Specialty Foundation Construction

Jet Grouting
Drilled Micropiles
High Mobility Grouting
Low Mobility Grouting
Post Tensioned Rock & Soil Anchors
Vibratory Ground Improvement & Stone Columns
Real Time Monitoring

miniJET® – A New Type of Micropile

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Layne GeoConstruction, Ruther Glen, VA

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Introduction

The typical construction procedure for installing jet-grouted columns involves the following main operations:

- Drilling a 75/100mm hole with jetting drill string to the designed depth;

- Injection of a water/cement mixture at high pressure (400/500 Bars) through nozzles threaded on a specialized “monitor” directly above the drill bit;

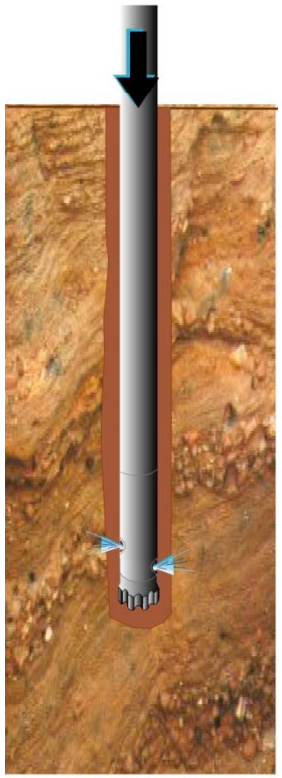
- Timed incremental lifting and simultaneous rotation of the drill string during pressure injection to the designed level.

Where the jet-grouted column requires steel reinforcing, the common process is to re-drill in of the center of the column, insert the reinforcement and grout.

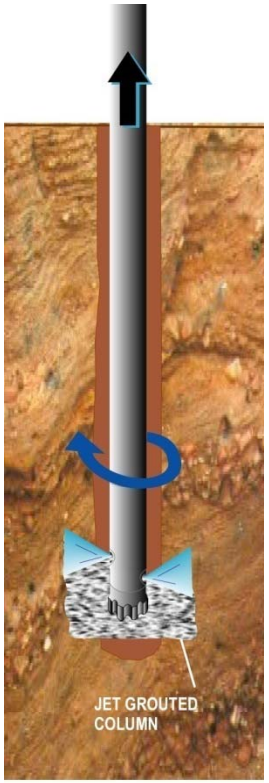
All of these operations are time consuming, significantly reduce production, and do not guarantee the centralization of the reinforcing and the integrity of the soilcrete column.

Jet Grout Column Installation

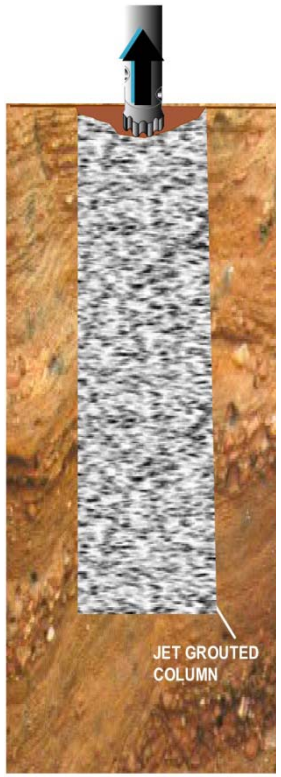
STEP ONE:
ADVANCE STEEL DRILL ROD DOWNWARD TO THE DESIGNATED COLUMN DEPTH.



STEP TWO:
SWITCH TO JET GROUTING SYSTEM. APPLY HIGH PRESSURE TO ACTIVATE THE JET MONITOR



STEP THREE:
PERFORM JET GROUTING AS JET ROD IS ROTATED AND WITHDRAWN AT A CONTROLLED RATE.



STEP FOUR:
AS THE JET ROD REACHES THE TOP, JET GROUTED COLUMN IS COMPLETED.

