

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 1.11.3
Prepared by: D.J. Satterfield	INSTALLATION OF BENTOMAT® CL GEOSYNTHETIC CLAY LINER ON WATER PIPE AND FITTINGS	Page: 1 of 7
Approved by: Jeff Schovanec		Supersedes: 10-19-11
		Effective: 3-12-15

GENERAL

This Construction Standard covers installation of Bentomat®CL geosynthetic clay liner (GCL) on water pipe, fittings, valves, and other appurtenances.

MATERIAL

Bentomat®CL geosynthetic clay liner (GCL) as manufactured by CETCO and dry Bentonite shall be according to District Specification 119. "Specifications for Materials".

INDICATIONS FOR USE

As specified on drawings, in Contract Specifications or as directed by the Engineer, Bentomat®CL geosynthetic clay liner (GCL) shall be installed in accordance with this Construction Standard on all water pipe and fittings installed in locations where it is impractical or unfeasible to obtain the required separation between the water main and existing or proposed sanitary, storm and/or combined sewers per State of Nebraska Department of Health and Human Services Title 179 NAC 7.

The GCL shall be installed 360° around polyethylene encased pipe to create a second barrier between the pipe and the surrounding soil. For pipe that normally is not encased in polyethylene wrap (i.e. PVC, HDPE, etc), install one layer of polyethylene wrap prior to installing the GCL. All lumps of clay, mud, and so forth, on the pipe surface shall be removed prior to installation of the polyethylene encasement and GCL. During installation, care shall be taken to prevent soil from becoming trapped between the polyethylene encased pipe and GCL.

The GCL shall be installed in a manner to provide a snug fit. Extra care shall be taken to completely cover and bridge irregular surfaces such as bell-spigot interfaces, bolted connections, and fittings. The GCL shall not be installed in locations where the surrounding soil is contaminated.

MATERIAL AND EQUIPMENT

The GCL will be supplied to MUD in standard 15' wide x 75' long rolls wrapped around a core pipe mounted between two stands and stored at the Construction Center.

Additional equipment needed for installation of GCLs includes:

- Sharp Gasket Knife and spare blades
- Bentonite mastic and/or granular Bentonite paste made from dry powder sodium Bentonite (MUD stock # 42-725-50)
- Optional - flat-bed truck to provide a working area for wrapping the pipe or offset.
- Adhesive Tape

Cutting GCL shall be performed using a sharp gasket knife. Frequent blade changes are recommended to avoid tearing of the geotextile components of the GCL.

The GCL shall be sealed around pipe joints, MJ hubs, flanges, bolts, nuts, valve bonnets, actuators, etc. using tape and bentonite paste or bentonite mastic to seal the GCL to these irregular surfaces.

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BENTONITE PASTE PREPARATION

Bentonite paste shall be prepared immediately prior to installation of the GCL. Mix water with bentonite granules to form a paste with a consistency similar to peanut butter. Spread bentonite paste on seams and folds before taping. If desired, bentonite paste may be spread with a trowel on polyethylene-wrapped pipe and fittings before wrapping with GCL.

INSTALLATION ON PIPE

The standard 15’ wide roll of GCL is similar to heavy carpeting for handling purposes. Unroll the 15’ wide roll of GCL and cut off the required amount needed to wrap around the outside diameter plus the required seam overlap on the bell end of MJ or RJ pipe. Refer to Table 1 below for the amount to cut from the roll.

TABLE 1

PIPE SIZE	OD MJ/RJ BELL	CIRCUMFERENCE OF MJ/RJ BELL	MINIMUM SEAM OVERLAP ON MJ/RJ BELL	FEET TO CUT FROM 15’ WIDE ROLL
6”	11.44”	35.94”	6”	4’
8”	13.97”	43.89”	6”	4’
12”	18.75”	58.90”	6”	6’
16”	23.22”	72.95”	6”	7’
24”	32.54”	102.23”	9”	10’

The GCL shall be wrapped around the pipe for the full length of the piping section, as indicated on project drawings or as directed by the Engineer, plus 2 additional feet. Therefore, if the section of pipe is longer than 13’, additional sections of GCL shall be cut off of the roll and installed on the pipe in an overlapped fashion until the required length of pipe plus the additional 1’ on each end has been wrapped.

