

INVITATION TO BID

Sealed bids will be received and publicly opened at the office of The Director of Purchasing and Risk Management, 256 West Mountain Avenue, Fort Collins, Colorado 80521, ( P O Box 580, 80522) at the time and date noted on the bid proposal and/or contract documents

Bids must be received at the Office of the Director prior to the opening time (our clock)

SPECIAL INSTRUCTIONS

All bids must be signed by an authorized representative of the company with the legal capacity to bind the company to the agreement. Bids may be withdrawn up to the date and hour set for opening. Once bids have been accepted by the City and opening time has passed, failure to enter into contract or honor the purchase order will be cause for removal of supplier's name from the city of Fort Collins' bidders list for a period of twelve months from the date of the opening. The City may also pursue any remedies available at law or in equity. Bid prices must be held firm for a period of forty-five days after bid openings.

Submission of a bid is deemed as acceptance of all terms, conditions and specifications contained in the City's specifications initially provided to the bidder. Any proposed modification must be accepted in writing by the City prior to award of the bid.

Only bids properly received by the Purchasing Department will be accepted.

No proposal will be accepted from, or any purchase order awarded, to any person, firm or corporation in default on any obligation to the City.

All bids must be labeled with both the project name and bid number indicated on the bid proposal.

Bids must be furnished exclusive of any federal excise tax, wherever applicable.

Bidders must be properly licensed and secure necessary permits wherever applicable.

Vendors not responding to requests for bid shall be removed from our automated listing for the requested commodities/services.

The City may elect where applicable, to award bids on an individual item/group basis or on a total bid basis, whichever is most beneficial to the City. The City reserves the right to accept or reject any and all bids, and to waive any irregularities or informalities.

**Sales Prohibited/Conflict of Interest** No officer, employee, or member of City Council, shall have a financial interest in the sale to the City of any real or personal property, equipment, material, supplies or services where such officer or employee exercises directly or indirectly any decision-making authority concerning such sale or any supervisory authority over the services to be rendered. This rule also applies to subcontracts with the City. Soliciting or accepting any gift, gratuity favor, entertainment, kickback or any items of monetary value from any person who has or is seeking to do business with the City of Fort Collins is prohibited.

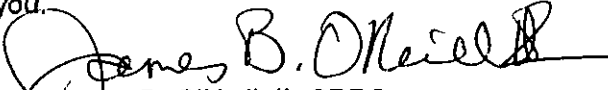
**Freight Terms** Unless otherwise noted, all freight is F O B destination, freight prepaid All freight charges must be included in prices submitted on proposal

**Discounts** Any discounts allowed for prompt payment, etc , must be reflected in bid figures and not entered as separate pricing on the proposal form

**Purchasing Restrictions** Your authorized signature of this bid assures your firm's compliance with the City's purchasing restrictions on cement A copy of the Resolution 91-121 is available for review in the Purchasing Division or the City Clerk's office

**Collusive or Sham Bids** Any bid deemed to be collusive or a sham bid will be rejected and reported to authorities as such Your authorized signature of this bid assures that such bid is genuine and is not a collusive or sham bid

**Bid Results** For information regarding results for individual bids send a self-addressed, self-stamped envelope and a bid tally will be mailed to you.

  
James B O'Neill, II, CPPO  
Director of Purchasing & Risk Management

FIRM NAME \_\_\_\_\_

**CITY OF FORT COLLINS  
BID PROPOSAL  
BID # 5343  
BID OPENING November 25, 1998 - 2 00 p m**

WE HEREBY ENTER OUR BID FOR THE CITY OF FORT COLLINS' REQUIREMENTS FOR **TRANSFORMER, PAD MOUNTED, 300 KVA** PER THE BID INVITATION AND ANY REFERENCED SPECIFICATIONS

**QUANTITY**

**DESCRIPTION**

4 Ea

Transformer, 300 KVA pad-mounted compartmental-type, three phase distribution with separable insulated load break high-voltage connectors High voltage rating 13200 GRDY/7620 Low voltage rating 480Y/277 Serial number 031 to be in accordance with Specification #368-300-031, Revision HH

\$ \_\_\_\_\_ Ea \$ \_\_\_\_\_ Total

Mfr & Mfr # \_\_\_\_\_

Delivery in Weeks \_\_\_\_\_

Desired delivery 10-12 weeks

THE CITY OF FORT COLLINS RESERVES THE RIGHT TO CONSIDER DELIVERY AS A PART OF THE AWARD CRITERIA

The transformers being bid meet or exceed the specifications \_\_\_\_ Yes \_\_\_\_ No If not, please list exceptions, on a separate sheet of paper and attach to your bid

Guaranteed No Load Loss \_\_\_\_\_  
Guaranteed Full Load Loss \_\_\_\_\_  
Guaranteed Total Load Loss \_\_\_\_\_  
Impedance (%) \_\_\_\_\_

Bid 5343

**SUPPLEMENTAL INSTRUCTIONS**

Prices quoted must remain firm for a 30 day period after the opening date

Freight terms F O B destination freight prepaid All freight charges must be included in pricing submitted on proposal and not entered as separate pricing

Any discount allowed by Vendor for prompt payment, etc must be reflected in quoted figure, and not entered as separate pricing

The City reserves the right to accept or reject any and all quotes

Bidder not responding to the services requested in this bid shall be removed from our automated listing for Not applicable

Any questions or inquiries regarding this bid should be directed to

Opal F Dick, CPPO, Senior Buyer, (970) 221-6778

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SIGNATURE AND TITLE

TYPED OR PRINTED NAME AND TITLE

---

COMPANY NAME

(AREA CODE) TELEPHONE NUMBER/FAX NUMBER

---

ADDRESS STREET, CITY, STATE, ZIP

DATE

1 COMMERCIAL DETAILS

Invoice Address To ensure prompt Payment mail invoices in duplicate to
City of Fort Collins Accounting Division
P O Box 580
Fort Collins, CO 80522

Tax exemptions By statute the City of Fort Collins is exempt from state and
local taxes Our Exemption Number is 98-04502 Federal Excise Tax Exemption
Certificate of Registry 84-8000587 is registered with the Collector of Internal
Revenue, Denver, Colorado (Ref Colorado Revised Statutes 1973, Chapter
39-26, 114 (a))

Goods Rejected GOODS REJECTED due to failure to meet specifications, either
when shipped or due to defects of damage in transit, may be returned to you
for credit and are not to be replaced except upon receipt of written instructions
from the City of Fort Collins

Inspection GOODS are subject to the City of Fort Collins inspection on arrival

Final Acceptance Receipt of the merchandise, services or equipment in
response to this order can result in authorized payment on the part of the City
of Fort Collins However, it is to be understood that FINAL ACCEPTANCE is
dependent upon completion of all applicable required inspection procedures

Freight Terms Shipments must be F O B , City of Fort Collins, 700 Wood St ,
Fort Collins, CO 80522, unless otherwise specified on this order If permission
is given to prepay freight and charge separately, the original freight bill must
accompany invoice Additional charges for packing will not be accepted

Shipment Distance Where manufacturers have distributing points in various
parts of the country, shipment is expected from the nearest distribution point
to destination, and excess freight will be deducted from invoice when
shipments are made from greater distance

Permits Seller shall procure at sellers sole cost all necessary permits,
certificates and licenses required by all applicable laws, regulations, ordinances
and rules of the state, municipality, territory or political subdivision where the
work is performed, or required by any other duly constituted public authority
having jurisdiction over the work of vendor Seller further agrees to hold the
City of Fort Collins harmless from and against all liability and loss incurred by
them by reason of an asserted or established violation of any such laws,
regulations, ordinances, rules and requirements

Authorization All parties to this contract agree that the representatives are, in
fact, bona fide and possess full and complete authority to bind said parties
LIMITATION OF TERMS This Purchase Order expressly limits acceptance to
the terms and conditions stated herein set forth and any supplementary or
additional terms and conditions annexed hereto or incorporated herein by
reference Any additional or different terms and conditions proposed by seller
are objected to and hereby rejected

2 DELIVERY

PLEASE ADVISE PURCHASING AGENT immediately if you cannot make
complete shipment to arrive on your promised delivery date as noted Time is
of the essence Delivery and performance must be effected within the time
stated on the purchase order and the documents attached hereto No acts of
the Purchasers including, without limitation, acceptance of partial late
deliveries, shall operate as a waiver of this provision In the event of any delay,
the Purchaser shall have, in addition to other legal and equitable remedies, the
option of placing this order elsewhere and holding the Seller liable for damages
However, the Seller shall not be liable for damages as a result of delays due to
causes not reasonably foreseeable which are beyond its reasonable control and
without its fault of negligence, such acts of God, acts of civil or military
authorities, governmental priorities, fires, strikes, flood, epidemics, wars or
nots provided that notice of the conditions causing such delay is given to the
Purchaser within five (5) days of the time when the Seller first received
knowledge thereof In the event of any such delay, the date of delivery shall
be extended for the period equal to the time actually lost by reason of the
delay

3 WARRANTY

The Seller warrants that all goods, articles, materials and work covered by this
order will conform with applicable drawings, specifications, samples and/or
other descriptions given, will be fit for the purposes intended, and performed
with the highest degree of care and competence in accordance with accepted
standards for work of a similar nature The Seller agrees to hold the purchaser
harmless from any loss, damage or expense which the Purchaser may suffer
or incur on account of the Sellers breach of warranty The Seller shall replace,
repair or make good, without cost to the purchaser, any defects or faults
arising within (3) years or within such longer period of time as may be

prescribed by law or by the terms of any applicable warranty provided by the
Seller after the date of acceptance of the goods furnished hereunder (acceptance
not to be unreasonably delayed), resulting from imperfect or defective work
done or materials furnished by the Seller Acceptance or use of goods by the
Purchaser shall not constitute a waiver of any claim under this warranty Except
as otherwise provided in this purchase order, the Sellers liability hereunder shall
extend to all damages proximately caused by the breach of any of the foregoing
warranties or guarantees, but such liability shall in no event include loss of
profits or loss of use NO IMPLIED WARRANTY OR MERCHANTABILITY OR OF
FITNESS FOR PURPOSE SHALL APPLY

4 CHANGES IN LEGAL TERMS

The Purchaser may make changes to legal terms by written change order

5 CHANGES IN COMMERCIAL TERMS

The Purchaser may make any changes to the terms, other than legal terms,
including additions to or deletions from the quantities originally ordered in the
specifications or drawings, by verbal or written change order If any such
change affects the amount due or the time of performance hereunder, an
equitable adjustment shall be made

