Merrimac Municipal Light Department

Commercial Developments Policy

General:

This document provides specific instructions for the provision of underground electrical facilities associated with the construction of commercial projects within the Town of Merrimac and interconnected to the MMLD's primary distribution system.

The Town requires that all new commercial establishments be served by underground electrical systems. In order to maintain the highest level of service reliability, the MMLD's underground commercial distribution (UCD) systems employ the use of conduit system (box pads, concrete pads, handholes, and ducts) and padmount transformers.
Developers and their contractors shall make no deviation from the instructions or specifications provided herein without the expressed written permission of the MMLD.

SECTION 1 – DEVELOPER/CONTRACTOR AND MMLD RESPONSIBILITIES

A. Developer's Responsibilities

The Developer shall be responsible for the following items:

1. Coordinate meetings with MMLD's General Manager, or its designee, to discuss project and review drawings with proposed electrical distribution layout and equipment sizes. Developer shall secure the services of a Professional Electrical Engineering firm familiar with the National Electrical Code, National Electric Safety Code and with experience on projects of similar magnitude.

2. Granting or furnishing an easement for all electric facilities. The electric utility easement requirement will be outlined by the MMLD and discussed with developer.

3. Providing the MMLD with copies of project drawings and Developer Load Data and AutoCAD drawings of the recorded plans approved by the Town of Merrimac showing complete layout of the project, as follows:

    a. One complete set of Town approved subdivision drawings prepared by the Developer's civil engineer and illustrating the physical layout of all project facilities shall be provided to the MMLD for review and use by the department. Physical drawings shall be to 1" – 40' scale and include

topographic plans and indicate the layout of the building(s), septic systems, streets, sidewalks, above ground and buried drainage facilities, water, gas, telephone and cable utilities and facilities.

b. Developer shall also provide AutoCAD files of all approved project drawings.

c. Developer shall provide the following data for building(s) to be built and other loads such as pumping and lift stations:

1) Size of commercial building(s) in square feet
2) Major electrical equipment, HVAC systems, etc., and their ratings
3) Estimated diversified load for the building(s)
4) Service size proposed for the commercial building(s)
5) Calculated load on primary cable of any pumping or lift stations or other special facilities to be served from the electrical system.

4. Planning and installing other utilities so as not to interfere with the installation and operation of electrical and street lighting cables, equipment and appurtenances and if necessary make arrangements for installation of these utilities prior to the electrical installation.

5. All costs for MMLD to procure and install equipment needed for the development. In such cases when the MMLD's staff is unable to perform the work necessary to complete all the installation of the electrical equipment, the MMLD will secure the services of outside consultants and/or electrical contractors to perform necessary tasks. These costs will need to be covered by the developer.

6. Developer and its electrical contractor will be responsible for construction work including excavation and installation of electrical conduit system per MMLD's specifications indicated in SECTION 2 – LAYOUT AND SIZING OF FACILITIES.

7. Developer and its electrical contractor will be responsible to procure and install secondary cables and connections from the padmount transformer to the building main switch.

8. All trenches shall be inspected prior to backfilling. The MMLD needs to be notified in advance (at least 24 hours) for all trenches needed to be inspected.

   Additional inspections requiring coordination with the MMLD include:

   a. Testing and proving of conduits.

   b. Installation of ground grids at all padmount transformers.

9. Attendance of Developer at a preconstruction meeting with MMLD representatives prior to start of any work.

10. The supply and installation of revenue-grade metering equipment. The location of these devices will be discussed with developer.

11. Assumption of financial responsibility for:

    a. Any discrepancy or change in final grade or plans which require an alteration of installed UCD facilities.

    b. Damage to the UCD system during and after installation, caused by the Developer or Contractor and/or his agent or servants.

    c. Replacement of any equipment or materials and any construction unacceptable to the MMLD.

12. Provide two sets of as-built drawings to the MMLD plus an electronic AutoCAD copy on a CD or memory drive.

B. MMLD Responsibilities

The electric department will perform the following at the expense of the Developer or Contractor:

1. Review and provide comments of the proposed design drawings, including equipment layout, electrical specifications and sizing, provided by Developer's electrical engineering consultant.

2. Procure and install high voltage cable, connections, padmount transformers, and any other equipment necessary for the completion of the project.

3. Install riser pole(s) as required for the project.

4. Conduct interim and final inspections of trenches, conduit installations and concrete work.

5. Test the completed underground facility prior to energization.

6. Make all primary voltage connections and installation of metering equipment.

7. Supply and install fuse disconnects on riser pole(s).

8. Own, operate and maintain the underground distribution facilities, including primary system, cables, transformers, handholes, but excluding secondary wires from the padmount transformer to the customer main switch.

