



CALIFORNIA DEPARTMENT OF TRANSPORTATION

Transportation Laboratory (TransLab)

State Furnished Materials (SFM) Electrical QA Manual

**QUALITY ASSURANCE GUIDELINES FOR
STATE FURNISHED ELECTRICAL MATERIALS**

Issued by:

Division of Materials Engineering and Testing Services

Office of Roadway Materials Testing

Electrical Testing Branch

Revision 2 – May 2015

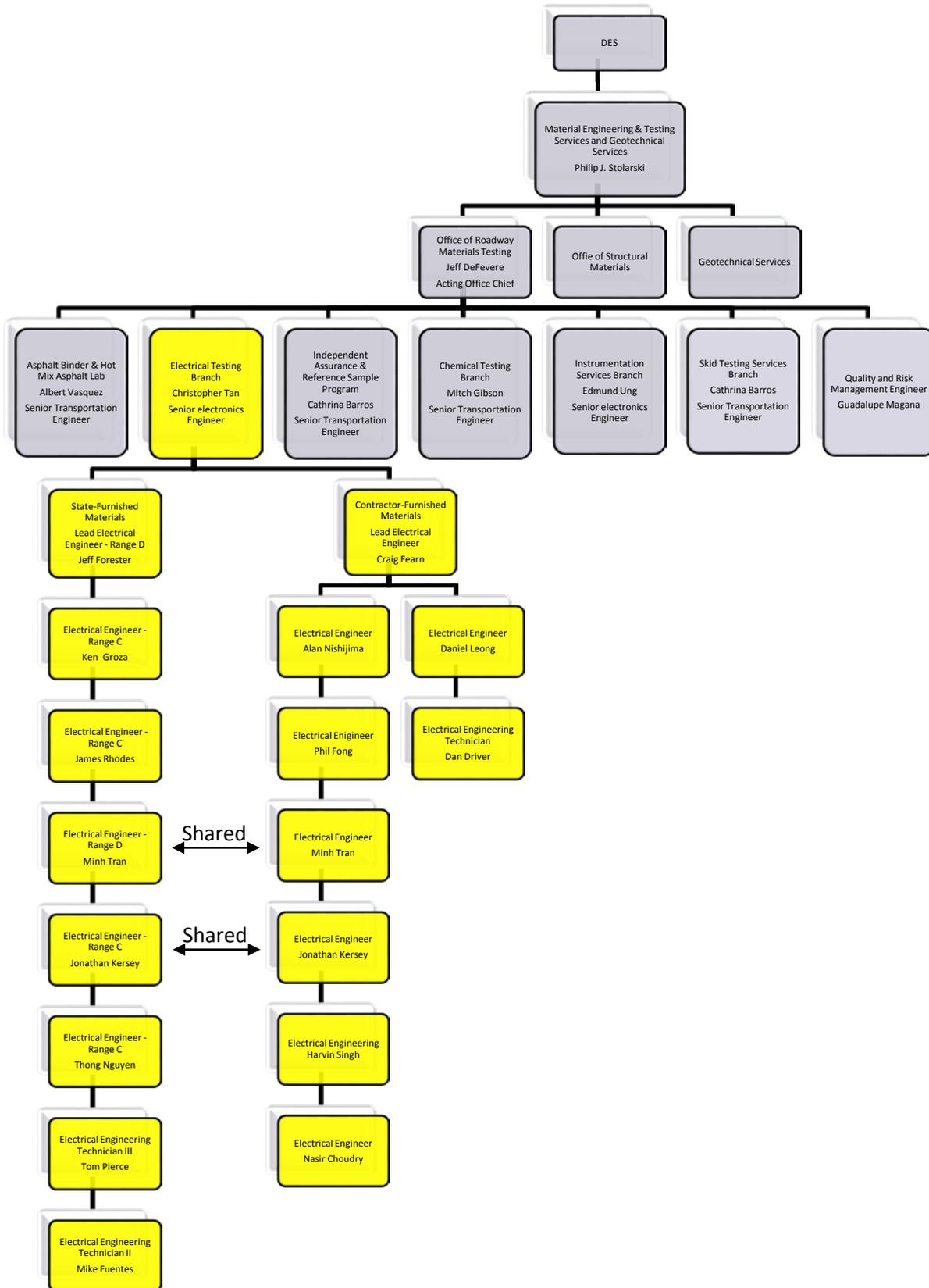
TransLab Staffing

The Electrical QA Testing Branch is part of the Roadway Materials Testing Office. It is staffed by electrical engineers and engineering technicians (electrical). Most of the work is performed in a laboratory environment, with material being shipped to the TransLab for testing. The TransLab also tests certain materials at the point of fabrication, and in a few instances at the point of use.

The branch is led by a Senior Electronics Engineer. Reporting to the senior are two lead engineers. These two lead engineers guide the day to day testing provided by an additional seven electrical engineers and five electrical engineering technicians.

The Electrical QA Testing Branch supports two programs, Contractor Furnished Materials (CFM), and State Furnished Materials (SFM). These two programs are ultimately linked together in that they both support capital construction projects. The difference being, CFM uses electrical materials that are procured and supplied to the project by the electrical contractor on the job and SFM uses electrical materials that are procured by the Caltrans Office of Procurement and Contracts and warehoused at the State Warehouse. When those materials are needed, they are provided to either Caltrans electrical crews or the electrical contractor on the job site. This manual will focus on the functioning of the SFM Electrical QA Program.

Electrical Testing Branch Organizational Chart



The Function of the TransLab SFM Electrical QA Program

It is first important to stress that the TransLab performs Quality Assurance (QA) testing, not Quality Control (QC). This brings up a question. What is the difference between QA and QC?

Quality Control can be simply defined as the operational techniques and activities that are used to fulfill the requirements for a quality product. Quality Assurance can likewise be simply defined as planned and systematic activities implemented to provide adequate confidence that an entity will fulfill requirements for a quality product.¹

The TransLab tests products that have been designed and manufactured by the companies that we do business with. It is these entities that the TransLab expects to manufacture a quality product. The TransLab therefore performs random sample QA testing to ensure that these manufacturers maintain a certain level of quality. It is the manufacturers that must maintain an adequate QC program. The manufacturer will also have its own in-house QA program that must be allowed to function independently from the QC processes of manufacturing. The QC process tends to be reactive and responds as it finds defects while the QA process tends to be proactive and geared toward preventing defects in the first place by identifying trends that may adversely affect quality.

It is the goal and the policy of the TransLab SFM Electrical QA team to ensure that all electrical materials (under our jurisdiction), that are used out on the state highways are of the highest possible quality and that they operate and perform at a level as specified by the **Caltrans Transportation Electrical Equipment Specifications (TEES) – March, 12, 2009**, and all Errata. In addition to these specifications, we also rely upon other documents for the internal operation of program, most notably, the **ANSI/ASQ Z1.4-2008 Sample Test Tables**, and a library of Test Procedures, QA Test Guidelines and California Test Methods that vary from single sheet, quick reference guides, to larger booklet type comprehensive manuals. These guides, manuals, and test tables are available in a document called "**Electrical QA Testing Guidelines, Procedures and Methods**", as well as other separate documents. A full listing of these documents is included at the end of this manual.

