Appendix I: Questionnaires

Questionnaire A

Suppliers

• What type of materials do you supply?
• Typical process to place an order by a customer? (i.e. visit the store, phone)
• Once the order is placed, how it is processed?
• Do you use any computers to process the orders?
• Who monitors the process?
• Do you use any technology (i.e. bar codes, EDI, RFID) for inventory control?
• What happens if you don't have the quantity required by the customer?
• Do you have many customers asking the price matching?
• Do you do pack all the materials needed by a contractor in a pallet and have them ready for pick up by the customer?
• Do you do JIT delivery?
• How effective is your delivery in terms of time and quality?
• What are the major problems that you can identify in the system? (i.e. delivery times, quantities, relations with customers)

Contractors

• What is the type of materials that you usually buy from suppliers?
• How do you typically place an order? (i.e. visit the store, phone)
• Who monitors the process and makes sure that the materials will be on site when needed?
• Do you use any technology (i.e. bar codes, EDI, RFID) for inventory control on site?
- Do you typically pick your materials or you like the supplier to deliver them?
- Do keep inventory in site?
- Do you use Just in Time (JIT) delivery?
- How effective is the delivery of suppliers in terms of time and quality?
- What are the major problems that you can identify in the system? (i.e. delivery times, quantities, relations with suppliers)
Questionnaire B

Storage Process
- Where are the materials stored?
- How do you keep track of materials installed/remaining? Tie with the stock requisition question

Inventory
- Who manages the on-site inventory?
- Does the distributor provide an on-site truck?
- Does the supplier provide inventory management?
- Based on what you schedule a materials release?

Materials Handling
- What are the major difficulties when handling material on-site?
- Who is in charge of the materials handling plan and procedures?
- Based on what you move materials to the site?
- How often do you move materials to the site?
- What happens if there are problems with materials shortages or materials damaged?

Problem Areas
- What do you think are the bottlenecks?
- Any suggestions for improvement?
Questionnaire C

General

• Do you have a classification for materials? Can you provide examples?
  o Bulk
  o Engineered
  o Fabricated

• What are the major problems that you can identify in the system overall? What is the major problem that you feel has to be fixed? Can you elaborate on major issues?
  o delivery times
  o quantities
  o quality
  o relations with suppliers

How to order material

• What are the types of material that you usually buy from suppliers?

• How do you typically place an order? Give examples? Is the process different for different type of materials?
  o Visit the store
  o Phone
  o Fax
  o E-mail

• Problems associated with the ordering process?
  o Lost of order
  o Fax not received
  o Too many papers to fill out
  o Not a good definition of what is wanted
  o Poor communication with supplier
  o Vague stated requirements
  o Materials not available
• Do you typically pick your materials or you like the supplier to deliver them?
• Which type of materials you must likely pick up? Which type of materials would you prefer be delivered to you?
• Who follows up the order and makes sure that the materials will be on site when needed?

**How to qualify suppliers**

• What are the procedures used to evaluate potential suppliers?
  o Forms
  o Experience of supplier
  o Reputation
  o Previously worked with the supplier
• What are the typical problems associated with the qualification process?
  o Time taken for the qualification process
  o Too many suppliers to qualify

**Quality Issues**

• Quality is specified in the specifications for a particular project. In order for approval of the work, the contractor has to meet the quality requirements specified. How are quality issues specified to the supplier?
  o Copy of specifications
  o Orally
• Sometimes when materials arrive to the site, they are not exactly what you order or don't meet the requirements specified. What are the typical problems associated with quality issues?
  o No supplier Quality Assurances
  o Materials don't meet the required quality
• The contractor has to tell the supplier the quality expected and the tolerances for the materials. How are inspection procedures specified to the suppliers? Are the inspection procedures different for different type of materials?
• Typical problems associated with inspection procedures
  o Procedures not followed
  o Non conforming items not identified
  o Non conforming items not isolated
• Typical problems associated with received materials from suppliers?
  Can you provide examples?
  o Lack of conformance to requirements
  o Quality problems
  o Damaged materials
  o Non-conformance with requirements
  o Late deliveries
  o Incorrect type of materials delivered
  o Incorrect sizes delivered
  o Incorrect quantities delivered
  o No supplier QA

