COUNCIL WORKSHOP ITEM

ITEM: An Ordinance adopting of the 2002 National Electrical Code
DATE: May 20, 2002
PREPARED BY: Donald Scheidler
PURPOSE: Up-Date the 1993 National Electrical Code and Amendments to the 2002 National Electrical Code and Amendments

DISCUSSION:

Staff and the Electrical Commission have met several times for the purpose of examining the 2002 National Electrical Code and existing Downers Grove Amendments. Currently the Village standard for residential and commercial electrical installations is the 1993 National Electrical Code. Many of the changes are do to a total reorganization of article and section numbers that have occurred from the 1993 National Electrical Code to the 2002 National Electrical Code. There are also some definition changes in the amendments that coincide with changes in the 2002 Code.

Three major changes in the amendments include the following.
1. Section 10-3(3), “qualified homeowner” is more clearly defined.
2. Section 10-24 Wiring; the use of rigid nonmetallic conduit has been extended.
3. Section 10-24 (y) Wiring, requires that all garages attached or detached have minimal electrical installed at the time of construction.

Staff and the Downers Grove Electrical Commission are recommending that Council adopt the 2002 National Electrical Code and Downers Grove Amendments.

ATTACHMENT:

AN ORDINANCE ADOPTING THE 2002 NATIONAL ELECTRICAL CODE.

RECOMMENDATION:

It is requested that this ordinance be placed on the workshop agenda of May 28th for Council review and consideration.

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DRAFT **Orig. 05/20/02**

ORDINANCE NO. _____

AN ORDINANCE ADOPTING THE 2002 NATIONAL ELECTRIC CODE

BE IT ORDAINED by the Council of the Village of Downers Grove, in DuPage County, Illinois, as follows: (Additions are indicated by shading; deletions by ~~strikeout~~.)

SECTION 1. That Chapter 10 of the Downers Grove Municipal Code is hereby amended as follows:

10-1SEC. Definitions.

For the purpose of this Chapter, the following words and phrases shall have the meanings respectively ascribed to them by this section:

*Electrical equipment.** Conductors and equipment installed for the utilization of electricity supplied for light, heat or power, but does not include radio apparatus or equipment for the wireless reception of sounds and signals except as provided for in Section 10-30, and does not include apparatus, conductors and other equipment installed for or by public utilities, including common carriers which are under the jurisdiction of the state commerce commission, for use in their operation as public utilities.

~~*Fixture*~~ *Luminaires*. Any energy-consuming electrical unit which is made a permanent and integral part of the electrical lighting and power system. Electric motors of one-half horsepower and less and generators and transformers of one-half kilo-volt-ampere and less are to be considered as ~~fixtures~~ *Luminaires*. Clusters and drops shall each be counted as one ~~fixture~~ *Luminaire*.

Motors, generators, transformers. All motors rated at more than one-half horsepower and all generators and transformers rated at more than one-half kilo-volt-ampere.

Outlet. A point in the wiring system at which energy is taken to supply fixtures, receptacles, appliances, motors not larger than one-half horsepower, generators and transformers not larger than one-half kilo-volt-ampere and energy consuming equipment generally; also switches for the control of other outlets.

Room. All habitable rooms, including bath and powder rooms, basements, utility rooms, attics, garages and accessory buildings in which outlets are installed. (Ord. No. 662, § 1; Ord. No. 1778, § 4; Ord. No. 2876, § 5.)

* For similar state law, see Ill. Comp. Stat., ch. 65, § 5/11-37-1.

10-3. Permit to install electrical equipment—Required prior to commencing work; persons eligible.

(a) No person shall install, alter or repair any electrical conduits, electrical wires, equipment or apparatus in any building or structure for which a permit is required until such permit shall have been secured.

(b) Persons who may perform work authorized by a permit issued pursuant to the provisions of this Chapter are the following:

(1) Electrical contractors who have satisfied the requirements of Sections 8-35 through 8-39.

(2) A maintenance electrician who is employed to execute or supervise the maintenance and repair of an electric system and any apparatus that is connected to such system on the premises of the person employing such maintenance electrician.

