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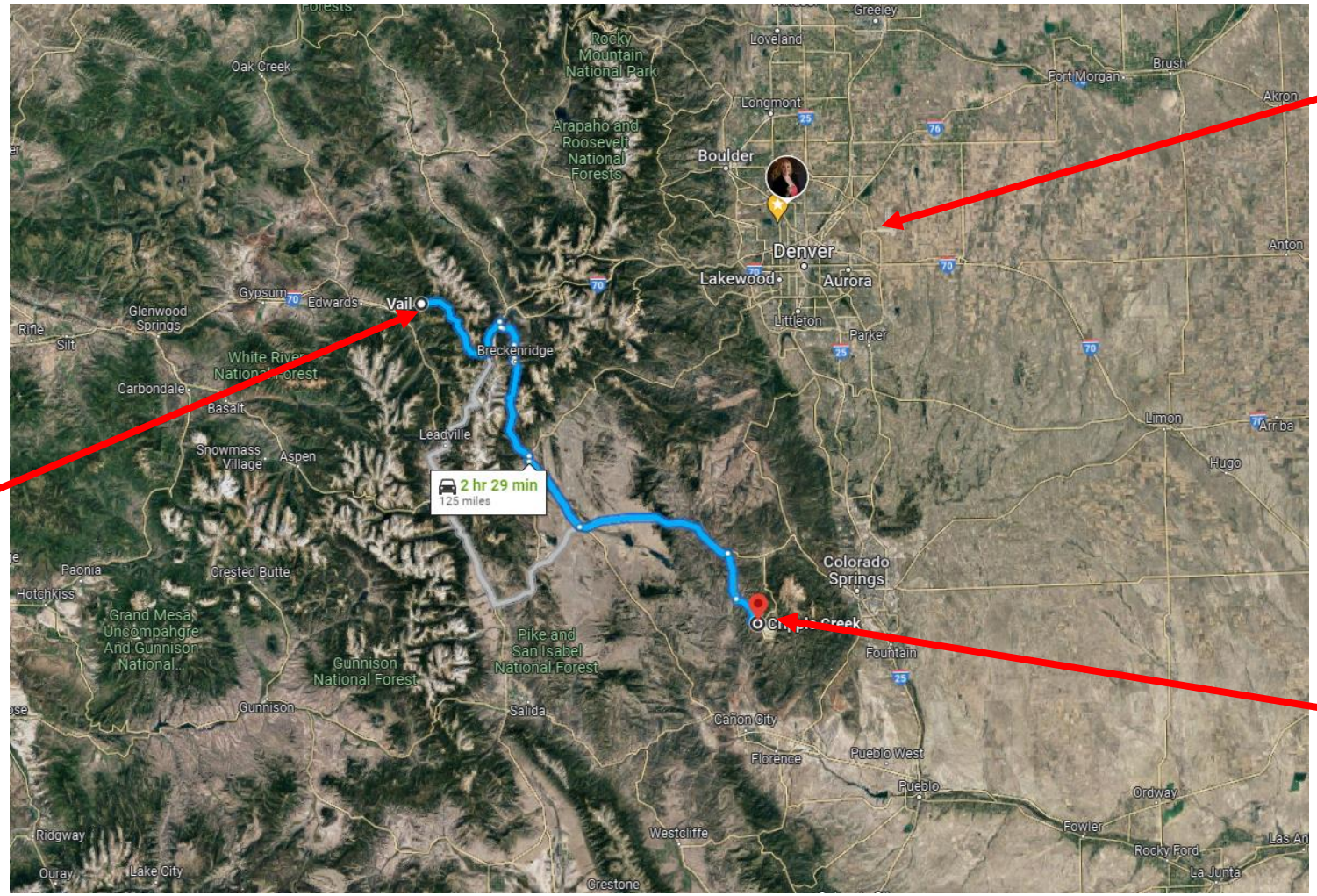
Bronco Billy's Hotel & Casino
Cripple Creek, CO

June 2, 2023

Cripple Creek, CO



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Old Mining Town. Legalized Gambling. New Hotel & Casino.

