GREEN COUNTY ENERGY
CAROLINA POWER & LIGHT
WOLVERINE POWER
WAPA
TRANSCANADA PIPELINES
ATCO ELECTRIC
ALBERTA NATURAL GAS
B.C. GAS
SYNCRUDE CANADA
SHELL CANADA
AMOCO
GREAT LAKES GAS TRANSMISSION
IES UTILITIES
TRANSALTA UTILITIES
ONTARIO HYDRO
GEMMA POWER SYSTEMS
ELPASO ENERGY INTERNATIONAL
MANITOBA HYDRO
ABB
ATCO POWER
BLACK & VEATCH
PPG RIVERSIDE COGEN
CAREBA POWER ENGINEERS
EPCOR
CANADIAN PACIFIC
BLACK & VEATCH

ESSO PETROLEUM
NEW YORK POWER AUTHORITY
PSD OHIO ENGINEERS
PICKERING NUCLEAR POWER FACILITY
FLUOR
SNC LAVALIN ENGINEERING
SUNCOR OILSANDS
BANTRELL ENGINEERING
DPH ENGINEERING
STONE & WEBSTER ENGINEERING
WILLBROS BUTLER ENGINEERS
CIMARRON ENGINEERING
TITAN ENGINEERING
COSYN TECHNOLOGIES
CANADIAN WESTERN NATURAL GAS
PARSONS ENERGY & CHEMICALS GROUP
MUSKREG RIVER OIL SANDS PROJECT
GKO ENGINEERING
DELTA HUDSON ENGINEERING
PANCANADIAN PETROLEUM
ANADIME PROCESSING & DISPOSAL INC
EP BREAUX ELECTRICAL INC
FLORIDA POWER
VENTUS ENERGY LTD
CANADIAN NATIONAL
SINAI ENGINEERING
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<tr>
<td>- SPECIFICATION</td>
<td>Pg 27</td>
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## SUMMARY

| SUMMARY | Pg 28 |
barkman was established in 1948 to manufacture and market precast concrete products for residential, commercial, municipal and industrial markets. Our offices and production facilities are located in Winnipeg, Steinbach. Our products are shipped throughout North America and overseas.

barkman is a leading manufacturer in precast products. Through ongoing research, development and testing we ensure our customers the best selection and quality in all our products. barkman manufacture and test our products to meet or exceed ASTM and CSA standards.
STANDARD ONE PIECE TRENCH

- Standard trench sections available in 40", 30", 24", 20" and 12" widths.
- Standard trench sections available in 15" and 24" depths.
- Standard trench lengths - 10'-0".

<table>
<thead>
<tr>
<th>TRENCH (AxB)</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIDTH x DEPTH</td>
<td>W/ OPEN BOTTOM</td>
</tr>
<tr>
<td>12 x 15</td>
<td>N/A</td>
</tr>
<tr>
<td>12 x 24</td>
<td>N/A</td>
</tr>
<tr>
<td>20 x 15</td>
<td>1649 lbs</td>
</tr>
<tr>
<td>20 x 24</td>
<td>2258 lbs</td>
</tr>
<tr>
<td>24 x 15</td>
<td>1686 lbs</td>
</tr>
<tr>
<td>24 x 24</td>
<td>2295 lbs</td>
</tr>
<tr>
<td>30 x 15</td>
<td>1743 lbs</td>
</tr>
<tr>
<td>30 x 24</td>
<td>2353 lbs</td>
</tr>
<tr>
<td>40 x 15</td>
<td>1841 lbs</td>
</tr>
<tr>
<td>40 x 24</td>
<td>2450 lbs</td>
</tr>
</tbody>
</table>

WEIGHT PER 10'-0" LONG PIECE
COMPONENT OVERVIEW

HIGHLIGHTS OF ONE PIECE TRENCH SYSTEM

- No pegging or backfilling required.
- Custom sizes available upon requests.
- Can be used in below grade or above grade situations.
- Stainless steel grounding clips are available.
- Trench covers are available in pedestrian loading (200lbs/sq ft) or light vehicle loading (7000 GVWR). Other loading is available upon requests.
- Cable support blocks are available and custom designed to your requirements.
- Galvanized or aluminum unistrut can be added in each trench where required.
- Concrete trench manufactured using sulfate resistant self consolidating concrete with CSA exposure class S-1.
CORNER/TEE CONNECTIONS