Storage
• Do you keep inventory on site? If you do keep inventory, which materials are the most likely in your on site inventory? Which materials will never be in your inventory on site?
• How adequate are procedures for storage material on site?
• Different things can happen to materials once it is stored on site due to weather, human factors, etc. What are the typical problems that you can associate with stored material?
  o Not adequate space for storage
Technology

- Do you use a computer in your company for material ordering, material tracking?
- How effective is the computer system used for materials ordering, tracking?
- Recently several electronic devices have been developed for materials tracking and inventory control. Among these devices bar codes are included. Do you use any technology for inventory control on site?
- What are the problems associated with technologies used for materials management?
  - Damage of bar codes
- Do you use JIT delivery?
- Typical problems associated with JIT
  - Late deliveries
  - Wrong quantities delivered
  - Wrong materials delivered
Table (A1.1): Problem Identification Questionnaire

<table>
<thead>
<tr>
<th>Material takeoff and identification</th>
<th>Problem</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Not a good scope definition</td>
<td>Not a good definition of what is want</td>
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<tr>
<td>Lack of communication</td>
<td>Lack of communication between parties involved</td>
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<tr>
<td>Incomplete Drawings</td>
<td>Plans are not complete and details are missing</td>
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</tr>
<tr>
<td>Lack of conformance to requirements</td>
<td>What is wanted by the customer is not what is prepared</td>
<td></td>
</tr>
<tr>
<td>Nonstandard specifications</td>
<td>Use of specifications different from those commonly used</td>
<td></td>
</tr>
<tr>
<td>Incomplete/ineffective meetings</td>
<td>Issues are not resolved in meetings</td>
<td></td>
</tr>
<tr>
<td>Use of nonstandard items</td>
<td>Special items that might require more time to be built</td>
<td></td>
</tr>
<tr>
<td>Vague stated requirements</td>
<td>Don’t communicate exactly what is wanted to suppliers</td>
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<tr>
<td>Ambiguities between plans and specifications</td>
<td>Differences in requirements between plans and specifications</td>
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</tr>
<tr>
<td>Not determining when and what materials are needed</td>
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</table>

<table>
<thead>
<tr>
<th>Vendor Selection</th>
<th>Problem</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Uncontrolled bids lists</td>
<td>Have too many suppliers bidding and don’t have much information about them</td>
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</tr>
<tr>
<td>Incomplete proposals</td>
<td>Suppliers didn’t all documents required with the proposal</td>
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<tr>
<td>Time spend investigating non-qualified suppliers</td>
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<table>
<thead>
<tr>
<th>Materials Procurement</th>
<th>Problem</th>
<th>Description</th>
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<tbody>
<tr>
<td>Availability of material</td>
<td>The requested material is in inventory and the quantities required are available</td>
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<tr>
<td>Availability of quantities required</td>
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<td></td>
</tr>
<tr>
<td>Matching price to competitor’s price</td>
<td>Customer asks for price reduction to match your competitor’ price</td>
<td></td>
</tr>
<tr>
<td>Late Deliveries</td>
<td>Materials are not delivered as scheduled</td>
<td></td>
</tr>
<tr>
<td>Late or incorrect of submittals</td>
<td>Submittals are not submitted and approved as planned or incorrect ones are submitted</td>
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</tr>
<tr>
<td>Late approval of submittals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor communication</td>
<td>Lack of communication between parties involved</td>
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</tr>
<tr>
<td>Lack of conformance to requirements</td>
<td>What is wanted by the customer is not what is prepared</td>
<td></td>
</tr>
<tr>
<td>Unrealistic delivery dates</td>
<td>Delivery dates are set that are impossible to meet</td>
<td></td>
</tr>
<tr>
<td>Vague stated requirements</td>
<td>Don’t communicate exactly what is wanted to suppliers</td>
<td></td>
</tr>
<tr>
<td>Re-handling of materials</td>
<td>Materials have to be moved from one place to another before being installed</td>
<td></td>
</tr>
<tr>
<td>Storage of materials</td>
<td>Storage areas are limited or are far from working area</td>
<td></td>
</tr>
<tr>
<td>Lost of Materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damaging</td>
<td>Materials damaged while handling or by other conditions</td>
<td></td>
</tr>
<tr>
<td>Late deliveries</td>
<td>Materials do not arrived as schedule</td>
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<tr>
<td>Incorrect type of materials delivered</td>
<td>There are differences in the materials ordered and the materials delivered</td>
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<tr>
<td>Incorrect sizes delivered</td>
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<td></td>
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<tr>
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<td></td>
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<tr>
<td>Keeping track of material</td>
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<td>No quality assurance from the supplier</td>
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<tr>
<td>Poor communication</td>
<td>Lack of communication between parties involved</td>
<td></td>
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<tr>
<td>Receiving, handling and storage of unused materials</td>
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<td></td>
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<tr>
<td>Can surplus be returned for credit?</td>
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<td></td>
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<tr>
<td>Conditions and interest on outstanding bills</td>
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<td></td>
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<tr>
<td>Return charges, salvage losses</td>
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### Table (AI.2): Checklist for Problematic Issues