New Hotel & Casino on Main Street

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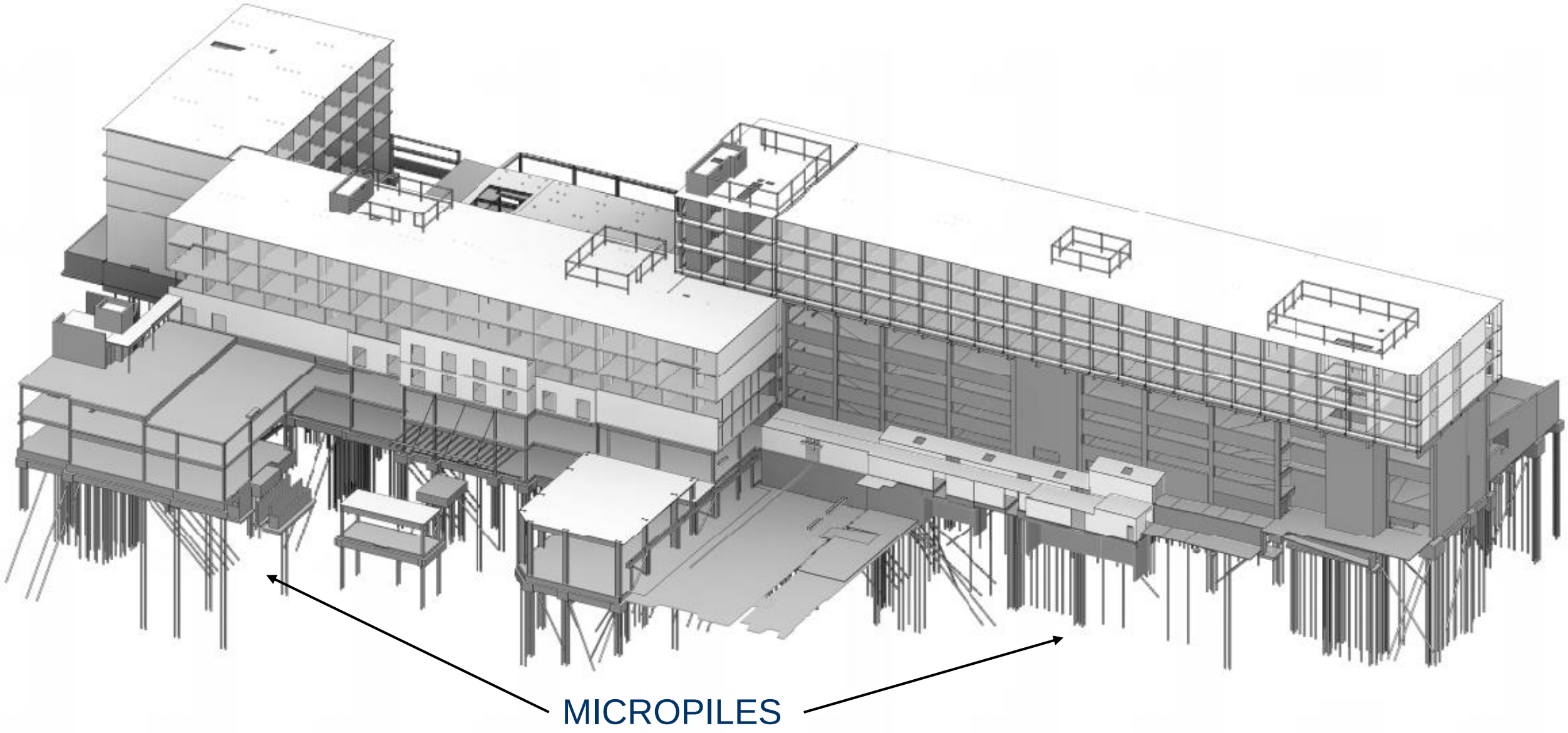
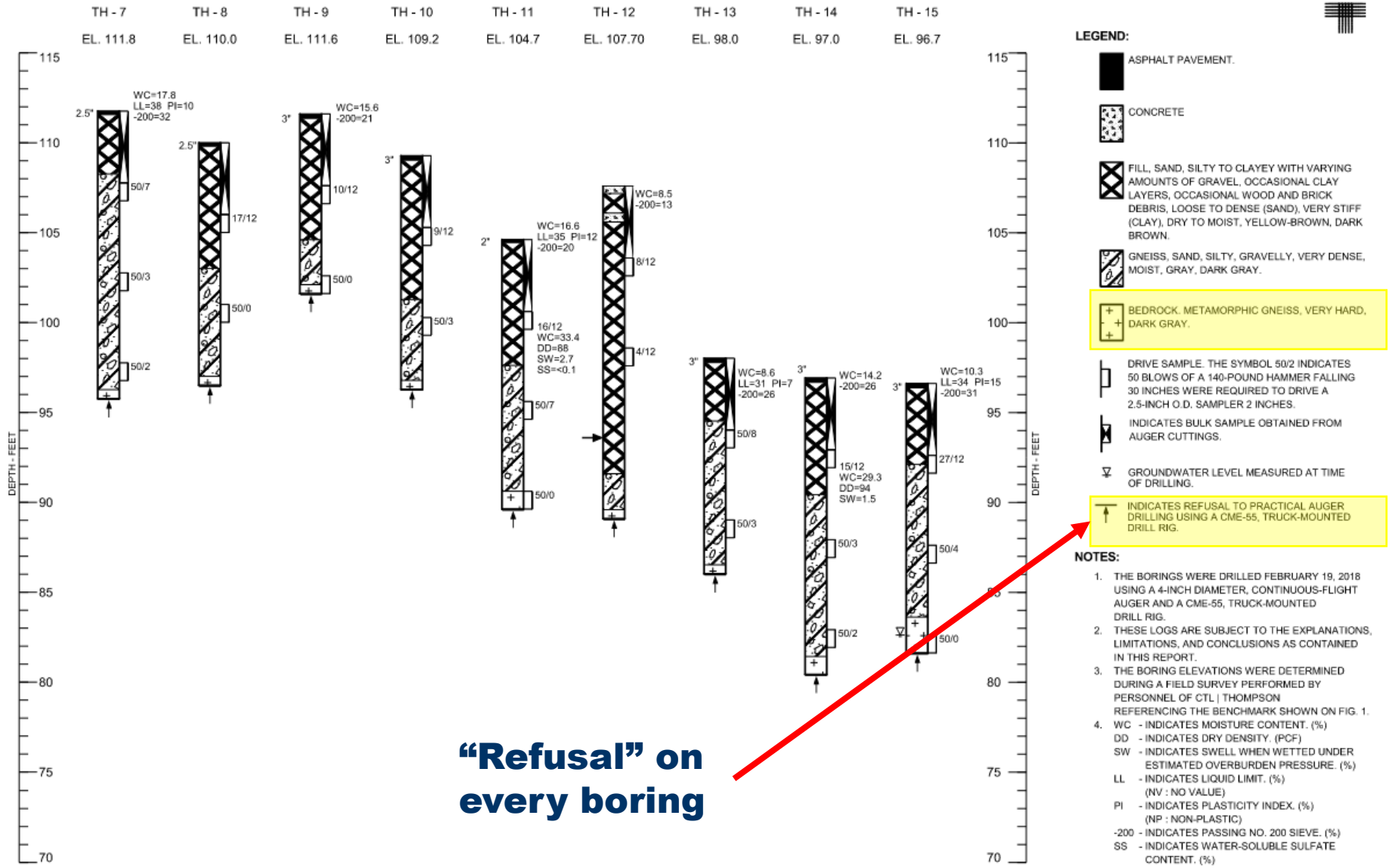