IMPORTANT NOTE: Design and installation for any electric distribution infrastructure within the Town of Merrimac will be done by the MMLD. In the event

the MMLD is not able to perform these tasks, it will secure the services of an outside contractor properly licensed in the Commonwealth of Massachusetts to perform such tasks. Contractor will work for the MMLD and costs will be passed to the Developer.

SECTION 2 – LAYOUT AND SIZING OF FACILITIES

General:

This section provides general guidelines to the acceptable layout of underground electric facilities within any commercial development.

1. Distribution System Characteristics

   a. MMLD's distribution system is a four wire, grounded-wye type, consisting of 4.16 kV three-phase/2.4 kV single-phase lines and 13.8 kV three-phase/7.97 kV single-phase lines. Over time, the 4.16/2.4 kV distribution system facilities will be upgraded to 13.8/7.97 kV.

   b. All primary cable facilities and equipment shall be rated at 13.8 kV to accommodate future conversion to 13.8/7.97 kV operation, but sized to carry the higher load current for 4.16/2.4 kV operation if the electric facilities are initially operated at 4.16/2.4 kV.

   c. Dual voltage padmount transformers will be required if initial operation is at 4.16/2.4 kV.

2. Phase Selection

   In order to prevent significant load/voltage unbalances on the MMLD's system, the selection of the type of primary service (i.e., three-phase or single-phase) to each project shall be as follows:

   a. A single-phase installation will be permitted where the maximum load current for the entire project (including all future phases) on the underground primary cable will not exceed the following:

      2.4 KV Primary: 50 amperes
      7.97 KV Primary: 20 amperes

   b. A three-phase installation is required for all three-phase loads and where single-phase load current for the entire project is expected to exceed the values noted above.

3. Guidelines For Facility Layout

   A. Padmount Transformers
      1. All padmount transformers shall be mounted concrete pads, per MMLD specifications.

B. Metering

Current transformers will be installed in the padmount transformer. Transformer will be equipped with meter socket to install the meter. In some cases, the meter may need to be installed on a pedestal nearby the transformer and a conduit from the transformer secondary compartment to the meter pedestal shall be installed by developer.

C. PVC Conduit and Accessories for Electrical Conduits

1. Conduits shall be sized per the National Electric Code with minimum sizes as follows:

    a. Primary Conduit – 4 inch diameter

    b. Secondary Conduit – 4 inch diameter

2. Furnish Schedule 40 PVC conduit.

3. Furnish conduit straight and true in minimum 10 foot lengths.

4. Furnish conduit system with couplings, adaptors, end bells, sweeps, spacers, supports and all other accessories as required for a complete installation.

5. Furnish material and accessories supplied by the same manufacturer.

6. Furnish PVC conduits and fittings that are homogeneous plastic material free from cracks, holes, or foreign inclusions with a conduit bore smooth and free of blisters, nicks or other imperfections which could damage the cables.

7. Fittings: Self-sealing type or sealed with conduit manufacturer's approved sealing compound.

8. Spacers: Non-metallic interlocking type.

9. End Caps: Provided with pull tabs.

10. Manufacturers: Carlon, Condux or MMLD approved manufacturer.

D. RGS Conduit at Riser Pole and Box Pad Installations

Conduit for riser pole and box pad installations shall be rigid steel conduit (RGS), zinc coated in accordance with ANSI C80.1 and UL6.

1. 90 degree RGS conduit sweeps with a 36-inch minimum radius on each conduit at riser pole.

2. 4-inch RGS conduit on each riser pole to a minimum of 10 feet above grade and a minimum of 10 feet below grade from RGS conduit sweep.

E. Primary Meter Pedestals

1. Meter pedestals shall be steel type construction.

2. Manufacturers: Anchor Electric, Milbank or MMLD approved manufacturer.

F. Underground Conduit System

1. All primary conduits shall be encased in concrete with minimum 3,000 lb. concrete.

2. Where due to ledge or other problems, the specified depth of burial for primary conduit is unable to be obtained, the developer shall utilize galvanized steel conduit. In such cases, the conduit shall be installed to a minimum depth of 2'-0" and shall be concrete encased.

3. In all cases, the entire conduit system shall have Caution Tape placed 12 inches above either the conduit or concrete encasement.