For example:

If a section of 12” diameter pipe to be covered with GCL is 20’ long, two 6’ long sections would be cut off the 15’ wide GCL roll. These sections would be trimmed and overlapped a minimum of 1’ in the middle and 1’ on each end of the pipe section for a total distance of 22’, see Figure 1 and Figure 2. Seal the area where the two sections of GCL overlap with Bentonite paste and tape closed.

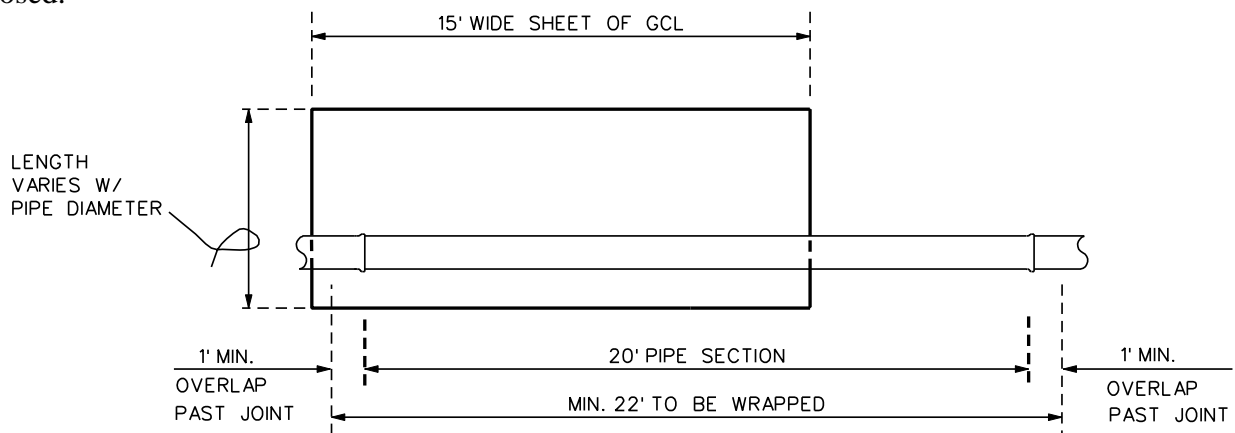


FIGURE 1

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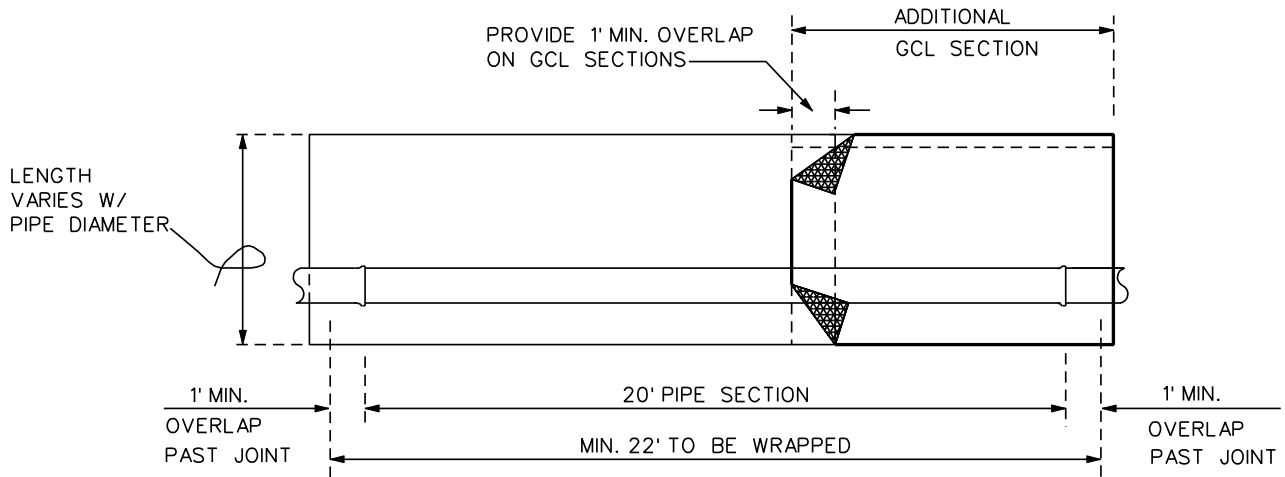