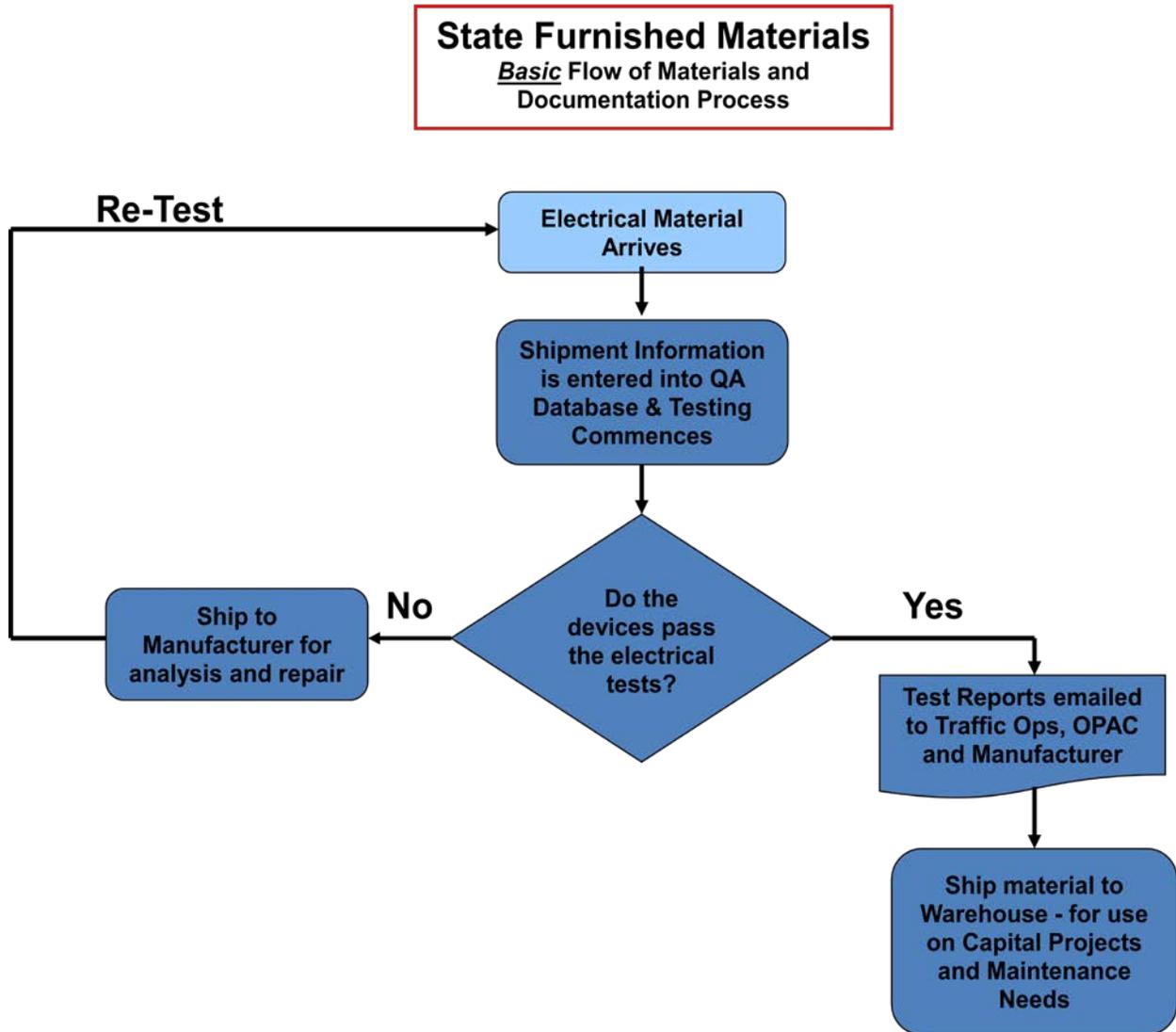
State Furnished Materials will normally have a 30 day limit, from receipt of modules to the issuance of a test report. These SFM devices are purchased in large quantities for warehousing, and is requested for given contracts when the need construction process is ready to install. Maintenance also uses warehoused SFM devices for replacement of worn material, knockdowns and scheduled maintenance replacement.

¹ ISO 9000 Definition

State Furnished Materials Tested by the TransLab

- Model 332L/342LX Traffic Signal Cabinets
- Model 334L/344LX Ramp Meter Cabinets
- Model 336L/346LX Traffic Signal Cabinets
- Model 206L/206LS Power Supplies
- Battery Backup Systems
- External Battery Cabinets (Maintenance Only)
- Model 2070E Traffic Controllers
- Model 2070-7A Communication Modules
- Model 170E Traffic Controllers
- Model 412C PROM Module
- Model 208/210 Conflict Monitors
- Model 222/232 Inductive/Magnetic Detectors
- Model 231 Magnetic Probes
- Model 242L/252 DC/AC Isolators
- Model 200/204 Switch Pack/Flashers
- Model 400 MODEMS and variants
- Model 2070-6A/B MODEMS and variants
- Model 500/510/520 Changeable Message Signs
- Model 710 - Advanced Variable Message Signs
- LED CMS Pixel Matrix Module
- LED Traffic Signals (Maintenance Only)
- LED Luminaires (Maintenance Only)

SFM Electrical QA Testing Methodology



State Furnished Materials Testing

The flowchart, shown above, is a simplified representation of the State Furnished Materials testing and reporting protocol. When electrical material arrives at the TransLab from the manufacturer, it begins a 30 day clock for us to fully test and make our reports. All information, including manufacturer name, vendor – if applicable, receive dates, serial number, test data and whether or not the material is accepted or rejected is captured in our QA Database, which is a Filemaker v. 9 formatted database. This will be explained in more detail later. A hardcopy of all test reports, shipping documents, data collected during testing, and packing lists that were shipped with the material is kept on file. The final test report is also transmitted to the manufacturer and/or vendor and also to Traffic Operations and the Division of Purchasing and Contracts (DPAC). All of these processes will be explained in SOP's where appropriate.

Master Purchase Agreements (MPA)

MPA's are managed by the Department of General Services (DGS). It is through the MPA that all materials for State Furnished Traffic Control Modules are purchased. Below is basic information pertaining to the scope and usage of these contracts.

1. SCOPE

The State's contract with various contractors, provides Traffic Control Modules at contracted pricing to the State of California Department of Transportation (DOT) in accordance with the requirements of Contract # 1-15-63-01A (for instance). The contractor shall supply the entire portfolio of products as identified in the contract and will be the primary point of contact for data collection, reporting, and distribution of Traffic Control Modules to the State.

The contract term is for two (2) years with an option to extend the contract for two (2) additional one (1) year extension period or portion thereof. The terms, conditions, and prices for the contract extension option shall be by mutual agreement between the contractor and the State. If a mutual agreement cannot be met the contract may be terminated at the end of the current contract term.

2. CONTRACT USAGE/RULES

A. State Departments

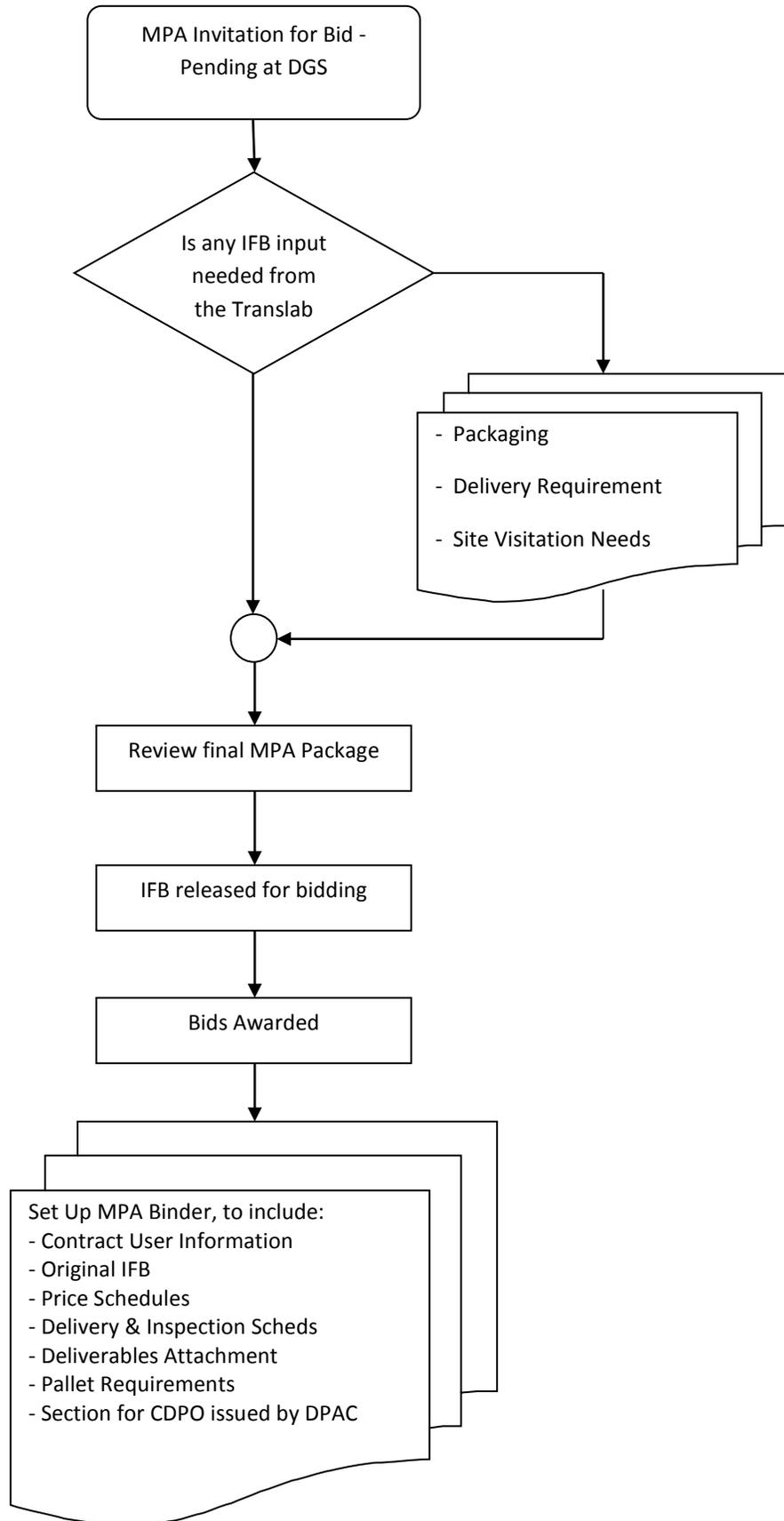
- The use of this contract is mandatory for the California Department of Transportation.
 - Ordering departments must adhere to all applicable State laws, regulations, policies, best practices, and purchasing authority requirements, e.g. California Codes, Code of Regulations, State Administrative Manual, Management Memos, and State Contracting Manual Volume 2 and 3, as applicable.
 - Prior to placing orders against this contract, departments must have been granted non-IT purchasing authority by the Department of General Services, Procurement Division (DGS/PD) for the use of this statewide contract. The department's current purchasing authority number must be entered in the appropriate location on each purchase document. Departments that have not been granted purchasing authority by DGS/PD for the use of the State's statewide contracts may access the Purchasing Authority Application at <http://www.dgs.ca.gov/pd/Resources/publications/SCM2.aspx> or may contact DGS/PD's Purchasing Authority Management Section by e-mail at pams@dgs.ca.gov.
 - Departments must have a Department of General Services (DGS) agency billing code prior to placing orders against this contract. Ordering departments may contact their Purchasing Authority contact or their department's fiscal office to obtain this information.
-