MICROPILES

Soil Conditions – Hard Rock (Gneiss)



LEGEND:

- ASPHALT PAVEMENT.
- CONCRETE
- FILL, SAND, SILTY TO CLAYEY WITH VARYING AMOUNTS OF GRAVEL, OCCASIONAL CLAY LAYERS, OCCASIONAL WOOD AND BRICK DEBRIS, LOOSE TO DENSE (SAND), VERY STIFF (CLAY), DRY TO MOIST, YELLOW-BROWN, DARK BROWN.
- GNEISS, SAND, SILTY, GRAVELLY, VERY DENSE, MOIST, GRAY, DARK GRAY.
- BEDROCK. METAMORPHIC GNEISS, VERY HARD, DARK GRAY.
- DRIVE SAMPLE. THE SYMBOL 50/2 INDICATES 50 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 2 INCHES.
- INDICATES BULK SAMPLE OBTAINED FROM AUGER CUTTINGS.
- GROUNDWATER LEVEL MEASURED AT TIME OF DRILLING.
- INDICATES REFUSAL TO PRACTICAL AUGER DRILLING USING A CME-55, TRUCK-MOUNTED DRILL RIG.

NOTES:

1. THE BORINGS WERE DRILLED FEBRUARY 19, 2018 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-55, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. THE BORING ELEVATIONS WERE DETERMINED DURING A FIELD SURVEY PERFORMED BY PERSONNEL OF CTL | THOMPSON REFERENCING THE BENCHMARK SHOWN ON FIG. 1.
4. WC - INDICATES MOISTURE CONTENT. (%)
   DD - INDICATES DRY DENSITY. (PCF)
   SW - INDICATES SWELL WHEN WETTED UNDER ESTIMATED OVERBURDEN PRESSURE. (%)
   LL - INDICATES LIQUID LIMIT. (%) (NV : NO VALUE)
   PI - INDICATES PLASTICITY INDEX. (%) (NP : NON-PLASTIC)
   -200 - INDICATES PASSING NO. 200 SIEVE. (%)
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)

“Refusal” on every boring

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Skin Friction

Rock Outcropping

Very high bond value

Table 5-3. Summary of Typical α_{bond} (Grout-to-Ground Bond) Values for Micropile Design.

Soil / Rock Description	Grout-to-Ground Bond Ultimate Strengths, kPa (psi)			
	Type A	Type B	Type C	Type D
Silt & Clay (some sand) (soft, medium plastic)	35-70 (5-10)	35-95 (5-14)	50-120 (5-17.5)	50-145 (5-21)
Silt & Clay (some sand) (stiff, dense to very dense)	50-120 (5-17.5)	70-190 (10-27.5)	95-190 (14-27.5)	95-190 (14-27.5)
Sand (some silt) (fine, loose-medium dense)	70-145 (10-21)	70-190 (10-27.5)	95-190 (14-27.5)	95- 240 (14-35)
Sand (some silt, gravel) (fine-coarse, med.-very dense)	95-215 (14-31)	120-360 (17.5-52)	145-360 (21-52)	145-385 (21-56)
Gravel (some sand) (medium-very dense)	95-265 (14-38.5)	120-360 (17.5-52)	145-360 (21-52)	145-385 (21-56)
Glacial Till (silt, sand, gravel) (medium-very dense, cemented)	95-190 (14-27.5)	95-310 (14-45)	120-310 (17.5-45)	120-335 (17.5-48.5)
Soft Shales (fresh-moderate fracturing, little to no weathering)	205-550 (30-80)	N/A	N/A	N/A
Slates and Hard Shales (fresh-moderate fracturing, little to no weathering)	515-1,380 (75-200)	N/A	N/A	N/A
Limestone (fresh-moderate fracturing, little to no weathering)	1,035-2,070 (150-300)	N/A	N/A	N/A
Sandstone (fresh-moderate fracturing, little to no weathering)	520-1,725 (75.5-250)	N/A	N/A	N/A
Granite and Basalt (fresh-moderate fracturing, little to no weathering)	1,380-4,200 (200-609)	N/A	N/A	N/A

Type A: Gravity grout only
Type B: Pressure grouted through the casing during casing withdrawal
Type C: Primary grout placed under gravity head, then one phase of secondary "global" pressure grouting
Type D: Primary grout placed under gravity head, then one or more phases of secondary "global" pressure grouting

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Micropile Design

- Pile Length typically governed by grout-to-soil (or rock) bond. With high bond stress, could pile length be governed by bar development length?
- Large tension loads – 175kip (800kN) and 281kip (1,250kN)
- Development length for bar in tension is ~48x bar diameter (can take reductions)
- Used #20 (2.5 inch / 64mm) and #24 (3 inch / 76mm)
- Standard development length calculation:
  - 48x #20 = 10ft (3m)
  - 48x #24 = 12ft (3.7m)
- Typical design bond length:
  - 8in (200mm) hole yields 60kip (270kN) per 1ft (300mm)!!
  - (Using “average bond” and Safety Factor = 2)
  - (8in x Pi x 12in x 400psi / 2)
- We have an issue! Potentially not enough pile length to “develop” the bar.

Micropile Design

- How we determined pile parameters:
  - Use minimum development length (10ft / 3m)
  - Use minimum concrete coverage (per IBC). Hole size must be 5in (125mm) larger than bar. Thus, 3in (75mm) bar requires 8in (200mm) diameter hole.
  - Reduce skin friction in design to “minimum required”. Only need 117psi (800kPa).
  - Less chance of pile bond failure (if in weathered rock).
  - Development length, NOT grout-to-rock friction governed!
  - (Added a 10ft “discounted length” at top of pile. Approximate depth to rock.)