6 TERMINATIONS

The Purchaser may at any time by written change order, terminate this
agreement as to any or all portions of the goods then not shipped, subject to
any equitable adjustment between the parties as to any work or materials then
in progress provided that the Purchaser shall not be liable for any claims for
anticipated profits on the uncompleted portion of the goods and/or work, for
incidental or consequential damages, and that no such adjustment be made in
favor of the Seller with respect to any goods which are the Sellers standard
stock No such termination shall relieve the Purchaser or the Seller of any of
their obligations as to any goods delivered hereunder

7 CLAIMS FOR ADJUSTMENT

Any claim for adjustment must be asserted within thirty (30) days from the date
the change or termination is ordered

8 COMPLIANCE WITH LAW

The Seller warrants that all goods sold hereunder shall have been produced,
sold, delivered and furnished in strict compliance with all applicable laws and
regulations to which the goods are subject The Seller shall execute and deliver
such documents as may be required to effect or evidence compliance All laws
and regulations required to be incorporated in agreements of this character are
hereby incorporated herein by this reference The Seller agrees to indemnify and
hold the Purchaser harmless from all costs and damages suffered by the
Purchaser as a result of the Sellers failure to comply with such law

9 ASSIGNMENT

Neither party shall assign, transfer, or convey this order, or any monies due or
to become due hereunder without the prior written consent of the other party

10 TITLE

The Seller warrants full, clear and unrestricted title to the Purchaser for a
equipment, materials, and items furnished in performance of this agreement
free and clear of any and all liens, restrictions, reservations, security interest
encumbrances and claims of others

11 NONWAIVER

Failure of the Purchaser to insist upon strict performance of the terms and
conditions hereof, failure or delay to exercise any rights or remedies provide
herein or by law, failure to promptly notify the Seller in the event of a breach
the acceptance of or payment for goods hereunder or approval of the design
shall not release the Seller of any of the warranties or obligations of the
purchase order and shall not be deemed a waiver of any right of the purchaser
to insist upon strict performance hereof or any of its rights or remedies as to any
such goods, regardless of when shipped, received or accepted, as to any prior
or subsequent default hereunder, nor shall any purported oral modification or
rescission of this purchase order by the Purchaser operate as a waiver of any
of the terms hereof

## 12 ASSIGNMENT OF ANTITRUST CLAIMS

Seller and the Purchaser recognize that in a normal economic practice, overcharges resulting from antitrust violations are in fact borne by the Purchaser. Therefore, for good cause and as consideration for executing this purchase order, the Seller hereby assigns to the Purchaser any and all claims it may now have or hereafter acquire under federal or state antitrust laws for such overcharges relating to the particular goods or services purchased or acquired by the Purchaser pursuant to this purchase order.

## 13 PURCHASERS PERFORMANCE OF SELLERS OBLIGATIONS

If the Purchaser directs the Seller to correct nonconforming or defective goods by a date to be agreed upon by the Purchaser and the Seller, and the Seller thereafter indicates its inability or unwillingness to comply, the Purchaser may cause the work to be performed by the most expeditious means available to it, and the Seller shall pay all costs associated with such work.

The Seller shall release the Purchaser and its contractors of any tier from all liability and claims of any nature resulting from the performance of such work.

This release shall apply even in the event of fault of negligence of the party released and shall extend to the directors, officers and employees of such party.

The Seller's contractual obligations, including warranty, shall not be deemed to be reduced, in any way, because such work is performed or caused to be performed by the Purchaser.

## 14 PATENTS

Whenever the Seller is required to use any design, device, material or process covered by letter, patent, trademark or copyright, the Seller shall indemnify and save harmless the Purchaser from any and all claims for infringement by reason of the use of such patented design, device, material or process in connection with the contract, and shall indemnify the Purchaser for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution or after the completion of the work. In case said equipment, or any part thereof or the intended use of the goods, is in such suit held to constitute infringement and the use of said equipment or part is enjoined, the Seller shall, at its own expense and at its option, either procure for the Purchaser the right to continue using said equipment or parts, replace the same with substantially equal but non-infringing equipment, or modify it so it becomes non-infringing.

## 15 INSOLVENCY

If the Seller shall become insolvent or bankrupt, make an assignment for the benefit of creditors, appoint a receiver or trustee for any of the Seller's property or business, this order may forthwith be canceled by the Purchaser without liability.

## 16 GOVERNING LAW

The definitions of terms used or the interpretation of the agreement and the rights of all parties hereunder shall be construed under and governed by the laws of the State of Colorado, USA.

The following Additional Conditions apply only in cases where the Seller is to perform work hereunder, including the services of Seller's Representative(s), on the premises of others:

## 17 SELLERS RESPONSIBILITY

The Seller shall carry on said work at Seller's own risk until the same is fully completed and accepted, and shall, in case of any accident, destruction or injury to the work and/or materials before Seller's final completion and acceptance, complete the work at Seller's own expense and to the satisfaction of the Purchaser. When materials and equipment are furnished by others for installation or erection by the Seller, the Seller shall receive, unload, store and handle same at the site and become responsible therefor as though such materials and/or equipment were being furnished by the Seller under the order.

## 18 INSURANCE

The Seller shall, at his own expense, provide for the payment of workers compensation, including occupational disease benefits, to its employees employed on or in connection with the work covered by this purchase order, and/or to their dependents in accordance with the laws of the state in which the work is to be done. The Seller shall also carry comprehensive general liability including, but not limited to, contractual and automobile public liability insurance with bodily injury and death limits of at least \$300,000 for any one person, \$500,000 for any one accident and property damage limit per accident of \$400,000. The Seller shall likewise require his contractors, if any, to provide for such compensation and insurance. Before any of the Seller's or his contractors' employees shall do any work upon the premises of others, the Seller shall furnish the Purchaser with a certificate that such compensation and insurance have been provided. Such certificates shall specify the date when such compensation

specify the date when compensation and insurance expires. The Seller agrees that such compensation and insurance shall be maintained until after the entire work is completed and accepted.

## 19 PROTECTION AGAINST ACCIDENTS AND DAMAGES

The Seller hereby assumes the entire responsibility and liability for any and all damage, loss or injury of any kind or nature whatsoever to persons or property caused by or resulting from the execution of the work provided for in this purchase order or in connection herewith. The Seller will indemnify, and hold harmless the Purchaser and any or all of the Purchaser's officers, agents and employees from and against any and all claims, losses, damages, charges or expenses, whether direct or indirect, and whether to persons or property to which the Purchaser may be put or subject by reason of any act, action, neglect, omission or default on the part of the Seller, any of its contractors, or any of its or their officers, agents or employees. In case any suit or other proceedings shall be brought against the Purchaser, or its officers, agents or employees at any time on account or by reason of any act, action, neglect, omission or default of the Seller or any of his contractors or any of its or their officers, agents or employees as aforesaid, the Seller hereby agrees to assume the defense thereof and to defend the same at the Seller's own expense, to pay any and all costs, charges, attorneys fees and other expenses, any and all judgments that may be incurred by or obtained against the Purchaser or any of its or their officers, agents or employees in such suits or other proceedings, and in case judgment or other lien be placed upon or obtained against the property of the Purchaser, or said parties in or as a result of such suits or other proceedings, the Seller will at once cause the same to be dissolved and discharged by giving bond or otherwise. The Seller and his contractors shall take all safety precautions, furnish and install all guards necessary for the prevention of accidents, comply with all laws and regulations with regard to safety including, but without limitation, the Occupational Safety and Health Act of 1970 and all rules and regulations issued pursuant thereto.

9/90  
Revised 11/91

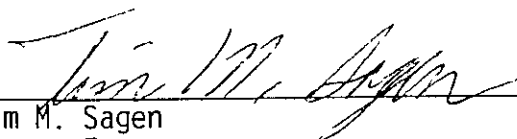
THE CITY OF FORT COLLINS

Light and Power Department  
P.O. Box 580  
Fort Collins, CO 80522

SPECIFICATION NO 368-300

TITLE. PAD-MOUNTED COMPARTMENTAL-TYPE, THREE-PHASE  
DISTRIBUTION TRANSFORMERS  
WITH SEPARABLE  
INSULATED LOAD BREAK HIGH-VOLTAGE CONNECTORS

APPROVED BY.

  
\_\_\_\_\_  
Tim M. Sagen  
Design Engineer

DATE · 8/12/83

1  
368-300

ITEMS COVERED BY THIS SPECIFICATION		
DESCRIPTION	STOCK NO.	
	SPECIFICATION NO.	SERIAL
75 KVA, 208Y/120 Radial	368-300	-006
75 KVA, 480Y/277 Radial	368-300	-007
75 KVA, 208Y/120 Loop	368-300	-008
75 KVA, 480Y/277 Loop	368-300	-009
150 KVA, 208Y/120 Loop	368-300	-015
150 KVA, 480Y/277 Loop	368-300	-016
300 KVA, 208Y/120 Loop	368-300	-030
300 KVA, 480Y/277 Loop	368-300	-031
500 KVA, 208Y/120 Loop	368-300	-050
500 KVA, 480Y/277 Loop	368-300	-051
750 KVA, 208Y/120 Loop	368-300	-075
750 KVA, 480Y/277 Loop	368-300	-076
1000 KVA, 208Y/120 Loop	368-300	-100
1000 KVA 480Y/277 Loop	368-300	-101
1500 KVA, 480Y/277 Loop	368-300	-151
2000 KVA, 480Y/277 Loop	368-300	-201
2500 KVA, 480Y/277 Loop	368-300	-251



## PREVIOUS REVISION DESCRIPTIONS ON FILE

REVISION DESCRIPTION	APPROVED
REVISION FF: Add Paragraph 5.2.2.9 3-pentahead locking bolts  Paragraph 3.2.2 13.1. add glossy requirement	Tim Sagen Susan Coram  10-18-95
REVISION GG: Title page Remove revised date  Paragraph 4.4 and Table II: Change Temperature Tests and Noise Tests from every unit to one unit of design	<i>Susan Coram</i> 8-22-95 <i>Tim M. Sagen</i> 9-22-95
REVISION HH. GE removed from Appendix B	Opal Dick Tim Sagen 12-13-96

## LIST OF ACTIVE PAGES

ORIGINAL PAGES		ORIGINAL PAGES		ADDED PAGES	
SHEET NO	REV. SYM:	SHEET NO.	REV. SYM:	SHEET NO.	REV. SYM.
1	GG	29	DD		
2	CC	30	CC		
3	HH	31	CC		
4	HH	32	EE		
5	CC	33	CC		
6	CC	34	CC		
7	CC	35	HH		
8	CC	36	CC		
9	EE	37	CC		
10	CC	38	EE		
11	CC				
12	FF				
13	CC				
14	CC				
15	CC				
16	CC				
17	CC				
18	CC				
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**SPECIFICATION FOR  
PAD-MOUNTED COMPARTMENTAL-TYPE, THREE-PHASE  
DISTRIBUTION TRANSFORMERS WITH  
SEPARABLE INSULATED LOAD BREAK HIGH-VOLTAGE CONNECTORS**

**1.0 SCOPE**

- 1.1 This Specification establishes the minimum electrical requirements and mechanical features of three phase, 60 HZ, mineral oil immersed, self-cooled, pad-mounted, compartmental-type distribution transformers rated 2500 kVA and smaller, high voltage 13,200 Grd Y/7620 volts, with separable insulated load break high voltage connectors. These transformers are used for step down purposes from an underground primary cable supply
- 1.2 This standard generally conforms with ANSI requirements for pad-mounted compartmental-type, self-cooled, three-phase, distribution transformers for use with separable insulated high-voltage connectors, C57.12.26.