FIGURE 2

Bring the sections of GCL up and around the circumference of the pipe overlapping the bell, barrel and spigot with a minimum of 6" to 9" as specified in Table 1. Take up the slack width at the top of the pipe as shown in Figure 3 to make a snug but not tight fit along the barrel of the pipe and/or surface of fitting, securing any folds in the GCL with tape. Folds shall be made, pasted and taped closed such that open area of fold does not collect back-fill material. Spread bentonite paste over folds and seams to seal wrap as needed prior to backfilling.

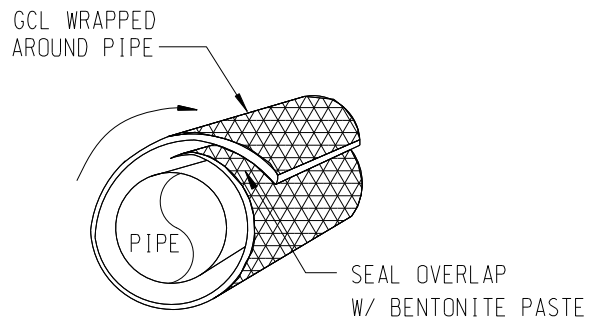


FIGURE 3

After the folds and seams have been be pasted and taped closed along the longitude of the pipe section the ends shall be pasted with bentonite and sealed with tape as shown in Figure 4.

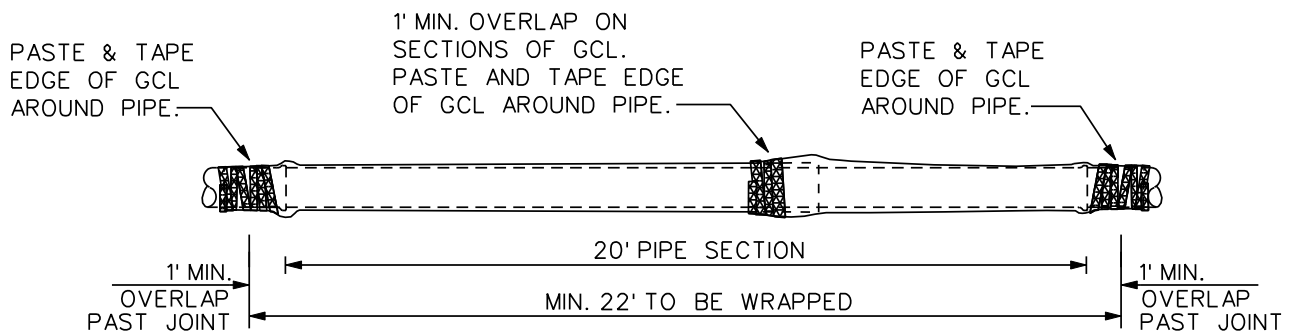


FIGURE 4

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* **INSTALLATION AT SEWER CROSSING**

Bentomat® encasement at sewer crossings shall extend a minimum of 10' beyond the outside edges of single sewers. At locations where multiple sewers are crossed, the encasement shall extend 10' from the outside edge of the first sewer crossing to 10' beyond the outside edge of the last sewer crossing. See Figure 4A.