Described on the next two pages is Standard Operating Procedure for how a Master Purchase Agreement is managed by the TransLab.

Master Purchase Agreement (MPA) SOP

- TransLab receives notification that an MPA is pending at DGS.
- The TransLab is asked if we have any special input that needs to be included before the package is released as an Invitation to Bid (IFB).
- If the TransLab has any input, it is typically regarding product packaging updates, delivery requirements and site visitation needs.
- The TransLab is then given the option to review the IFB before it is posted.
- The IFB is released to allow prospective companies to submit their bids.
- DGS evaluates and awards bids to the appropriate vendors/manufacturers.
- All bid packages, documentation and awardees are posted on BidSync.
- TransLab sets up an MPA Binder that is used to collate all MPA information:
 - Contract User Information
 - Original IFB
 - Price Schedules
 - Delivery and Inspection Schedules
 - Deliverables Attachment
 - Pallet Requirement Attachment
 - Section for CDPO's that DPAC will issue on this MPA.

MPA SOP Flowchart



Purchase Orders

It is DPAC that orders material from the various awardees of the MPA, using the standard Purchase Order Purchasing Authority process.

Once DPAC initiates a PO with any given vendor, a copy of the PO is also delivered to the TransLab Electrical QA Office. Per contract, no material will be accepted and paid for until testing has been completed by the TransLab. Typically, the material is not expected to be delivered for testing until 45 days after receipt of order. This time can be shorter or longer depending on the complexity of the material being ordered. This SOP process is shown on pages 11 and 12.

Delivery Locations

The MPA documents state which material gets delivered to where. These locations will be either directly to the TransLab, or to the DPAC Warehouse. This is dependent upon the volume and size of material. The Warehouse has much larger storage capacity than the TransLab. If the material is delivered to the Warehouse, it is the responsibility of the Warehouse to then deliver the sample size to be tested to the TransLab. The only exception to this is for very large and complex Changeable Message Signs. By contract, the manufacturer of these signs are responsible for arranging transportation of TransLab engineers to their facility in order for those materials to be tested at the manufacturer's location. After being successfully tested the signs then get shipped directly to the site where they are intended to be used.

Factory Site Inspections

One of the MPA documents, excerpt shown on the next page, is available when the items are bid on by vendors, lets them know where the material is to be shipped and if a Site Visit is warranted. There are 3 types of site visits, depending on the material. Some items have no associated site visit requirements.

Site Visit 1 is for a Pre-Production Meeting at the manufacturers facility prior to delivery of any materials. These meetings are paid for by the manufacturer and are accounted for in the price of the contract.

Site Visit 2 is for routine testing and inspection of all Changeable Message Signs. Again, these inspection trips are to be paid by the manufacturer.

Site Visit 3 is only for when shipments of material being tested at the TransLab are being rejected and an evaluation of how the manufacturer is testing their product is called for. If this visit is needed, again, it is to be paid for by the manufacturer.

Attachment 3 - Delivery and Inspection Schedule (Part of MPA)

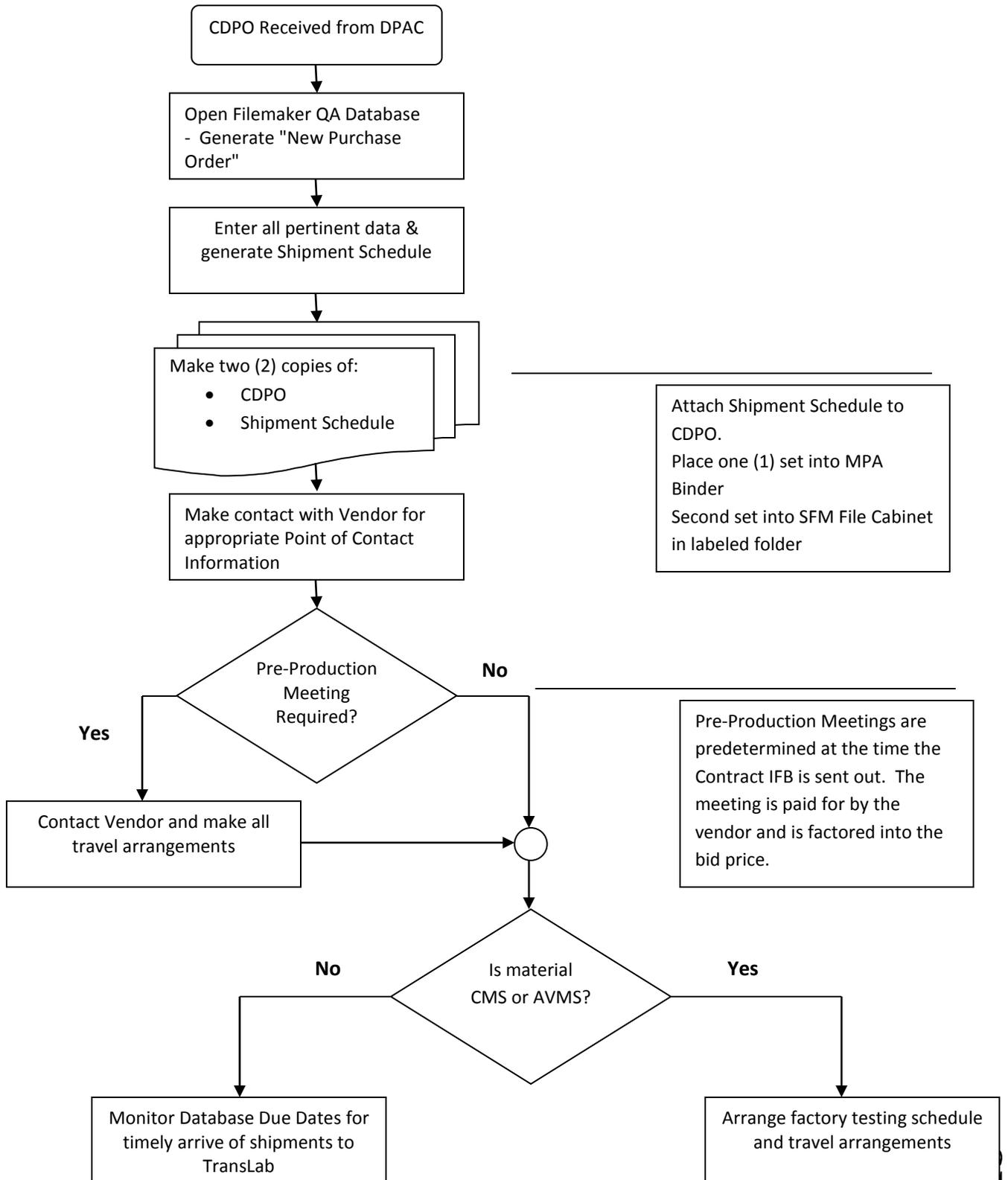
	A	B	C	D	E	F
1						
2	Contract Line Item Number	Commodity Description	Initial Purchase Order Delivery Instructions	Subsequent Orders Delivery Instructions	Delivery Location	Site Visit #
3	G1-1	Module Traffic Control System, Model 170E Controller (DOT #7440-0173-4)	Monthly Delivery 25 Units. First delivery shall be within 60 days ARO. Following delivery shall be sent within 30 days upon notification of successful testing by the Department Translab. Deliveries shall be sent in lots of 25 units per shipment.		DOT Warehouse Shipping and Receiving 2001 Evergreen Street Sacramento, CA 95818	Site Visit #3
4	G1-2	Program Module Traffic, Model 412C (DOT #7440-0576-0)	Semi-Annual Delivery 75 Units. First delivery shall be within 60 days ARO. Deliveries shall be 75 every six months in lots of 75 per shipment.		Division of Materials Engineering & Testing Services 5900 Folsom Blvd. Sacramento, CA 95819 Attn: Jeff Forester	Site Visit #3
5	G1-3	Module Traffic Control System, EPROM Chip UVE Prom 27256 (DOT #7440-0581-0)	Semi-Annual Delivery 125 Units. First delivery shall be within 60 days ARO. Deliveries shall be 125 every six months in lots of 125 per shipment.		DOT Warehouse Shipping and Receiving 2001 Evergreen Street Sacramento, CA 95818	
6						
44	G12-1	Battery Back Up System (BBS) Inverter, Type II (DOT#7440-0673-5)	Monthly Delivery 45 Units. First delivery shall be within 60 days ARO. Following delivery shall be sent within 30 days upon notification of successful testing by the Department Translab. Deliveries shall be sent in lots of 45 units per shipment.	Note: The BBS shall be delivered without batteries. Each BBS shall be packed into a single box. The shipping shall comply with the Standard California pallet specification of no higher than 54" on a 42" x 42" pallet and shrink wrapped. Individual components may be boxed separately and included in the BBS box.	DOT Warehouse Shipping and Receiving 2001 Evergreen Street Sacramento, CA 95829	Site Visit #1
45						
46	G13-1	External Battery Back Up System Cabinet (DOT #7440-0672-3)	Monthly Delivery 45 Units. First delivery shall be within 60 days ARO. Following delivery shall be sent within 30 days upon notification of successful testing by the Department Translab. Deliveries shall be sent in lots of 45 units per shipment.		DOT Warehouse Shipping and Receiving 2001 Evergreen Street Sacramento, CA 95829	Site Visit #3
47						
48	G14-1	Module Traffic Control System, CMS Model 500 (Right Hand) or (Left Hand) With CMS Cabinet, Harness #4 & #5 (DOT #7440-0175-9)	Annual Delivery 40 Units. First delivery shall be within 120 days ARO. Following delivery shall be sent within 30 days upon notification of successful testing by the Department Translab. Deliveries shall be sent in lots of 40 units per shipment.		DOT Warehouse Shipping and Receiving 2001 Evergreen Street Sacramento, CA 95829	Site Visit #1, Site Visit #2

