



dura·line

Technology Summit 2019



MICROTRENCHING



Dan Urban

Corbel

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Technology
Summit



CCI Corbel Communications
Industries, LLC.

FIBER VOICE DATA RF | CONSTRUCTION & MAINTENANCE

IMAGINE NO LONGER, WE ARE HERE

MICROTRENCHING



CORBEL
Communications Industries, LLC.



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Thank You for Attending the First Microtrenching Summit

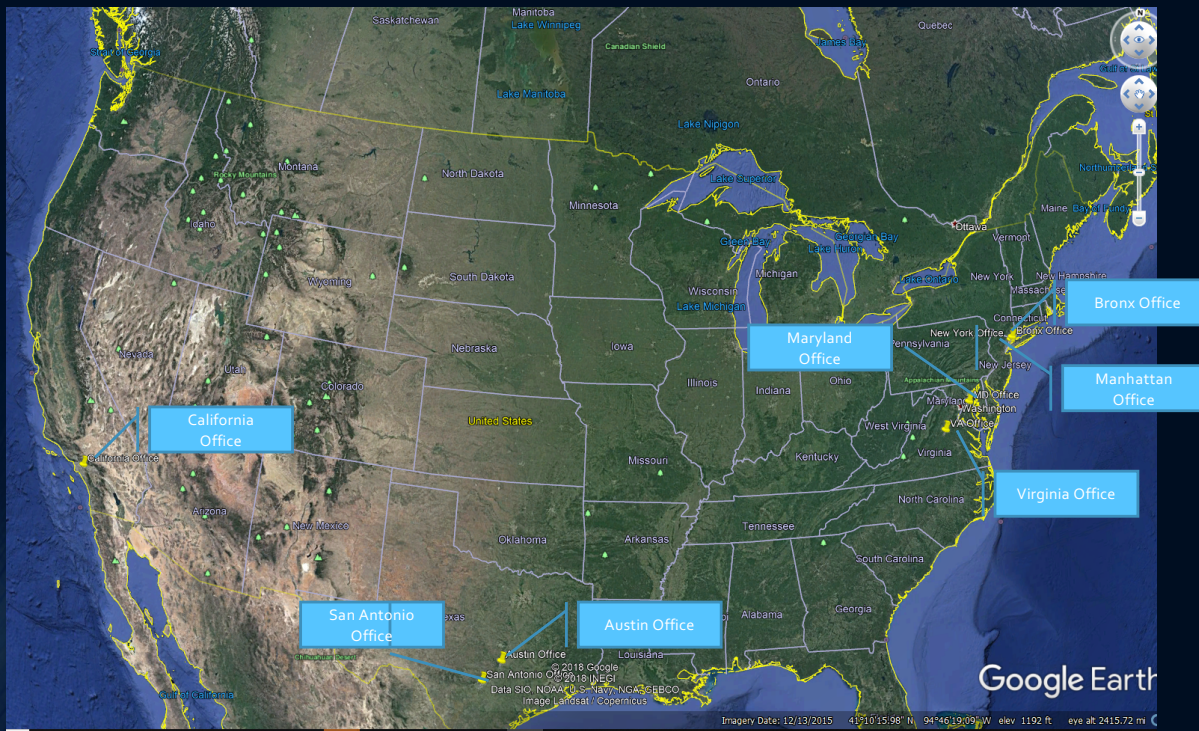
- Fellow Speakers
- Friends
- Sponsors and Partners
- Rick Dvorak
- Tanya, Kay, Molly, Jennifer, and Dura-Line Team
- Victor, Josh, Javier and Corbel Team
- Darnell Sutton and HWDC Team
- Angelo Pino and Stephen Javakian
- Mayor Richard Thomas