**2.0 APPLICABLE DOCUMENTS**

The following documents form a part of this Specification to the extent specified herein. The latest issue in effect on the date of invitation for bids shall form a part of this Specification, unless otherwise noted.

**2.1 ANSI C57.12.00**

Distribution, power, and regulating transformers, and shunt reactors, general requirements for

**2.2 ANSI C57.12.26**

Pad mounted, compartmental-type, self-cooled three phase, distribution transformers for use with separable insulated high voltage connectors, high voltage 34,500 Grd Y/19,920 volts and below, 2500 kVA and smaller, requirements for.

**2.3 ANSI C57.12.70**

Terminal markings and connections for distribution and power transformers.

**2.4 ANSI C57.12.80**

Terminology for power and distribution transformers.

**2.5 ANSI C57.12.90**

Distribution, power, and regulating transformers, and shunt reactors, test code for.

**2.6 ANSI/IEEE 386**

Separable insulated connectors for power distribution systems above 600V.

**2.7 NEMA STANDARD TRI**

Transformers, regulators and reactors.

**3 0 REQUIREMENTS****3.1 GENERAL REQUIREMENTS FOR DESIGN****3.1.1 BASIC DESIGN STANDARDS**

Transformers purchased under these Specifications shall be new and, unless otherwise specified, meet the requirements of the applicable ANSI Standards and the modifications and additions given in the subsequent paragraphs. In case of conflict, the requirements of the following documents shall apply in the priority shown:

- a) This Specification.
- b) ANSI C57.12.26
- c) Other applicable ANSI and NEMA Standards

**3.1.2 KILOVOLT-AMPERE TEMPERATURE RATINGS**

Kilovolt-ampere ratings are continuous and are based on not exceeding either a 65°C average winding temperature or an 80°C hot spot temperature rise. The temperature rise of the insulating oil shall not exceed 65°C when measured near the top of the tank. The temperature rise is based on an altitude of 3,300 feet.

**3 1.3 GENERAL CONSTRUCTION**

**3.1.3.1** The pad-mounted compartmental-type transformers shall consist of the transformer tank, high-voltage cable terminating compartment, and the low-voltage cable terminating compartment. All three of these components shall be assembled as an integral unit, tamperproof and weatherproof for mounting on a pad. There shall be no exposed screws, bolts or other fastening devices which are externally removable, except the main cover bolts may be exposed. Where the main cover bolts are exposed, the corner bolts shall be welded or otherwise rendered tamperproof. There shall be no opening through which foreign objects such as sticks, rods, or wires might be inserted to contact live parts. Suitable means for padlocking the compartment door(s) shall be provided.

**3.1.3 2** The high and low-voltage compartment shall be located side by side on one side of the transformer tank. When facing the compartment, the low-voltage compartment shall be on the right.

- 3.1.3.3 Construction of the unit shall be such that it can be lifted, skidded, and slid into place on the mounting pad without disturbing the entrance cables.
- 3.1.3.4 An undercoating over the regular finish or an equivalent treatment shall be applied to all surfaces that are in contact with the pad to minimize corrosion.
- 3.1.3.5 Minimum dimensions shall be as shown in Fig. 1 or Fig. 2 of this Specification. Maximum transformer and minimum pad dimensions are shown in Fig 6 of this Specification.

#### 3.1 4 LOSSES

The total losses of a transformer shall be the sum of the excitation losses and the load losses (I<sup>2</sup>R losses). Load loss tests shall be performed and reported on all units regardless of whether or not a record of such tests is available on duplicate units. Loss evaluations and loss costs will be based on the values shown in the "Special Conditions and Supplemental Instructions to Bidders." Transformers will be evaluated on excitation losses and I<sup>2</sup>R losses at the specified rates. If tested losses exceed quoted losses but are within the tolerances of Table 18, ANSI C57.12.00-1987, the additional cost incurred from the differential of losses will be calculated using the following equation and the above specified rates and will be deducted from the original Purchase Order or back charged to the manufacturer. In Table 18 and the following equation "Units" shall mean "Transformers of the same size and design on one order."

Excess loss \$ = [No. of units] [(No Load Loss Evaluation \$) (Avg. No Load Losses - Quoted No Load Losses) + (Load Loss Evaluation \$) (Avg. Load Losses - Quoted Load Losses)] If this equation results in a negative number no credit will be given the Supplier.

If any unit or units exceed the tolerances of Table 18, ANSI C57.12.00-1987, that unit or units shall not be shipped without express permission from the City. If accepted, the deduction for excess losses will be based on the following equation: Excess loss \$ = (No Load Loss Evaluation \$) (No Load Losses - Quoted No Load Losses) But Not Less Than Zero + (Load Loss Evaluation \$) (Load Losses - Quoted Losses) But Not Less Than Zero

#### 3.1.5 SERVICE CONDITIONS

Service conditions shall be as defined in paragraph 4.1 of ANSI C57.12.00 except the ambient temperature range shall be 40°C above to 32°C below zero. The transformer shall operate safely with starting temperatures as low as 32°C below zero.

**3.2 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-015****3.2.1 FUNCTIONAL DESCRIPTION**

The transformer shall be a three phase, pad mounted, loop feed-safe break, "deadfront" type for use on a 13.8 kV grounded "Y" distribution system.

**3.2.2 DESIGN AND CONSTRUCTION****3.2.2.1 RATING**

The transformer shall be rated as follows:

- |                         |   |
|-------------------------|---|
| a) kVA Capacity         | 150   |
| b) High Voltage         | 13,200 Grd. Y/7620 (neutral commonly grounded with secondary neutral) |
| c) Low Voltage          | 208Y/120  |
| d) Taps                 | Two - 2½% FC above and below normal.                                  |
| e) Impedance            | 2.1%  |
| f) Angular displacement | Fig. 10 ANSI C57.12.26-1987   |

**3.2.2.2 INSULATION LEVEL**

3.2.2.2.1 The basic impulse insulation level (BIL) of the completely assembled transformer, including high-voltage and low-voltage terminals shall be 95 kV and 30 kV respectively.

3.2.2.2.2 Dielectric test levels shall be in accordance with the distribution levels in Paragraph 5.10 of ANSI C57.12.00-1987.

3.2.2.2.3 The unit shall withstand test voltages in accordance with ANSI Standard C57.12.00 and impulse tests in accordance with NEMA Standards for Transformers, Publication No. TR1.

**3.2.2.3 TRANSFORMER CORE**

A five-legged core-coil assembly or three separate core-coil assemblies shall be employed. The use of three-legged designs is expressly prohibited.

**3.2.2.4 HIGH VOLTAGE TAPS**

A no-load tap changer with external operating handle shall provide two 2½% full capacity taps above and below normal. The operating handle shall be mounted in the primary compartment.

**3.2.2.5 BUSHING WELLS AND TERMINALS**

3.2.2.5.1 The number, location, and arrangement of bushing wells, terminals and parking stands shall be as shown in Fig. 1 or Fig. 2 and Fig. 5. All low-voltage bushings and high-voltage wells shall be externally clamped and shall have leads of sufficient length to allow them to be changed without removing the cover. Welded bushings and wells are expressly prohibited.

3.2.2.5.2 High-voltage bushing wells shall be 200A loadbreak interface 8.3/14.4 kV bushings in accordance with ANSI/IEEE Std. 386

3.2.2.5.3 Low-voltage line and neutral terminals shall be stud type bushings in accordance with ANSI C57.12 26-1987, Fig. 9(d), shall include a separate spade with NEMA standard drilling and shall be in accordance with Fig. 3 of this Specification. Bushing arrangement and spacing shall be "staggered", as shown in Fig. 5 of this Specification.

3.2.2.5.4 The low-voltage neutral shall be a fully insulated bushing. A ground pad shall be provided on the outer surface of the tank and a removable copper ground strap shall be provided and connected between the low-voltage neutral bushing and the ground pad.

3.2.2.5.5 The high-voltage neutral shall be connected to the low-voltage neutral internally with provision for opening this connection for testing.

**3.2.2.6 ACCESSORY CABINET**

3.2.2.6.1 The accessory cabinet shall consist of a high-voltage and low-voltage compartment generally constructed in accordance with applicable ANSI specifications and dimensioned in accordance with Fig. 1 or Fig. 2 of this Specification

3.2.2.6.2 Cabinet doors shall be hinged, removable, and lockable. Stainless hinge pins shall be provided.

**3.2.2.7 ACCESSORY EQUIPMENT**

Accessory equipment shall be provided in accordance with Table I and the following details:

3.2.2.7.1 Suitable jack bosses or equivalent jacking facilities shall be provided on the tank. Vertical clearance for a jack shall be 1½ inches minimum, 3½ inches maximum

3.2.2.7.2 The transformer base shall be arranged for rolling in two directions:

Parallel to and at right angles to the center line of the high-voltage bushings.