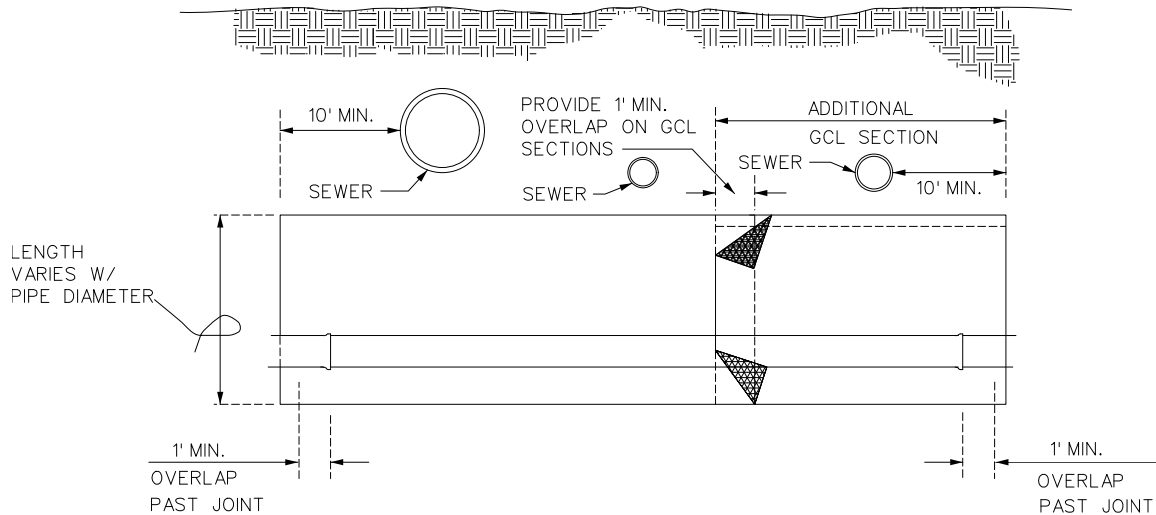


FIGURE 4A

INSTALLATION ON ODD SHAPED APPURTENANCES

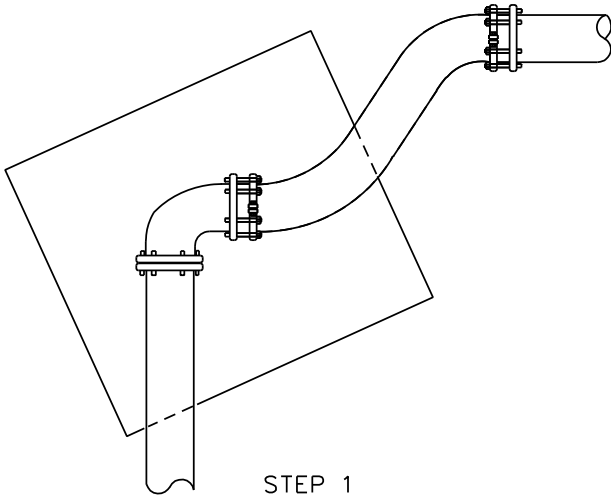
Wrap with GCL by passing the sheet under the appurtenance and bringing it up around the body. Cut the GCL into smaller sections to facilitate the wrap. Wrap, overlap, tuck and tape each section working from the middle along the shape to the outer edge of the pipe or appurtenance to be wrapped. Make seams by bringing the edges of the GCL sheet together, folding over, and taping down. Spread bentonite paste over folds and seams as needed prior to backfilling. If possible wrap assembled section above ground at waist level for safety as shown in Figure 5.