- Bridge system allows for variable direction change within trench.
- 3" x 3" HSS tubing material / hot dipped galvanized finish.
- Available on any standard or custom trench design.
CAST IN PLACE END WALL

- Optional end wall to close off trench.
- Available on any standard or custom trench design.
- Optional removable end wall is available.
ONE PIECE TRENCH COVERS

- Covers fit both one piece trench and modular trench system.
- Trench covers are available in pedestrian loading (200 lb/ft²) or light vehicle loading (7000 GVWR). Other loading is available upon request.
- Covers can be cut on site where shorter sections are required.
- Pedestrian covers have an optional light weight glass fiber reinforced concrete cover available. These covers weigh less than 10 lbs/sq ft.
- 7000 GVWR lids offer a galvanized edge to protect concrete from damage.
- Cover manufactured using low-slump general use concrete with CSA exposure class C-2.

### STANDARD ONE PIECE TRENCH COVER

<table>
<thead>
<tr>
<th>TYPE</th>
<th>LOADING</th>
<th>DIMENSIONS (AxB)</th>
<th>DEPTH <em>(C)</em></th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>40&quot;</td>
<td>PEDESTRIAN</td>
<td>12&quot; X 47&quot;</td>
<td>1 3/4&quot;</td>
<td>116 lbs</td>
</tr>
<tr>
<td>40&quot;</td>
<td>7000 GVWR LOAD</td>
<td>60&quot; X 47&quot;</td>
<td>2 1/2&quot;</td>
<td>845 lbs</td>
</tr>
<tr>
<td>30&quot;</td>
<td>PEDESTRIAN</td>
<td>12&quot; X 37&quot;</td>
<td>1 3/4&quot;</td>
<td>92 lbs</td>
</tr>
<tr>
<td>30&quot;</td>
<td>7000 GVWR LOAD</td>
<td>60&quot; X 37&quot;</td>
<td>2 1/2&quot;</td>
<td>665 lbs</td>
</tr>
<tr>
<td>24&quot;</td>
<td>PEDESTRIAN</td>
<td>12&quot; X 31&quot;</td>
<td>1 3/4&quot;</td>
<td>77 lbs</td>
</tr>
<tr>
<td>24&quot;</td>
<td>7000 GVWR LOAD</td>
<td>60&quot; X 31&quot;</td>
<td>2 1/2&quot;</td>
<td>557 lbs</td>
</tr>
<tr>
<td>20&quot;</td>
<td>PEDESTRIAN</td>
<td>12&quot; X 27&quot;</td>
<td>1 3/4&quot;</td>
<td>66 lbs</td>
</tr>
<tr>
<td>20&quot;</td>
<td>7000 GVWR LOAD</td>
<td>60&quot; X 27&quot;</td>
<td>2 1/2&quot;</td>
<td>485 lbs</td>
</tr>
<tr>
<td>12&quot;</td>
<td>PEDESTRIAN</td>
<td>12&quot; X 19&quot;</td>
<td>1 3/4&quot;</td>
<td>46 lbs</td>
</tr>
<tr>
<td>12&quot;</td>
<td>7000 GVWR LOAD</td>
<td>60&quot; X 19&quot;</td>
<td>2 1/2&quot;</td>
<td>341 lbs</td>
</tr>
</tbody>
</table>

* INDICATES BEARING DEPTH ON WALL PANEL

---

Barkman Concrete Ltd.
909 Gateway Road, Winnipeg, MB Canada R2K 3L1
TF (800) 342-2879 F (204) 663-4854
www.barkmantrenching.com info@barkmantrenching.com
45° OFFSET TRENCH COVERS