- 3.2.2.7.3 Four lifting lugs shall be provided. These lugs shall be adequate strength and size and arranged on the tank to provide a suitable lift for the completely assembled unit.
- 3.2.2.7.4 The base of the assembly shall be provided with suitable means for mounting the unit on the pad. An internal flange shall be provided at the base of the accessory compartment to provide means for mounting the unit on the pad. (Fig. 1 and 2).
- 3.2.2.7.5 Terminal designations are shown in Figures 1 and 2. The identification of terminal connections shall be shown on the instruction nameplate. Instruction nameplate shall be located in the low-voltage compartment and shall be readable with cables in place. Where the nameplate is mounted on a removable part, the manufacturer's name and transformer serial number shall be permanently affixed to a non-removable part

Instruction nameplate shall contain the information specified in ANSI C57.12.00-1987, paragraph 5.12. In addition, either on the nameplate or label affixed near it, the manufacturer shall indicate that the dielectric fluid is non-PCB

- 3.2.2.7.6 An automatic pressure relief device shall be located within the compartment. This device shall meet the following requirements:
- ¼" NPT or larger male Inlet Port
  - Exposed parts of weather and corrosion resistant materials.
  - Non-deteriorating gasket and o-ring material.
  - Manual pull ring able to withstand 25 pound force minimum.
  - Body able to withstand 100 pound force minimum.
  - Bug shield
  - Cracking pressure of  $10 \pm 2$  psig.
  - Resealing pressure of 6 psig minimum.
  - Zero leak rate from resealing pressure to -8 psig.
  - Minimum flow rate of 35 SCFM at 15 psig.

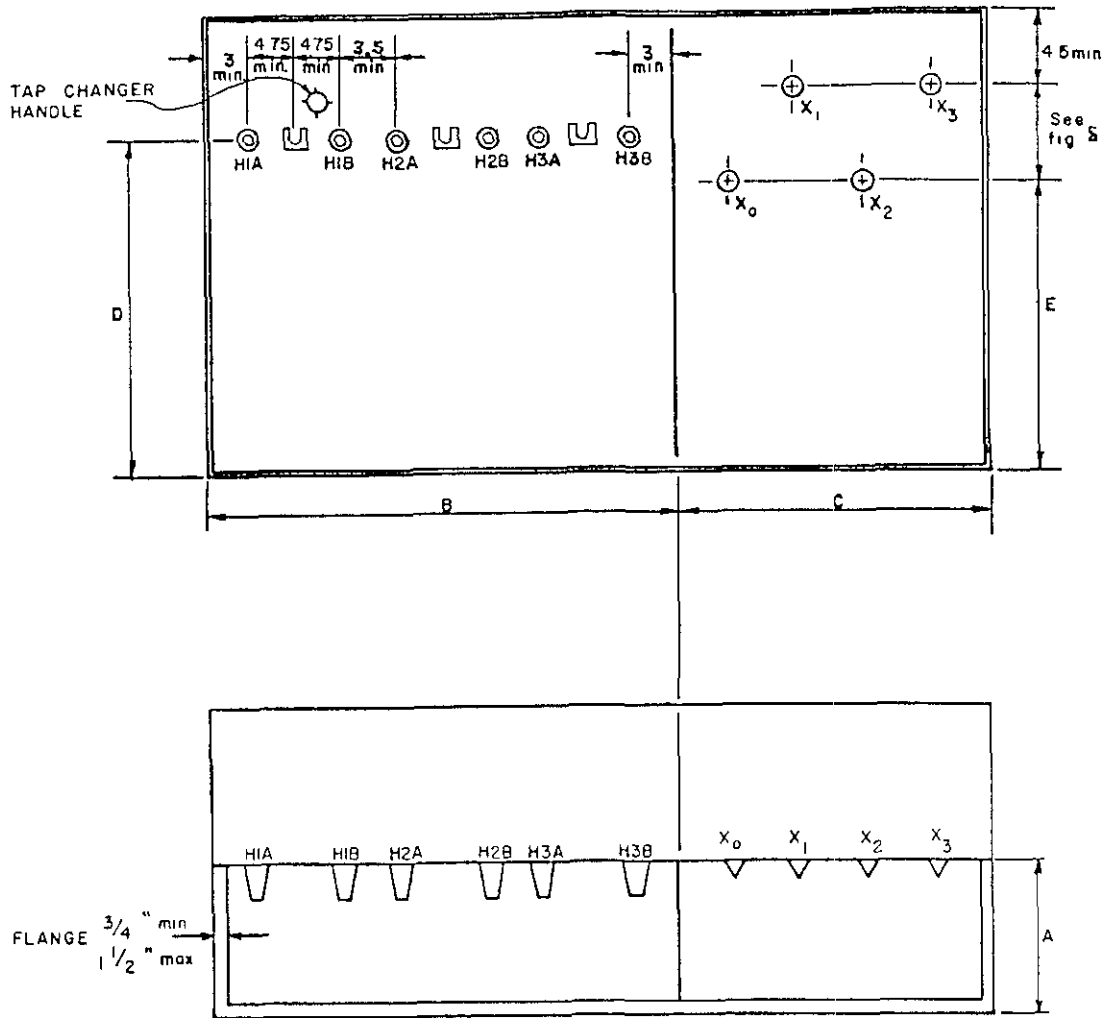
### 3.2.2.8 OIL PRESERVATION

Transformers shall be of sealed-tank construction. Sealed-tank construction is that which seals the interior of the tank from the atmosphere, and in which the gas plus the oil volume remains constant. The transformer will remain effectively sealed for a top-oil temperature range of -32°C to 105°C

### 3.2.2.9 TANKS

The tank shall be domed or sloped to shed water and shall be of sufficient strength to support a minimum of 500 lbs. Construction of the tank shall be in accordance with ANSI C57.12.26-1987, Section 7, except bolted cover is preferred.

- 3.2.2.9.1 If main cover is welded, adequate handhole(s) shall be provided. Handholes shall be concealed. Bolted-on covers shall be adequately gasketed and tamperproof. Main cover bolts may be exposed; however, where cover bolts are exposed, the corner bolts shall be welded or otherwise rendered tamperproof.
- 3.2.2.9.2 Tank grounding provision shall be in accordance with paragraph 7.6.4 of ANSI C52.12 26-1987.
- 3.2.2.9.3 Locking bolts shall be pentahead.
- 3.2.2.10 **COMPONENTS FOR LOOPED PRIMARY**
- The minimum current-carrying capability of components for the looped primary cable system shall be 200 amperes (continuous) and 10,000 amperes symmetrical (momentary).
- 3.2.2.11 **AUDIBLE SOUND LEVEL**
- The audible sound level shall be in accordance with NEMA Standard TR1.
- 3.2.2.12 **BASE PLAN**
- The base plan of a completely assembled unit shall be such that it can be installed on a pad of the dimensions shown in Fig. 6.
- 3.2.2.13 **PAINT**
- 3.2.2.13.1 Surfaces to be painted shall be blast cleaned (commercial blast) to provide a clean dry surface free of dirt, dust, chalk, loose paint, rust, grease and any other contaminants that may exist.
- 3.2.2.13.2 EEI "Finishing Guidelines" specification shall apply. Finish coat shall be Desert Tan, Munsell #10YR6 0/3 0, glossy.
- 3.2.2.14 **SAFETY LABELS**
- NEMA 260 Safety Labels shall not be applied by the manufacturer, Purchaser will apply custom "Mr. Ouch" labels after delivery.



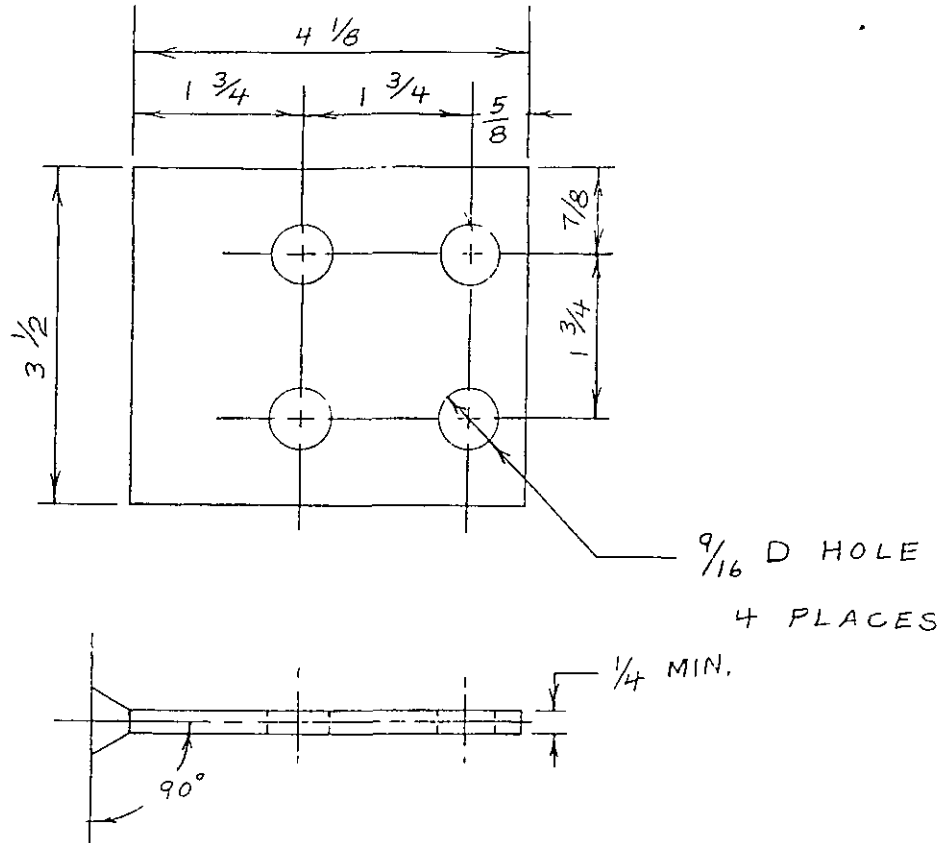
KVA RATINGS	LOW VOLTAGE RATINGS	COMPARTMENT DIMENSIONS (MINIMUM)			BUSHING HEIGHT	
		A*	B*	C*	D	E
75-150	A11	18	41.5	23.25	32-36	27
225-500	A11	18	41.5	24	32-36	31
750-1000	480Y/277, 208Y/120	18	41.5	28	36-40	38
1500 - 2500	480Y/277	18	41.5	28	40-44	38

NOTE: All dimensions in inches \* Denotes inside dimensions  
 Maximum dimensions shall allow one inch clearance from edge of pad (Fig. 6).