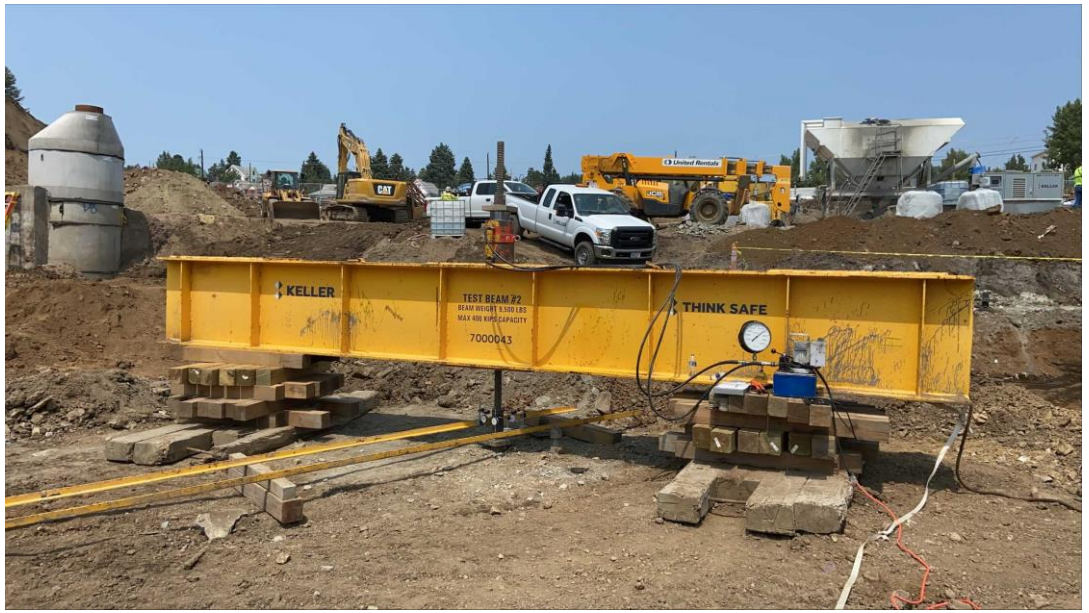
Granite and Basalt (fresh-moderate fracturing, little to no weathering)	1,380-4,200 (200-609)

- Final Designs:
  - 8in x 20ft with #20 bar (200mm x 6m with 64mm Bar) for 175kip (800kN)
  - 8in x 30ft with #24 bar (200mm x 9m with 76mm Bar) for 328kip (1,460kN)

Load Testing Program

All TENSION Load Tests (no compression)

- 175kip (800kN). #20 Bar.
  - 5ea 2x Design. 2x 175kip = 350kip (1,555kN)
  - 6ea 1.5x Design. 1.5x 175kip = 260kip (1,170kN)
- 328kip (1,460kN). #24 Bar. (Tension only 281kip/1,250kN)
  - Tested max load in tension.
  - 2ea 2x Design. 2x 328kip = 655kip (2,920kN)
  - 2ea 1.5x Design. 1.5x 328kip = 490kip (2,180kN)
- Numerous tests due to possible variability in rock quality.
  - All tests passed.