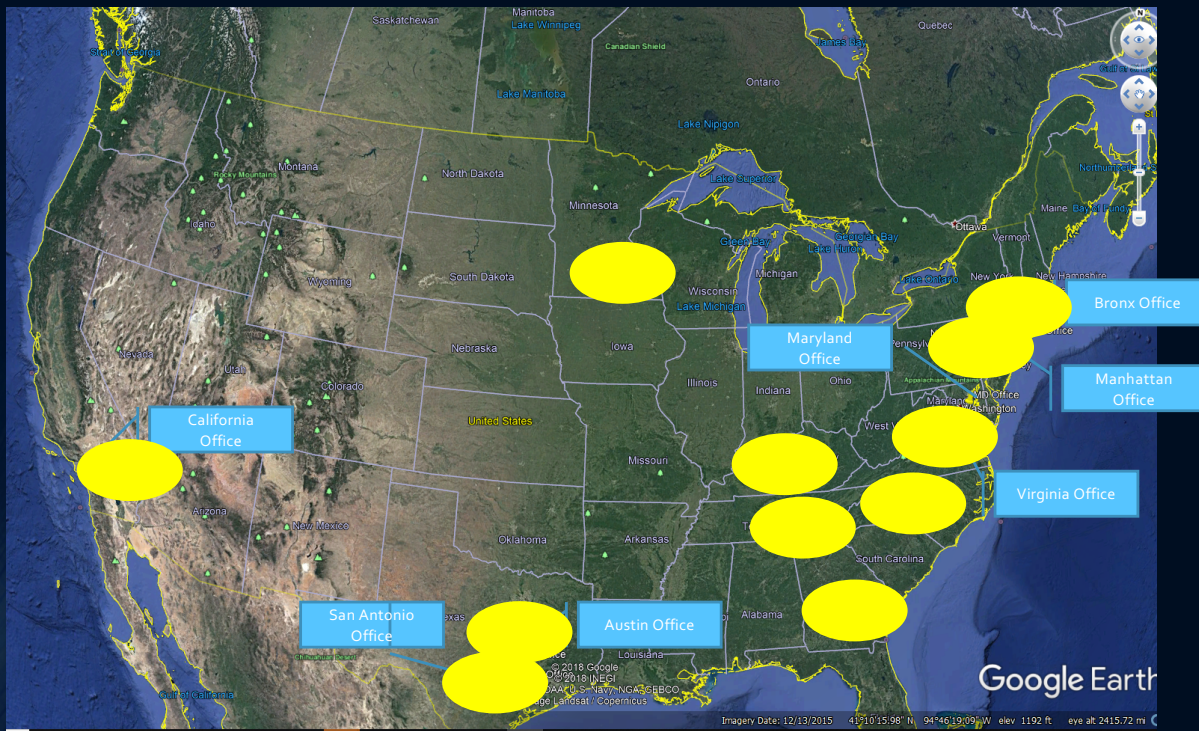
- Known for Innovation and Continuous Process Improvement
- Capable of Handling any Challenging Project
- Have Been Pioneers in Microtrenching with Great Partners in our Clients, Duraline, Ditch Witch, Backfill Manufacturers.



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More than 5,000,000 LF of MT completed.

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Our Promise

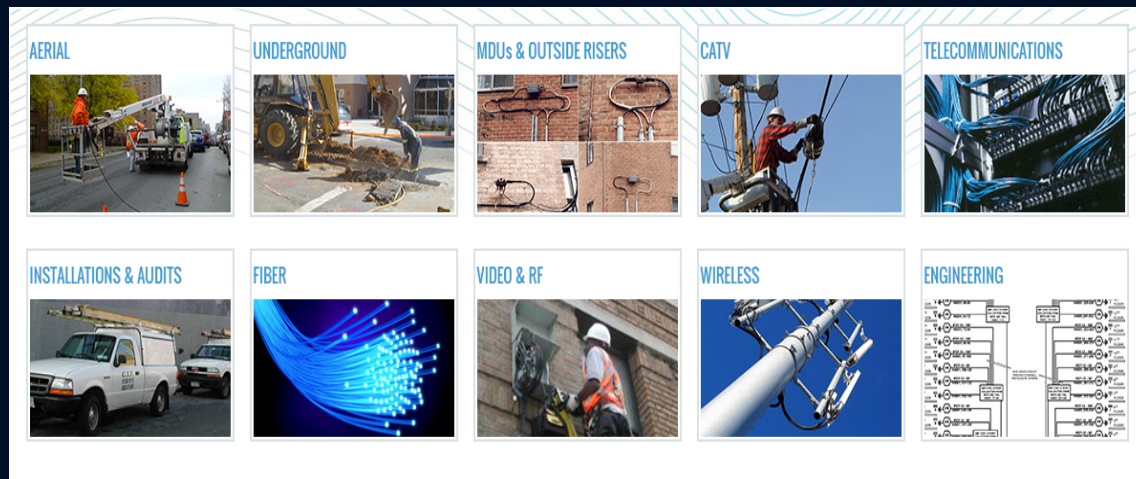
- Combining a wealth of experience, technology expertise, and a talented and certified staff, Corbel provides customers with the highest quality of survey, design and engineering, the safest construction, in addition to an unprecedented level of professionalism, and the most cost effective solutions available.