(3) A qualified home owner, provided that such permit shall be only for electrical work on residential premises owned ~~or~~ and occupied by the ~~applicant~~ home owner, and further provided that he/she has sufficient knowledge and technical training to perform the installation, alteration, repair and maintenance of electrical wiring and equipment authorized by the permit by passing a written test given by the Code

Services Department with a minimum score of seventy percent correct. If the home is to be remolded before the owner moves in, there must be proof that the applicant/owner will reside in the home for a period of not less than (6) months. (Ord. No. 662, § 11; Ord. No. 2871, § 2.)

10-22. National Electrical Code adopted.

There is hereby adopted, for the purpose of establishing rules and regulations to govern any electrical system or equipment or method of installation thereof not specifically covered by this Chapter that certain Electrical Code known as the National Electrical Code recommended by the National Fire Protection Association, being particularly the ~~1993~~2002 edition thereof in its entirety, save and except such portions as are hereinafter deleted, modified or amended, and the same is hereby adopted and incorporated as fully as if set out at length herein. All references to the National Electrical Code in other sections in this Chapter shall mean the edition referred to in this section. At least one copy of said Code, including such amendments to it as shall be enacted, shall be filed in the office of the Village Clerk, and additional copies shall be available in the Code Services Department of the Village. (Ord. No. 662, § 33; Ord. No. 1778, §§ 1, 3; Ord. No. 2178, § 1; Ord. No. 2876, §§ 2, 5; Ord. No. 3403, § 2.)

NOTE: For state law as to adoption of codes by reference, see Ill. Comp. Stat., ch. 65, § 5/1-3-2.

10-23. Amendments to National Electrical Code.

The National Electrical Code is amended by deleting therefrom the following provisions in their entirety:

(a) Articles ~~333~~ 320,~~363~~ 322,~~325~~,326,~~334~~ 330,~~330~~ 332,~~336~~ 334, ~~340~~ 336,~~337~~,338,~~339~~,340,~~347~~,352,~~343~~,354, 356,~~331~~,362,~~358~~,348,372,~~356~~,374,~~342~~ 382, 388~~324~~,394,390,~~321~~ 396,~~320~~ 398,545,547,550,551,552, 553, 555, 604 and 605.

(b) Section 110-26(e) is amended by adding the following to the end of the exception paragraph: "but not less than 5 feet from the bottom of the joist to the top of the concrete floor."

~~(b) The exception in Section 110-16(f) and FPN No. 3 in Section 110-31.~~

~~(c) Subsection (a)(1) of Section 210-8 and the exceptions to subsection (a)(2) of Section 210-8.~~

~~(d) Sections 250-81, 250-83, 250-84 and 250-86.~~

~~(e) Sections 230-9, 230-71, and subsection (a) of Section 230-72.~~

~~(f) Part B of Article 351 titled Liquidtight Flexible Nonmetallic Conduit; and Part B of Article 352 titled Surface Nonmetallic Raceways.~~

~~(g) Subsection (4) of Section 210-8.~~

~~(h) Section 645-10.~~

(c) Section 110-26(f)(1)(a) and (b) is amended by deleting the same in its entirety and substituting in lieu thereof the following:

Section 110-26(f)(1) Dedicated Electrical Space;

The space equal to the width and depth of the equipment and extending from the floor to the next structural ceiling or 25 feet which ever is lower, shall be dedicated to the electrical installation. No Foreign Systems shall be placed in the area above the dedicated electrical space. The distance above electrical equipment to the next structural floor shall not be less than 6 feet.

(d) Section 110.31 is amended by deleting the following language from the second paragraph:

"and a 300-mm (1 ft.) or more extension utilizing three or more strands of barbed wire or equivalent".

(e) Section 210-8(a)(1) & (5) is amended by deleting the same in its entirety.

(f) Section 230-9(A) is amended by deleting the following language therefrom:

"that are designed to be open"

(g) Section 230-71 is amended by deleting the same in its entirety.

(h) Section 230-72(a) is amended by deleting the same in its entirety.

