VII Semana de Infraestrutura da Internet no Brasil

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São Bernardo do Campo Case

Method of Construction – Micro Trenching deploying 3 ducts of 18 mm each

Perform estimation in 34 days - 300m per day

Cost estimation R$ US$ 152,880,00 or US$ 15/m

Proposed Solution
Construcion on micro trenches: Cut and micro duct instalation
Construction on micro trenches: Cut and micro duct installation

Deep: 70 to 300 mm
Width: 10 to 30 mm
Trench opened with specialized equipments that has cut disks
Fill the trench with quick drying grout
Conventional Tech x Micro cable Techs

General Comparisons

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Microcables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Infraestrutura cost</td>
<td>Greater</td>
<td>Smaller</td>
</tr>
<tr>
<td>2. Cable Cost (288fo)</td>
<td>US$ 9.55/m</td>
<td>US$ 6.36/m</td>
</tr>
<tr>
<td>3. Execution Time (300m trench)</td>
<td>10 days</td>
<td>2 days</td>
</tr>
<tr>
<td>4. Dificult grade of execution</td>
<td>Greater</td>
<td>Smaller</td>
</tr>
<tr>
<td>5. Sistem flexibility</td>
<td>Smaller</td>
<td>Greater</td>
</tr>
<tr>
<td>6. Pavement cost recomposition</td>
<td>Greater</td>
<td>Smaller</td>
</tr>
</tbody>
</table>
## Aprox Numerical Comparitions

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Microcable/microtrench</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cost per Km of trench</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>2. Cost per Km x duct</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>3. Cost of cable</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>4. Cost per m x fibra</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. Cost per pavement recover(*)</td>
<td>20</td>
<td>1 (*)</td>
</tr>
</tbody>
</table>

(*) It depends on agreement with City Halls in order to eliminate the necessity of mill 2 or 3 m at each side of the trench and redo the asphalt pavement.
## Estimates

<table>
<thead>
<tr>
<th>Description</th>
<th>Qty</th>
<th>US$/m</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro ducts 18 mm in micro trench 18 mm x 300 mm (LxP)</td>
<td>7</td>
<td>15</td>
<td>6,7</td>
</tr>
<tr>
<td>Conventional ducts 40 mm in conventional trench</td>
<td>7</td>
<td>100</td>
<td>1</td>
</tr>
</tbody>
</table>

Important: All above is totally theoretical, since we do not have history of micro trenches constructions.
Estimative to start this kind of deployment in 2016, January due micro cable homologation considerations.
Actual aerial Network

- High level of occupation of the poles;
- Impeachment of new occupations in central áreas of the main cities (São Paulo, Rio and Curitiba);
- High level of cuts due third part actions, vandalisms, vehicles accidents, high height of trucks, short circuits in power transformers generating fires.
Motivation

- Actual subterranean Network
- High metropolitan construction cost: R$ 300/m ou US$ 100/m;
- High level of impact in the traffic of vehicles;
- Low Productivity: 30 m/day;
- High level of pavement damage, requiring recomposition of large area and increment of costs due this.
Development of the work to get micro cable Anatel´s homologation

Futurecom I have invite all Optical cable maker to form a fórum to discuss the microcable specs

- Recognizing that the success of this technology is strongly dependente of the micro duct and cable lay techs, was invited another companies, such as: micro duct makers, subcontractors, cut machines makers, labs, among others.

Start the works to write the specs and I divide in the groups:

- Micro Cable
- Micro Ducts
- Installation and maintenance

Several meetings was performed
Development

- Project, construcion and acceptance of outside networks with micro cables
- Project, construcion and acceptance of micro ducts in micro trenches
- Project, construcion of aerial micro ducts
- Fiber splice and termination of micro cables
- Operation and Maintenance
- Training
- Project, construcion and acceptance of internal Optical networks
Obtained Results at the moment
MICRO DUCTS
COMPARISON OF MICRO DUCTS WITH ACTUAL DUCTS
Dutos convencionais x Microdutos

Duto 7x40mm

- Ø TOTAL 120mm
- Area 0.0107 m²

Duto 7x32mm

- Ø TOTAL 96mm
- Area 0.0073 m²

Duto 7x16mm

- Ø TOTAL 54mm
- Area 0.0023 m²

Duto 7x12.7mm

- Ø TOTAL 44mm
- Area 0.0015 m²
Dutos convencionais x Microdutos
Comparativo em vala a céu aberto

A área escavada é 3 vezes menor.
Se escavamos 5cm de largura para instalar apenas 1 sétuplo 12,7mm a área escavada (0,024m²) é 9 vezes menor
Construction of Micro ducts: Closing
Aerial Micro ducts

- The micro duct grouped + micro cable allow optimize the available space in the poles.
- 1 point can be shared up to 7 PTTs
DERIVATIONS