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Jet Grouting Methodology

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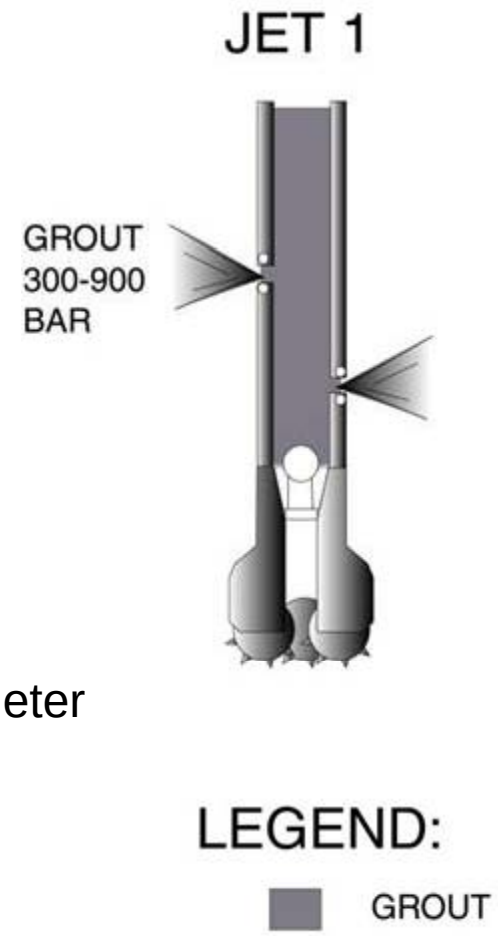
miniJET® Methodology

- Hybrid of a Type E Micropile (FHWA 2000)
- Combination of Micropile and Jet Grouted Column
- Hi pressure grout to create larger element
- Larger element section provides greater resistance against compressive and lateral loads also provides greater bond area
- Simultaneous installation of reinforcing increases production efficiency and quality of the column

- miniJET® installation utilizes jet down technique
- Typically 1 to 3 nozzles
  - 1 directed down to aid in drilling
  - 1 to 2 directed laterally to develop column diameter
- Downward jet technique in steps based on geology



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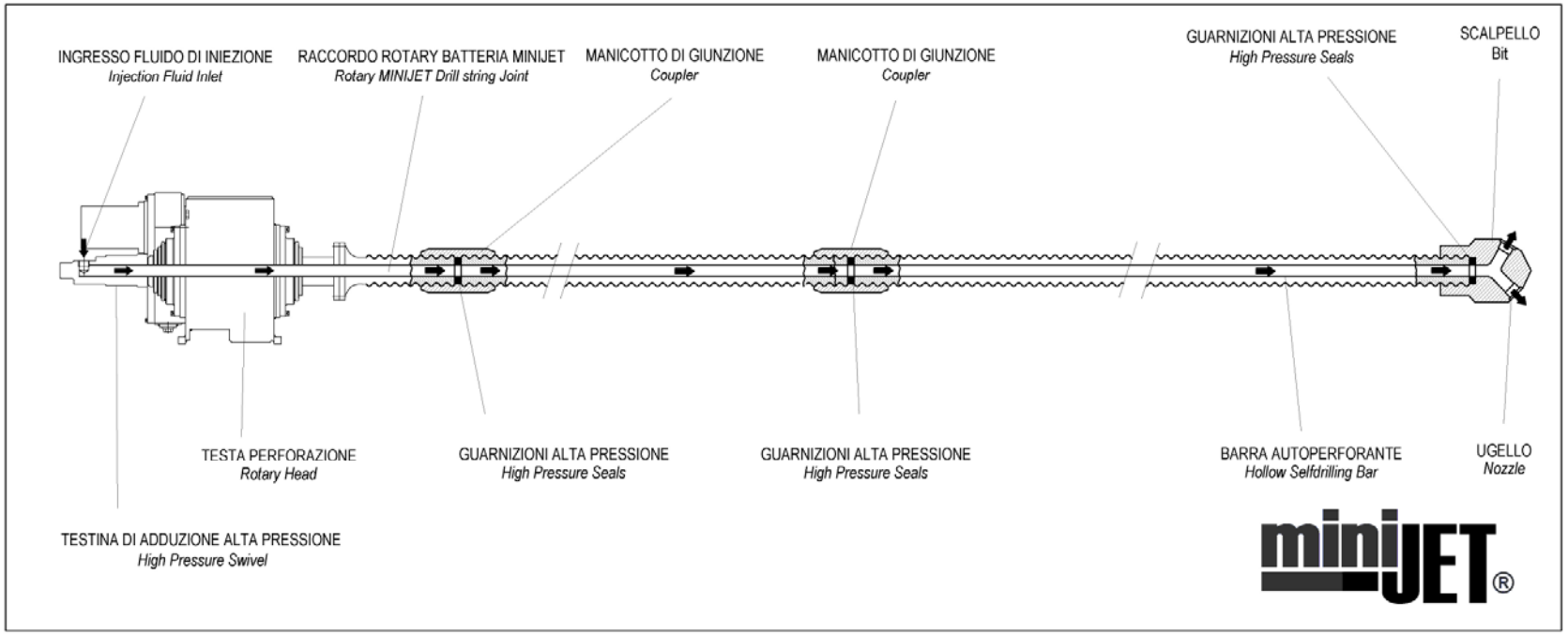

