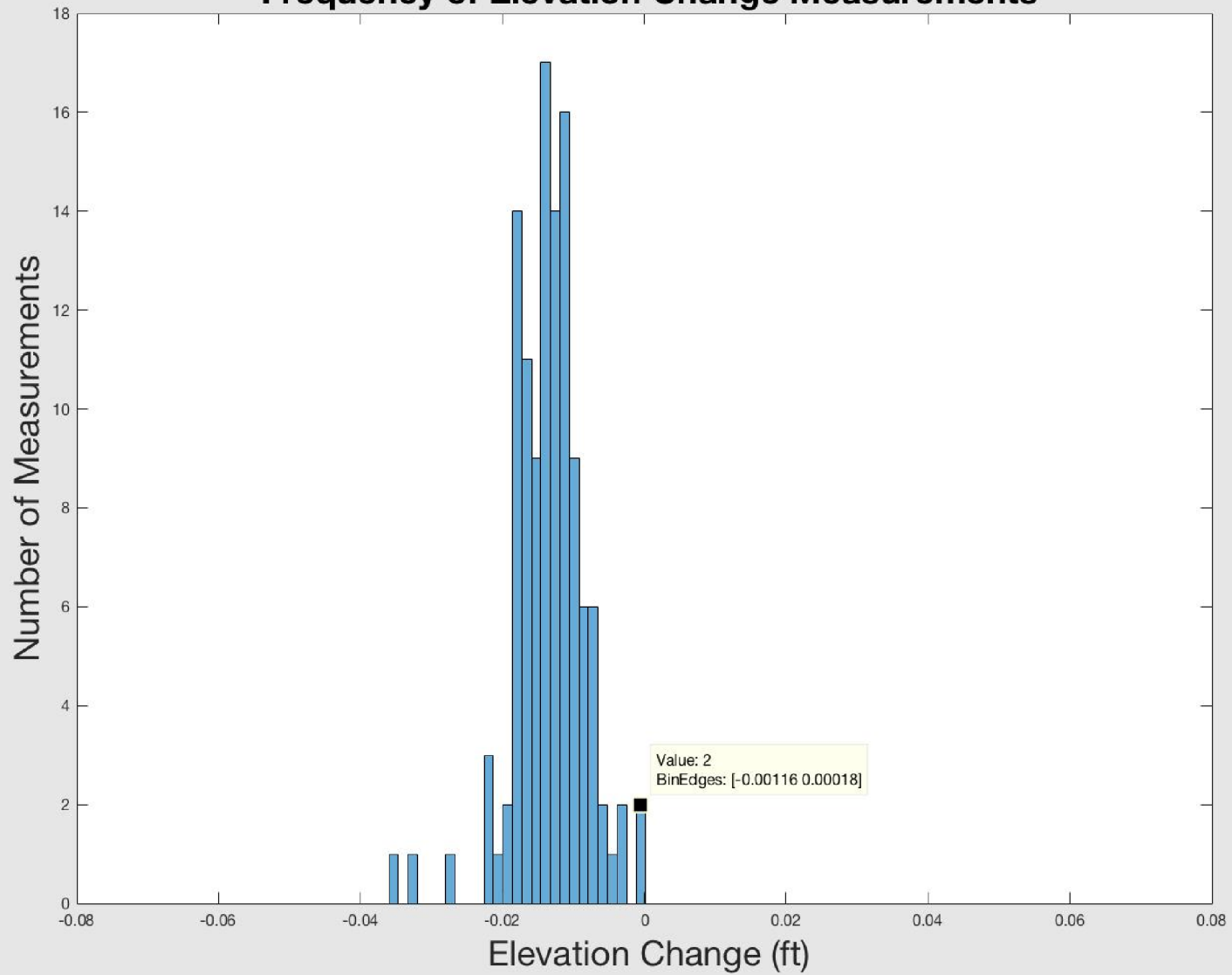


**RED LODGE SUBSIDENCE
MONITORING INVESTIGATION
ELEVATION CHANGES
QM9 THROUGH QM12**

DATE: 10/9/2017

4 OF 4

Red Lodge Subsidence Survey Frequency of Elevation Change Measurements