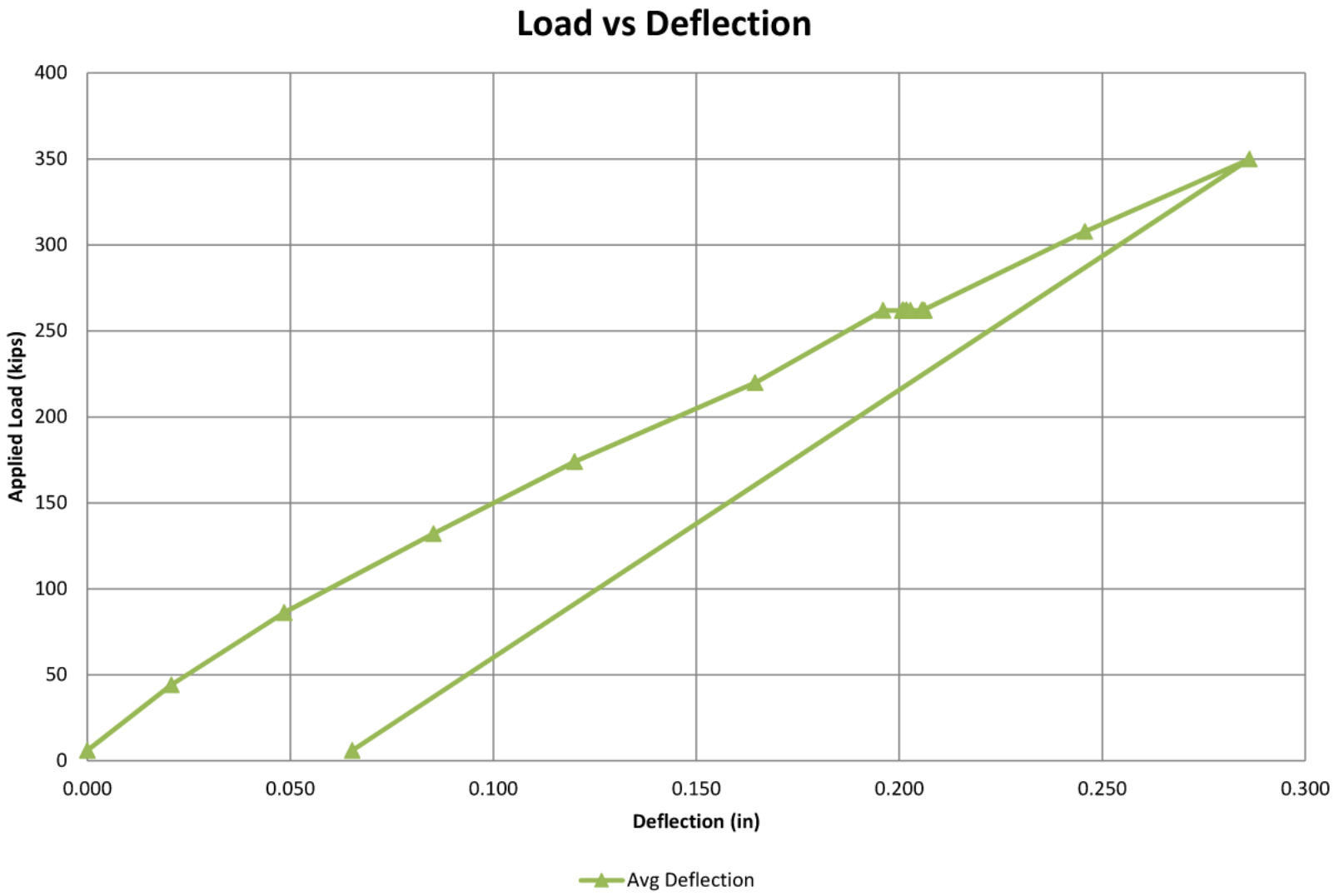


Results

8in x 20ft deep with #20 Bar

(200mm x 6m with 64mm Bar)

- **Only 0.286in (7.26mm) at 350kip (1,555kN)!**
- **Tested in TENSION, not Compression.**