miniJET® DRILL STRING

miniJET® Self Drilling Re-bar

Technical features	**U.M.**	**Rm32/15**	**Rm38/16**	**Rm51/29**	**Rm76/48S**	**T103S**
Outside diameter	mm	32	38	51	76	103
Average Inner diameter	mm	14	16	28	48	59
Ultimate load	kN	415	540	840	1800	3780
Yeld load	kN	350	450	700	1450	2730
Suggested working load	kN	230	300	450	970	1820
Weight	Kg/ml	4,5	6,2	9,5	20,5	41,8
Delivery lengths	1,0 m – 1,5 m – 2,0 m – 3,0 m – 4,0 m – 6,0 m					

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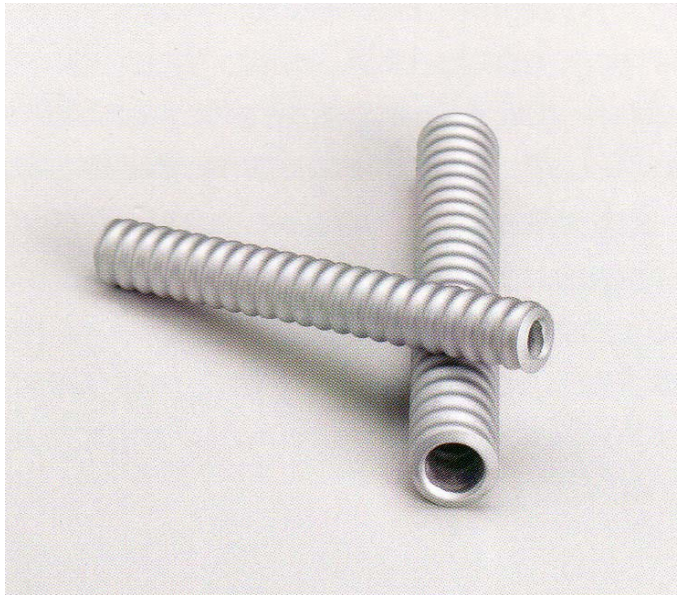
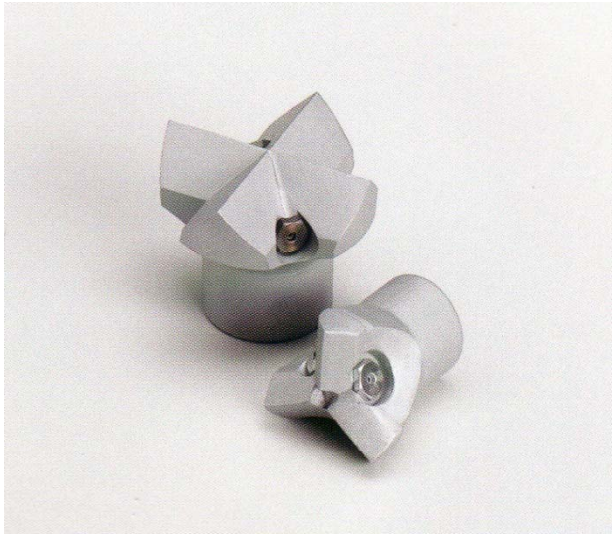
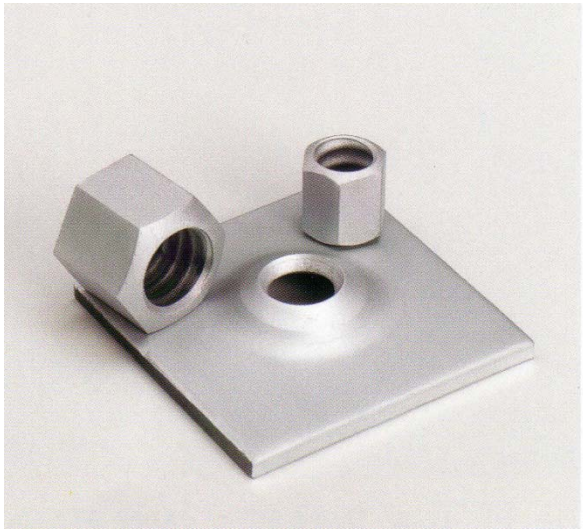