This table indicates the Model Numbers, CT#'s and Delivery schedule / quantities of each product. Also shown are any additional instructions, the delivery location and if a Site Visit is required and what type.

CDPO Check-In SOP

- TransLab receives copy of CDPO issued to Vendor.
- Open Filemaker QA Database - SF Inspections/Purchase Orders/Purchase Orders (Admin Options).
- Generate a "New Purchase Order".
- Enter all pertinent data into the appropriate fields.
- Generate a Shipment Schedule.
- Make copies of both CDPO and Shipment Schedule. Place one copy into the MPA Binder, and another copy into the SFM File Cabinet in a labeled hanging letter folder.
- If this is the first PO from a new vendor, make contact with vendor and find out all of the Points of Contact within the company. This will be used for cc information on test reports.
- If this is the first PO of an MPA and the product being purchased requires a Pre-Production Meeting, make arrangements with the vendor.
- If the material is a CMS or AVMS, arrange factory testing schedule with the manufacturer.
- All else, monitor due dates for timely shipment of materials.

CDPO Check-In SOP Flowchart



Sample Testing Plan

The table below indicates the number of samples to test on various State Furnished electrical materials as well as the acceptance and rejection criteria for that testing. State furnished devices, unlike contractor furnished devices can easily reach lot sizes of 500 – 1200.

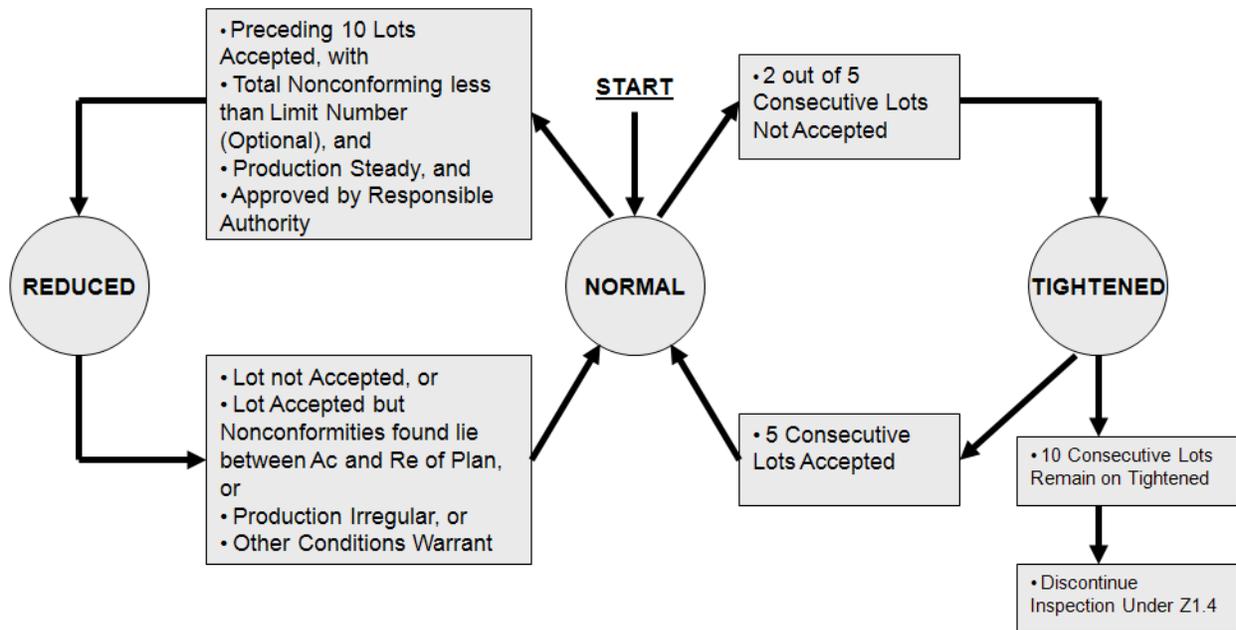
SFM Normal Sampling Plan (ANSI/ASQ Z1.4 – 2008 Lot Random Sampling)
REVISION 9, February 2015 (2015 MPA Starting Table)

Description	Lot or Shipment Size	Testing Sample Size	Critical			Major			Minor		
			AQL	Acc	Rej	AQL	Acc	Rej	AQL	Acc	Rej
Power Dist. Assembly (PDA 2,3,4) Controller (170E) Power Supply (206) Cabinets (332,334) Watch Dog Monitor (208) Program Module (412C)	2 – 8	2	1.0	0	1	2.5	0	1	6.5	0	1
	9 – 15	3	1.0	0	1	2.5	0	1	6.5	0	1
	16 – 25	5	1.0	0	1	2.5	0	1	6.5	1	2
	26 – 50	8	1.0	0	1	2.5	0	1	6.5	1	2
	51 – 90	13	1.0	0	1	2.5	1	2	6.5	2	3
	91 – 150	20	1.0	0	1	2.5	1	2	6.5	3	4
Battery Backup System	26 – 50	8	1.5	0	1	4.0	1	2	10	2	3
	51 – 90	13	1.5	0	1	4.0	1	2	10	3	4
	91 – 150	20	1.5	1	2	4.0	2	3	10	5	6
	151 – 280	32	1.5	1	2	4.0	3	4	10	7	8
Modems (400, 2070-6A & 6B) Serial Comm (2070-7A) Flasher (204) Switch Pack (200) Loop Detector (222,224) Mag. Det./Element (232,234/231) DC & AC Isolator (242, 252) LED Signals	2 – 8	2	1.5	0	1	2.5	0	1	6.5	0	1
	9 – 15	3	1.5	0	1	2.5	0	1	6.5	0	1
	16 – 25	5	1.5	0	1	2.5	0	1	6.5	1	2
	26 – 50	8	1.5	0	1	2.5	0	1	6.5	1	2
	51 – 90	13	1.5	0	1	2.5	1	2	6.5	2	3
	91 – 150	20	1.5	1	2	2.5	1	2	6.5	3	4
	151 – 280	32	1.5	1	2	2.5	2	3	6.5	5	6
	281 – 500	50	1.5	2	3	2.5	3	4	6.5	7	8
	501 – 1200	80	1.5	3	4	2.5	5	6	6.5	10	11
1201 – 3200	125	1.5	5	6	2.5	7	8	6.5	14	15	
Controllers (2070L & 2070E)	2 – 8	2	2.5	0	1	4.0	0	1	6.5	0	1
	9 – 15	3	2.5	0	1	4.0	0	1	6.5	0	1
	16 – 25	5	2.5	0	1	4.0	0	1	6.5	1	2
	26 – 50	8	2.5	0	1	4.0	1	2	6.5	1	2
	51 – 90	13	2.5	1	2	4.0	1	2	6.5	2	3
	91 – 150	20	2.5	1	2	4.0	2	3	6.5	3	4
Conflict Monitor (210) (General Inspection III)	3 – 8	3	1.0	0	1	1.0	0	1	1.0	0	1
	9 – 15	5	1.0	0	1	1.0	0	1	1.0	0	1
	16 – 25	8	1.0	0	1	1.0	0	1	1.0	0	1
	26 – 50	13	1.0	0	1	1.0	0	1	1.0	0	1
	51 – 90	20	1.0	0	1	1.0	0	1	1.0	0	1
	91 – 150	32	1.0	1	2	1.0	1	2	1.0	1	2