#### Design Description

<table>
<thead>
<tr>
<th>Issue</th>
<th>Issue Description</th>
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<tbody>
<tr>
<td>Not a good definition of what is wanted</td>
<td>Not a good scope definition</td>
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Appendix II: Flowcharts and Narratives

Appendix II presents the flowcharts for the material management process for the companies interviewed and the narratives for the flowcharts.

Majority of the interviews were conducted at the offices of the companies. However, the interviews were complemented with site visits to jobsites, warehouse/pre-fabrication shops and also interviews with the field/warehouse personnel.

The information presented in this appendix only covers the aspects necessary to develop the flowcharts and subsequent narratives.
Subs Estimate from Drawings and Specs

1. Supplier A

2. Sub asks Crescent for Price

3. Crescent Contacts Manufacturers

4. Crescent Applies gross Margin

5. Material Delivered to sub

6. Subs Asks for prices for specialties

Figure (AII.1) : Flow Chart Supplier A
Supplier A

Narrative

Straight Bid- Majority of Projects

Negotiated Project

Time and material project

1.0

- Depending on the size of project subs limit the number of distributors
- Sub takes off job and gives a list of materials to different distributors to get prices.
- They ask mostly for prices on distribution equipment (switch gears, safety switches, panels) and lighting. They send copies of the project schedule with expected installation dates for distribution equipment and for lightning.
- If the sub calls the manufacturer first, the distributor still gets involved, since the material has to go through the distributor

2, 3, 4, 5

- Supplier A limits their business to 1-2 manufacturers for partnering purposes and to get better prices
- Supplier A contacts manufacturers, gets prices and adds a profit margin
- Subs select the distributor based on lowest price (95% of times)
- For small panels Supplier A will assemble them, for big projects the manufacturer will assemble them
- Sub asks for prices on specialty type items such as cable tray and under floor ducts sometimes
Company is active in marketing themselves with contractors. Sometimes company gets contacted by people that used to work for some other company that dealt with Supplier A and moved to a new company.

**Supplier A**

Value Added Services

1.) Trailer on Site- First project this year
Supplier A buys a trailer and provides it with material ordered by the contractor in it. The contractor buys all the material in the truck. The contractor administers the truck once it goes to the jobsite. Once the job finishes, he returns the remaining material and Supplier A credits the contractor.
Supplier A could provide inventory management on the trailers. Salesman will go once a week to the trailer and verify materials needed and send them to the trailer.

2.) Manager material inventory on industrial sites- Salesman goes to the industrial site, verifies materials needed and send them to the site

3.) Yearly contracts
Supplier A doesn't offer yearly contracts on fixed price for commodities. They offer a yearly contract in which their profit is fixed. The item will be sold at the cost in that particular day plus the profit specified in the yearly contract. These contracts provide market share for Supplier A. Yearly contracts are not used for major items such as switch gears, fixtures. Supplier A can't fix the price of commodities such as wires and PVC piping, because their price is dependent on market conditions.
Supplier B

Customer Contacts supplier by phone or by visiting the store

Customer asks for price and/or price matching

Customer specifies the quantities needed

Supplier verifies that the quantities required are available and if he can comply with delivery date

Order is placed

Materials required are grouped together

Materials are delivered

Figure (AII.2): Flowchart Supplier B
Supplier B
Interview

1. What is the process that takes place when someone places an order until he receives it?
The process is fairly the same although it can be started by two different ways, either the customer gives us a phone call or he comes to the store. The customers ask for price, most of the times for matching price to other competitors, I give them the price and they tell me if they want it or not. The customer specifies the quantities needed, time and place of delivery. I verify if I have the quantities needed and the price that the customer wants it. I verify the delivery log to see if I will be able to deliver the material when is needed. The rest of the process is computer work.