- Covers fit both one piece trench and modular trench system.
- Trench covers are available in pedestrian loading (200 lb/ft²) or light vehicle loading (7000 GVWR). Other loading is available upon request.
- Custom sizes available upon request.
- Used on 45° corners.
- Pedestrian covers have an optional light weight glass fiber reinforced concrete cover available. These covers weigh less than 10lbs/sq ft.
- 7000 GVWR offer a galvanized edge to protect concrete from damage.
- Cover manufactured using sulfate resistant self consolidating concrete with CSA exposure class S-1.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>LOADING</th>
<th>DIMENSIONS (A)</th>
<th>DEPTH *(C)</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>40&quot;</td>
<td>PEDESTRIAN</td>
<td>47&quot;</td>
<td>1 3/4&quot;</td>
<td>232 lbs</td>
</tr>
<tr>
<td>40&quot;</td>
<td>7000 GVWR LOAD</td>
<td>47&quot;</td>
<td>2 1/2&quot;</td>
<td>363 lbs</td>
</tr>
<tr>
<td>30&quot;</td>
<td>PEDESTRIAN</td>
<td>37&quot;</td>
<td>1 3/4&quot;</td>
<td>153 lbs</td>
</tr>
<tr>
<td>30&quot;</td>
<td>7000 GVWR LOAD</td>
<td>37&quot;</td>
<td>2 1/2&quot;</td>
<td>240 lbs</td>
</tr>
<tr>
<td>24&quot;</td>
<td>PEDESTRIAN</td>
<td>31&quot;</td>
<td>1 3/4&quot;</td>
<td>113 lbs</td>
</tr>
<tr>
<td>24&quot;</td>
<td>7000 GVWR LOAD</td>
<td>31&quot;</td>
<td>2 1/2&quot;</td>
<td>178 lbs</td>
</tr>
<tr>
<td>20&quot;</td>
<td>PEDESTRIAN</td>
<td>27&quot;</td>
<td>1 3/4&quot;</td>
<td>90 lbs</td>
</tr>
<tr>
<td>20&quot;</td>
<td>7000 GVWR LOAD</td>
<td>27&quot;</td>
<td>2 1/2&quot;</td>
<td>140 lbs</td>
</tr>
<tr>
<td>12&quot;</td>
<td>PEDESTRIAN</td>
<td>19&quot;</td>
<td>1 3/4&quot;</td>
<td>51 lbs</td>
</tr>
<tr>
<td>12&quot;</td>
<td>7000 GVWR LOAD</td>
<td>19&quot;</td>
<td>2 1/2&quot;</td>
<td>80 lbs</td>
</tr>
</tbody>
</table>

* INDICATES BEARING DEPTH ON WALL PANEL

Barkman Concrete Ltd.
909 Gateway Road, Winnipeg, MB Canada R2K 3L1
TF (800) 342-2879 F (204) 663-4854
www.barkmantrenching.com info@barkmantrenching.com
STEEL VENTED TRENCH COVERS

- Covers fit both one piece trench and modular trench system.
- Optional steel vented or galvanized covers are able to allow excess heat to escape the system.
- Custom sizes available upon request.
- Trench covers are available in pedestrian loading (200 lb/ft²) or light vehicle loading (7000 GVWR). Other loading is available upon requests.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>LOADING</th>
<th>DIMENSIONS (AxB)</th>
<th>DEPTH *(C)</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>40&quot;</td>
<td>PEDESTRIAN</td>
<td>11 3/4&quot; X 47&quot;</td>
<td>1 1/2&quot;</td>
<td>24 lbs</td>
</tr>
<tr>
<td>40&quot;</td>
<td>7000 GVWR LOAD</td>
<td>11 3/4&quot; X 47&quot;</td>
<td>2 1/2&quot;</td>
<td>27 lbs</td>
</tr>
<tr>
<td>30&quot;</td>
<td>PEDESTRIAN</td>
<td>11 3/4&quot; X 37&quot;</td>
<td>1 1/2&quot;</td>
<td>19 lbs</td>
</tr>
<tr>
<td>30&quot;</td>
<td>7000 GVWR LOAD</td>
<td>11 3/4&quot; X 37&quot;</td>
<td>2 1/2&quot;</td>
<td>21 lbs</td>
</tr>
<tr>
<td>24&quot;</td>
<td>PEDESTRIAN</td>
<td>11 3/4&quot; X 31&quot;</td>
<td>1 1/2&quot;</td>
<td>16 lbs</td>
</tr>
<tr>
<td>24&quot;</td>
<td>7000 GVWR LOAD</td>
<td>11 3/4&quot; X 31&quot;</td>
<td>2 1/2&quot;</td>
<td>18 lbs</td>
</tr>
<tr>
<td>20&quot;</td>
<td>PEDESTRIAN</td>
<td>11 3/4&quot; X 27&quot;</td>
<td>1 1/2&quot;</td>
<td>14 lbs</td>
</tr>
<tr>
<td>20&quot;</td>
<td>7000 GVWR LOAD</td>
<td>11 3/4&quot; X 27&quot;</td>
<td>2 1/2&quot;</td>
<td>16 lbs</td>
</tr>
<tr>
<td>12&quot;</td>
<td>PEDESTRIAN</td>
<td>11 3/4&quot; X 19&quot;</td>
<td>1 1/2&quot;</td>
<td>38 lbs</td>
</tr>
<tr>
<td>12&quot;</td>
<td>7000 GVWR LOAD</td>
<td>11 3/4&quot; X 19&quot;</td>
<td>2 1/2&quot;</td>
<td>11 lbs</td>
</tr>
</tbody>
</table>