miniJET® Hollow rebars

Rebar-rebar coupling



Drill bit with injection nozzles



Nuts and anchoring plate

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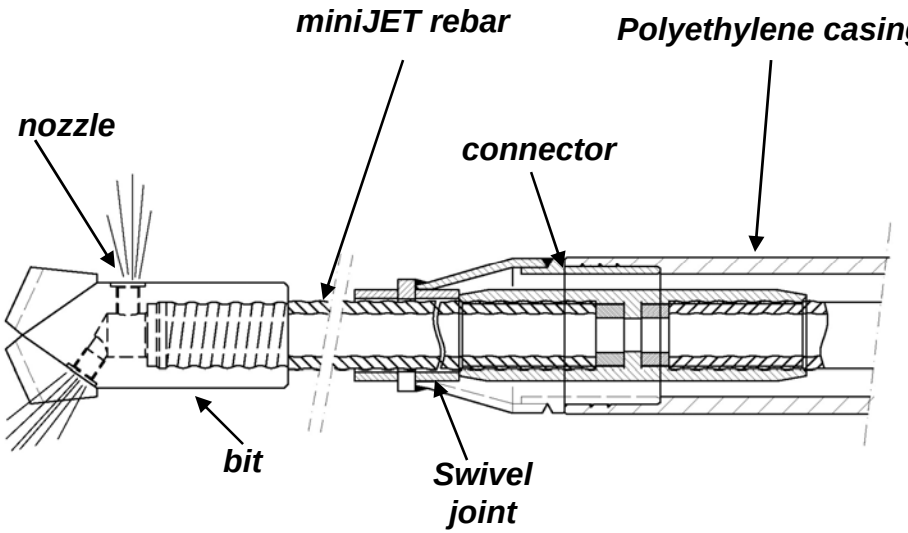