2. What happens if you don't have the quantities that the customer needs?
If we don't have the quantities that the customer wants available at the moment, we can get the materials either from another Supplier B or from another supplier in the area.

3. Who monitors that process?
I personally monitor the process and make sure that the order is ready when the customer needs it. I can verify the status of the order in the computer and make sure everything is working the way it should be working.

4. Do you use any computer software for monitoring the process?
Computers are used to get the order ready, verify if the quantities are available and to bill quotes to customers.
5. Does the store delivers or customers have to pick up?
Most of the times the products have to be delivered. Depending on the time
that the contractor needs the materials and load of work. Sometimes the
customer comes and pick up the materials if they need them that same day.

6. How effective is the delivery? In terms of time and quality,
Most of the times we deliver the materials at the specific day that we tell the
customers, however this depends on the weather conditions, job site location
and ease to get into the job site.

7. Do you do JIT delivery?
We can't deliver at a specific time because it depends on the workload that
we have, however we can tell the customer if it's going to be delivered
during the morning or the afternoon and the day of the delivery.

8. Do you do packaging, i.e. contractor requests different materials and you
put it in a pallet for him?
A lot of times we will do that if it's an item that we can put in a pallet. The
materials have to be fairly packed to go into the truck anyway. If the
customer calls and specifies the materials he wants and that he wants them
in a pallet or in a package we can usually do that for the customer.

9. What are the major problems that you can identify in the system?
I can't talk to you about the internal problems that we have.
Figure (AII.3): Flowchart Contractor B
Figure (AII.4): Flowchart Contractor C
Figure (AII.5): Flowchart Contractor D

Contractor D

- Cost for some commodities taken from books, others from blankets
  - Major material, quote from supplier
  - Excel used for the estimate

- PM revises estimate and create a list of detailed quantities for materials
- PM requests quotes for non blanket materials
- PM clarifies scope

1. Submittals → Purchase material → Delivery → Install → Surplus
- Multiple Releases, delivery dates specified
- Commodities, buy less than estimated
- Purchasing Department buys the commodities
- Foreman has small purchase orders for small things
- PM in charge of major material
- Deliver to site as often as possible
- Sometimes deliver to rigging sub fee storage until installation
- Sent to warehouse to be used in future projects

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Figure (AII.6): Flowchart Contractor E
Contractor E

Narrative

1.0

- Prices are known through yearly contracts with suppliers
  - piping
  - wiring
  - devices
    - switch
    - receptacles
- fittings and straps

2.0, 2.1, 2.2

- Miscellaneous material include EMT, wire, fitting and straps, pipes, wiring devices
- A list of materials is sent to the warehouse to see if the materials are available
- If materials are available in the warehouse, the warehouse will supply materials to the project
- If the warehouse has a major part of the materials needed, they supply that amount of materials and the rest of bought from a supplier
- If the warehouse has a small amount of the materials needed, then all the materials are bought from a supplier
- Sometimes orders are split to avoid overstocking on the construction site
- Purchasing department coordinates suppliers with the site for materials delivery
- Purchasing department issues POs to the supplier for the materials ordered
2.3, 2.4, 2.5

- The supplier delivers the material directly to the site
- Any additional material needed is supplied by the warehouse if it is available on the warehouse, if not get it from supplier
- Material is delivered to the site and stored on site
- Packing slip is sent to purchasing for payment purposes
- The remaining material (surplus) is sent to the warehouse. The project gets a credit if the materials are in good condition

3.0

- Main materials are switch gears and lighting fixtures
- Purchasing department requests bids from manufacturers unless the manufacturer is specified in the contract
- Bidding is more beneficial because the company can get better prices when manufacturers are competing against each other
- Purchasing department coordinates supplier and jobsite for material deliveries
- Material delivered to site and used as needed
Figure (AII.7): Flowchart Contractor F
**Contractor F**