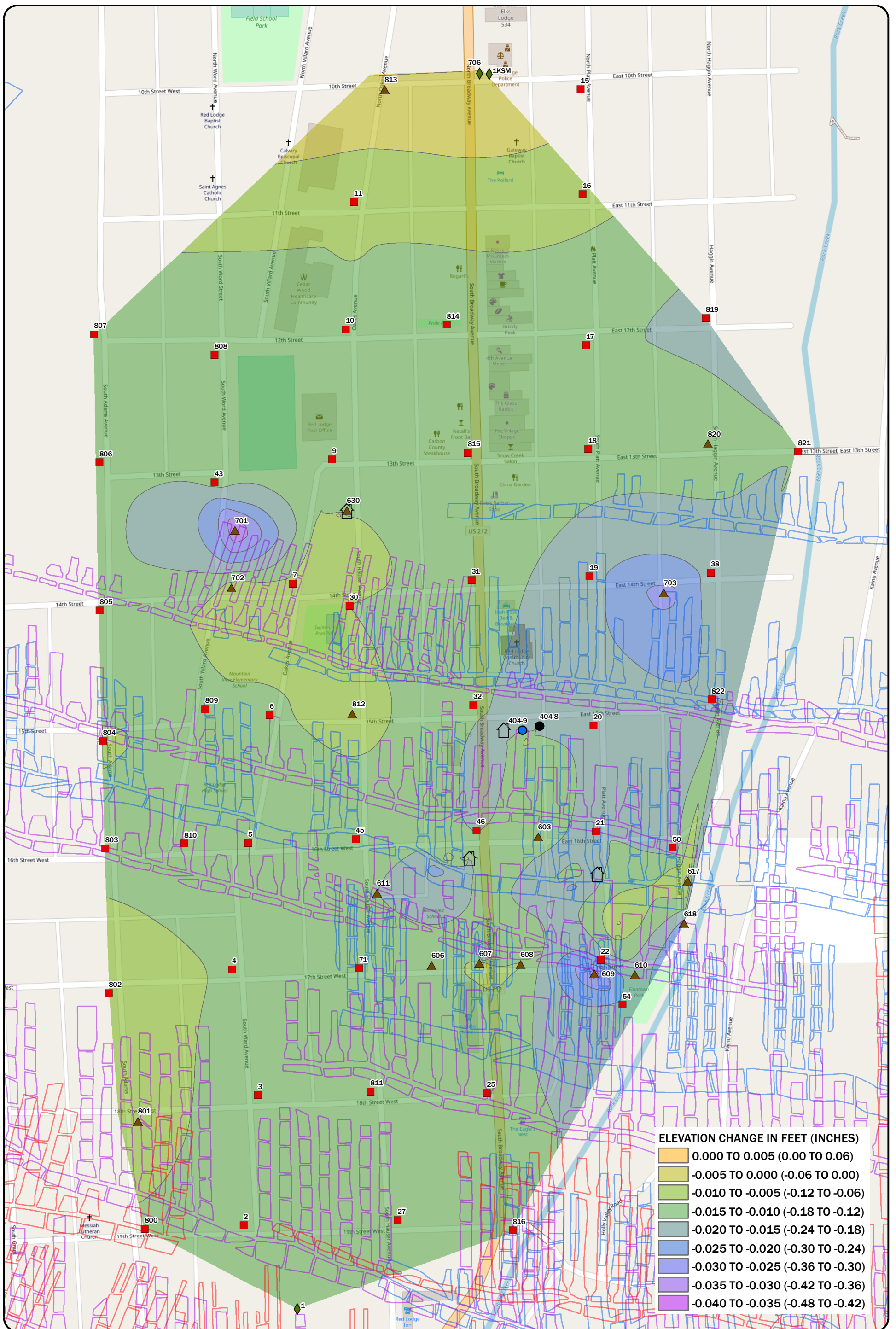
DISPLAYED AS: _____
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 DATUM: NA _____
 UNITS: NA _____
 SOURCE: PIONEER _____