(i) Section 210-8(A)(4) & (5) is amended by deleting the same in its entirety. (Ord. No. 2178, § 2; Ord. No. 2876, §§ 2, 5; Ord. No. 3403, § 3.)

10-24. Wiring.

Notwithstanding any provision in this Article, including the 1993 National Electrical Code to the contrary, wiring shall be installed in conformance with the following requirements where applicable.

(a) The wiring method employed in all electrical installations within or upon all buildings in the Village shall be rigid conduit, intermediate conduit, electrical metallic tubing, flexible metallic tubing, flexible metallic conduit, liquidtight flexible metal conduit, or other metallic raceway, including those approved for use in floors in accordance with the National Electrical Code. Flexible metal conduit shall be permitted only to finish walls and as fixture whips not to exceed six feet in length. Flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit not to exceed six feet in length shall be allowed for fixtures, motors, and other similar attachments. Where aluminum flexible metal conduit is used, an equipment bonding jumper shall be installed. Where used to connect equipment where flexibility is required, an equipment grounding conductor shall be installed. Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134(B) of the National Electrical Code. Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102 of the National Electrical Code. Rigid nonmetallic conduit may be used for parking lot ~~lights only~~luminaries, exterior luminaries, in concrete slabs on grade only, in open parking structures where out of the way of physical danger, in wet locations, locations where chemicals can be harmful to steel conduit or where approved by the Chief Electrical Inspector. Only compression or screw type fittings shall be used on electrical metallic tubing, rigid conduit, flexible metal conduit, flexible metallic tubing, or intermediate metallic conduit. Rigid or intermediate metal conduit shall be used in all concrete slabs above grade. Rigid or intermediate metal or rigid nonmetallic conduit shall be used underground. Rigid, rigid nonmetallic, intermediate or aluminum conduit shall be used wherever exposed to weather. Armored cable and MC cable may be used in detached single family residential accessory structures. Type UF cable may be used between a residential structure and an accessory structure and it shall enter the structure and the accessory structure in rigid conduit. All wire or cable within any building in the Village shall be copper.

(b) Nonmetallic cable may be permitted for specific uses by the chief electrical inspector.

(c) All joints in wires, including those to which fixtures are attached, shall be made mechanically secure and soldered or an Underwriter's Laboratories, Inc. ~~approved~~listed connector used, except that connectors employing hard types of insulation such as ceramic or bakelite without metal inserts shall not be permitted.

(d) No junction boxes, pull boxes, cabinets or ground clamps shall be permitted in any place, location or position so that access to the interior connections is prevented by any permanent object or structure such as pipes, ducts, walls, plaster, cabinets, plumbing fixtures, other electrical equipment or appliances.

(e) Single pole, three-way and four-way switches must in all cases be cut in the live or ungrounded side of the line.

(f) All neutral wires shall be insulated and identified by the color white or grey.

(g) All fuses and circuit breakers shall be part of approved service or panelboard assemblies or distribution cabinets which are totally enclosed in metal or shall be totally enclosed in metal or part of an approved device in which the fuse is inaccessible unless the device is removed from all source of electrical energy.

(h) Each appliance, except portable appliances, rated at ten amperes or more, and each motor or motor-driven appliance of one-half horsepower or more, shall be provided with its own separate circuit, over current protection and disconnecting means.

(i) Each furnace or combustion heating unit shall be connected to separate circuit and be provided with a switch which removes all voltage from the unit. Each motor of each furnace or combustion heating

unit shall be provided with adequate overcurrent protection. If this protection is not built into the motor, it shall be provided separately.

(j) All lighting above one hundred fifty volts to ground shall have low voltage switching except when switched at electrical panel board.

(k) Battery exit and emergency lights shall be installed in all multi-family dwellings that have common stairs or hallways.

(l) On all open wood studs, bracket boxes shall be used unless otherwise approved by the electrical inspector.

(m) All attic and crawl spaces larger than one hundred square feet shall have a light installed in such space and a switch installed in the entrance to such a space.

(n) All distribution panels, subpanels, breaker panels, motor control centers, and fuse panels shall be protected by a main breaker or disconnect located within three feet and in sight.