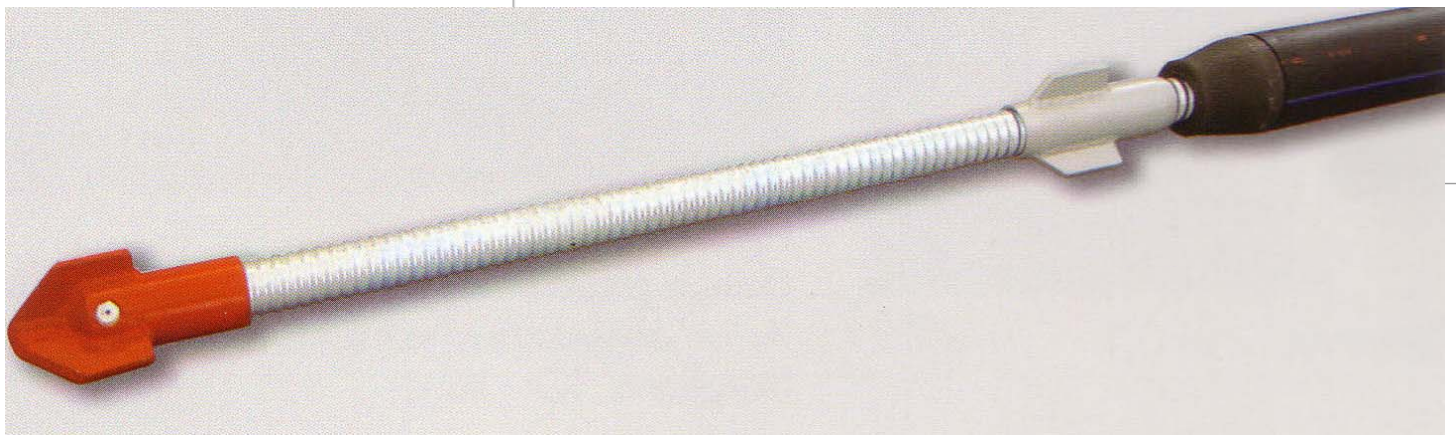

miniJET® PERMANENT ANCHOR

with galvanized coating treatment and polyethylene casing *(for free zone)*

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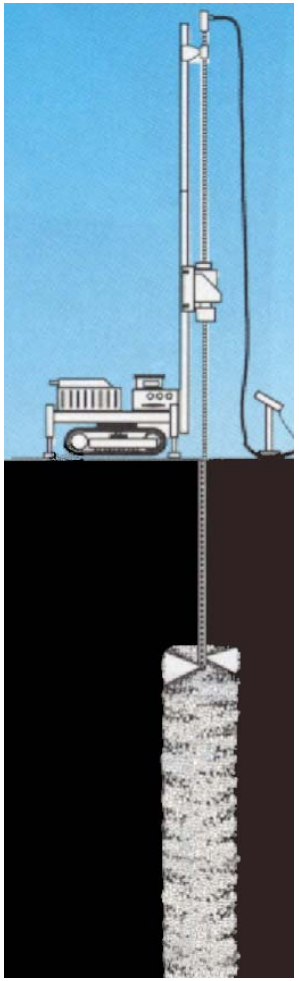
miniJET® Applications



Foundation Support
Excavation Support Systems
Structural Underpinning
Seepage Barrier / Cutoff Walls
Soil Stabilization
Tiebacks and Anchors

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Foundation Support Project

- Industrial facility in Florida
- miniJET® and traditional jet grouted columns utilized
  - miniJET® for foundation support – 437 columns
  - Traditional for support of excavation – 325 columns
- miniJET® loading characteristics
  - Compression = 150 kips
  - Tension = 75 kips
  - Lateral = 20 kips
  - 2 inch(51 mm) hollow threadbar (ultimate load 189 kips)
  - Anticipated column diameter 2.5 to 3 feet
  - Bonded length 25 foot minimum
- Additional test column installed with 3 inch hollow threadbar
  - Bonded length 35 feet
  - 3 inch (76 mm) hollow threadbar (ultimate load 405 kips)
  - Tested to 200 ton capacity

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Results

- All testing met the project requirements
- 14 day UCS – 1500 to 2000 psi
- Average diameter – 36 to 40 inches
- Compression test
  - Vertical movement @ 300 kips = 0.137 inches
- Tension Test
  - Vertical extension @ 150 kips = 0.517 inches
- Lateral Test
  - Elastic movement @ 80 kips = 0.025 inches