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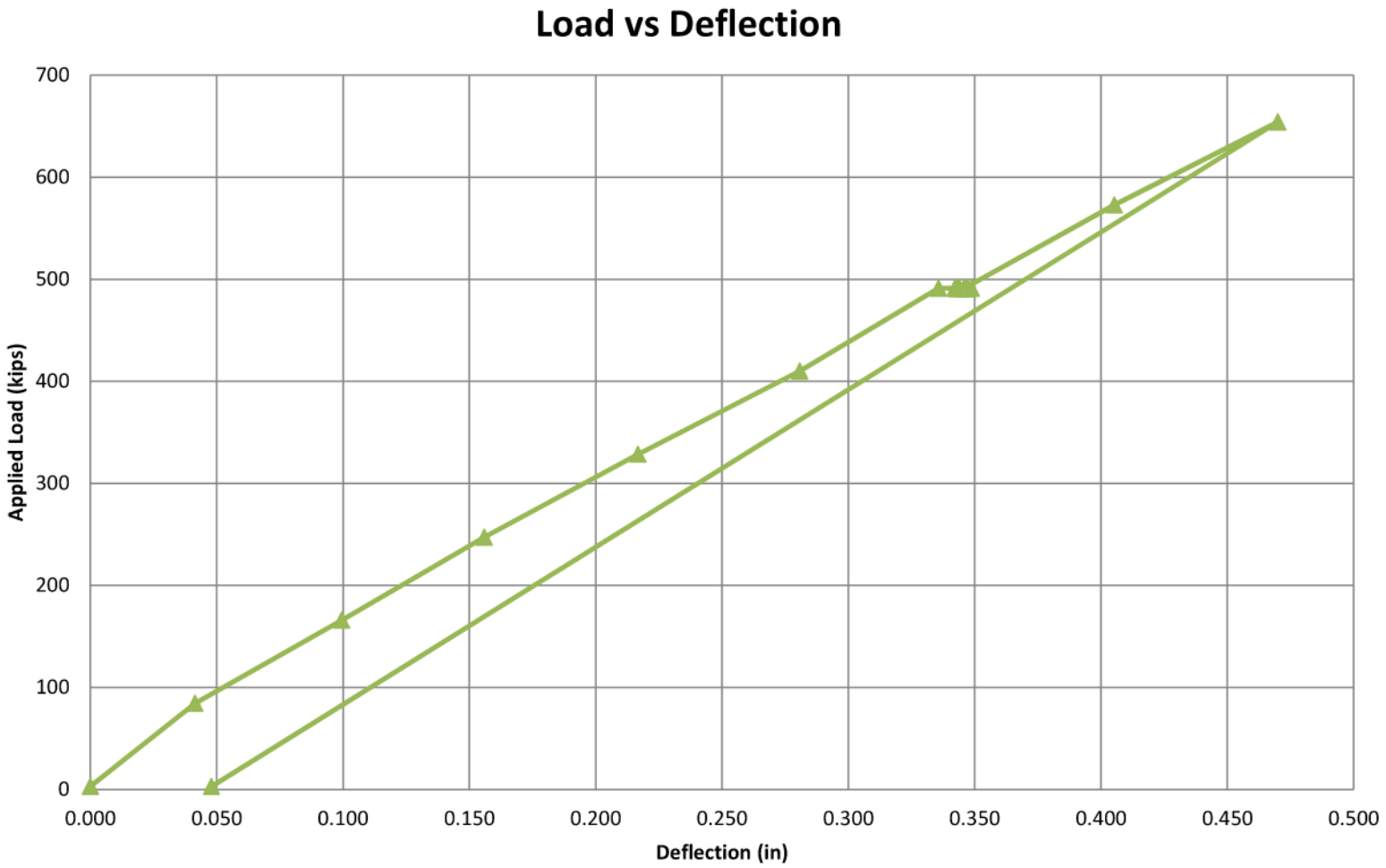
Results

