

# Planning Your Way to Successful Installations

*Before pulling wire or cable, you must develop a solid project plan. This helps you to proceed without unnecessary questions or unexpected problems.*

By Paul Rosenberg, Datacom Consultant

LESSON TWO

A detailed project plan is essential for the successful completion of any cabling system installation—whether it be retrofit or new construction. Ranging from simple documents on smaller projects (checklist) to complex documents on larger jobs, every good project plan should outline how you will accomplish the proposed work from a priority standpoint. This means addressing the following considerations in detail:

- Resources required for compliance with the schedules;
- Permit acquisition;
- Material staging;
- Coordination with other trades;
- Scheduled meetings;
- Overall job schedule;
- Security and safety plan;
- Materials list;
- Tools list;
- Task list and description;
- Job requirements;
- Labor estimates;
- Acceptance plan;
- Inspection schedules;
- Special circumstances; and
- Labeling system.

Now that you know what your plan should include, let's talk about working with your customer. When customers request a cabling system installation, they typically already have an idea of what they want in mind. Through a request for proposal, formal contract, purchase order, or other official document, the

customer passes these plans on to the cabling company bidding on the work. These documents should contain the drawings and specifications that identify the materials you should use, when you should install them, and what standards you should follow. You'll also need to understand and interpret installation drawings, a list of materials, scope of work, and overall project schedule for an effective installation. Let's take a closer look at each of these elements.

**Designer's drawings.** The customer or architect may hire a Registered Communications Distribution Designer (RCDD) or RCDD/LAN Specialist to

Typical Material List						
Project Number		XXXXXXXXXXXX				
Project Name:		Anywhere Elementary School				
Address:		Anywhere, USA				
Item	Material Description	Manufacturer	Catalog Number	Quantity Each	Unit Price	Total Price
1	Wire, 4-pair, 24 AWG, UTP, Cat. 5, CMR	Mfg. A	530141-TP	54,000 ft	0	\$0.00
2	Surface raceway, small	Mfg. B	MT1ABC5	350 ft	0	\$0.00
3	Surface mount box, single gang	Mfg. C	WT12DB	56	0	\$0.00
4	Cat. 5 relay rack E/W wire management	Mfg. D	55053-703	2	0	\$0.00
5	Vertical wire management hardware	Mfg. E	11374-703	2	0	\$0.00
6	Patch panel, 96 port, T568A	Mfg. F	49485-C96	4	0	\$0.00
7	Patch panel, 24 port, T568A	Mfg. G	49485-C24	2	0	\$0.00
8	Faceplate, single gang, dual port	Mfg. H	41080-2AP	9	0	\$0.00
9	Faceplate, single gang, quad port	Mfg. I	41080-4AP	47	0	\$0.00
10	Modular jack, Cat. 5., orange, T568A	Mfg. J	41108-RO5	208	0	\$0.00
11	Horizontal wire management panel	Mfg. K	49253-BCM	16	0	\$0.00
12	Rear cable bars	Mfg. L	49258-TWB	36	0	\$0.00
13	Firestop compound	Mfg. M	AA529	10	0	\$0.00
14	Electrical metallic tubing, 3/4 in.	Mfg. N	34EMT	150 ft	0	\$0.00
15	Electrical metallic tubing, 2 in.	Mfg. O	2EMT	160 ft	0	\$0.00
16	Cable, fiber optic, 6 str., OFNR	Mfg. P	PDRCB3510/15	300 ft	0	\$0.00
17	Fiber distribution panel	Mfg. Q	4R130-OTA	2	0	\$0.00
18	Connector panels	Mfg. R	4F100-6TM	2	0	\$0.00
19	ST connectors	Mfg. S	95-100-01R	12	0	\$0.00
20	10Base-T 24-port hubs	Mfg. T	AT3624TR-15	1	0	\$0.00
21	10Base-T 24-port hubs	Mfg. U	AT3624TRS-15	3	0	\$0.00
22	Chassis	Mfg. V	AT-36C3	2	0	\$0.00
23	Fiber optic transceivers	Mfg. W	AT-MX26F-05	2	0	\$0.00
24	Duplex, ST/ST, 3 m F/O jumpers	Mfg. X	STST3M	2	0	\$0.00
25	Data patch cords	Mfg. Y	42454-030	104	0	\$0.00
26	Data patch cords	Mfg. Z	42454-050	104	0	\$0.00
27	Data line cords	Mfg. AA	42454-100	208	0	\$0.00
28	Exempt materials	various	various	1 lot	N/A	\$0.00
29	Transportation					\$0.00
<b>Total materials</b>						<b>\$0.00</b>

Table 1. Typical materials list for an elementary school cabling project.