Fig. 1 - Accessory Compartment and Bushing Dimensions - Configuration I

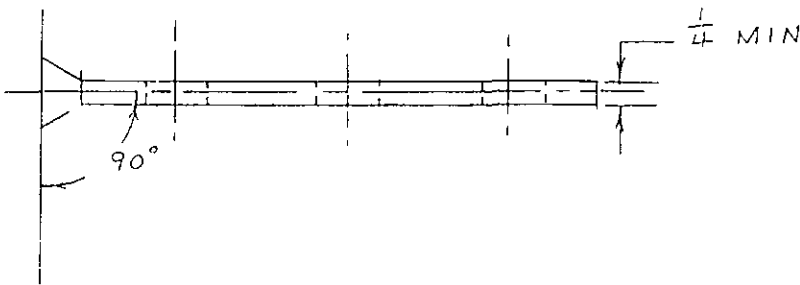
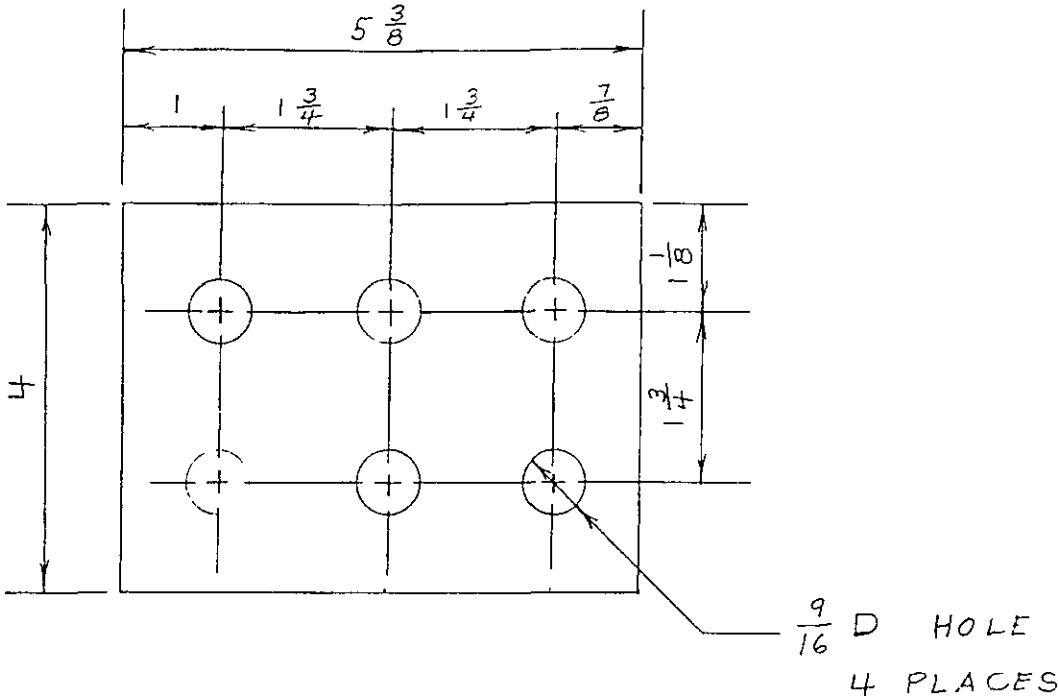
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Fig. 2 - Accessory Compartment and Bushing Dimensions - Configuration II



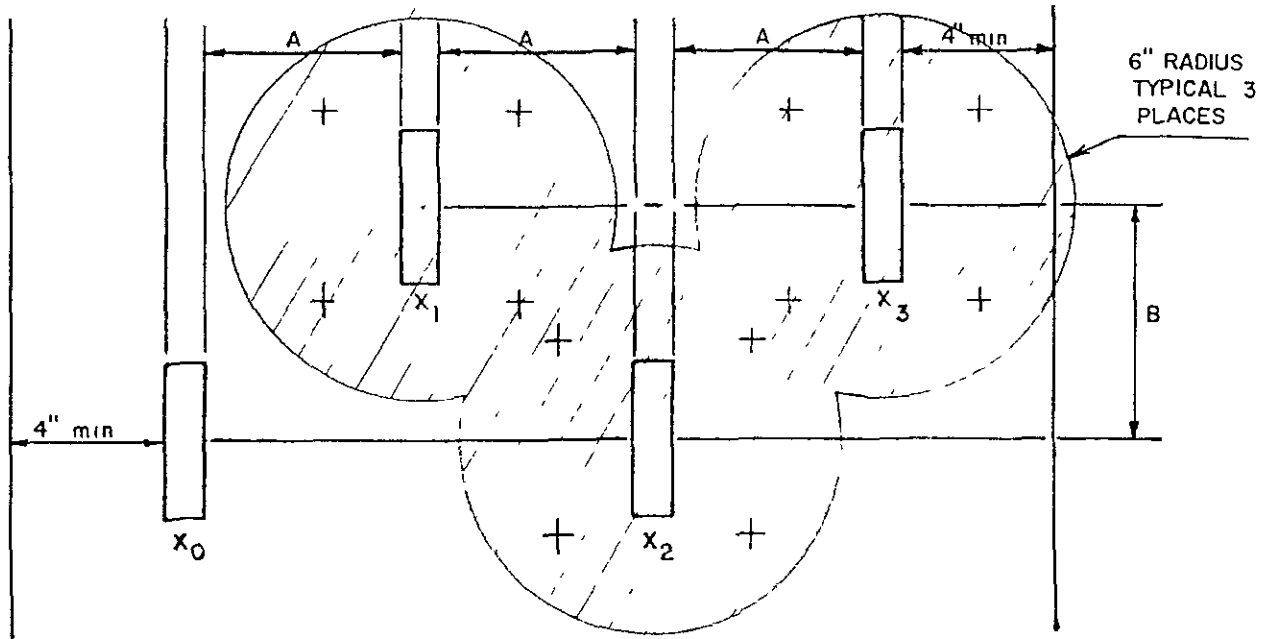
KVA	75	150	150	300	300	500
SERIAL	-007	-015	-016	-030	-031	-051
	-008					

Fig. 3 - Four Hole "H" Spade Low Voltage Terminals



KVA	500	750	750	1000	1000	1500	2000	2500
SERIAL	-050	-075	-076	-100	-101	-151	-201	-251

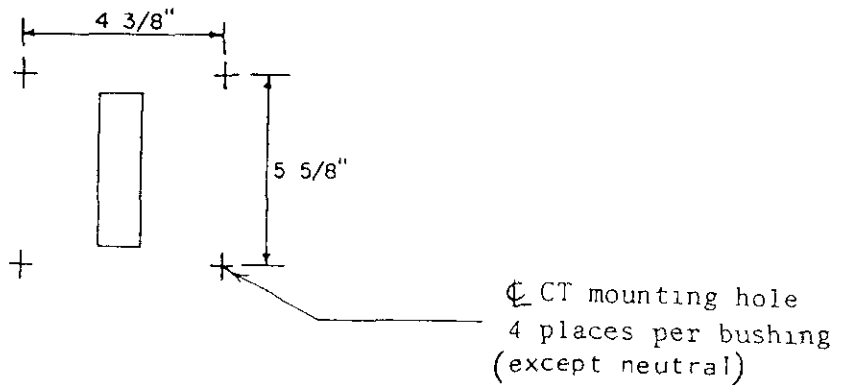
Fig. 4 - Six Hole "J" Spade Low Voltage Terminals



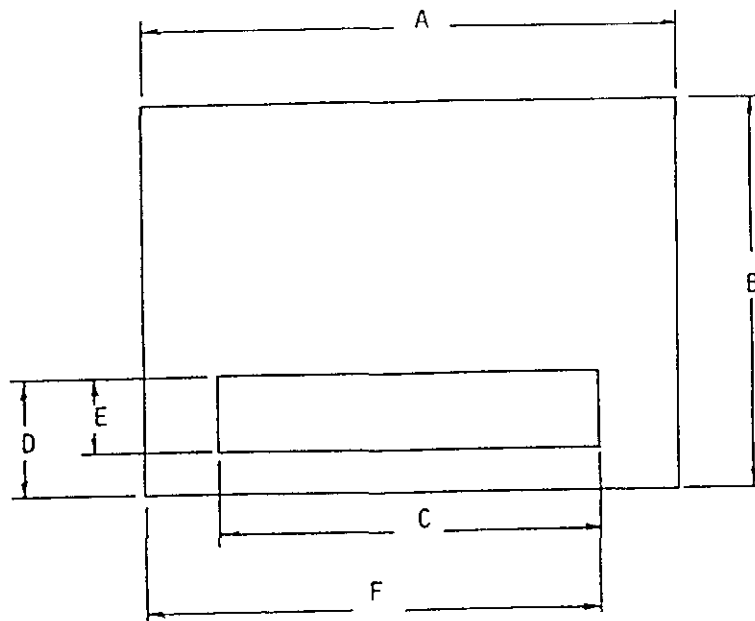
KVA	LOW VOLTAGE RATING	A	B
75 - 150	A11	4 75	8
225 - 500	A11	5	8
750 - 2500	480Y/277, 208Y/120	5 5	10

Fig. 5 - Staggered low - voltage bushing arrangement all dimensions minimum (inches).

NOTE: The cross-hatched area shown above shall be clear of obstructions such as gauges, etc (CT mounting studs excepted).



Typical CT Mounting Hole Dimensions  
(Holes to be 3/8" max. with USS thread)



KVA	SERIAL	PAD DIMENSIONS (inches)					
		A	B	C	D	E	F
75	-006 thru -009	75	55	40	21	15	61
150	-015	75	55	40	21	15	61
150	-016	75	55	40	21	15	61
300	-030	75	55	40	21	15	61
300	-031	75	55	40	21	15	61
500	-050	75	55	40	21	15	61
500	-051	75	55	40	21	15	61
750	-076, -075	85	72	49	23	15	67
1000	-101, -100	85	72	49	23	15	67
1500	-151	101	87	51	23	15	76
2000	-201	107	88	51	23	15	79
2500	-251	107	88	51	23	15	79

Fig. 6 - Pad Dimensions



TABLE I ACCESSORY EQUIPMENT			
KVA	75-150	300	500-2500
ACCESSORY			
Tap changer handle in HV compartment	X	X	X
Instruction nameplate in LV compartment	X	X	X
Jacking provisions	X	X	X
Provisions for rolling in two directions	X	X	X
Lifting lugs	X	X	X
Provisions for mounting on pad	X	X	X
Arrester mounting provisions			
Grounding provisions in both compartments	X	X	X
Oil Drain:			
1" drain plug	X		
1" valve with sampling device		X	X
Upper filter press and filling plug (or cap) (1")	X	X	X
Provisions for oil gauge		X	
Provisions for pressure-vacuum gauge		X	X
Oil gauge			X
Thermometer	X	X	X
Secondary CT mounting holes (4 holes on 4 3/8" x 5 5/8" centers)	X	X	X
Manual/automatic pressure relief valve	X	X	X

**3.3 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-016**

The requirements for 368-300-016 transformer shall be the same as the -015 with the following exception:

**3.3.1 RATING**

The transformer shall be rated as follows:

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 150      |
| b) Low Voltage  | 480Y/277 |
| c) Impedance    | 2.1%     |

**3.4 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-030**

The requirements for 368-300-030 transformer shall be the same as the -015 with the following exception:

**3.4.1 RATING**

The transformer shall be rated as follows:

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 300      |
| b) Low Voltage  | 208Y/120 |
| c) Impedance    | 2.5%     |

**3.5 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-031**

The requirements for 368-300-031 transformers shall be the same as the -015 with the following exception.