Narrative

**Estimate**
- Quantity takeoff of items list in drawings done manually
- Takeoff based on assemblies
- No classification of materials used
- Quantities are input into the computer
- TRF computer program used to generate list of materials
- Some items are customized in the software
- Estimate is verified 2-3 times

**Price Request**
- 2-3 suppliers are asked for price
- Requests sent by fax mostly
- Most of the times the contractor deals with the supplier
- In small occasions the contractor deals directly with manufacturer for high dollar value items such as cables

**Contract Awarded to supplier**
- If the contractor is the lowest bidder, the contract is awarded to the supplier based on the lowest price
- Purchase order is used as an agreement of prices and quantities
- The supplier submits submittal (8-9 copies)
- The agreement is valid upon approval of the submittals

**Procure Materials**
- 100% of material estimated is ordered
- Dates when materials are needed are specified based on the project schedule
• Orders are done by fax
• Foreman can buy commodities as they are needed on site

Materials Delivered
• Delivered to site when possible
• Big materials delivered to warehouse
• Invoice sent to PM
• Materials ordered at once
• For some materials, such as conduits, only 75% is released up front
• Biggest problem is to keep track of materials

Verify Materials
• Verify quantities received against packing slip
• Verify quality and types of materials received
• The contractor stores as much as they can
• Invoice paid at the end of the month

Material Surpluses
• Store leftovers to be used in future projects
• Specialty items, not of the shelf items, leftover are sent back to the supplier and a penalty is paid (usually 20%)
• Shelf items carry no guarantee if they are returned

Extra Materials Needed
• If extra materials are needed, the foreman can procure them from any supplier that can deliver them, as long as they are commodities

No yearly contracts are used, because the company can get better prices from different suppliers if they don't lock their selves for one year with a particular supplier
Contractor F
Second Interview
1. How do you decide amount of material to buy?
Material is normally ordered based on lead time. For example, major material requires normally more than 90 days for delivery. We buy the amount of material that was estimated since we verify our estimates 3-4 times.

2. Do you usually create delivery schedules in batches?
For miscellaneous material, we usually buy the entire package needed and store it in the jobsite.

3. Why buy the entire package and not schedule batches?
By buying the entire package we avoid prices increases. By giving the supplier a PO, this certifies that we will get the material at the quoted price.

4. The entire package needed is stored until it will be used. Do you consider inventory cost versus ordering in batches?
Material is sent to the site because you have to prove that the material is available before you can start building. We don't consider any storage cost. We are more worried for availability and delays in the project. In addition, we order material early because once the labor force is in the jobsite, it would be very costly for the company if there is no material for them to work.

5. How do you measure accuracy of the amount being ordered?
Usually our estimates are revised 3-4 times before we submit them. Once we get the job, we order the amount that was estimated and we include contingencies. As the work progresses, we verify the amount of inventory
versus the amount of work remaining, if we have shortages we get the material from the same supplier.

6. How do you deal with theft, loss and misplacements?
Every foreman in the construction site verifies the inventory and keeps track of the material being used.

7. How do you decide what brand to buy and from whom?
Our suppliers are usually selected on lowest prices, we don't have blanket orders. If the brand is specified in the contract, we request quotes from the suppliers that can deliver that brand. Many times we have more than 2 suppliers in a job, because of the brand requirements.

8. If you could get the material in batches delivered just before you need them, would you do that?
We are more worried about delays and labor cost than inventory cost. We are not sure that the supplier will 100% deliver the material, therefore we prefer to store and have it available. If material is not available it can impact the labor cost, which can get very expensive.

9. Where do you store on site? Are there any contingencies for re-handling?
We normally store material in trailers. If there is space on the building floor, we store it there. If there are space constraints on the floor, we store in trucks and move it to the site as needed. We don't like to get into re-handling material on the building floor, it is time consuming and can be expensive. In addition, the owner will pay for stored material, so we prefer to minimize our risk of not having the material.
10. Mainly, from what I can get from this interview, you buy the total materials early, you deliver to the jobsite, you store it and you buy the amount of materials estimated. Is availability the most important factor? Yes, as I said for us availability is more important that inventory cost as the owner will pay for stored material. The cost of purchasing is known from the estimate, so it is not unknown and no increases will happen. The inventory cost incurred now is smaller than the cost that will incur on labor and delays if the material is not available.