Because of the large volumes of materials that are purchased by DPAC (up to 50,000 devices per year), the TransLab sample tests each batch, or shipment that arrives. This is mostly applicable to the State Furnished Material program which purchases materials in large batch quantities. The table show above was developed using the ANSI document and by reaching an agreement between the TransLab and Traffic Operations on what sort of minimum Acceptable Quality Level (AQL) can be tolerated. For example, if the TransLab receives a shipment of 100 Model 2070E Controllers, the sample test size will be 20. The entire shipment can be considered acceptable so long as no more than 1 critical failure, 2 major failures or 3 minor failures are identified by testing. The **Acc** column is the maximum number of failures that allow the shipment to be considered compliant, where the **Rej** column is the number of failures that causes entire shipment to be rejected as noncompliant.

<u>ANSI Z1.4-2008 Definitions</u>	<u>Failure Categories</u>
<ul style="list-style-type: none"> • Lot or Shipment Size – Each lot or batch shall, as far as is practicable, consist of units of product of a single type, grade, class, size, and composition, manufactured under essentially the same conditions, and at essentially the same time. • Presentation of Lots or Shipments – The formation of the lots or shipments and the manner in which each lot or shipment is to be presented and identified by the supplier shall be designated or approved under Caltrans authority. It is preferred that each unit in a given shipment is packaged in a separate box, which may then be packaged inside a larger shipping carton. Shipments shall be delivered in production lot order. Each unit from a single lot shall be permanently marked or labeled with a unique, consecutive, sequential serial number and the production date. A list of unit production dates and unit serial numbers contained within the shipping carton shall be affixed to the outside of every shipping carton. Each carton shall be marked with the supplier's name and the purchase order number. Each shipment shall include a packing list with all serial numbers listed. • Initiation of Inspection – Normal inspection criteria will be used at the start of inspection. Caltrans inspectors may modify this to either reduced or tightened inspection criteria depending on historical test data collected. 	<ul style="list-style-type: none"> • AQL – Acceptable Quality Level – is the maximum percent non-conforming that, for purposes of sampling inspection, can be considered satisfactory as a process average. As long as the samples selected do not exceed the rejection quantity, it can be expected that the non-conforming units in the lot or shipment shall not exceed the given percentage. • Critical – Nonconformity of such a nature as to seriously impair the functioning of the unit or present a serious safety concern. It is to be expected that a critical non-conformity would be present on all units in a given shipment. • Major – Nonconformity of such a nature that major points of the specification are violated, may or may not impair the units function or present a serious safety concern. A major non-conformity would most likely not be present on all units in a given shipment. • Minor – Nonconformity of such a nature where the only concerns are those of cosmetic appearance or other general issues minimal concern. For example, labels that have fallen off or a broken connector, etc.

The above definitions describe some of the terms used in the Sample Test Plan charts. On very complex traffic control devices, especially when the device is of a new design based on new specifications, the policy is to not use the Sample Plan and instead test at 100%, with the anticipation that after several shipments the rejection rate will drop to below the AQL levels cited in the Normal Sample Plan. Once that occurs, testing then reverts to “Normal”.



Testing generally begins using the Normal Sampling Plan. If the conditions, described above, warrant, the testing will then switch to either reduced testing or tightened testing. Reduced testing is applicable when there is a high confidence in the materials being delivered, as indicated by a successful testing track record. Reduced testing greatly reduces the number of samples that must be tested per shipment. Tightened testing is applicable when there are high numbers of defects that are causing the shipments to fail.

Whenever testing results in failures, depending on the severity, the manufacturer will be required to analyze the nature and cause of the failure and to submit a formal Failure Analysis document on company letterhead and signed by a responsible officer of the company.

Tables have also been developed to handle both Reduced Testing and Tightened Testing.

Testing will follow carefully derived steps that are indicated in the TransLab developed Electrical QA Test Procedures, Guidelines and Test Methods. Each of these test documents concisely indicate what test equipment is necessary, how to set up for the test, including all of the connections to be made and how to align each of the required pieces of test equipment. The test documents then describe in sufficient detail all of the measurements that must be made and what is considered a normal and abnormal measurement. In many cases there are supporting tables in which to write down measurements for future reference, especially when generating a Test Report. In the cases that there are not, it is sufficient to document any pertinent observations into the body of the Test Report. With very few exceptions, measurements that are made with the test equipment are not required to be quantitatively precise and therefore, it is not usually necessary to keep test equipment constantly calibrated to ANSI standards. Again, all of these test documents are kept together in a Laboratory Binder for general reference. The Test Reports that are generated are also kept on file for at least 5 years.

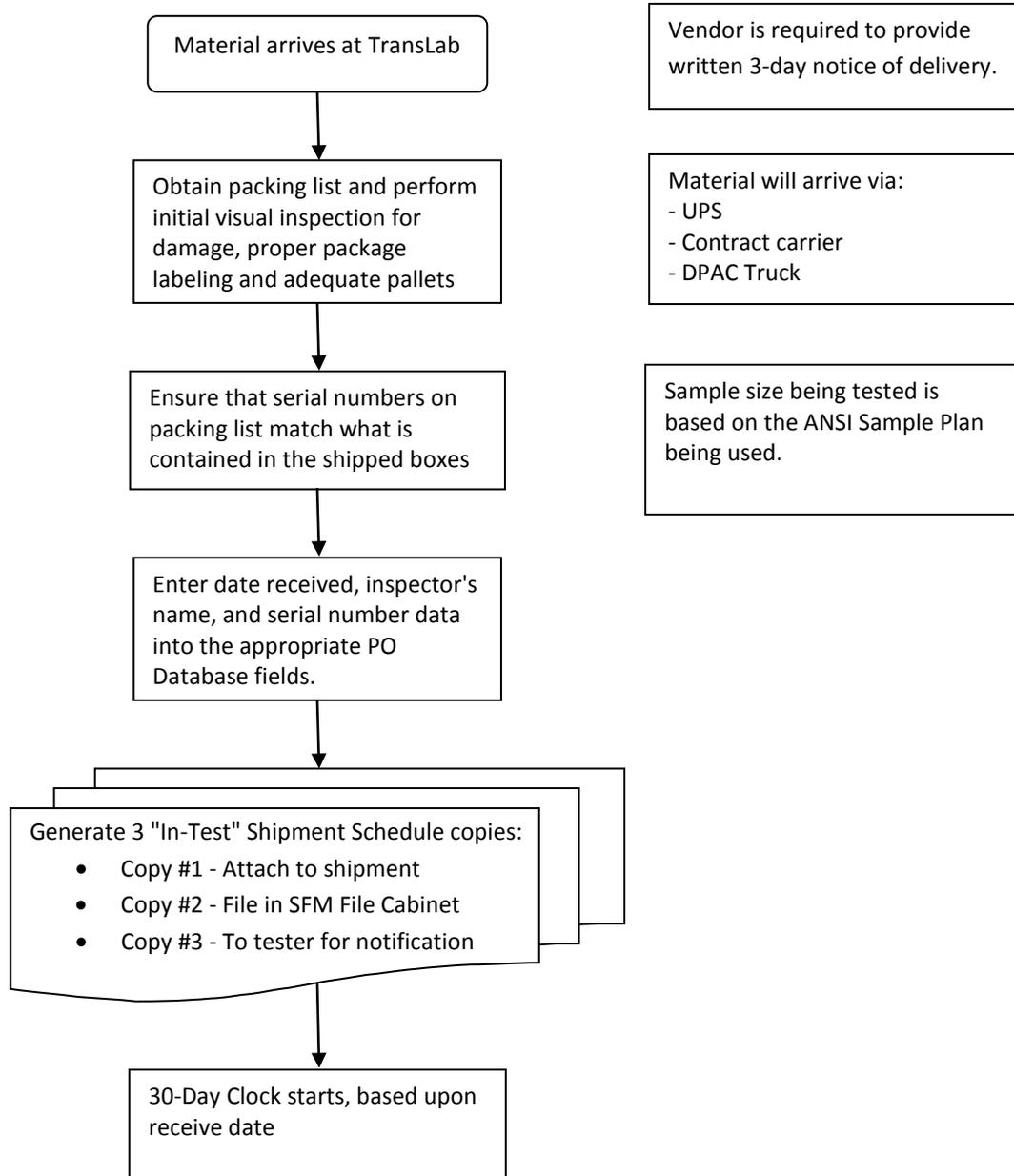
There are generally two steps involved in the testing process. The first step is when the material actually shows up at the TransLab and is processed in. This is typically performed by the SFM Lead Engineer and then assigned to a Test Engineer / Technician. The second step is for the test personnel to actually perform the testing and then to document and generate a test report that can be sent to all of our customers to notify them of the results and also enable payment to be made to vendors, if the equipment is compliant.