* INDICATES BEARING DEPTH ON WALL PANEL

Barkman Concrete Ltd.
909 Gateway Road, Winnipeg, MB Canada R2K 3L1
TF (800) 342-2879 F (204) 663-4854
www.barkmantrenching.com info@barkmantrenching.com
SAMPLE INSTALLATION

7000 GVWR COVER

END WALL

PEDESTRIAN LOAD COVER

BR-2 BRIDGE

END WALL
ONE PIECE TRENCH INSTALLATION INSTRUCTIONS

BASE PREPARATION
It is recommended that a 12" granular base be constructed under the one piece trench system. Base design should be reviewed on a project specific basis by a geo-technical engineer.

DRAINAGE
It is recommended to install a continuous 4" - 6" diameter perforated drain tile complete with tee connections at 30'-0" intervals and/or all low spots connected to a frost free outlet. (Consult engineer for soil conditions and grading plans)

TRENCH (ONE PIECE SYSTEM)
Once granular base is in place, position trenches end to end keeping each level and straight with the next trench, leaving approximate $\frac{1}{4}$" between ends. Each trench is machine installed using the supplied lifting eyes. Use of a spreader bar is recommended.

Covers are placed on top of the trenches once cables are installed. Make sure all bearing surfaces are clear of debris before placing the covers.
ONE PIECE TRENCH SYSTEM SPECIFICATIONS

Design Load
- Standard trench and cover designed for 7000Lbs GVWR loading and 200 lb/ft² pedestrian loading.

Concrete (Trench)
- Cement - Type GU Normal Portland (Trench).
- Compressive Strength @ 56 days to be minimum 35 MPa or 5000 psi.
- Concrete flow shall be in the range of 600mm - 700mm (23 1/2" - 27 1/2").
- Air entrainment shall be in the range of 4 - 7 percent.
- Exposure class S-1 (concrete subjected to very severe sulphate exposures).
- Water to cement ratio: 0.40.

Concrete (Trench Cover)
- Cement - Type GU Normal Portland (Cover).
- Compressive Strength @ 28 days to be minimum 35 MPa or 5000 psi.
- Air entrainment shall be in the range of 5 - 8 percent.
- Exposure class C-1 (concrete subjected to chloride exposures).
- Water to cement ratio: 0.40.

Materials
- All concrete materials shall be in accordance with CSA A23.4.
- All admixtures shall be in accordance with CAN3-A266.2-M78.
- All reinforcing shall conform to CAN/CSA-G30.18.

Reinforcing
- Reinforcing steel shall be new billet deformed bars and shall conform to CSA standard G30.18 Grade 400.
- Minimum cover for all reinforcing to be minimum 25mm or 1 inch.