**WHEREVER AND
WHENEVER YOU SPECIFY**

Overview > Services & Solutions

We are a full service turnkey contractor. A one stop shop that completes the entire cycle from survey and design through engineering and construction to installations and testing.



What Makes Corbel Unique?

- Have helped pioneer the microtrenching processes used today.
- The most experience in microtrenching in the United States.
- The latest technology and working with manufacturers on the next generation of equipment.
- Working with Cities to gain approval.
- Developed own unique backfill mix.
- Demonstrated national abilities and proven its model across the United States.

Microtrenching

“ Unlike traditional trenching, which is primarily used in soil and may be cut to four feet deep and four to eight inches wide. Microtrenching, as it’s name implies is used cut a narrow, shallower trench. It ranges from $\frac{3}{4}$ in. to 2 in. Wide and a maximum depth of 26 in.



Types of Installations

- Small Cell
- Smart Cities
- Fiber to the Premises
- Rural Broadband
- Enterprise Laterals
- Backbone
- Low Voltage Electric

Comparison of Installation Speed

- Central Business Districts
 - 17 nodes in Dallas would have taken 8 Weeks. We did it in 3 days!
- Fiber to Premises
 - Missile Bore – 1000 LF per day with a lot of manpower.
 - Directional Drill 500-700 per day in ideal conditions per machine.
 - Plowing and Missile Bore under driveway – 1000 LF per day.
 - Microtrenching 4,000LF per day!



Reduced Complaints



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Video Courtesy of KXAN

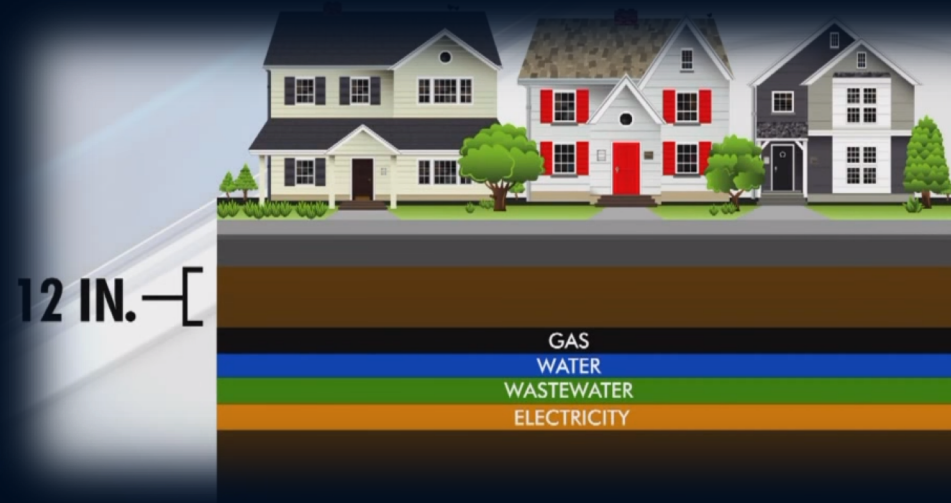
Utility Strikes



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Countermeasures that can be Implemented