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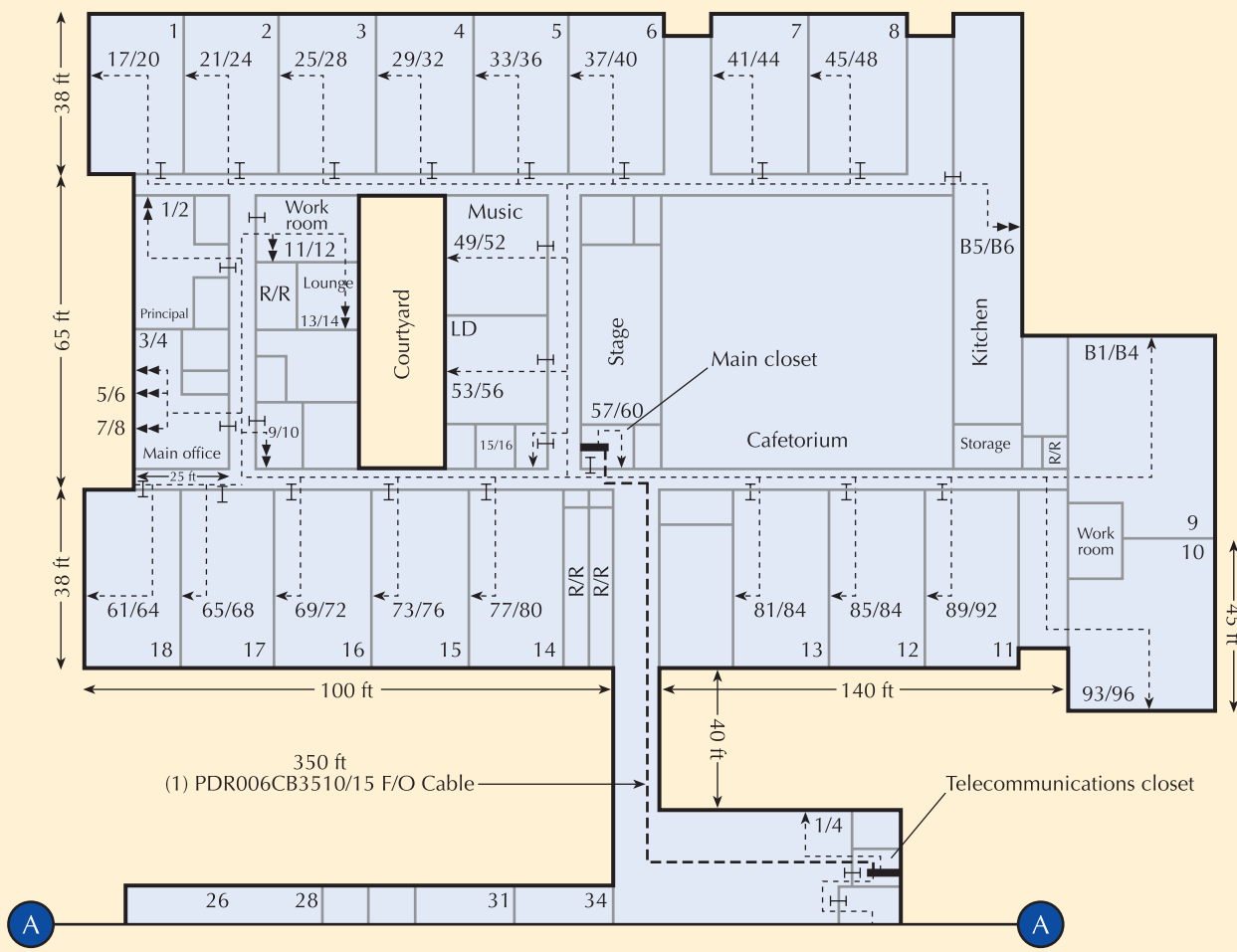
develop the required drawings and specifications. However, on occasion, a member of the telecommunications installation team develops them.

These drawings should indicate the type of cable specified, splicing sequence (if any), and cable pairs you'll extend to all telecommunications closets (TCs). They also show the type of connecting hardware by size, quantity, and configuration. Typically, the designer will prepare separate drawings for each type of telecommunications system specified (i.e., drawings for copper cables, optical fiber cables, coaxial cables, and low-voltage cables). If the project is small enough, all of this information may fit on one drawing (see figure, below). However, for larger projects, an overall drawing should show all the

cables and sleeves so you can determine proper backbone routing.