Shown on the next several pages are first, the Traffic Signal Module Check-In SOP and Flowchart, and then the Traffic Signal Module Testing SOP and Flowchart.

Traffic Signal Module Check-In SOP

- TransLab receives minimum 3-day notification of arriving material from the vendor.
- Material will arrive via either UPS direct from vendor, or via truck from Warehouse delivering a sample of the shipment - based on ANSI Sample Plan being used.
- Obtain packing slip from shipment.
- Inspect boxes for damage and for proper labeling and packaging.
- If material is shipped on pallets, ensure that pallets meet the Caltrans pallet spec.
- Ensure that serial number list on packing slip matches what is labeled on the boxes and that what is inside of the boxes matches what is labeled on the boxes.
- Enter date received, inspector names and serial number data into the appropriate Purchase Order Database fields.
- Generate three (3) copies of the "In-Test" Shipment Schedule form.
- Copy #1 gets attached to the incoming shipment for identification (shown after the SOP Flowchart on the following page).
- Copy #2 gets attached to the packing slip and placed in the SFM File Cabinet under the matching CDPO number.
- Copy #3 get routed to the test technician/engineer
- 30 day clock is started, based upon the received date that was entered.

Traffic Signal Module Check-In SOP Flowchart



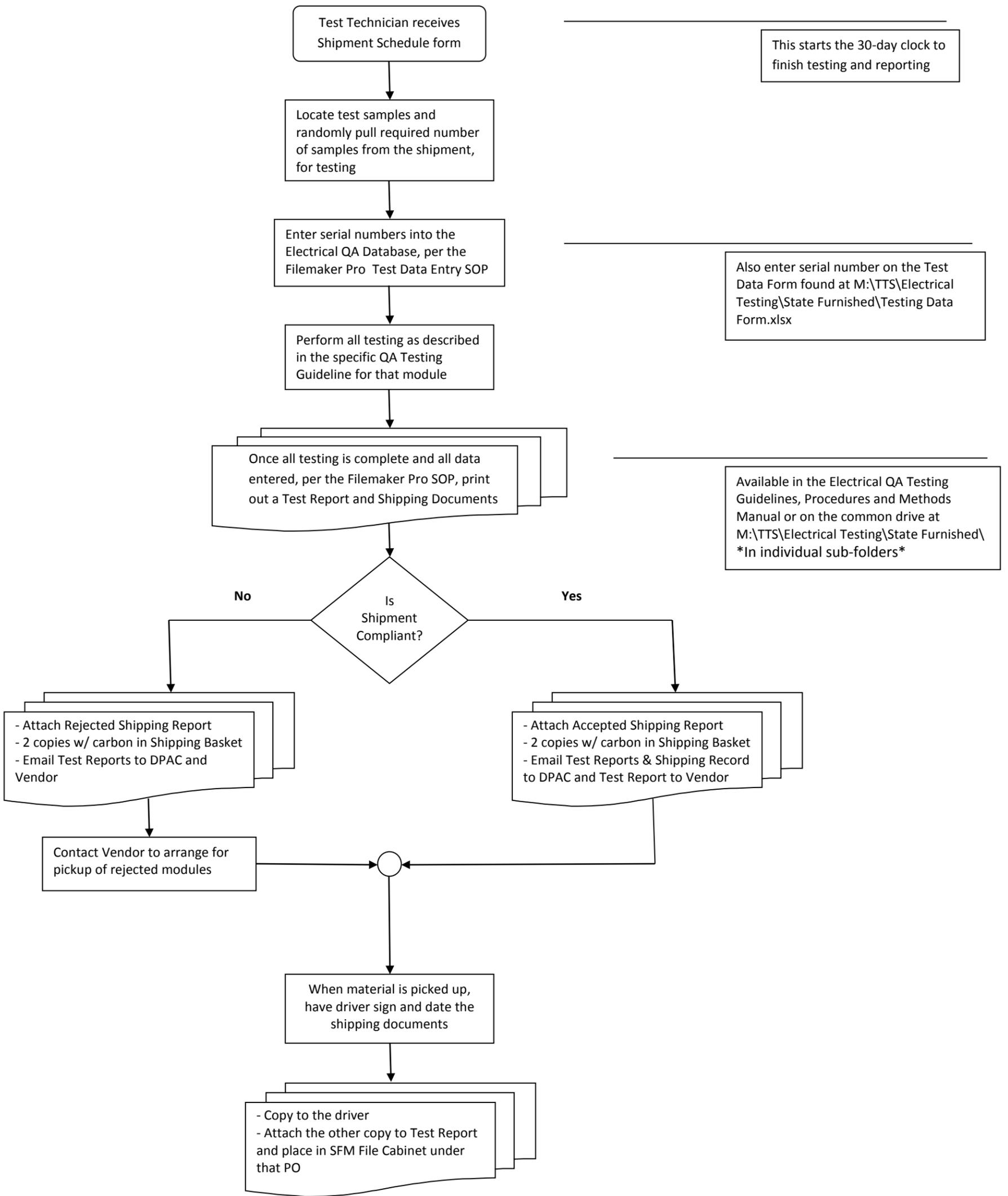
State Furnished Electrical Equipment Purchase Order (PO) Database Shipment Schedule													
MAIN MENU													
PO Main Menu													
Print		Enter New Shipment											
Assigned To													
Mike Fuentes													
PO Number		PO Date		Total Qty		Device		Vendor					
16150000027 - 1		8/15/2014		2500		222		Western Pacific Signal					
Shipment	Status	Scheduled Qty	Expected Date	Delivered Qty	Received Date	Due Date	Complete Date	Compliance Date	Tester Initials	Qty Tested	Qty Passed	Qty Failed	
View	1 A	Complete	500	10/14/2014	500	11/24/2014	12/24/2014	12/17/2014	12/17/2014	MF	8	500	0
View	2 A	Complete	500	11/13/2014	500	1/9/2015	2/8/2015	1/16/2015	1/16/2015	MF	8	500	0
View	3 A	Complete	500	12/13/2014	500	2/26/2015	3/28/2015	3/27/2015	3/27/2015	MF	50	500	0
View	4 A	In-Test	500	1/12/2015	500	4/27/2015	5/27/2015			MF	50	0	0
View	5 A	Expected	500	2/11/2015							0	0	0
Totals:		Scheduled Qty		Delivered Qty						Qty Tested	Qty Passed	Qty Failed	
		2500		2000						116	1500	0	

This is the Shipment Schedule that gets filed with the packing list that comes with modules that are shipped from our Vendors and that also get attached to the outside of the shipment by the TransLab for purposes of identification of the material, and the tester, and critical information, such as the receive date and the date that completion of testing and reporting is due.