- Utility Locates
- Ground Penetrating Radar
- Test Pits



Shallower Depth Reduces Hits Dramatically

Savings Example

- 20,000 Nodes
- Half Can be MT = 10,000 Nodes
- Avg of 400 LF per Location
- Total of 4,000,000 LF
- Avg cost of conventional \$200 per LF= \$800,000,000.00 (80K per Node)
- IF MT= AVG \$60 per LF = \$240,000,000 (24K Node)
- Potential Savings \$560 Million and Much Faster Deployment
- If invested savings into expansion could deploy approximately 23,000 additional sites

Successful Deployments

- Boston MA
- New York City
- Eagan MN
- Louisville KY
- Nashville TN
- Charlotte NC
- Atlanta GA
- Wintergreen VA
- Washington DC
- Austin TX
- San Antonio TX
- Gatlinburg TN
- Wintergreen VA
- Philadelphia PA
- Los Angeles CA
- Fullerton CA
- Chicago IL

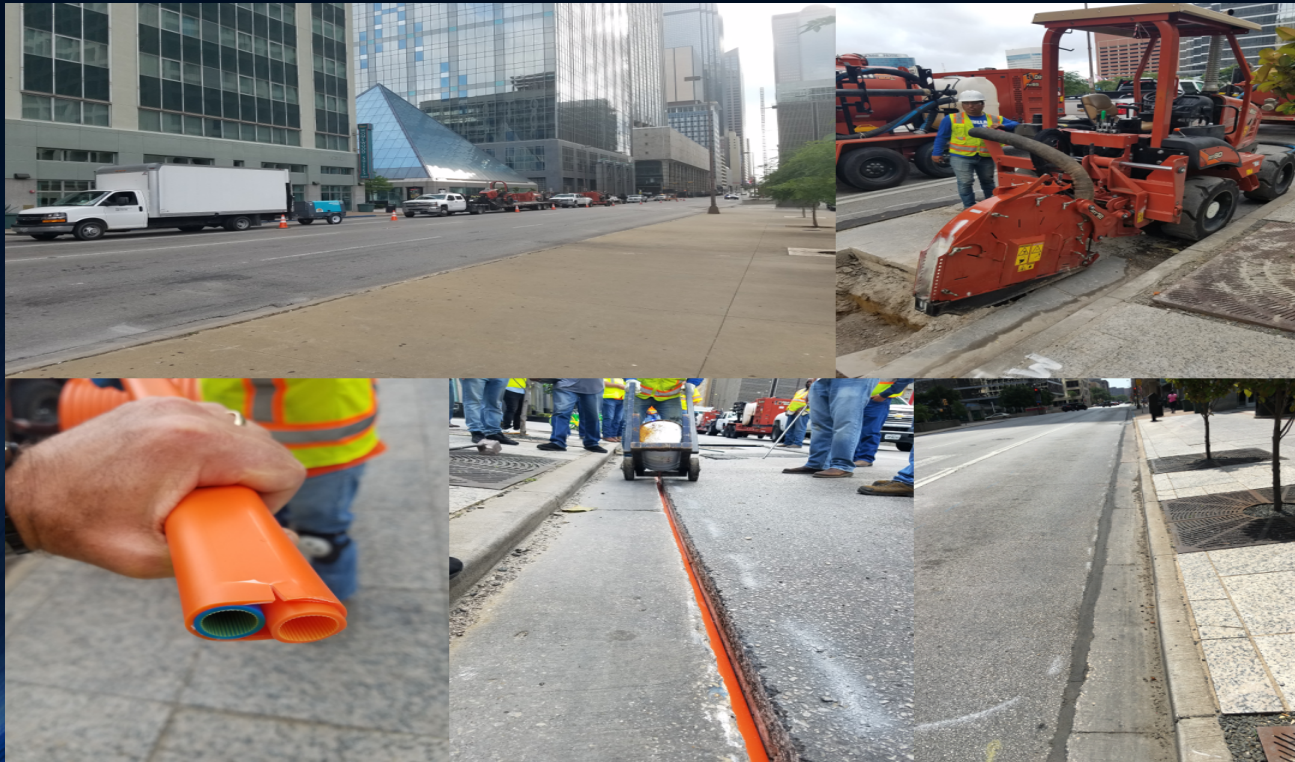
Along Gutterline -Austin TX



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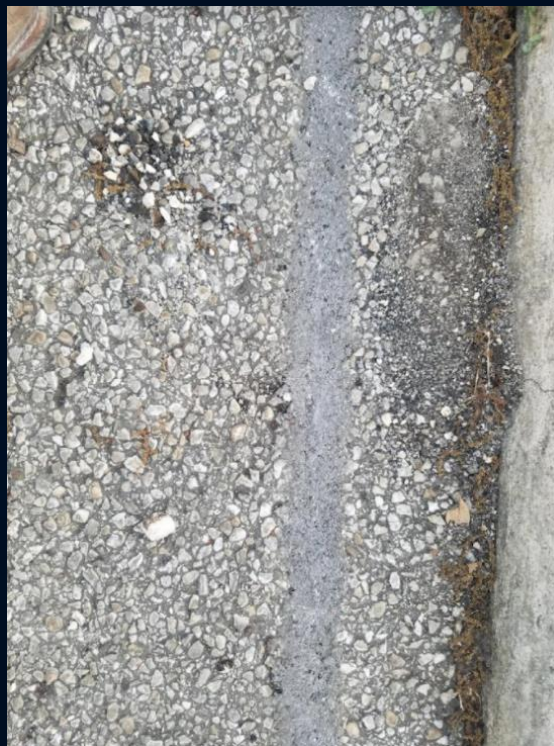


Along Gutter - Dallas TX



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Offset from Curb -San Antonio



Concrete Streets - Louisville KY



Traditional Streets



Behind Sidewalks, Under Pavers



Backfill Approach



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- Reduce Cost of Thermoset Resins and Other Chemical Compounds
- Find something that has high adhesive capability
- Find a product that will set quickly and not be susceptible to Tire Tracks
- Find a Product that Won't Flow out of trench when on inclines.
- Find a Product that has minimal shrinkage

Corbel Trench Fill

Corbel Trench Fill

Micro Trench Reinstatement Material

DESCRIPTION

Corbel Trench Fill is a one-component, rapid setting, low shrinkage, extendable cement that is used for reinstatement of a micro trench. Corbel Trench Fill is mixed with aggregate and water on site for large scale micro trench and small street cut out applications. The mix is placed in the microtrench in one pass, rolled to smooth and create texture and ready for traffic in 2-3 hours.