Other
- Concrete manufacturing and testing practices shall be undertaken in accordance with National Precast Concrete Association (NPCA) and Canadian Standards Association (CSA) standards.
STANDARD ROAD CROSSING TRENCH

- Standard trench sections available in 40", 30", 24", 20" and 12" widths.
- Standard trench sections available in 15" and 24" depths.
- Standard trench lengths - 10'-0", but manufacturing can be accommodated to meet any required length.
- Required where heavy vehicular traffic (H20, 32,000 lbs/axle) will be traveling.
- Top of walls are reinforced with a 3" galvanized U-channel for increased wear protection.
- Road crossing sections are provided with weld plates on each outer corner permitting sections to be welded together for a secure connection.

<table>
<thead>
<tr>
<th>TRENCH (AxB)</th>
<th>WEIGHT WITH CLOSED BOTTOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIDTH x DEPTH</td>
<td></td>
</tr>
<tr>
<td>12 x 15</td>
<td>3370 lbs</td>
</tr>
<tr>
<td>12 x 24</td>
<td>4540 lbs</td>
</tr>
<tr>
<td>20 x 15</td>
<td>3700 lbs</td>
</tr>
<tr>
<td>20 x 24</td>
<td>4870 lbs</td>
</tr>
<tr>
<td>24 x 15</td>
<td>3867 lbs</td>
</tr>
<tr>
<td>24 x 24</td>
<td>5040 lbs</td>
</tr>
<tr>
<td>30 x 15</td>
<td>4115 lbs</td>
</tr>
<tr>
<td>30 x 24</td>
<td>5290 lbs</td>
</tr>
<tr>
<td>40 x 15</td>
<td>4535 lbs</td>
</tr>
<tr>
<td>40 x 24</td>
<td>5705 lbs</td>
</tr>
</tbody>
</table>

WEIGHT PER 10'-0" LONG PIECE
ROAD CROSSING TRENCH
COMPONENT OVERVIEW

3" x 2" x 10 GAUGE BENT PLATE
GALV. FINISH STANDARD

(2)-6" DIAMETER DRAIN HOLES

SOLID ROAD CROSSING TRENCH

(4) 2.5 TON CAPACITY LIFTING HOOKS

HIGHLIGHTS OF ROAD CROSSING TRENCH SYSTEM

· No pegging or backfilling required.
· Custom sizes and loading available upon request.
· Can be used in below grade or above grade applications.
· Galvanized steel road crossing trench covers are available.
· Stainless steel grounding clips are available.
· Road crossing trench are able to be built to create tees, angles, 90° corner, end walls and transitions.
· Cable support blocks are available and custom designed to your requirements.
· Galvanized or aluminum unistrut can be added in each trench where required.
· Concrete trench manufactured using sulfate resistant self consolidating concrete with CSA exposure class S-1.
ROAD CROSSING TRENCH COVERS

- Standard trench sections available in 46½", 36½", 30½", 26½" and 19½" widths.
- Standard trench cover lengths - 5'-0".
- Required where heavy vehicular traffic (H20, 32000 lbs/axle) will be traveling.
- Custom load ratings also available.

<table>
<thead>
<tr>
<th>TRENCH WIDTH</th>
<th>COVER WIDTH</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>18 ½&quot;</td>
<td>576 lbs</td>
</tr>
<tr>
<td>20&quot;</td>
<td>26 ½&quot;</td>
<td>825 lbs</td>
</tr>
<tr>
<td>24&quot;</td>
<td>30 ½&quot;</td>
<td>951 lbs</td>
</tr>
<tr>
<td>30&quot;</td>
<td>36 ½&quot;</td>
<td>1137 lbs</td>
</tr>
<tr>
<td>40&quot;</td>
<td>46 ½&quot;</td>
<td>1450 lbs</td>
</tr>
</tbody>
</table>

WEIGHT PER 5' 0" LONG PIECE

Barkman Concrete Ltd.
909 Gateway Road, Winnipeg, MB Canada R2K 3L1 TF (800) 342-2879 F (204) 663-4854
www.barkmantrenching.com info@barkmantrenching.com
SAMPLE INSTALLATION
(ROAD CROSSING & ONE PIECE SYSTEM)
ROAD CROSSING INSTALLATION INSTRUCTIONS

BASE PREPARATION
Consult engineer for base design with respect to site specific soil conditions and traffic loads. The standard road crossing trenches are designed for 32,000 lb axle loads but can be increased if required.