**Material list.** During the bidding phase, the customer should provide a list of materials by description, catalog number, quantity, unit price, and total price. Many contractors prepare a similar list for installation labor units, which indicate the amount of time allocated for each portion of the installation (Table 1, on page 64F, and Table 2, on page 64J). The list should also have a column indicating when you receive and dispense materials.

**Scope of work.** The scope of work is a document that lists all elements of the installation. The customer or



Master Legend	
←-----	(1) 41080-XAP faceplate equipped with (4) 41108-RX5 Cat. 5, T568A, modular jacks; academic locations
←←-----	(1) 41080-XAP faceplate equipped with (2) 41108-RX5 Cat. 5, T568A, modular jacks; administrative locations
————	External building wall (masonry construction)
————	Interior building wall (may or may not be fire/smoke rated)
-----	Cat. 5 wire route (proposed)
-----	Fiber optic cable route (proposed)
————	(1) 55053-703 relay rack E/W (2) 11374-703 vertical management panels

Typical designer drawing showing cable routing, termination points, and relay rack locations.

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## Registration for the Iowa State University TELECOMMUNICATIONS CABLING INSTALLATION Course:

Name \_\_\_\_\_

Company \_\_\_\_\_

Social Security Number \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

The registration fee of \$485.00 will be handled as follows:

Enclosed is a check payable to *Iowa State University*.

VISA     MasterCard     Discover

Exp. Date \_\_\_\_\_ Card # \_\_\_\_\_

Signature \_\_\_\_\_

Mail or fax this completed form and registration fee to: **Karen Larrew, Iowa State University, 102 Scheman Building, Ames, Iowa 50011; Fax: (515) 294-6223**

The entire course must be completed to gain 6.0 of CEU credit. The registration fee must be paid in advance to Iowa State University.

### COMMON QUESTIONS:

**Is this a college course?** Yes. The course is a joint venture of *EC&M* magazine and Iowa State University (College of Engineering, Dept. of Continuing Education).

**How does the course work?** This course is conducted completely by correspondence. You will get all of your lessons by U.S. mail, along with the textbook and exercises, about two weeks after you register. (The cost of the textbook is included in the course fee.) After you complete your lessons, send them back to the instructor. He will grade your papers, and graduates will receive their certificates a few weeks following. You may return lessons either one at a time, or all at once.

**How long does it take?** There are 11 lessons in the course. Most students spend between three and six hours on each lesson. However, how quickly you complete the course depends on you.

**Do I get some type of credit?** When you complete the course, you will receive a certificate of completion from Iowa State University, along with 6 continuing education units (CEUs). All segments of the course must be completed to gain the CEU credit for the series; partial credit will not be awarded. The credits will be permanently recorded by the Department of Extended and Continuing Education. Each person who earns credit will receive a certificate of completion from Iowa State University.

**Is there a time limit?** Yes. Registration is open through April 15, 2001, and all course work must be completed by August 15, 2001.

**Are there prerequisites?** There are no prerequisites, although a general understanding of electricity is assumed.

**Can I get more information?** Sure, call Karen Larrew at (515) 294-6229.

### Typical Labor List

Project Number: XXXXXXXXXXXX  
Project Name: Anywhere Elementary School  
Address: Anywhere, USA

Item	Material Description	Units/Quantity	Unit Rate	Total Price
1	Installing horizontal wires (2 per run)	9	0	\$0.00
2	Installing horizontal wires (4 per run)	47	0	\$0.00
3	Installing faceplates and jacks	208	0	\$0.00
4	Installing relay racks	2	0	\$0.00
5	Installing patch panels	6	0	\$0.00
6	Terminating wires at patch panels	208	0	\$0.00
7	Certifying Cat. 5 wires	208	0	\$0.00
8	Installing surface raceway	56	0	\$0.00
9	Installing surface mount boxes	56	0	\$0.00
10	Installing backbone fiber optic cables	300	0	\$0.00
11	Installing F/O connecting hardware	4	0	\$0.00
12	Terminating F/O cables	12	0	\$0.00
13	Testing F/O cables	6	0	\$0.00
14	Install fire-/smoke-rated partition penetrations	59	0	\$0.00
15	Mount hubs on relay racks	4	0	\$0.00
16	Installing backbone conduit from main building to portables	120	0	\$0.00
17	Installing horizontal conduit between backbone conduit and portables	48	0	\$0.00
<b>Total labor</b>				<b>\$0.00</b>

Total cost			\$0.00
Materials markup	50%		\$0.00
Labor markup	50%		\$0.00
State sales tax on materials	6%		\$0.00
<b>Total price to customer</b>			<b>\$0.00</b>

Table 2. Typical labor requirements for a school cabling job.

designer can generate it when bidding or responding to a customer's request for proposal (RFP), or by you (the installer). The scope of work should indicate:

- The work you will perform;
- Materials you'll need;
- Methodology;
- The identification, labeling, and documentation system;
- Testing methods;
- When and how you'll turn the installation over to the customer; and
- Clarifications that elaborate on various items involved in the installation.