11. If there is a tool available that would allow you to analyze the tradeoffs between costs, availability, delays, etc. would you be willing to implement it?
If the tool can help me and we could cost savings without sacrificing availability on site I would consider it.

12. The main idea of this research is to develop a blueprint for a DSS for material supply chain, after our discussions and after seeing what we are considering, are you willing to give it a shot in your company?

I think that the research you are conducting is very comprehensive and you are considering all the aspects that we should consider, but mostly we don't. After talking to you a couple of times and knowing the scope of your research, I would definitely like to take a look at the final product. Lots of good ideas suggestions & alternative options have come out of it.
Figure (A II.8): Flowchart Contractor G
Contractor H
First Interview- Purchasing Manager

General

• Do you have a classification for materials? Can you provide examples?
  o We mostly buy medium and low voltage products as we don't do any power work at the moment. Some materials, such as wiring, are bought in bulk. We don't classify the materials by category just by name.

• What are the major problems that you can identify in the system overall? What is the major problem that you fill has to be fixed? Can you elaborate on major issues?
  o The major problems are with materials that are already ordered and then there is a change in the project. These materials are paid for and can't be returned because the supplier will not accept them. Is not the supplier's fault, this situation arises because of changes requested by the owner or his representative.

How to order material

• What are the types of material that you usually buy from suppliers?
  o I buy all my materials from suppliers. As I said wiring in bulk and low to medium voltage products.

• How do you typically place an order? Give examples? Is the process different for different type of materials?
  o I use the internet, email and fax to place orders. Sometimes I call the supplier if I need the material if the process needs to be accelerated.
• Problems associated with the ordering process?
  o There are no major problems with the ordering process, most of the errors are human errors that can be fixed easily. Sometimes there are problems with materials that are not available, but those are isolated incidents.

• Do you typically pick your materials or you like the supplier to deliver them?
  Which type of materials you must likely pick up? Which type of materials would you prefer be delivered to you?
  o I would prefer the supplier to deliver as much material as they can. Sometimes if the material is needed in a rush we'll pick it up. We always want the supplier to deliver bulk material, because this material typically goes to the jobsite.

• Who follows up the order and makes sure that the materials will be on site when needed?
  o I personally ensure that the materials are received when expected in the construction site. Sometimes there are delays with material coming directly from the manufacturer, but that doesn't happen often.

How to qualify suppliers
• What are the procedures used to evaluate potential suppliers?
  o I've been working with same 7-8 suppliers for the last 20 years. The experience of work from previous jobs is very important for me. Depending on the materials and price offerings we decide from which supplier we are going to get the materials. Sometimes the specifications specify from which manufacturer they want the product, therefore this influences from which supplier we buy.
• What are the typical problems associated with the qualification process?
  o I don't qualify suppliers, because I do business with the same 7-8 suppliers.

Quality Issues
• Quality is specified in the specifications for a particular project. In order for approval of the work, the contractor has to meet the quality requirements specified. How are quality issues specified to the supplier?
  o Quality is specified to the supplier by the brand that we request. The quality is dictated by the manufacturer

• Sometimes when materials arrive to the site, they are not exactly what you order or don't meet the requirements specified. What are the typical problems associated with quality issues?
  o No major problems associated with quality issues. Just one time one manufacturer sent defective material, but the situation was corrected as soon as we noticed and talked to them.

• The contractor has to tell the supplier the quality expected and the tolerances for the materials. How are inspection procedures specified to the suppliers? Are the inspection procedures different for different type of materials?
  o The manufacturer dictates quality, therefore we buy materials based on manufacturer and the quality comes with the brand. Our superintendents verify that the materials have the quality specified.

• Typical problems associated with inspection procedures
  o No problems with inspection procedures until now

• Typical problems associated with received materials from suppliers?
Can you provide examples?
  o No major problems associated with quality and suppliers. If there are problems, those problems will be with the manufacturer, not with the supplier.