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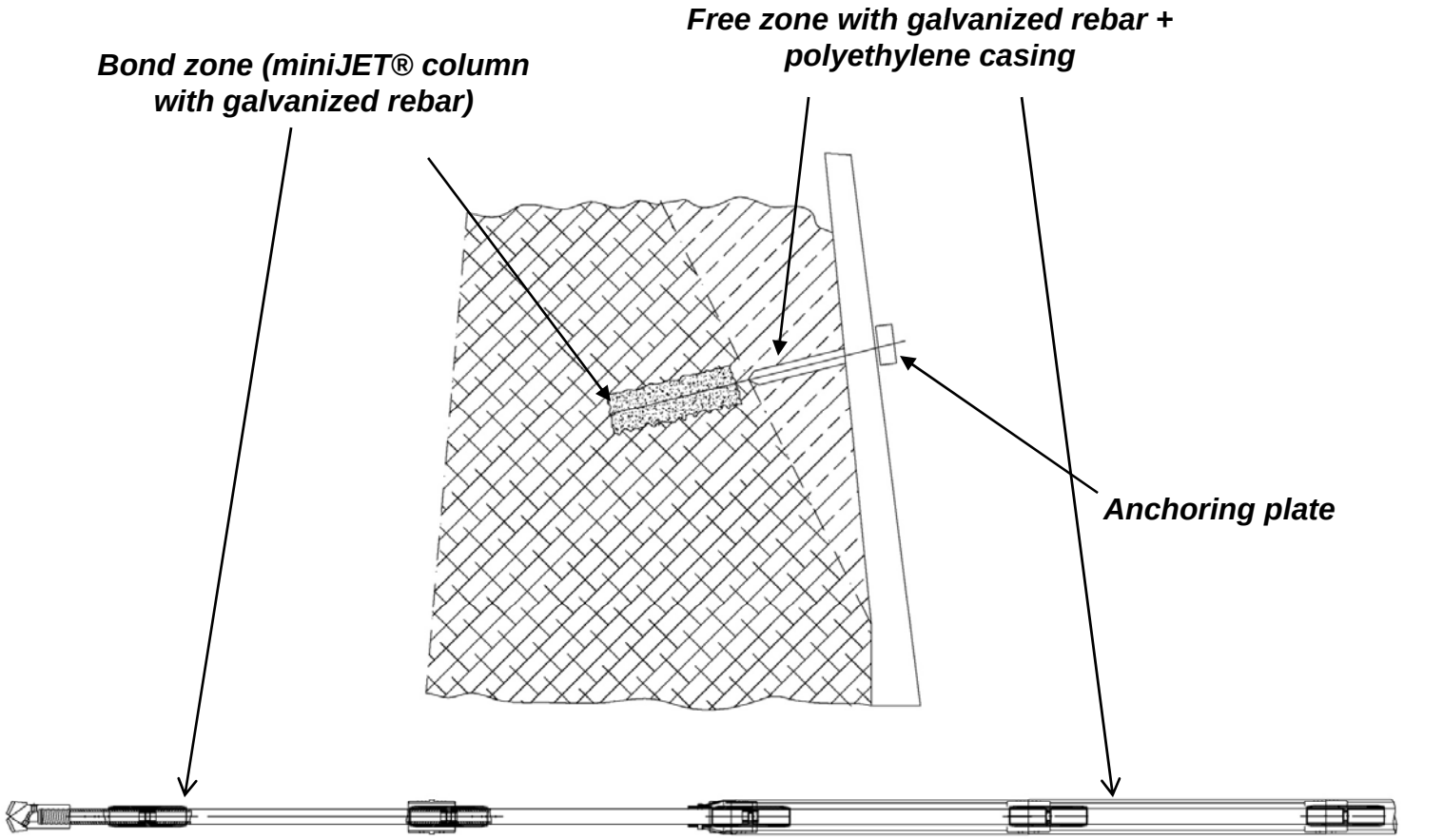
Anchor System



miniJET® ANCHOR

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