A contract is written to document the agreement between the customer and you. Some customers generate a purchase order that refers to the other documents associated with the project. If a contract is available, make sure all documents listed are available. Familiarize yourself with the contract penalties for not completing the work or delays in completion. Pay attention to liquidated damages. The contract may require performance bonds and insurance.

**Project schedule.** Companies use a variety of different project management styles and software to create a project schedule. Two of the more prominent

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## Knowing Your Role

It's important to review your responsibilities with the general contractor to better understand your role in the completion of the overall cabling installation project. Remember, the general contractor owns a new building until the owner accepts it. So what the general contractor says becomes "de facto" law on such a site. Here are a few questions you should ask before you commit to any installation:

- Have the subcontractors adhered to the architect's and designer's original drawings and specifications?

- Will changeorders affect the pathways and spaces?
- How is the building grounding infrastructure installed, and does it comply with ANSI/TIA/EIA-607 and the NEC?
- When will the telecommunications rooms, closets, and pathways be completed?
- When will the inspector or fire marshal perform the occupancy inspection?
- When will you turn the project over to the owner?

packages used today are Microsoft Project and MacProject Pro from Claris Corporation. With this software, the charts and graphs feature allows you to track materials receipt and disbursements, labor items completed, and the overall status of the project. However, you can generate project schedules manually, especially on smaller less complex projects.

**Site survey.** Once you get all of the initial project documents, it's time to perform a site survey. Pay particular attention to the various locations where you'll perform installation work, and carry the designer's documents with you. These drawings may

indicate hidden obstacles not visible from floor level. And don't forget the tools you'll need for a thorough site survey, including: hard hat, safety glasses, leather gloves, leather boots, hearing protection, ladder, flashlight, measuring wheel, handheld tape recorder, digital camera, and video camera.

As you make your way through the site, use a checklist to make sure you address all items of concern (Table 3). As you find problems, formulate plans to overcome these obstacles while on site—saving you a return visit. Finally, place all information gathered during the site survey into the project file. This information will become invaluable later, especially if you assign new team members to the installation.

When visiting a project site, determine who is responsible for construction of the pathways and spaces. The general contractor and/or the electrical subcontractor is usually responsible for this. If you are responsible for the pathways, determine how to install them and identify any obstacles you must overcome. Lastly, make sure you're familiar with and understand installation standards, national and local codes, BICSI manuals, manufacturers' specifications, and basic telephony principles to give you that extra advantage. Now, that you've formulated a plan, installation should run smoothly. **EC&M**

*Next month, we'll cover the installation of supporting structures such as relay racks, cabinets, cable trays, and more.*

Item	Description of Operation	Date Checked	Y	N
1	Is the general contractor responsible for construction and finish of the closets and pathways?			
2	Is the electrical contractor on the project responsible for the pathways?			
3	Is the electrical contractor responsible for the telecommunications grounding and bonding within the building?			
4	Are the closets completed and ready for use by the telecommunications vendor? If not, when will they be ready?			
5	Are the pathways completed and ready for use by the telecommunications vendor? If not, when will they be ready?			
6	Is the grounding and bonding system installed and ready for use by the telecommunications vendor? If not, when will they be ready?			
7	Is there space on the job site available for storage and staging of materials and tools? Will it be secured?			
8	Will the space be under the control of the telecommunications vendor? If not, you must work out responsibility for loss or damage.			
9	Is the space inside or outside?			
10	Does the general contractor conduct construction progress meetings? When? Can the telecommunications vendor attend?			
11	Does the general contractor have a posted safety plan?			
12	What is the schedule for inspections by local code authorities?			
13	Is the building equipped with suspended ceilings? Are they used to handle environmental air?			
14	Where can the telecommunications vendor setup field operations?			
15	Is there a way to get large cable reels and other heavy materials to the top floor of the building?			
16	Are lifts required on the job site?			
17	Is the building a hard-hat area?			
18	When will the telecommunications vendor be allowed access to all spaces in the building requiring telecommunications work?			
19	When will the walls receive final finishes?			
20	Are elevators and loading docks available and appropriate for the job?			
21	Is rigging required?			
22	Does any equipment require floor loading modifications?			
23	Verify position of sprinklers and water pipes?			
24	Are any alarm systems activated?			

Table 3. Use a checklist like this when performing a site survey.