DRAINAGE
It is recommended to install a continuous 4" - 6" diameter perforated drain tile complete with tee connections at 30'- 0" intervals and/or all low spots connected to a frost free outlet. (Consult engineer for soil conditions and grading plans).

ROAD CROSSING UNITS
Each unit must be machine installed using clamps or the lifting eyes provided. Using a spreader bar for both the one piece trench and road crossing units is recommended.

The trenches are then placed and leveled one unit to the next until the desired length is achieved. The units may be tack welded together at joints where weld plates occur; a minimum 200mm or 8" bead weld should be used.

Before placing covers, make sure bearing surfaces on the road crossing units are clear of debris.
ROAD CROSSING SPECIFICATIONS

Design Load
- Precast road crossing trench and cover designed for H20, 32000 lbs./Axle loading.

Concrete (Trench)
- Cement - Type GU Normal Portland (Trench).
- Compressive Strength @ 56 days to be minimum 35 MPa or 5000 psi.
- Concrete flow shall be in the range of 600mm - 700mm (23½" - 27½").
- Air entrainment shall be in the range of 4 - 7 percent.
- Exposure class S-1 (Concrete subjected to very severe sulphate exposures).
- Water to cement ratio: 0.40.

Concrete (Trench Cover)
- Cement - Type GU Normal Portland (Cover).
- Compressive Strength @ 28 days to be minimum 35 MPa or 5000 psi.
- Concrete flow shall be in the range of 600mm - 700mm (23½" - 27½").
- Air entrainment shall be in the range of 5 - 8 percent.
- Exposure class C-1 (Concrete subjected to chloride exposures).
- Water to cement ratio: 0.40.

Materials
- All concrete materials shall be in accordance with CSA A23.4.
- All admixtures shall be in accordance with CAN3-A266.2-M78.
- All reinforcing shall conform to CAN/CSA-G30.18.

Reinforcing
- Reinforcing steel shall be new billet deformed bars and shall conform to CSA standard G30.18 Grade 400.
- Minimum cover for all reinforcing to be minimum 25mm or 1 inch.

Other
- Concrete manufacturing and testing practices shall be undertaken in accordance with National Precast Concrete Association (NPCA) and Canadian Standards Association (CSA) standards.
MODULAR TRENCH SYSTEM

- Standard trench sections available in 40", 30", 24", 20" and 12" widths.
- Standard trench sections available in 12", 18" and 24" depths.
- Covers fit both one piece trench and modular trench system.
- Trench covers are available in pedestrian loading (200lbs/sq ft) or light vehicle loading (7000 GVWR). Other loading is available upon request.
- Wall supports sections (spacers) are placed every 59 1/2" on center.
- Tees, angles, corners, end walls and transitions are available.
- Can be used in conjunction with our one piece and road crossing system.
- Optional unistrut channel insert and divider panel provisions can be added if required.
- Unistrut is available as galvanized or aluminum.
- Self supporting design requires no pegging or backfilling.
- Vertical wall brackets are made from 10ga stainless steel.
- Custom sizes available upon request.
- Concrete trench manufactured using sulfate resistant self consolidating concrete with CSA exposure class S-1.

<table>
<thead>
<tr>
<th>SPACER</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>40&quot;</td>
<td>46 1/2&quot;</td>
<td>40&quot;</td>
<td>15&quot;</td>
<td>21&quot;</td>
<td>27&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>36 1/2&quot;</td>
<td>30&quot;</td>
<td>15&quot;</td>
<td>21&quot;</td>
<td>27&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>30 1/2&quot;</td>
<td>24&quot;</td>
<td>15&quot;</td>
<td>21&quot;</td>
<td>27&quot;</td>
</tr>
<tr>
<td>20&quot;</td>
<td>26 1/2&quot;</td>
<td>20&quot;</td>
<td>15&quot;</td>
<td>21&quot;</td>
<td>27&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>18 1/2&quot;</td>
<td>12&quot;</td>
<td>15&quot;</td>
<td>21&quot;</td>
<td>27&quot;</td>
</tr>
</tbody>
</table>
COMPONENT OVERVIEW
MODULAR SPACER