**3.5.1 RATING**

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 300      |
| b) Low Voltage  | 480Y/277 |
| c) Impedance    | 2.5%     |

**3.6 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-050**

The requirements for 368-300-050 transformers shall be the same as the -015 with the following exceptions:

**3.6.1 RATING**

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 500      |
| b) Low Voltage  | 208Y/120 |
| c) Impedance    | 3.04%    |

**3.6.2 LOW VOLTAGE TERMINALS**

Low voltage line and neutral spades shall be in accordance with Fig. 4.

**3.7 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-051**

The requirements for 368-300-051 transformers shall be the same as the -015 with the following exceptions:

**3.7.1 RATING**

- a) kVA Capacity 500
- b) Low Voltage 480Y/277
- c) Impedance 3.04%

**3.7.2 LOW VOLTAGE TERMINALS**

Low voltage line and neutral spades shall be in accordance with Fig. 3

**3.8 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-076**

The requirements for 368-300-076 transformers shall be the same as the -015 with the following exceptions:

**3.8.1 RATING**

- a) kVA Capacity 750
- b) Low Voltage 480Y/277
- c) Impedance 5.75%

**3.8.2 LOW VOLTAGE TERMINALS**

Low voltage line and neutral spades shall be in accordance with Fig. 4

**3.8.3 TANK**

Tank grounding provisions shall be in accordance with paragraph 7.6.4 of ANSI C57.12.26-1987.

**3.9 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-101**

The requirements for 368-300-101 transformers shall be the same as the -015 with the following exceptions:

**3.9.1 RATING**

- a) kVA Capacity 1000
- b) Low Voltage 480Y/277
- c) Impedance 5.75%

**3.9.2 LOW VOLTAGE TERMINALS**

Low voltage line and neutral spades shall be in accordance with Fig. 4.

**3.9.3 TANK**

Tank grounding provisions shall be in accordance with paragraph 7.6.4 of ANSI C57.12 26-1987.

**3.10 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-151**

The requirements for 368-300-151 transformers shall be the same as the -015 with the following exceptions

**3.10.1 RATING**

- a) kVA Capacity 1500
- b) Low Voltage 480Y/277
- c) Impedance 5.75%

**3.10.2 LOW VOLTAGE TERMINALS**

Low voltage line and neutral spades shall be in accordance with Fig. 4.

**3.10.3 TANK**

Tank grounding provisions shall be in accordance with paragraph 7.6.4 of ANSI C57 12.26-1987

**3.11 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-201**

The requirements for 368-300-201 transformers shall be the same as the -015 with the following exceptions:

**3.11.1 RATING**

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 2000     |
| b) Low Voltage  | 480Y/277 |
| c) Impedance    | 5.75%    |

**3.11.2 LOW VOLTAGE TERMINALS**

Low voltage line and neutral spades shall be in accordance with Fig. 4.

**3.11.3 TANK**

Tank grounding provisions shall be in accordance with paragraph 7.6.4 of ANSI C57.12.26-1987.

**3.12 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-251**

The requirements for 368-300-251 transformers shall be the same as the -015 with the following exceptions:

**3.12.1 RATING**

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 2500     |
| b) Low Voltage  | 480Y/277 |
| c) Impedance    | 5.75%    |

**3.12.2 LOW VOLTAGE TERMINALS**

Low voltage line and neutral spades shall be in accordance with Fig 4

**3.12.3 TANK**

Tank grounding provisions shall be in accordance with paragraph 7.6.4 of ANSI C57.12.26-1987

**3.13 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-006**

The requirements for 368-300-006 transformers shall be the same as the -015 with the following exceptions:

**3.13.1 FUNCTIONAL DESCRIPTION**

The transformer shall be a three phase, pad mounted, radial tap-safe break, "deadfront" type for use on a 13.8 kV grounded "Y" distribution system.

**3.13.2 RATING**

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 75       |
| b) Low Voltage  | 208Y/120 |
| c) Impedance    | 1.90%    |

**3.13.3 BUSHING WELLS AND TERMINALS**

The number, location, and arrangement of bushing wells, terminals and parking stands shall be as shown in Fig 5A, 7 and 8(a) of ANSI C57.12.26-1987 except high voltage bushing wells shall be 32 to 36 inches from the base of the transformer.

3.13.3.2 High voltage bushing wells shall be 200A loadbreak interface 8.3/14.4 kV in accordance with ANSI/IEEE 368.

3.13.3.3 Low voltage bushings shall be staggered

**3.13.4 ACCESSORY CABINET**

The accessory cabinet shall be dimensioned in accordance with Fig 7 of ANSI C57.12.26-1987

**3.14 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-075**

The requirements for design of 368-300-075 transformers shall be the same as the -015 with the following exceptions:

**3.14.1 RATING**

- a) kVA Capacity 750
- b) Low Voltage 208Y/120
- c) Impedance 5.75%

**3.14.2 LOW VOLTAGE TERMINALS**

Low voltage line and neutral spades shall be in accordance with Fig. 4.

**3.14.3 TANK**

Tank grounding provisions shall be in accordance with paragraph 7.6.4 of ANSI C57 12.26-1987.

**3 15 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-100**

The requirements for 368-300-100 transformers shall be the same as the -015 with the following exceptions:

**3.15.1 RATING**

- a) kVA Capacity 1000
- b) Low Voltage 208Y/120
- c) Impedance 5.75%

**3.15.2 LOW VOLTAGE TERMINALS**

Low voltage line and neutral spades shall be in accordance with Fig. 4.

**3.15.3 TANK**

Tank grounding provisions shall be in accordance with paragraph 7.6.4 of ANSI C57.12 26-1987

### 3.16 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-008

The requirements for 368-300-008 transformers shall be the same as the -015 with the following exception:

#### 3 16 1 RATING

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 75       |
| b) Low Voltage  | 208Y/120 |
| c) Impedance    | 1.90%    |

### 3 17 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-007

The requirements for 368-300-007 transformers shall be the same as the -015 with the following exceptions:

#### 3.17 1 FUNCTIONAL DESCRIPTION

The transformer shall be a three phase, pad mounted, radial tap-safe break, "deadfront" type for use on a 13.8 kV grounded "Y" distribution system

#### 3 17.2 RATING

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 75       |
| b) Low Voltage  | 480Y/277 |
| c) Impedance    | 1.90%    |

#### 3.17.3 BUSHING WELLS AND TERMINALS

3.17 3.1 The number, location, and arrangement of bushing wells, terminals and parking stands shall be as shown in Fig. 5A, 7, and 8(a) of ANSI C57.12.26-1987, except high voltage bushings shall be 32 to 36 inches above the base of the transformer

3 17.3.2 High voltage bushing wells shall be a 200A loadbreak interface 8.3/14.4 kV in accordance with ANSI/IEEE 386

3.17 3 3 Low voltage bushings shall be staggered.

#### 3 17 4 ACCESSORY CABINET

The accessory cabinet shall be dimensioned in accordance with Fig. 7 of ANSI C57.12.26-1987.



**3.18 SPECIFIC REQUIREMENTS FOR DESIGN OF 368-300-009**

The requirements for 368-300-009 transformers shall be the same as the -015 with the following exception:

**3.18.1 RATING**

- |                 |          |
|-----------------|----------|
| a) kVA Capacity | 75       |
| b) Low Voltage  | 480Y/277 |
| c) Impedance    | 1.70%    |

**4.0 QUALITY ASSURANCE****4.1 GENERAL****4.1.1 RESPONSIBILITY FOR INSPECTION**

Unless otherwise specified, the vendor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the vendor may utilize his own facilities or any commercial laboratory acceptable to the City of Fort Collins. The City reserves the right to perform or witness any of the inspections set forth in this Specification where such inspections are deemed necessary.

**4.1.2 TEST REPORT**

The manufacturer shall furnish to the purchaser certified copies of the results of all tests prior to payment. Copies shall be sent to the Design Section as well as with the invoice. Unsigned copies are not acceptable even if accompanied by a signed cover letter. The Quality Control Manager shall review and sign each test report.

**4.2 TEST CONDITIONS**

Unless otherwise specified, testing defined in Section 4.6 shall be conducted under the following conditions:

**4.2.1 REFERENCE TEMPERATURE**

The reference temperature to which losses, impedance, regulation, and efficiency are corrected shall be 85° C.

**4.2.2 TOLERANCE ON IMPEDANCE VOLTAGE**

Tolerance shall be as specified in ANSI C57.12.00

**4.2.3 TOLERANCE ON IMPEDANCE VOLTAGE ON A TAP**

The percent departure of tested impedance voltage on any tap from tested impedance voltage at rated voltage shall not be greater than the total tap voltage range expressed as a percentage of the rated voltage

## 4 4 FUNCTIONAL TESTS

Functional tests shall consist of those tests and related requirements as cross referenced in Table II and shall be performed on each unit, except Temperature and Noise Tests which shall be performed on one unit of each design (KVA) per order

## 4 5 Not used

TABLE II FUNCTIONAL TESTS		
TEST	TEST PARAGRAPH	REQUIREMENT OR REFERENCE
Examination of Product	4 6	3 0, 3 1, 3 2, 3 10 (This Spec)
Ratio	4 6	C57 12 00, Section 8 (ANSI)
Polarity and Phase Relation	4 6	C57 12 00, Section 8 (ANSI)
Excitation Loss	4 6	C57 12 00, Section 8 (ANSI)
Excitation Current	4 6	C57 12 00, Section 8 (ANSI)
Impedance and Load Loss	4 6	C57 12 00, Section 8 (ANSI)
Temperature Tests *	4 6	C57 12 00, Section 8 (ANSI)
Dielectric Tests	4 6 1	3 2 2 2 (This Spec)
Impulse Tests	4 6 2	3 2 2 2 (This Spec)
Leak Testing	4 6 3	3 2 2 8, 3 2 2 9 (This Spec)
Noise Testing *	4 6 4	3 2 2 11 (This Spec)

\* one unit per design per order

## 4 6 TEST METHODS -- FUNCTIONAL TESTS

Each completed unit shall be inspected to determine compliance with respect to dimensions, material, workmanship, construction and marking, and routine tests on all units shall be made as specified in Section 8 of ANSI Standard C57 12 00 and in ANSI Standard C57 12 90. In addition to routine tests, the following test requirements and/or modifications shall apply

## 4 6 1 DIELECTRIC TESTS

Induced and applied potential Dielectric Tests shall be performed in accordance with ANSI C57 12 00 and C57 12 90. The low voltage windings shall have a test potential to ground of 10,000 volts for one minute. The test potential between high voltage windings shall be 34 000 volts for one minute

#### 4.6.2 IMPULSE TESTS

ANSI Standard Impulse Tests shall be performed. Full Wave Impulse Test shall use a 1.5 x 50 microsecond wave.