4. Requirements for the installation of primary conduits is summarized in the following table:

Primary Voltage Conduit System		
Feature	**Normal Installation**	**Shallow Installation**
Conduit Type	Sch 40 PVC	RGS
Minimum Conduit Size	4"	4"
Minimum Conduit Sweep	24"	24"
Embedment Type	Concrete	Concrete
Minimum Burial Depth	48"	24"

5. Trench Excavation and Backfill

a. Stockpile excavated material suitable for use as backfill.

b. Remove unstable and unsatisfactory materials from the bottom of excavation.

c. Backfill over-excavated areas with suitable backfill materials generated in the work and approved by MMLD or suitable imported backfill materials.

d. Ensure excavations are kept dry and free of standing water.

e. Maintain side slopes of excavations in accordance with OSHA guidelines.

f. Furnish and install shoring and bracing conforming to OSHA guidelines where conditions require it.

g. Ensure trench bottom soil is at optimum moisture content. Add water or allow soil to dry as needed.

h. Proof compact trench bottom by making 2 passes with a vibratory plate compactor prior to installation of conduits.

i. Ensure conduit installation is complete and inspected by MMLD prior to initiating backfilling operations.

j. Do not backfill over, wet, frozen or unstable sub-grade surfaces.

k. Maintain optimum moisture content of backfill materials to attain required compaction density.

6. Concrete

a. Cement: ASTM C150, Type II; Portland type; gray white color.

b. Fine and Coarse Aggregates: ASTM C33.

c. Water: clean and not detrimental to concrete.

d. Mix and deliver concrete in accordance with ASTM C9.4 – Specifications for Ready – Mix Concrete.

e. Provide concrete for all project concrete work of the following characteristics:

1)	Compressive Strength (28 days):	3,000 psi
2)	Coarse Aggregate Size (maximum):	ASTM C33 No. 57
3)	Air Entrainment:	5 percent
4)	Maximum Water Cement Ratio:	0.50

f. Add air entraining agent to concrete mix for all concrete work.

g. Place concrete in accordance with ACI 301 and ACI 304.

7. Concrete and Sand Encased Conduits

a. Inspect all conduits before installation to ensure they are free from cracks, holes or foreign inclusions. Ensure the conduit bore is smooth and free of blisters, nicks, or other imperfections which could damage conductors or cables.

b. Install conduit in not less than 10-foot minimum lengths, except at the end of a run or at bends.

c. Make all field cuts of PVC conduit with a hacksaw. Make the cut square to the conduit axis. Ream the cut end smooth. Join field cut conduits with couplings designed for this purpose.

d. Join all PVC conduits and fittings with a solvent cement in strict accordance with the manufacturers' recommendations or utilize self-sealing fittings.

e. Make all field cuts of rigid galvanized steel conduit (RGS) with a device that will not damage the conduit. Ream all field cut ends to remove burrs and rough edges. Utilize unions to join lengths of RGS conduit where it is inconvenient to use standard couplings. Expansion couplings that expand the conduit diameter are prohibited from use.

f. Maintain continuous earth support under conduits and make transitions in as straight an alignment as possible when changes in the formation of conduits in a duct run are necessary.

g. Concrete Encasement

    1. Concrete envelopes shall be installed so that a minimum of 6 inches clearance is maintained from other subsurface utilities and structures.

    2. Support concrete encased conduits with plastic spacers placed at approximately every 5 feet along the route. Secure conduits and spacers together with non-metallic ties after installation to prevent floating of the ductbank during concreting operations.

    3. Form the vertical faces of the ductbank to shape the concrete to the specified dimensions.

    4. Raise the entire conduit assembly after the conduits, spacers, and reinforcing steel is in place and place on concrete or plastic blocks so that the concrete bed of specified depth is formed below the conduit assembly.

    5. Key or interlock construction joints in ductbanks if a complete run is not completed before hardening of the concrete begins.

    6. Ensure that all concrete is well spaded to completely fill voids between and beneath all conduits in the ductbank.

h. Plug the ends of all conduits at the end of each work day or when conditions require it to prevent water and debris from entering the conduits.

i. Pull a standard flexible mandrel, not less than 12 inches long and having a diameter approximately ¼ inch less than the inside diameter of the conduit, through each completed conduit. Replace all conduits that do not allow passage of the mandrel.

j. Pull a stiff brush through each completed conduit after the mandrel operation is complete to ensure that no particles of earth, sand, gravel or other foreign material has been left in the conduit.

k. Terminate conduits in location where transformer concrete pad will be, with end bells.

l. Plug both ends of all conduit runs with plastic inserts equipped with pull tabs.

m. Install a 3/16 inch, 500 lb. polypropylene or polyolefin rope or MMLD approved equal in each length of completed conduit and tie to the pull tab provided on the conduit plugs.