WALL PANEL DIVIDER SECURE WALL PANELS IN PLACE

UNISTRUT (OPTIONAL) PROVIDES LOCATION TO SECURE CABLES TO SPACER

SPACER BASE
MODULAR TRENCH WALL PANELS

- Wall Panels available in 12", 18" and 24" depths.
- Wall panels are 59" long and can be cut on site, where shorter lengths are required.
- Transition walls allow different depths to be used in the same trench runs.
- Wall panels are available with knock outs, allowing cable to cross over between parallel trenches. Knock outs walls also have optional vent screen to allow excess heat to escape in above grade applications, and aids in preventing rodents from entering the trench.
- Optional galvanized or aluminum unistrut can be added to wall panels using nail-in anchors if required.
- Custom sizes available upon request.
- Concrete trench manufactured using low-slump general use concrete with CSA exposure class C-2.

<table>
<thead>
<tr>
<th>WALL PANEL SIZE</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STANDARD</td>
</tr>
<tr>
<td>59&quot;x12&quot;x3&quot;</td>
<td>125 lbs</td>
</tr>
<tr>
<td>59&quot;x18&quot;x3&quot;</td>
<td>175 lbs</td>
</tr>
<tr>
<td>59&quot;x24&quot;x3&quot;</td>
<td>220 lbs</td>
</tr>
</tbody>
</table>
SPACERS TYPES

TYPE A SPACER.
This spacer is used for continuous connections that are straight.

TYPE B SPACER.
This spacer is used for cable entry into foundation walls on buildings.

TYPE B1 SPACER.
This spacer is used to close off a trench section with an end wall.

TYPE B2 SPACER.
This spacer is used for tee connections.
**SPACERS TYPES**

**TYPE B4-90 SPACER.**
This spacer is used for creating 90° turns.

**TYPE B4-TEE SPACER.**
This spacer is used for creating tee connections.

**TYPE C45 SPACER.**
This spacer is used for creating 45° turns in a trench.

**TYPE C90 SPACER.**
This spacer is used to create 90° corners.

**TYPE CY SPACER.**
This spacer is used for truncating 90° corners to allow for more gradual corners.
MODULAR TRIANGLE TRENCH COVER

- Available on 40", 30", 24", 20", 12" wide trenches
- Trench covers are available in pedestrian loading (200lbs/sq ft) or light vehicle loading (7000 GVWR). Other loading is available upon requests

<table>
<thead>
<tr>
<th>TYPE (AxB)</th>
<th>LOADING</th>
<th>DEPTH * (C)</th>
<th>WEIGHT</th>
</tr>
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<tbody>
<tr>
<td>ONE SIZE FOR ALL</td>
<td>PEDESTRIAN</td>
<td>1 3/4&quot;</td>
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<tr>
<td>TRENCH WIDTHS</td>
<td>7000 GVWR LOAD</td>
<td>2 1/2&quot;</td>
<td>320 lbs</td>
</tr>
</tbody>
</table>

* INDICATES COVER BEARING DEPTH ON WALL PANEL

200lb/ft² PEDESTRIAN COVER

7000 GVWR COVER
BRIDGE UNITS
- These units are used in conjunction with B2, B4-90 and B4 tee for cover support.
- Bridge units are hot dipped galvanized for corrosion resistance.
- Custom sizes available upon request.
- Br-2 bridge also used on one piece trench systems.