FIGURE 5

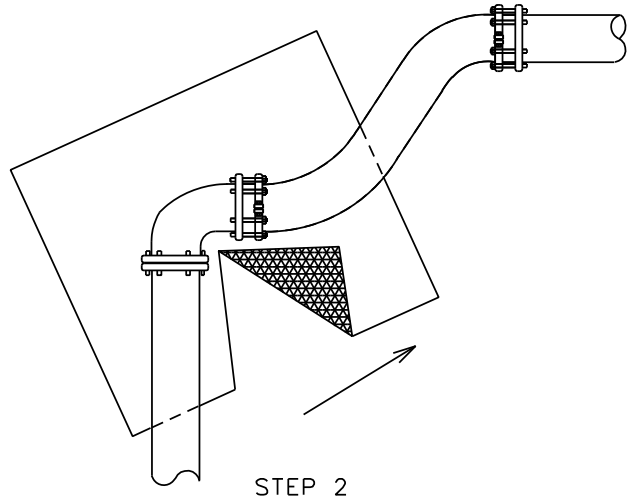
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An example of wrapping an offset is shown below in Steps 1 - 8.



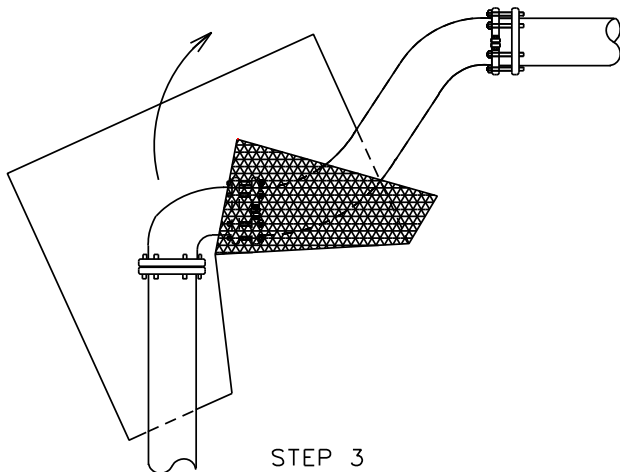
STEP 1

PLACE ASSEMBLED OFFSET, BEND & PIPE TO BE WRAPPED ON SHEET OF GCL.



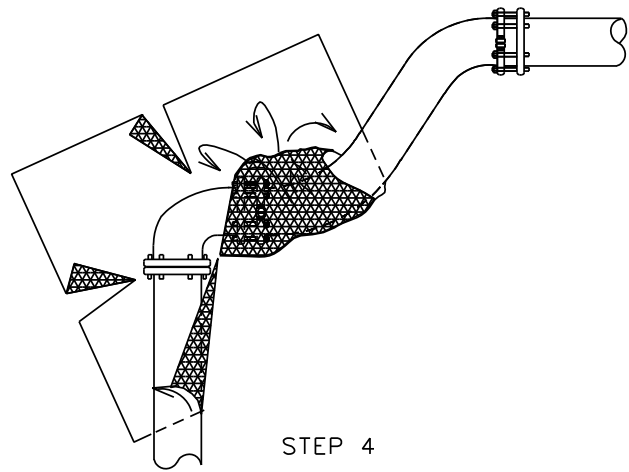
STEP 2

CUT GLC AND BEGIN WRAP.



STEP 3

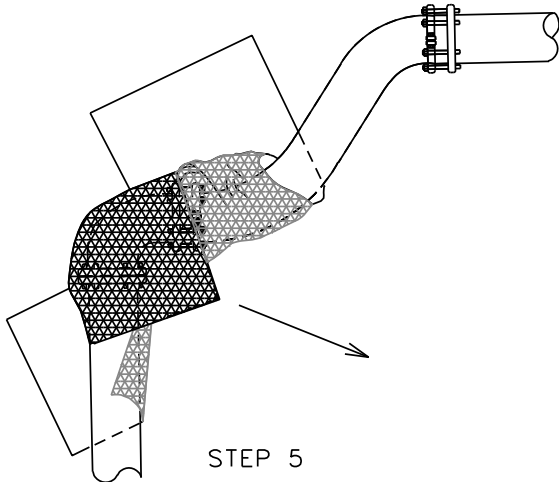
BRING GCL UP AROUND OFFSET.