Traffic Signal Module Testing SOP

- When Test Technician receives copy of Shipment Schedule form, the 30-day clock to finish testing and reporting is started.
- Locate test samples. They will have an identical Shipment Schedule form attached.
- Randomly pull required number of samples from the shipment, as indicated on the Shipment Schedule.
- Enter the sample serial numbers into the Electrical QA Test Form (M:\TTS\Electrical Testing\State Furnished\Testing Data Form.xlsx), per the Filemaker Pro Electrical QA Database SOP.
- Perform testing as described in the appropriate QA Testing Guideline for that particular module.
- Once all testing is complete and all data is entered into the QA Database, per the Filemaker Pro - Inspector Test Data Entry SOP, print out all required test reports and shipping documents.
- If the Modules are to be accepted, attach the Accepted Shipping Document to the shipment for identification. Place two other copies of the Accepted Shipping Document with a piece of carbon paper between them, into the SFM Outgoing Shipping Basket.
- Email a copy of the test report and the shipping document to DPAC. This is the mechanism for initiating a pickup.
- Also email a copy of the test report to the vendor.
- When the material is picked up, either by DPAC personnel or the Contract Shipper, have the shipping document signed by the driver and dated.
- One copy is given to the driver. The other copy will be attached to the Test Report and placed into the SFM File Cabinet in the hanging folder marked with the same Purchase Order Number.
- If the Modules are to be rejected, the process is the same, except that Rejected Shipping Documents will be printed out instead.
- Also, in this case, DPAC will not generally be picking up the material.
- However, DPAC will still need a copy of the Test Report.
- Arrangements will need to be made with the Vendor to get material returned for repair.
- Once the Modules get repaired and returned by the Vendor, those will be handled as a Re-Test.

Traffic Signal Module Testing SOP Flowchart



Filemaker SFM QA Electrical Database Information

PO Number 16140000015 - 1 Shipment # 1 A Date Received 6/5/2014	<div style="border: 1px solid black; padding: 2px; display: inline-block; background-color: #e0e0e0;"> Complete </div>	# of Boxes: to OPAC <input type="text" value="36"/> to Vendor <input type="text" value="0"/>						
<p style="color: red; font-weight: bold; margin: 0;">A space MUST follow all commas and separate all dashes</p>		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Tester</td> <td style="width: 33%;">Test Hrs</td> <td style="width: 33%;">ReTest Hrs</td> </tr> <tr> <td><input type="text" value="KG"/></td> <td><input type="text" value="50"/></td> <td><input type="text"/></td> </tr> </table>	Tester	Test Hrs	ReTest Hrs	<input type="text" value="KG"/>	<input type="text" value="50"/>	<input type="text"/>
Tester	Test Hrs	ReTest Hrs						
<input type="text" value="KG"/>	<input type="text" value="50"/>	<input type="text"/>						
Received Serial #s <input type="text" value="B7355 - B7541"/>	Received Quantity <input type="text" value="187"/>	Manufacturer <input type="text" value="Econolite"/>						
Tested Serial #s <input type="text" value="B7415 - B7438, B7499 - B7510"/>	Tested Quantity <input type="text" value="36"/>	Model # <input type="text" value="2070E"/>						
Passed Serial #s <input type="text" value="B7355 - B7541"/>	Passed Quantity <input type="text" value="36"/>	Dates: Compliance: <input type="text" value="7/3/2014"/> Complete: <input type="text" value="7/3/2014"/>						
Failed Serial #s <input type="text"/>	Failed Quantity <input type="text" value="0"/>	* If rejecting the entire shipment, enter the "Complete Date" <u>only</u> . If accepting the shipment, enter both dates.						
Test Report: Signed By: <input type="text" value="Ken Groza"/> Signed Title: <input type="text" value="Transportation Engineer, Electrical"/>								

Test Report Comments Return to Testing Menu

Econolite Model 2070E Controller Unit w/ 1E CPU Module, 4A Power Supply, 2E Field I/O, and 8Mbit 3.3V Datakey

Documentation: 1 Manual included per box.

Controller Units tested as follows:
 * Using Caltrans Volume I Production Acceptance Testing Manual, rev. 9/2010
 * All units physically inspected for quality workmanship.
 * All units tested for high voltage transient suppression compliance (2KV) while running TSCP Ver. 2.04.
 * All units tested with Diagnostic Acceptance Testing Program with Checksum 0CA9 at -37degC and +74degC.

Results:
 Units comply
 Image Build Version 1.3.0.0.923.0
 Check sum 203B-7F5D

The above form is a sample of how all State Furnished material testing results gets entered and formatted. This provides a method of standardized input for all materials. The comments field also prefaced by an opening header paragraph that is also standardized for the particular item under test and includes a reference to the test procedure used to perform the testing. Once all testing is complete and once all information is entered, a standardized Test Report is generated (shown on the following page).

All test reports include pertinent information about the results of the testing, including the PO Number, Shipment Number, Total size of the shipment, the sample size, date of receipt and completion and a list of whom the report was submitted to. It is this test report that is sent to all of our customers at Traffic Operations, DPAC and the Vendor / Manufacturer. A signed Original is kept on file with the Electrical Testing Branch. The following two pages outline the SOP of how the Inspector enters data into the Electrical QA Database, as indicated on the previous page and that generates the Test Report shown on this page.

Purchase Order Test Report

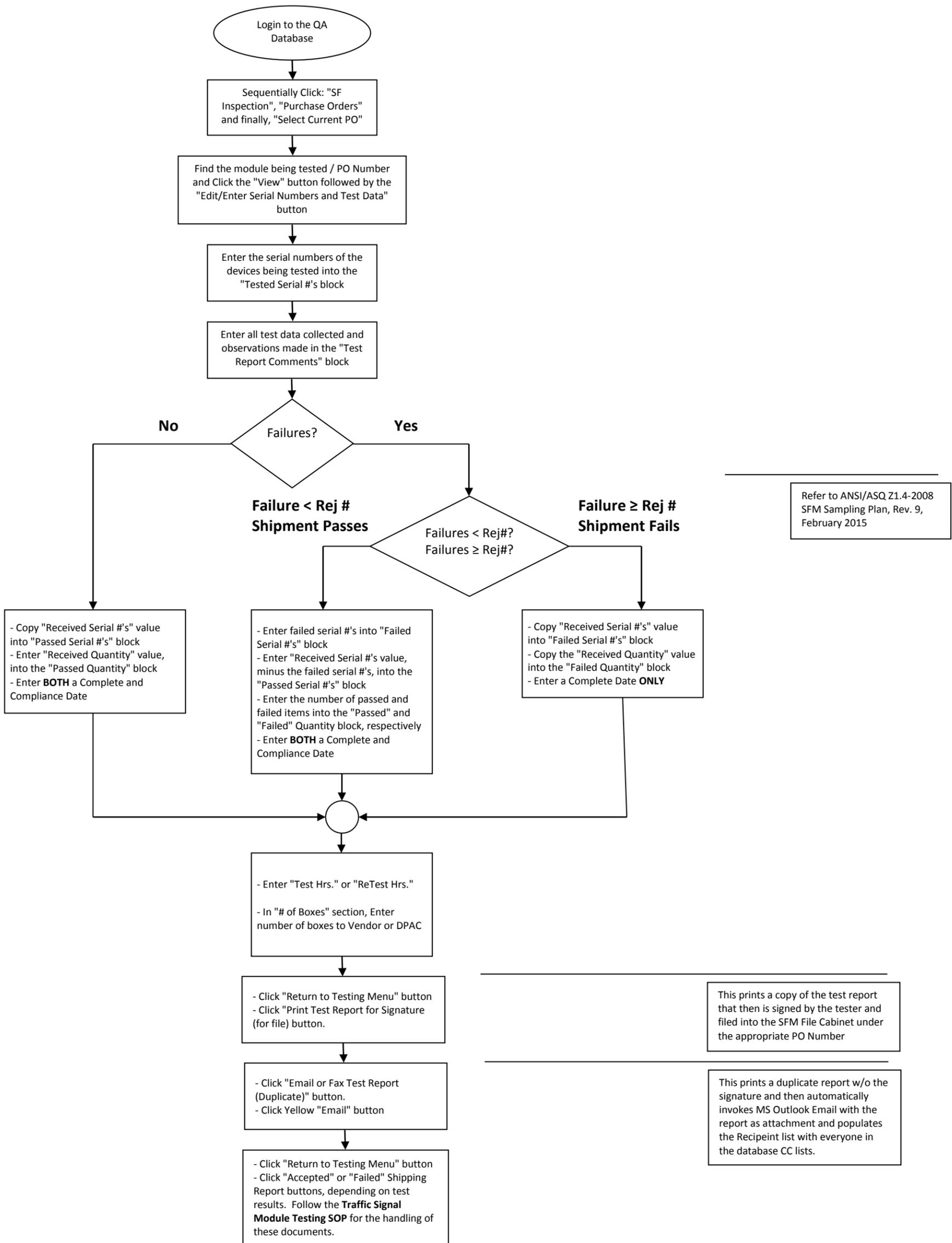
State of California, Department of Transportation Division of Materials Engineering and Testing Services Office of Roadway Materials Testing Electrical Testing Branch 5900 Folsom Blvd. Sacramento, CA 95819		Purchase Order #: 161400000152-1 Shipment #: 1 A Receive Date: 6/5/2014 Vendor Name: City Source Rental & Supply Brand/Device: Econolite / 2070E Description: Advanced Traffic Controller Spec Reference: TEES, July 2009 2009 TEES Errata 1, Jan. 2010	
Tested By: Ken Groza Hours of Test: 50 Re-Test Hours:			
Project: 0000020505	Spec D: 62070T4	Sub Obj: 025	
Total Units in Shipment: 187	Units Sample Tested: 36	Compliant Units: 187	Non-Compliant Units: 0
		Report Completion Date: 7/3/2014	
Serial #'s of Delivered Units: B7355 - B7541		Serial #'s of Tested Units: B7415 - B7438, B7499 - B7510	
Serial #'s of Failed (rejected) Units:			
Test Report Comments: Econolite Model 2070E Controller Unit w/ 1E CPU Module, 4A Power Supply, 2E Field I/O, and 8Mbit 3.3V Datakey Documentation: 1 Manual included per box. Controller Units tested as follows: * Using Caltrans Volume I Production Acceptance Testing Manual, rev. 9/2010 * All units physically inspected for quality workmanship. * All units tested for high voltage transient suppression compliance (2KV) while running TSCP Ver. 2.04. * All units tested with Diagnostic Acceptance Testing Program with Checksum OCA9 at -37degC and +74degC. Results: Units comply Image Build Version 1.3.0.0.923.0 Check sum 203B-7F5D			
SHIPMENT IS COMPLIANT			
Caltran's CCs: Herasmo Iniguez , HQ Traffic Ops Kim Ballard , DPAC Warehouse Mario Chacon Jr. , DPAC Warehouse Tanya Thee , DPAC Warehouse		Vendor/Manufacturer CCs: Diane Leider , Leider Group LLC Marc Lichty , Safetran Traffic	
		Chris Tan, Chief Electrical Testing Branch By: X _____ Ken Groza Transportation Engineer, Electrical	