BR-1 BRIDGE

<table>
<thead>
<tr>
<th>TRENCH</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>40&quot; Wide</td>
<td>41&quot;</td>
<td>12&quot;, 18&quot;, 24&quot;</td>
</tr>
<tr>
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</tr>
<tr>
<td>12&quot; Wide</td>
<td>12&quot;</td>
<td>12&quot;, 18&quot;, 24&quot;</td>
</tr>
</tbody>
</table>

BR-2 BRIDGE

<table>
<thead>
<tr>
<th>TRENCH</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>40&quot; Wide</td>
<td>40&quot;</td>
<td>12&quot;, 18&quot;, 24&quot;</td>
</tr>
<tr>
<td>30&quot; Wide</td>
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<td>20&quot; Wide</td>
<td>20&quot;</td>
<td>12&quot;, 18&quot;, 24&quot;</td>
</tr>
<tr>
<td>12&quot; Wide</td>
<td>12&quot;</td>
<td>12&quot;, 18&quot;, 24&quot;</td>
</tr>
</tbody>
</table>
SAMPLE INSTALLATION
(TRUNCATED TEE)

WALL PANELS

END WALL PANEL
(CUT TO FIT)

CY SPACER

BR-2 BRIDGE
B4 SPACER

BR-1 BRIDGE
(TRIANGLE COVER)

CY SPACER

CY SPACER

SAMPLE INSTALLATION
(90° CORNER AND TEE SECTION)

COVERS
(PEDESTRIAN LOAD)

END WALL PANEL
(CUT TO FIT)

B2 SPACER

END WALL PANEL
(CUT TO FIT)

A SPACER

C90 SPACER

BR-2 BRIDGE

B1 SPACER

B SPACER

C90 SPACER

COVERS
(PEDESTRIAN LOAD SHOWN)

Barkman Concrete Ltd.
909 Gateway Road, Winnipeg, MB Canada R2K 3L1 TF (800) 342-2879 F (204) 663-4854
www.barkmantrenching.com info@barkmantrenching.com
MODULAR TRENCH

BASE PREPARATION
It is recommended that a 12" granular base be constructed under modular trench system. Base design should be reviewed on a project specific basis by a geo-technical engineer.

DRAINAGE
It is recommended to install a continuous 4" - 6" diameter perforated rain tile complete with tee connections at 30'-0" intervals and/or all low spots connected to a frost free outlet. (Consult engineer for soil conditions and grading plans).

TRENCH
Once granular base is in place, use a thin layer of sand for final leveling. Position spacers 1500mm or 59 ½" center to center. Allow 12mm or ½" between spacers for wall panel variances. Slip wall panels into spacer units. Where shorter sections of wall is required, panels can be cut on-site using a concrete saw. This is a self supporting system so back filling is not required immediately or at all, but if desired, it can be done at any time during construction.

Covers are placed onto wall panels once cables are installed. Make sure to sweep any debris off bearing surface of wall panels.
MODULAR TRENCH SYSTEM SPECIFICATIONS

Design Load
- Standard trench and cover designed for 7000Lbs GVWR loading and 200 lb/ft² pedestrian loading.

Concrete (Trench)
- Cement - Type GU Normal Portland (Trench).
- Compressive Strength @ 56 days to be minimum 35 MPa or 5000 psi.
- Air entrainment shall be in the range of 4 - 7 percent.
- Exposure class S-1 (Concrete subjected to very severe sulphate exposures).
- Water to cement ratio: 0.40.

Concrete (Trench Cover)
- Cement - Type GU Normal Portland (Cover).
- Compressive Strength @ 28 days to be minimum 35 MPa or 5000 psi.
- Air entrainment shall be in the range of 5 - 8 percent.
- Exposure class C-1 (Concrete subjected to chloride exposures).
- Water to cement ratio: 0.40.

Materials
- All concrete materials shall be in accordance with CSA A23.4.
- All admixtures shall be in accordance with CAN3-A266.2-M78.
- All reinforcing shall conform to CAN/CSA-G30.18.

Reinforcing
- Reinforcing steel shall be new billet deformed bars and shall conform to CSA standard G30.18 Grade 400.
- Minimum cover for all reinforcing to be minimum 25mm or 1 inch.

Other
- Concrete manufacturing and testing practices shall be undertaken in accordance with National Precast Concrete Association (NPCA) and Canadian Standards Association (CSA) standards.
barkman precast concrete trench systems provide an excellent selection of sizes and are manufactured for long life and durability. A barkman trench provides accessibility to your entire electrical cable or piping system without having to resort to costly and time consuming excavation.

barkman precast concrete trench systems is committed to providing quality products and customer satisfaction.