FIGURE 2-12



**RED LODGE SUBSIDENCE
 MONITORING INVESTIGATION
 DISTRIBUTION OF ELEVATION
 CHANGE MEASUREMENTS**

DATE: 10/9/2017

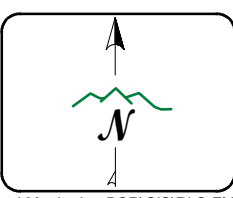


ELEVATION CHANGE IN FEET (INCHES)

Orange	0.000 TO 0.005 (0.00 TO 0.06)
Yellow-Green	-0.005 TO 0.000 (-0.06 TO 0.00)
Light Green	-0.010 TO -0.005 (-0.12 TO -0.06)
Medium Green	-0.015 TO -0.010 (-0.18 TO -0.12)
Dark Green	-0.020 TO -0.015 (-0.24 TO -0.18)
Blue-Green	-0.025 TO -0.020 (-0.30 TO -0.24)
Blue	-0.030 TO -0.025 (-0.36 TO -0.30)
Purple-Blue	-0.035 TO -0.030 (-0.42 TO -0.36)
Purple	-0.040 TO -0.035 (-0.48 TO -0.42)

LEGEND

- HOUSE OF INTEREST
- BENCH TIE
- FIRE HYDRANT
- MAG NAIL
- 3FT REBAR WITH ALUMINUM CAP
- NATIONAL SURVEY MONUMENT
- WELL
- 0.005 FT CONTOURS
- MINE 1 1/2
- MINE 4
- MINE 5