Electrical Database - Inspector Test Data Entry SOP

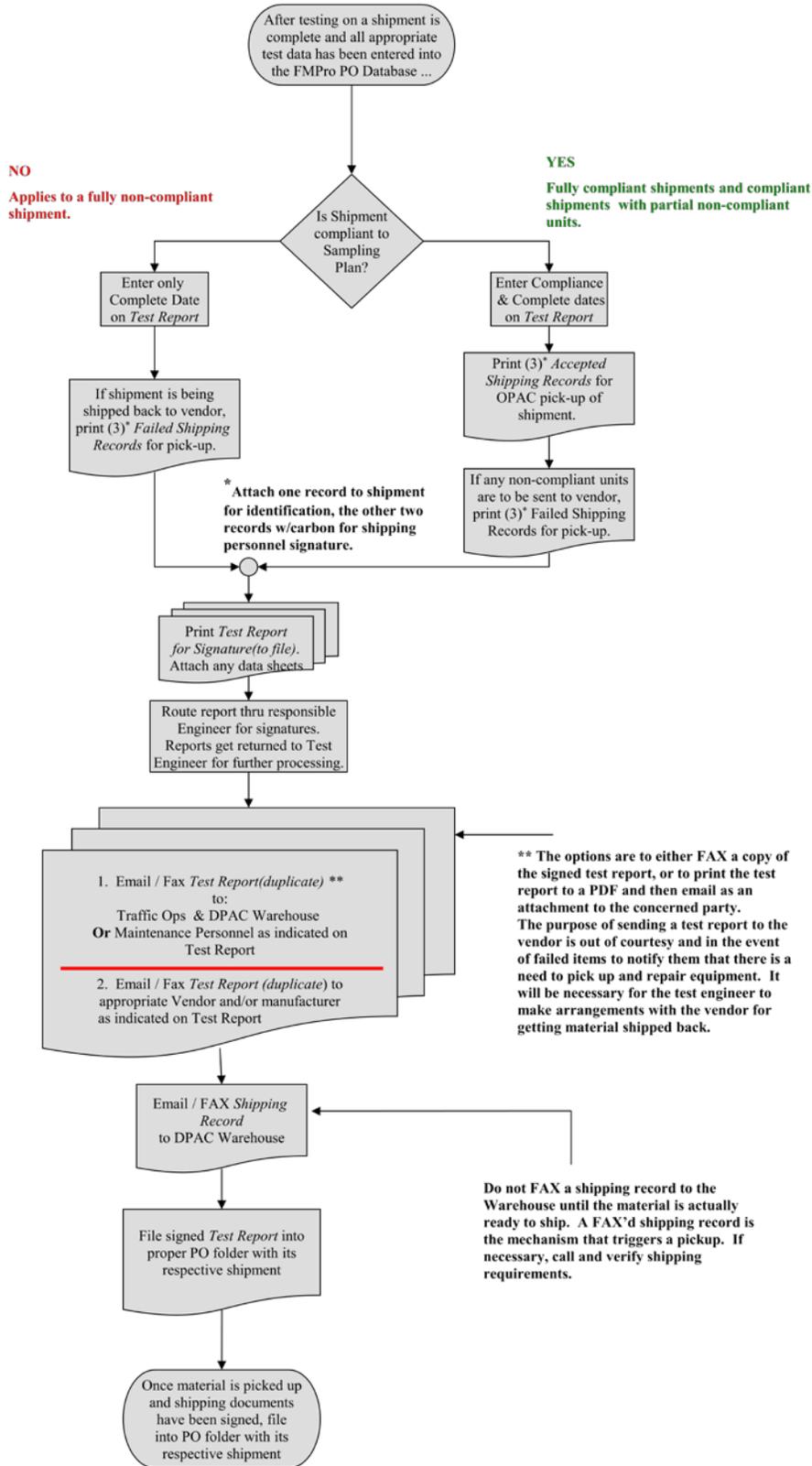
- Login to the QA Database.
- Click the "SF Inspection" button.
- Click the "Purchase Orders" button.
- Click the "Select Current PO" button.
- Find the module being tested & PO Number from the list and click the "View" button.
- Click the "Edit/Enter Serial Numbers and Test Data" button.
- If the "Tested Serial #'s" block is not pre-populated, enter them as described.
- Perform testing as described in the appropriate QA Testing Guideline for that particular module.
- Enter all important test data collected and observations made in the "Test Report Comments" block.
- If no failures are detected, enter the entire serial# range shown in the "Received Serial #'s" block into the "Passed Serial #'s" block, and enter the "Received Quantity" value into the "Passed Quantity" block.
- If there are some failure, but the number of failure is less than the "Rej" number (shown on the ANSI Sample Plan), then enter the failed serial numbers into the "Failed Serial #'s" block, and the quantity into the "Failed Quantity" block.
- Enter dates into both the "Complete" and "Compliance" date blocks. In this case, the shipment is considered compliant, minus the small number of rejected modules.
- If the number of failures does equal or exceed the "Rej" number, the entire shipment must be rejected.
- Enter the entire serial# range shown in the "Received Serial #'s" block into the "Failed Serial #'s" block, and enter the "Received Quantity" value into the "Failed Quantity" block.
- Enter a date into the "Complete" date only. Leave the "Compliant" date block empty.
- Enter the number of hours used for testing into the "Test Hrs" block and the number of boxes to ship back to DPAC or to the Vendor, for any failed units, in the "# of Boxes - To DPAC, and To-Vendor" blocks.
- Click the "Return to Testing Menu" button.
- This set of menu's give the user the ability to print out Test Reports for Signature, to email copies of this Test Report and Shipping Reports to all listed Caltrans customers and Vendor customers.
- Click the "Print Test Report for Signature (for file)" button to print out a copy of the test report.
- This test report gets signed by the tester and filed into the SFM File Cabinet under the appropriate PO Number.
- Click the "Email or Fax Test Report (Duplicate) button. This prints out a duplicate report without the signature.

- Click the Yellow "Email" button. This will automatically start up Microsoft Outlook Email with the test report as an attachment and populate the Recipient list with everyone in the database CC lists.
- Again, click the "Return to Testing Menu" button and then click the "Accepted Shipping Report" or "Failed Shipping Report" button, depending on the testing results. Follow the Traffic Signal Module Testing SOP in the handling of these document.

Electrical Database - Inspector Test Data Entry SOP Flowchart



Purchase Order Test Report Routing Protocol



External Support Documents for the TransLab Electrical QA Program

1. Volume II – Electrical QA Testing Guidelines, Procedures and Methods
2. ANSI/ASQ Z1.4 – 2008 Sampling Procedures and Tables For Inspection By Attributes
3. Transportation Electrical Equipment Specifications (TEES), March 12, 2009
4. TEES 2009 Errata No.1, January 21, 2010
5. TEES 2009 Errata No. 2, December 5, 2014
6. TEES Chapter 4, Battery Backup System, July 7, 2009
7. TEES Chapter 8, Changeable Message Sign System, June 4, 2009
8. Standard Plans and Specifications, May 2006