WHERE TO USE

- Airport runways
- Asphalt streets
- Asphalt street/concrete curb joint
- Concrete street and curb
- Street cut out where digging under curb

YIELD

Approx. 3 yards per bulk-bag/super sack but largely dependent upon aggregate proportion

SHELF LIFE

12 mos. properly stored

APPLICATION TEMPERATURE RANGE

40°F to 90°F (Hot weather placement procedures recommended above 90°F; Cold weather placement procedures recommended below 50°F)

HOW TO APPLY

Surface Preparation (See ICRI guidelines)

1. Concrete must be sound and fully cured (28 days).
2. Saw cut the perimeter of the area being patched into a square with a minimum depth of 1/2" (13 mm).
3. Remove all laitance, oil, grease, curing compounds, and other contaminants that could prevent adequate bond.
4. The concrete substrate should be saturated surface-dry (SSD), without standing water, before application.
5. Blend with aggregate and apply the mixed material onto the prepared saturated surface-dry (SSD) substrate best practices to ensure there are no air pockets. Ensure proper consolidation of the mortar and compaction around reinforcing steel. Minimum application thickness is 1". Finish the completed repair, as required, taking care not to overwork the surface.

Reinforced Steel

Remove all oxidation and scale from the exposed reinforcing steel in accordance with ICRI Technical Guideline No. 03730 "Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion."

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Corbel Trench Fill

Mixing

Approximately 0.38-0.42 water to cementitious materials ratio by weight. Conduct field trials to verify proper slump (4-inch 8-inch) and consistency.