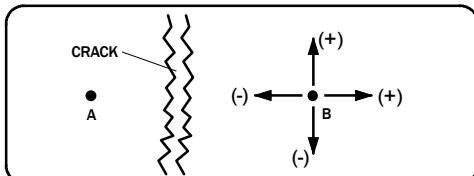
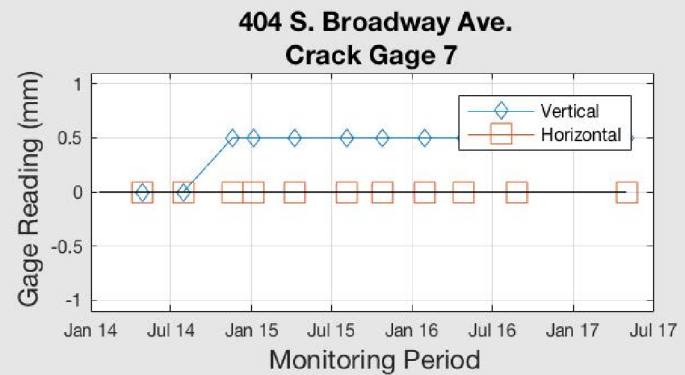
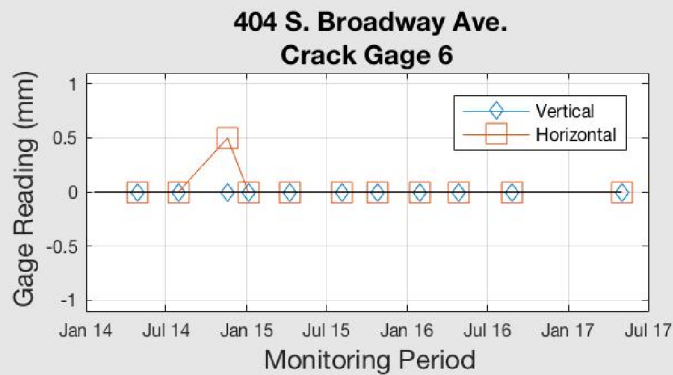
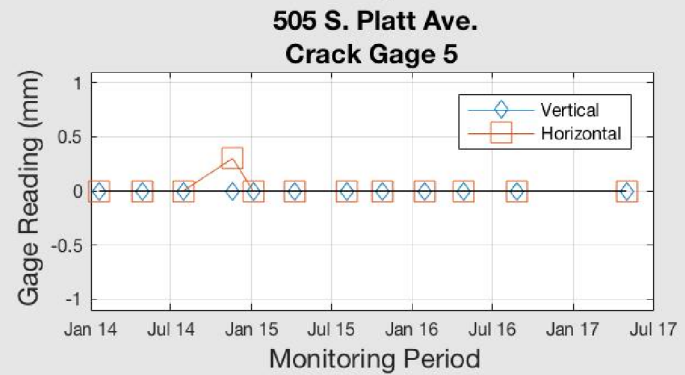
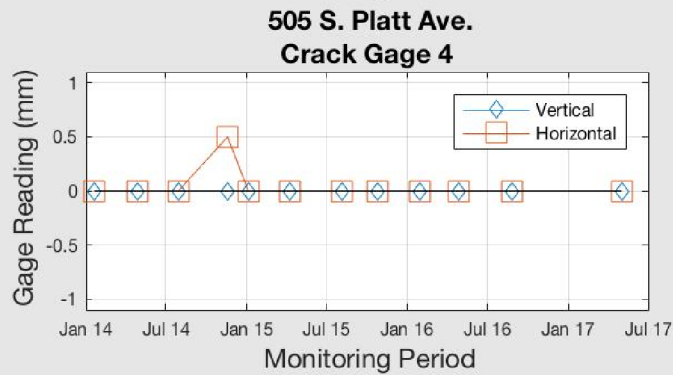
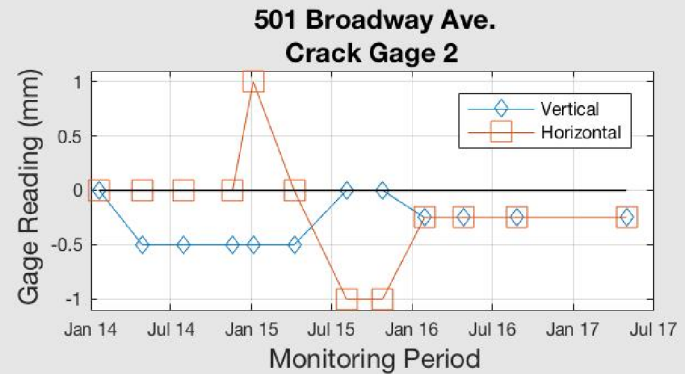
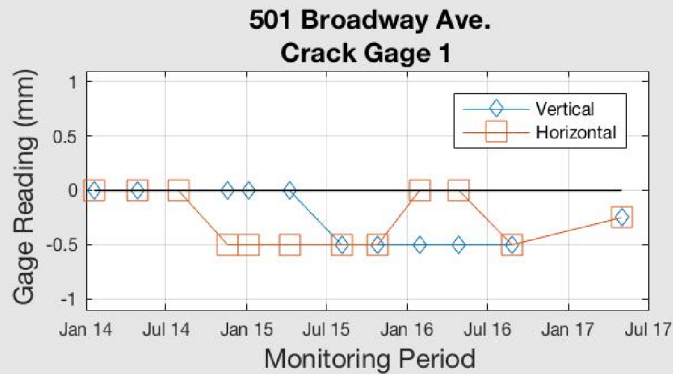
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 PROJECTION / ZONE: MONTANA STATE PLANE
 DATUM: NAD 1983
 UNITS: INT'L FEET
 SOURCE: OSM/PIONEER

FIGURE 2-13

RED LODGE SUBSIDENCE MONITORING INVESTIGATION ELEVATION CHANGES CONTOUR MAP

PIONEER
 TECHNICAL SERVICES, INC.

DATE: 12/7/2017



READINGS SHOW RELATIVE
MOVEMENT BETWEEN POINTS A
AND B (EITHER SIDE OF CRACK)

DISPLAYED AS:
PROJECTION/ZONE: NA
DATUM: NA
UNITS: NA
SOURCE: PIONEER



FIGURE 3-1
RED LODGE SUBSIDENCE
MONITORING INVESTIGATION
CRACK GAGE MEASUREMENTS
DATE: 10/12/2017