(o) Battery exit and emergency lights shall be installed in all commercial and industrial buildings over one thousand two hundred square feet unless a generator system with automatic transfer of power is installed to supply exit and emergency lights.

~~(p) Rigid nonmetallic conduit shall only be used to supply outdoor lights and similar apparatus, and shall enter the building in rigid or intermediate conduit.~~

(~~q~~p) Any equipment above six hundred volts shall be maintained by a licensed electrical contractor.

(~~r~~q) Plastic wire nuts with a steel spring insert may be used. The wires are to be mechanically twisted together before the wire nut is installed.

(~~s~~r) Crimp connectors may only be used on stranded wire.

(~~t~~s) A device may not be used as splice.

(~~u~~t) Backstabbing may not be used on any device. All wires must be secured under the screws on the device.

(~~v~~u) Ground-fault circuit-interrupter protection shall be required within six (6) feet of sinks in commercial installation.

(~~w~~v) All 125-volt, single phase, 15- and 20-ampere receptacles installed below grade shall have ground-fault circuit-interrupter protection for personnel.

(~~y~~w) A single break glass shunt trip with spring loaded switch shall be provided to disconnect all electrical computer equipment and HVAC in an electronic computer/data processing equipment room and to disconnect all power to and out of the UPS (uninterruptible power supplies) room. The shunt trip shall not be installed any higher than eight (8) feet from the floor.

(~~z~~x) All 125-volt, single phase, 15- and 20-ampere receptacles, electrical equipment, light fixtures, and fans, installed in bathrooms shall be installed with GFCI protection.

(y) All detached and attached garages will be required to have at least one accessible 110v GFCI protected outlet, an interior light on a switch, and an exterior light on a switch for the service door. Detached Garages will be required to have a single main disconnect labeled "Garage Disconnect" in the garage to control the power in the garage. (Ord. No. 662, § 25; Ord. No. 1778, § 3; Ord. No. 2178, § 3; Ord. No. 2876, §§ 3, 5; Ord. No. 2971, § 1; Ord. No. 3403, § 4.)

10-24.1. Public utility cables; high rise buildings.

A public utility company shall be allowed to install a high voltage riser system over six hundred volts in high rise buildings, or any other building, provided the following requirements are met:

(1) Aluminum or copper cables shall be installed by a public utility company and only on the primary side of each transformer;

(2) Aluminum or copper cable shall be terminated with high pressure lugs;

(3) All transformers and cables shall be enclosed in a minimum two hour masonry enclosure with ~~the~~an appropriate fire door as required in Table ~~916.1~~714.2 of the ~~1990 BOCA National Building~~

~~Code~~2002 International Building Code. The cable in the enclosure does not need to be installed in a conduit system;

(4) A main shunt control panel shall be installed in the fire control room and shall contain an indicator light for power and HVAC, and a switch for each floor. The shunt trip panel shall be boxed in with a glass front and the box shall contain a locking mechanism. The front of the panel shall be constructed as shown in Diagram 1.

Diagram #1

Floor	Switch	Power	HVAC
10	~~0~~	0	0
9	~~0~~	0	0
8	~~0~~	0	0
7	~~0~~	0	0
6	~~0~~	0	0
5	~~0~~	0	0
4	~~0~~	0	0
3	~~0~~	0	0
2	~~0~~	0	0
1	~~0~~	0	0

Each switch on the main shunt control panel shall:

(a) Shut off all power on that floor and the power on the floor either directly above or directly below the floor in question; and

(b) Shut off the HVAC on that floor and the HVAC on two other floors; either two above, two below, or one floor above and one floor below the floor in question.

The indicator light for power and HVAC on the main floor will light up when the switch is activated. The lights for power and HVAC for any other floor affected will also light up as shown on Diagram 2. The emergency generator power system (for emergency and standby power and venting for smoke and building pressurization) shall not be connected to the shunt trip system.

Diagram #2

Floor	Switch	Power	HVAC
10	~~0~~	0	0
9	~~0~~	0	0
8	~~0~~	0	0
7	~~0~~	0	0
6	~~0~~	0	0
5	~~0~~	0	**!**
4	~~0~~	**!**	**!**
3	~~0~~	**!**	**!**
2	~~0~~	0	0
1	~~0~~	0	0

The switch has been activated for floor number 3. The lights go on for light and HVAC for floor #3. The lights for light and HVAC on floor #4 and the light for HVAC goes on for floor #5.