#### 4.6.3 LEAK TESTING

The transformer tank shall be filled with oil and tested for air and oil leaks under (1) 4 psig vacuum for ½ hour, (2) 7 psig pressure for 24 hours in the sequence indicated. An alternate method of leak testing may be performed by injecting halogen gas under 10 psig and detecting leaks through the use of a halogen detector. (Note, the automatic/manual pressure relief device must be removed for this test)

#### 4.6.4 NOISE TESTING

Noise testing shall be conducted in accordance with applicable NEMA Standards.

#### 5.0 PREPARATION FOR DELIVERY

Transformers shall be prefilled with the appropriate amount of transformer oil and shall be shipped by open-bed truck. Units shall be packaged in such a way as to provide for ease of handling and to protect units from shipping damage. Units shall be fully palletized in four-way universal pallets with 28" minimum openings to facilitate handling from any side. Pallets shall be independent of the transformer. The Supplier shall give 24 hour notice prior to delivery for any shipments where an individual transformer weighs over 4,000 pounds. In addition to these requirements, the Supplier shall comply with any additional requirements or modifications shown on the purchase order and/or supplemental instructions.

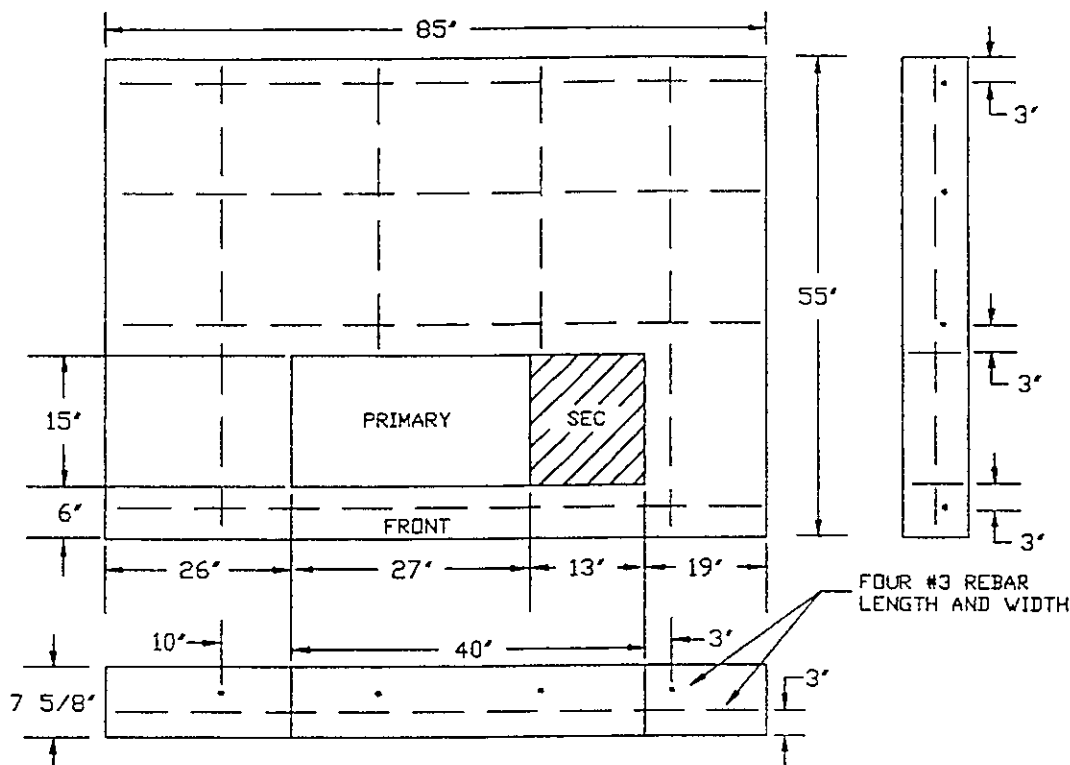
## 6.0 DEFINITIONS AND ABBREVIATIONS

- 6.1 Vendor or Supplier - The manufacturer and/or manufacturer's agent supplying or quoting on the specified article.
- 6.2 Article, Unit, Assembly - All refers to the equipment defined by this Specification.
- 6.3 DC or d.c. - Direct Current.
- 6.4 AC or a.c. - Alternating Current.
- 6.5 °C - Degree Celsius (Centigrade)
- 6.6 °F - Degree Fahrenheit
- 6.7 kV - 1000 volts.
- 6.8 CPS or Hz - Cycles per second.
- 6.9 psig - Pounds per square inch gauge
- 6.10 V or v - Volts
- 6.11 kVA - 1000 Volt-amperes.

APPENDIX A

Typical pad designs are shown in Figures 1A through 3A.

The dimensions in inches of Figures 1A through 3A will fit the minimum compartments on transformers covered by this Specification as well as the maximum transformer envelope.



Notes on Pad Material -

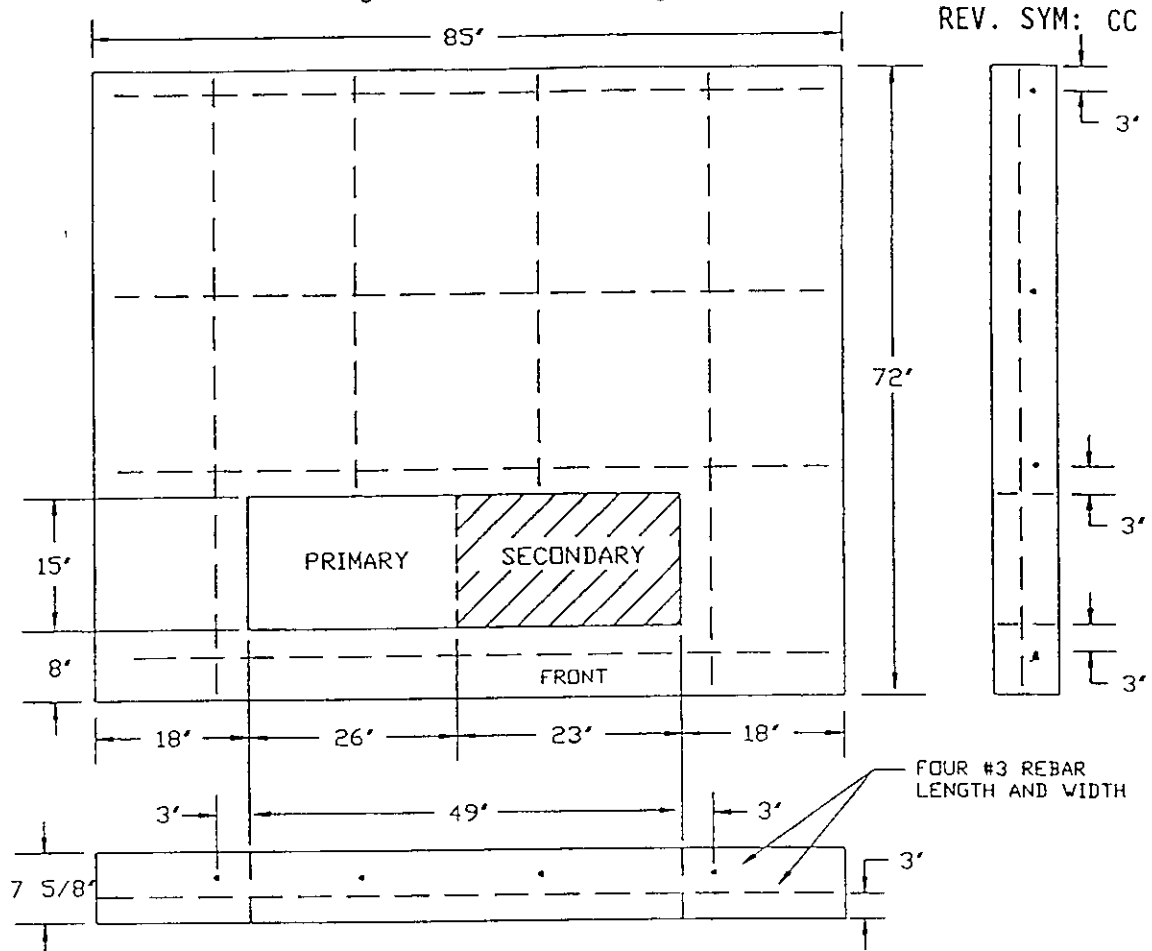
- 1 Concrete must be 3,000 psi minimum
2. Maximum coarse aggregate size 1 1/2 inches

Space requirements for pad and primary switching cabinet will generally be 9' X 12'. Factors to be considered in locating the pad include -

- 1 Accessibility - The transformer pad shall be accessible to line boom trucks equipped for the installation and removal of heavy transformers. Such accessibility shall not require intrusion on adjacent property.
- 2 Proximity of Buildings, Walls, Barriers, and/or Overhangs - In addition to the clearances required for installation and removal, the minimum clearance in front of the transformer pad shall be eight (8) feet and the minimum clearance from all other sides shall be three (3) feet. If the building has an overhang, clearance to the edge of the transformer pad shall be measured horizontally from the outer edge of the overhang. Transformers through 300 KVA may be installed under the overhang if the vertical clearance between the pad and the overhang is at least 25 feet and the location is accessible to line boom trucks.
- 3 Codes and Standards - In addition to the above, the installation shall conform to the National Electric Code and federal, state and city codes and standards.