Set time

min. at 72° F (22° C) ASTM C 191
Initial 20-30 minutes
Final 30-40 minutes

Chloride Penetration— Time of testing: 360 min (ASTM

C 1202)
Time.....Coulombs
7 Day.....99
28 Day.....117

Compressive strength— 3"X 6" Cylinders; ASTM C39

2 Hour.....3,500 psi (24.1 MPa)
3 Hour.....4,300 psi (29.6 MPa)
1 Day.....5,740 psi (48.3 MPa)
7 Day.....6,680 psi (55.2 MPa)
28 Day.....7,260 psi (55.2 MPa)

Shear Bond Strength— ASTM C882

24 hr.....2,760 psi (19.0 MPa)
7day.....2,900 psi (20.0 MPa)

Shrinkage- astm c157; Air Cure

28 day.....0.020%

Curing

Cure immediately after finishing. Use a curing compound that complies with ASTM C 309. For curing dyed product, use Cornerstone Construction Material Cure and Seal 1315 Solvent Based Curing and Sealing Compound to maintain color for up to two years between applications.

Clean Up

Clean tools and equipment with clean water immediately after use. Cured material must be removed mechanically.

Health and Safety

Make certain the most current versions of product data sheet and SDS are being used

Risks

Product contains portland cement and sand (crystalline silica); it can cause skin and eye irritation. Ingestion or inhalation of dust may cause tract irritation. This contains free respirable quartz, which has been listed as a suspected human carcinogen by NTP and IARC. Repeated or prolonged overexposure to free respirable quartz may cause silicosis or other serious and delayed lung injury.

Precautions

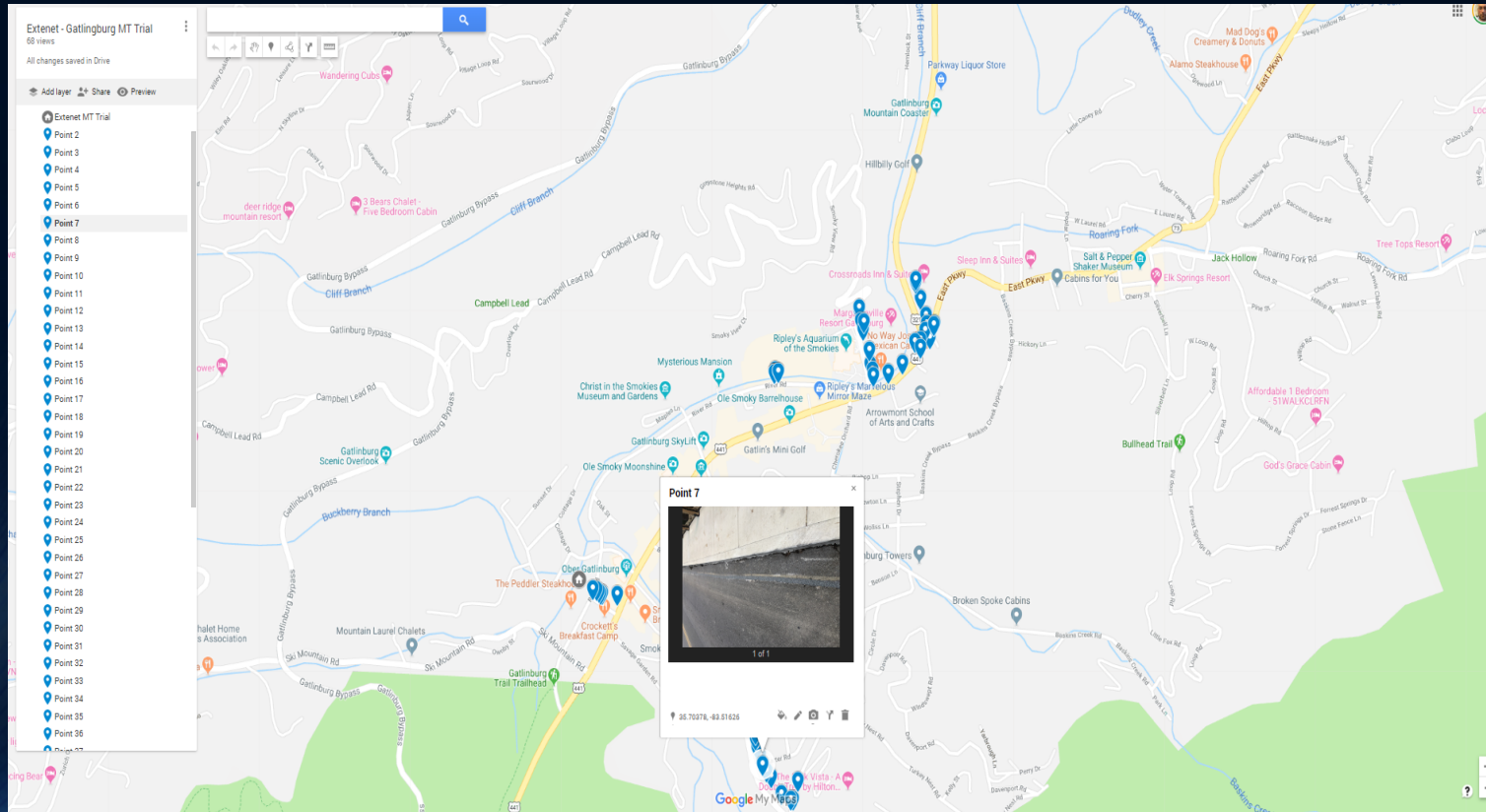
KEEP OUT OF THE REACH OF CHILDREN. Prevent contact with skin and eyes. Prevent inhalation of dust. DO NOT take internally. Use only with adequate ventilation. Use impervious gloves, eye protection and if the TLV is exceeded or is used in a poorly ventilated area, use NIOSH/MSHA approved respiratory protection in accordance with applicable federal, state and local regulations.