(5) There shall be a single 125V-15A receptacle at each landing runoff of the emergency generator. This receptacle shall be of a NEMA type L5-15-R. (Ord. No. 3403, § 5.)

10-26. ~~Transformers~~ Reserved.

~~Transformers in which a part of the turns are common to both primary and secondary alternating current circuit, ordinarily known as auto-transformers, shall not be used to supply an interior wiring system. This rule, however, does not prohibit the use of auto-transformers in auto starters used for controlling induction motors, nor does it prohibit the use of auto-transformers for supplying motorstarting current to individual motors, nor the use of supply circuits wholly within a device which also contains an auto-transformer.~~ (Ord. No. 662, § 27; Ord. No. 1778, § 3; Ord. No. 2876, § 5.)

10-27. ~~Outdoor lighting; signs~~ Reserved.

~~Sign and border lighting shall be wired with No. 12 AWG wire and a maximum of fifteen hundred watts per circuit will be permitted. Sign and festoon lighting supply shall be taken only from such points in the wiring system where correct fusing can be provided. All outdoor electric signs shall be controlled by a safety switch, at the sign and in view. On all neon signs the high voltage transformers and high voltage equipment shall be installed in approved metal boxes and all metal parts shall be grounded to the conduit system. The wiring on all outdoor signs and billboards exposed to weather shall be encased in rigid conduit.~~ (Ord. No. 662, § 29; Ord. No. 1778, § 3; Ord. No. 2178, § 4; Ord. No. 2876, § 5; Ord. No. 3403, § 7.)

10-28. Services.

(a) All unprotected service entrance conductors shall enter the ~~building~~panel in rigid, intermediate, or aluminum threaded conduit. Threaded or compression fittings shall be used in wet and damp locations. Set screw shall be allowed in dry locations. Service entrance cable may be used on temporary services with the permission of the chief electrical inspector. No live unfused service entrance conductor shall extend over five feet inside the building without special permission from the chief electrical inspector. All underground service conductors shall be in the form of cable with thermoplastic or other insulation and coverings approved for the use and rated by Underwriter's Laboratories, Inc., or other approved testing agency as allowed by the chief electrical inspector, and protected against mechanical injury and terminated in an approved manner which does not require the use of solder. No solder shall be used on a service entrance conductor. Each residential occupancy shall be provided with a main switch or circuit breaker, except where there is more than one meter installed, a main disconnect or breaker shall be installed for the entire service and a main breaker or disconnect shall be installed in either each meter or panel. Except as provided in Section 10-24.1, all commercial, industrial, and multi-use buildings shall have a main disconnecting means, which shall shut down power to the entire building with one operation of the hand. All ground wire shall be copper without splices.

(b) All service and distribution equipment shall be approved for the use which it is intended by Underwriter's Laboratories, Inc., NEMA, or other approved laboratories as allowed by the chief electrical inspector, and shall be so labeled.

(c) The minimum service of any new or revised residential or multiple family structure shall be one hundred amp twenty circuit panel.

The minimum service on any new or revised commercial or industrial installation shall be one hundred amp twenty circuit panel, except as provided for in Section 10-24.1, and all service conductors shall be copper.

(d) If a two hundred amp service is installed, the panel shall have not less than forty circuits.

For any installation, there shall be only one wire under the screw or lug for each fuse or breaker. No tandem circuit breakers shall be allowed.

(e) On one hundred amp services, the minimum size of service conductors shall be #3 THW, THHW, THWN, XHHW, or larger. On two hundred amp services, the minimum size of service conductors shall be 3/0 THW, THHW, THWN, XHHW, or larger.

(f) All service grounds shall be run directly to the street side of the water meter, with a supplemental eight foot copper ground rod driven outside the structure, unless otherwise approved by the chief electrical inspector.