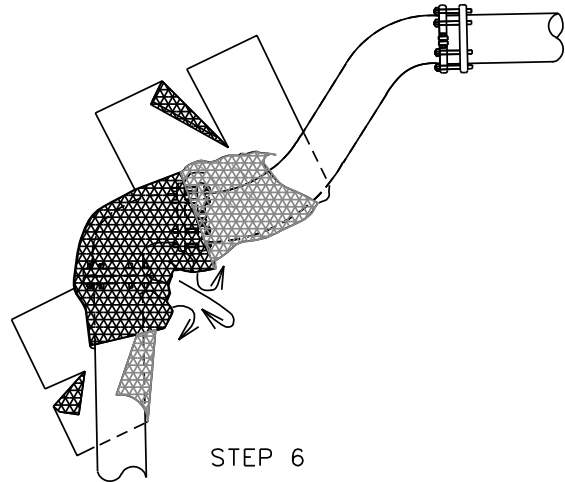
STEP 4

TUCK GCL UNDER OFFSET & SEAL W/ TAPE. BRING GCL AROUND STRAIGHT PIPE & TAPE. MAKE TWO CUTS IN GCL TO FACILITATE WRAPPING THE BEND.

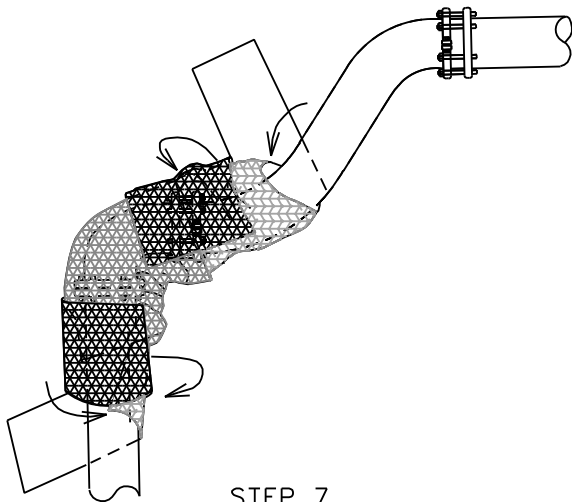
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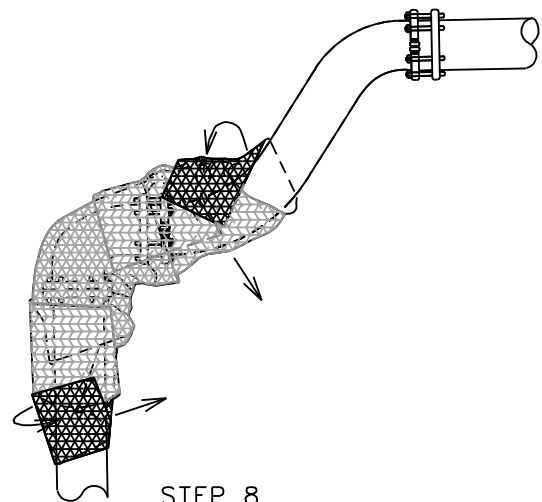
STEP 5
BRING GCL DOWN AROUND BEND.



STEP 6
TUCK GCL UNDER BEND & SEAL W/ TAPE.
MAKE CUTS IN REMAINING GCL TO
FACILITATE WRAPPING.



STEP 7
CONTINUE WRAPPING GCL AROUND
OFFSET. TAPE EDGES & SEAL IN
PLACE W/ BENTONITE PASTE.



STEP 8
FINISH WRAPPING GCL AROUND PIPE.
TAPE EDGES & SEAL W/ BENTONITE PASTE.

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FIGURE 6

Seal overlaps and seams with bentonite paste and tape GCL securely in place at valve stems and other penetrations as shown in Figure 6.

REPAIRS

Repair cuts, tears, punctures, or damage to GCL with bentonite paste prepared in accordance with procedure listed above. Spread the bentonite paste around the pipe and GCL to cover the damaged area.

BACKFILL

Special care shall be taken to prevent damage to the GCL-wrapped pipe when placing backfill. Backfill material shall be free from cinders, refuse, boulders, rocks, stones, or other material that could damage the GCL.

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