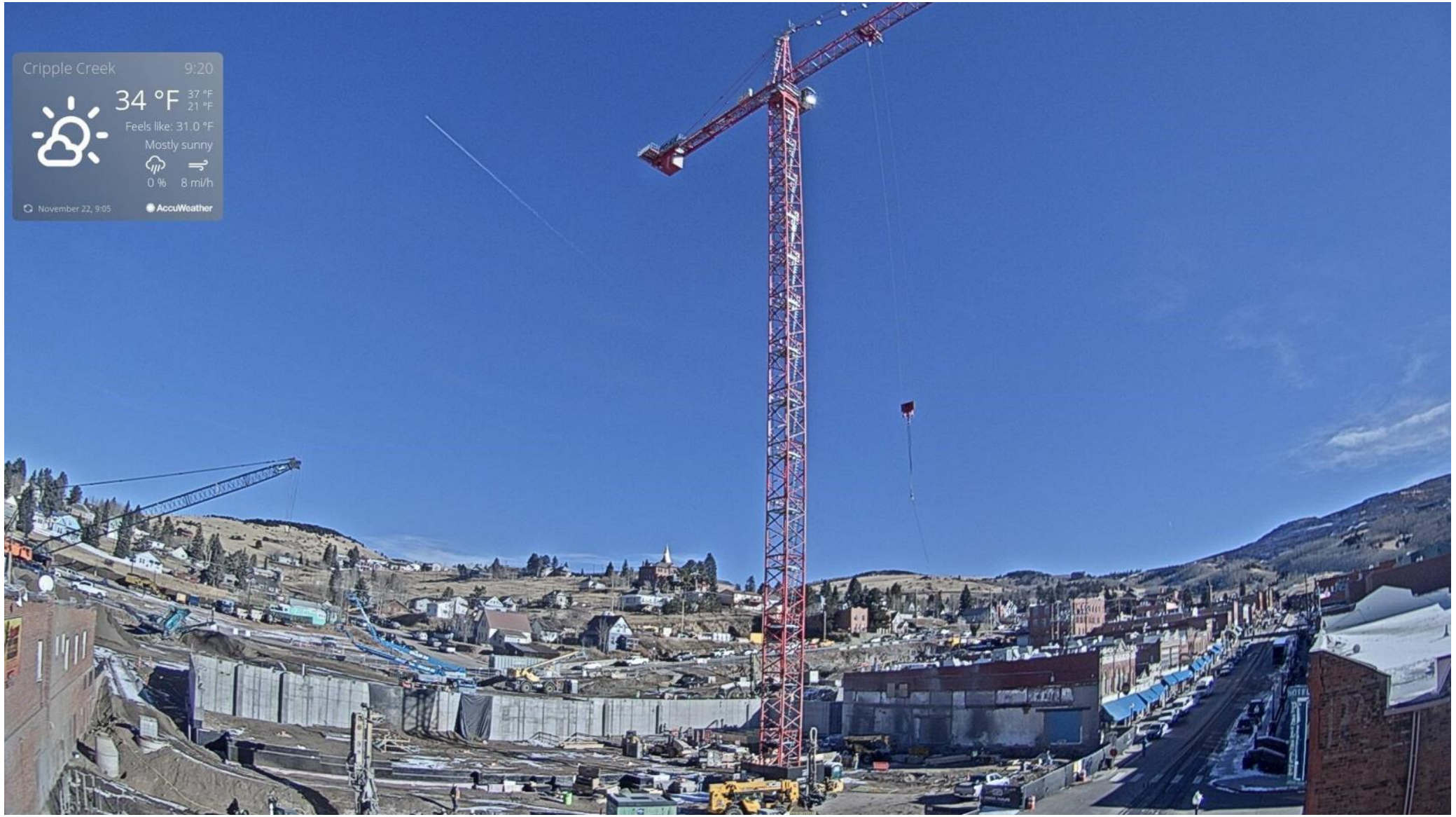
8in x 30ft deep with #24 Bar

(200mm x 9m with 76mm Bar)

- **Only 0.470in (11.94mm) at 655kip (2,920kN)!**
- **Tested in TENSION, not Compression.**

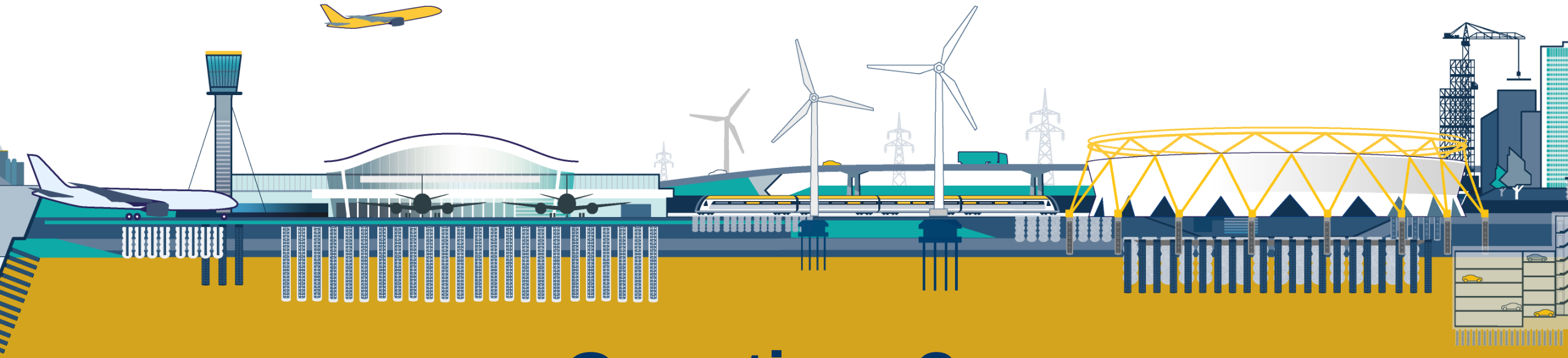



Chamonix Hotel and Casino C...
15:55:22 LIVE
Cripple Creek, Colorado
Chamonix Hotel and Casino Construction South Camera 01 (Looking Northeast)
broncobillyscasino.com


Cripple Creek
9:20
34 °F
37 °F
21 °F
Feels like: 31.0 °F
Mostly sunny
0 %
8 mi/h
November 22, 9:05
AccuWeather

Will be completed December 2023. Come back and visit ☺

- **Owner:** Full House Resorts
- **Prime Contractor:** Hensel Phelps
- **Structural Engineer:** Martin/Martin
- **Geotechnical Engineer:** CTL Thompson
- **Inspections & Materials Testing:** CTL Thompson
- **Micropile Design-Build Contractor:** Keller



Questions?