First Aid

In case of eye contact, flush thoroughly with water for at least 15 minutes, and seek medical attention. In case of skin contact, wash affected areas with soap and water. If the irritation persists, seek medical attention. Remove and wash contaminated clothing. If inhalation causes physical discomfort, remove to fresh air. If the discomfort persists, breathing difficulty occurs, or if swallowed seek medical attention. Refer to Safety Data Sheet (SDS) for further information.

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State of the Art QA/QC



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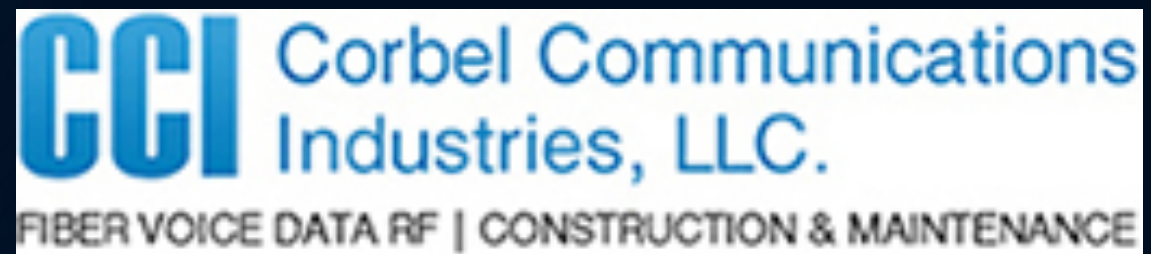
Where is the Future heading in MT?

- Better Partnerships with City's and Right of Way Providers
 - Select Location together.
 - Gutterline
 - In Roadway
 - Behind Curb
 - In Sidewalk
 - In Marking Stripes
 - Reduce Costs of Entry for Carriers will help residents and businesses.
- Recycling Spoils from Trenching
- Faster Speeds
- Less Impacts
- Deeper Depths

Microtrenching

- Safer
- Faster
- Cheaper
- Less Invasive
- Less Disruptive
- The Path Forward to winning the 5 G and technology race.

Q&A





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