Storage
  • Do you keep inventory on site? If you do keep inventory, which materials are the most likely in your on site inventory? Which materials will never be in your inventory on site?
    o We store small things in the warehouse, like 1 day things (consumables) that we need. We receive material in site in large quantities as we needed on the jobsite. It functions like a just in time system, but we storage the quantities that we don't use in a particular day.
  • How adequate are procedures for storage material on site?
    o The procedures to store material on site are good because we know which materials to store and where.
  • Different things can happen to materials once it is stored on site due to weather, human factors, etc. What are the typical problems that you can associate with stored material?
    o We haven't experienced any major problems with stored materials on site. With our experience we know which materials we can store on site and which ones we can't.

Technology
  • Do you use a computer in your company for material ordering, material tracking? o I use the computer for material ordering
  • How effective is the computer system used for materials ordering, tracking?
    o The computer is very good to place orders
• Recently several electronic devices have been developed for materials tracking and inventory control. Among these devices bar codes are included. Do you use any technology for inventory control on site?
  o We don't use yet any bar codes or any other technology for materials tracking.
• What are the problems associated with technologies used for materials management?
  o N/A
• Do you use JIT delivery?
  o I prefer to have a buffer just in case that the material doesn't arrive on time
• Typical problems associated with JIT
  o N/A
Contractor H
Second Interview- Vice-President, Electrical Division

1. How do you decide on how much to order?
Usually 80% of the material needed is ordered. The ordering time is based on project schedule and the lead time specified by the supplier. Damage, loss, misplacements are not considered when ordering material, at the end we have to assume the costs associated with these.

2. How often do you order material and who decides on the batch amounts?
Get all the material for the job to be performed at once and store it until it is needed, in that way we can get discounts from the suppliers. In addition, we minimize the ordering costs per item.

3. Do you consider the tradeoff between inventory cost and availability?
We prefer to pay for storage instead of having delays. The cost of availability and possible delays versus storage costs has not being studied. We include a storage cost for material in our estimates.

4. If you have these numbers, would you change your ordering policy?
Yes, if we could have numbers for material storage cost we could change our policy. However it also depends on the performance of the supplier.

5. How do you verify that the ordered quantities are correct?
The accuracy of the how much material is needed is realized when the job is progressing. At some point in the construction, the project manager verifies
the work to be done and the material required and compares with the material available that is remaining, from the 80% ordered initially. If more material is needed, then it is ordered. The 80% is used to avoid surpluses that could result in re-stocking fees or inventory costs by storing in warehouse.

6. What are the major factors used to decide when to buy?
We order material two weeks in advance, based on lead time of the supplier. We store the material for availability purposes in case that there is schedule acceleration.

7. Suppose that the supplier could do a one day before needed delivery, would you be willing to deliver the day before needed?
If the supplier could deliver day before the material will be used, we would ask for delivery the day before usage. However, it is very difficult to ensure it. That's why we order the material early and store it on site.

8. Do you have any problems with backorders?
We don't have problems with backorders.

9. Where do you deliver your material?
All the material is requested to be delivered to the jobsite. It is usually stored in trailers.

10. Do you order material to store or material to install?
Usually all the material ordered is material to install. We store it on the jobsite, but not for long periods of time.

11. If you have a safety stock, would your ordering policies with respect to
11. How do you track materials once they are delivered?
Materials are tracked with PO numbers and job numbers. We verify every shipment to the jobsite.

12. How do you tackle theft and loss of material?
We really don't track amounts for that in a jobsite.

13. How do you decide on what brand to order and from whom?
Usually contracts specify more than one brand that can be used, so we request quotes from suppliers that distribute those brands. If we are pinned to one brand, then we request quotes from suppliers that distribute that brand.

14. If a brand is specified and a blanket contract is in place, would you get the material from that particular supplier?
Not necessarily, blanket orders are supposed to give the lower price, but sometimes better prices can be obtained by bidding. We go with the better price.

15. How do you deal with material storage in the jobsite?
Sometimes the lay down areas are very small and we have to put our storage trucks far away from the jobsite. Sometimes, the location of the storage areas and cost associated with moving material to the building is not considered in the estimate.
17. Do you have any contingencies for material re-handling on the floor of the building?
No, re-handling costs are not considered in the estimate. It is difficult to assess and it would be difficult to get a job if all these contingencies are included in the estimate. The available space is specified by the GC.

18. How do you define the criticality of an item?
Most of the times the criticality is defined by the schedule and by the lead time of the material. A critical material is an item that if it is not available, delays the progress of the work or a material that is required by the GC by certain date.