CITY OF FORT COLLINS LIGHT AND POWER DEPARTMENT
TRANSFORMER PAD DESIGN 75 - 500 KVA 3 PHASE

Figure 2A - Pad Design



Notes on Pad Material -

- 1 Concrete must be 3,000 psi minimum
- 2 Maximum coarse aggregate size 1 1/2 inches

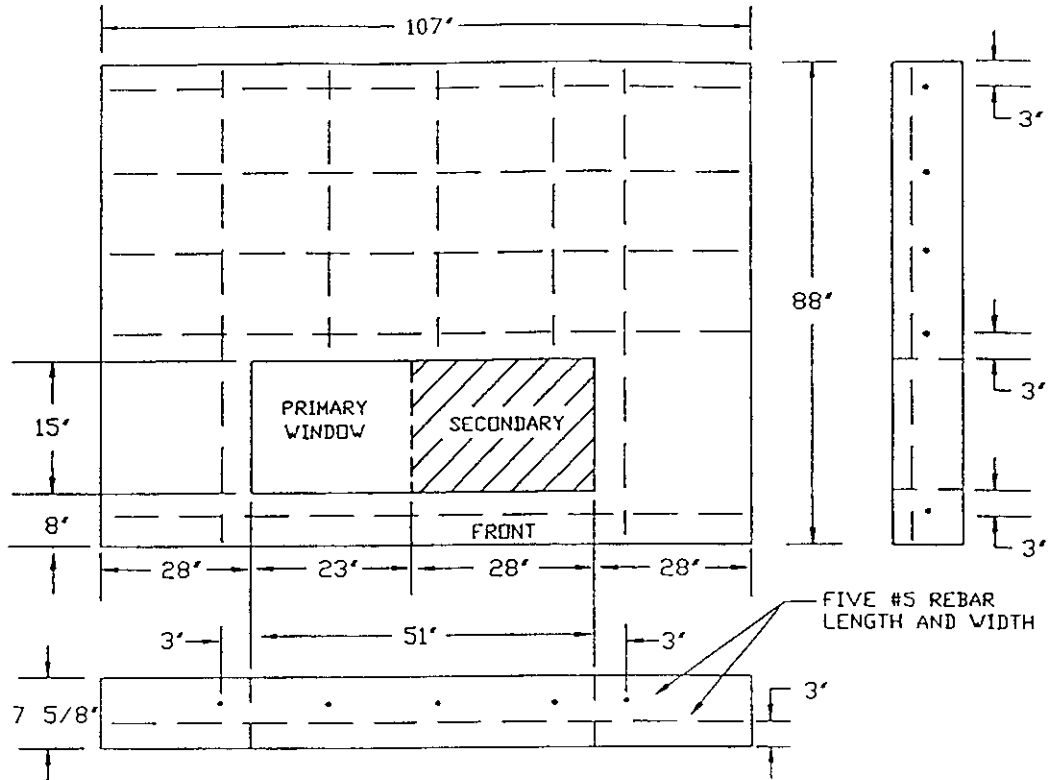
Space requirements for pad and primary switching cabinet will generally be 9' X 12'. Factors to be considered in locating the pad include -

- 1 Accessibility - The transformer pad shall be accessible to line boom trucks equipped for the installation and removal of heavy transformers. Such accessibility shall not require intrusion on adjacent property.
- 2 Proximity of Buildings, Walls, Barriers, and/or Overhangs - In addition to the clearances required for installation and removal, the minimum clearance in front of the transformer pad shall be eight (8) feet and the minimum clearance from all other sides shall be four (4) feet. If the building has an overhang, clearance to the edge of the transformer pad shall be measured horizontally from the outer edge of the overhang. Transformers through 300 KVA may be installed under the overhang if the vertical clearance between the pad and the overhang is at least 25 feet and the location is accessible to line boom trucks.
- 3 Codes and Standards - In addition to the above the installation shall conform to the National Electric Code and federal, state and city codes and standards.

CITY OF FORT COLLINS LIGHT AND POWER	TRANSFORMER PAD DESIGN 500 - 1000 KVA 3 PHASE	REVISION DATE NOV 2, 1990
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Figure 3A - Pad Design

REV. SYM: CC



Notes on Pad Material -

- 1 Concrete must be 3,000 psi minimum
- 2 Maximum coarse aggregate size 1 1/2 inches

Space requirements for pad and primary switching cabinet will generally be 9' X 12'. Factors to be considered in locating the pad include -

- 1 Accessibility - The transformer pad shall be accessible to line boom trucks equipped for the installation and removal of heavy transformers. Such accessibility shall not require intrusion on adjacent property.
- 2 Proximity of Buildings, Walls, Barriers, and/or Overhangs - In addition to the clearances required for installation and removal, the minimum clearance in front of the transformer pad shall be eight (8) feet and the minimum clearance from all other side shall be four (4) feet. If the building has an overhang, clearance to the edge of the transformer pad shall be measured horizontally from the outer edge of the overhang. Transformers through 300 KVA may be installed under the overhang if the vertical clearance between the pad and the overhang is at least 25 feet and the location is accessible to line boom trucks.
- 3 Codes and Standards - In addition to the above the installation shall conform to the National Electric Code and federal, state and city codes and standards.

CITY OF FORT COLLINS LIGHT AND POWER	TRANSFORMER PAD DESIGN 1000 - 2500 KVA 3 PHASE	REVISION DATE OCT 24, 1990
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## APPENDIX B

Transformers purchased under this Specification shall be of the make shown below. Manufacturers not listed below may submit written proposals demonstrating compliance with these Specifications for consideration of addition to the accepted manufacturers list prior to the next request for bids. In addition to inclusion on the list below, manufacturer's equipment must also satisfy all requirements of this Specification to be acceptable.

TABLE IIIB

<u>MANUFACTURER</u>	<u>SERIAL NO.</u>
Cooper Power Systems	A11
ASEA Brown-Bovari	A11
Howard Industries	A11
Pauwels Transformers	A11

The manufacturers in the following list have been conditionally approved and may bid as an alternate. The definition and intent of "Conditional Approval" of a manufacturer is to allow the City to gain some experience with the manufacturer's product. Should a conditionally approved manufacturer be the evaluated low bidder, the City reserves the right to award all, part, or none of the order to them, dependant upon the current needs of the City for that item or items.

APPENDIX C

The following forms for Individual and Average Transformer Losses are used by the City of Fort Collins to determine loss penalties.

- 1) Transformer Loss Evaluation  
Average Losses Form
- 2) Individual Transformer Loss  
Evaluation Form

TRANSFORMER LOSS EVALUATION

AVERAGE LOSSES

City Order No. \_\_\_\_\_ S/N \_\_\_\_\_

Manufacturer \_\_\_\_\_ Invoice No. \_\_\_\_\_

KVA/Unit \_\_\_\_\_

<u>LINE</u>	<u>DESCRIPTION</u>	<u>AMOUNT</u>
(1)	No. of units	_____
(2)	Average core losses	_____
(3)	Quoted core losses	_____
(4)	Excess average core losses line (2) less line (3)	_____
(5)	Penalty for excess average core losses line (1) x line (4) x \$_____	_____
(6)	Average copper losses	_____
(7)	Quoted copper losses	_____
(8)	Excess average copper losses: line (6) less line (7)	_____
(9)	Penalty for excess average copper losses: line (1) x line (8) x \$_____	_____
(10)	Penalty to be assessed manufacturer: line (5) plus line (9) but not less than zero	_____

Date \_\_\_\_\_ Prepared By: \_\_\_\_\_  
Design Engineering

NOTE. If any unit(s) exceeds the loss tolerances of ANSI C57.12.00, Light & Power will either reject it, include it on these averages, or calculate losses using the Individual Transformer Losses Evaluation Form, whichever is most favorable to Light and Power.

## INDIVIDUAL TRANSFORMER LOSS EVALUATION

City Order No. \_\_\_\_\_ S/N \_\_\_\_\_  
 Manufacturer \_\_\_\_\_ Invoice No. \_\_\_\_\_  
 KVA/Unit \_\_\_\_\_

<u>LINE</u>	<u>DESCRIPTION</u>	<u>AMOUNT</u>
(1)	Tested core losses	_____
(2)	Quoted core losses	_____
(3)	Excess core losses line (1) less line (2) but not less than zero	_____
(4)	Percent difference line (3) - line (2) x 100	_____
(5)	Tested total losses	_____
(6)	Quoted total losses	_____
(7)	Excess total losses line (5) less line (6) but not less than zero	_____
(8)	Percent difference line (7) - line (6) x 100	_____
(9)	Tested copper losses	_____
(10)	Quoted copper losses	_____
(11)	Excess copper losses line (9) less line (10) but not less than zero	_____
(12)	Penalty for excess core losses line (3) x \$ _____	_____
(13)	Penalty for excess copper losses line (11) x \$ _____	_____
(14)	Penalty to be assessed manufacturer line (12) plus line (13)	_____

Date \_\_\_\_\_ Prepared By: \_\_\_\_\_  
 Design Engineering

Issued: 8/17/72  
Revised: 3/14/94  
Revised: 12/13/96

Special Conditions and  
Supplemental Instructions to Bidders  
Applicable to  
Specification 368-300

A. Data to be Supplied with Bidder's Proposal

The following data shall be supplied with the bidder's proposal in addition to that information required by the "Invitation to Bid" and the "Purchase Requisition".

1. Impedance volts in % at full load, high voltage to low voltage at 85°C.
2. No load and total losses at 85°C.
3. Delivery in weeks.
4. A statement indicating compliance with our Specification without exception or a detailed list of exceptions.
5. Escalation is \_\_\_\_\_, is not \_\_\_\_\_ applicable for the transformers bid. If escalation applies, the Bidder shall indicate in his bid the specific items or materials subject to escalation, and shall give the method and indices to be used in computing the amount thereof. Escalation occurring after the quoted delivery date will not be paid unless delays are the result of actions by the City. Escalation occurring after acceptance, if Purchaser exercises the option to delay shipment after manufacturing is completed, will not be paid

If the above information and compliance statement are not supplied, the proposal will not be evaluated.

An alternate bid for the total order may be submitted in addition to the unit bids.

B Loss Evaluations

Loss penalties and loss evaluations will be based on the following values

1. No load or excitation losses at \$3 90/watt
2. Load losses at \$2 30/watt.

C. Shipping Terms

Ship F.O.B. point of destination, freight prepaid.

D. Terms of Payment

1. If escalation applies, the City of Fort Collins shall not be billed for escalation occurring after the promised delivery date.
2. Test reports shall accompany the invoice. If test reports do not accompany the invoice, late payment penalty charges incurred due to delays in obtaining the test reports will not be paid. Certified copies of test reports shall be sent to the Design Section, Fort Collins Light and Power Utility.
3. Loss penalty credits and escalation charges shall be itemized on the invoice.