(g) Service conductors installed as open conductors, or multiconductor cable without an overall outer jacket, shall have a clearance of not less than three (3) feet (914mm) from any stationary or openable window, door, fire escape or similar location.

(h) If there is any work done from the service head to the primary conductors in the rear of the main panel, a service upgrade shall be required to not less than 100 amp.

(i) Sidecars /panel extensions will be allowed only when installed within three feet and insight of the main power source and will be powered by circuit breakers in the main panel. Installation will be the same as required for new services. The minimum number of circuits allowed in a sidecar or subpanels will be 8. (Ord. No. 662, § 30; Ord. No. 1778, § 3; Ord. No. 2876, § 5; Ord. No. 3403 § 8.)

10-29. ~~Fixtures; sockets~~ Reserved.

~~Fixtures which are supported in such manner as to make the outlet box inaccessible shall not be permitted. This applies to bracket lights which are set in cement, as in bathrooms.~~

~~Sockets when directly over or within two feet (in a horizontal direction) of any conducting surface such as metal pipe, radiators, plumbing fixtures, damp walls or similar conducting surfaces shall be of the porcelain or standard weatherproof type. Any fixtures attached thereto shall be nonmetallic unless permanently grounded.~~ (Ord. No. 662. § 31; Ord. No. 1778, § 3; Ord. No. 2876, § 5.)

10-30. ~~Radio and television antennas~~ Reserved.

~~All outdoor radio or television aerials shall be provided with approved lightning arresters, properly grounded. In those cases where the dipole aerial is insulated from the supporting metal mast, the metal mast shall be grounded and the dipole connected to an approved lightning arrestor.~~ (Ord. No. 662, § 32; Ord. No. 1778, § 3; Ord. No. 2876, § 5.)

10-34. Feeder and branch circuit distribution equipment.

All feeder distribution and branch circuit distribution equipment shall be dead front unless both of the following conditions are met:

(a) Access to the distribution equipment is only through an approved steel door with integral lock or locks.

(b) Access is limited to a qualified maintenance electrician and his qualified subordinates or an electrical contractor.

~~All feeder and branch circuit conductors shall be protected against excessive currents by strict compliance with Section 240-15 of the National Electrical Code.~~ (Ord. No. 662, § 26; Ord. No. 1778, § 3; Ord. No. 2876, § 5.)

10-41. Same-Wiring.

(a) *Wire size*. All circuit breakers used to power the pre-wired office partition shall be 28 ampere or less. Line circuit wire shall be the proper size to adequately carry the current permitted by the circuit breaker. (Example: a 20 ampere circuit breaker requires no smaller than a 12 AWG line wire with not less than 14 strands.)

(b) *Neutral wire*. Neutral wire shall be the proper size to adequately carry the total current possible from an unbalanced system. (Example: if one wire is dedicated as a neutral for two lines and each line is

protected by a 20 ampere circuit breaker on the same leg, the neutral wire shall be capable of carrying 40 amperes and be no smaller than 10 THHN.

(c) *Ground wire.* Ground wire shall be the proper size to adequately carry the current possible on the line circuit having the largest circuit breaker if a fault develops.

(d) *Color code.*

(1) Line circuit wire may be any color except white, slate (light grey), or green.

(2) The neutral wire shall be white. If white is unavailable, the neutral wire shall be slate. Any additional neutral wires in the group shall be either white or slate with a color trace.

(3) The ground wire shall be green. If green is unavailable, the ground wire shall be green with yellow trace. Any additional ground wires in the group shall be green with a color trace.

(e) *Flexibility and slack.* All wiring shall be capable of withstanding flexing experienced during installation, movement due to accidental bumping, planned relocations, and subsequent wiring changes.

10-46. Same-Underwriters Laboratory ~~Approval~~Listing.

All components and system configurations of the pre-wired office partition shall be UL ~~approved~~listed and labeled/marked as such.

SECTION 2. That all ordinances or parts of ordinances in conflict with the provisions of this ordinance are hereby repealed.

SECTION 3. That this ordinance shall be in full force and effect from and after its passage and publication in the manner provided by law.

_____
Mayor

Passed:

Published:

Attest: _____
Village Clerk

[elec-02]