







LEGEND:

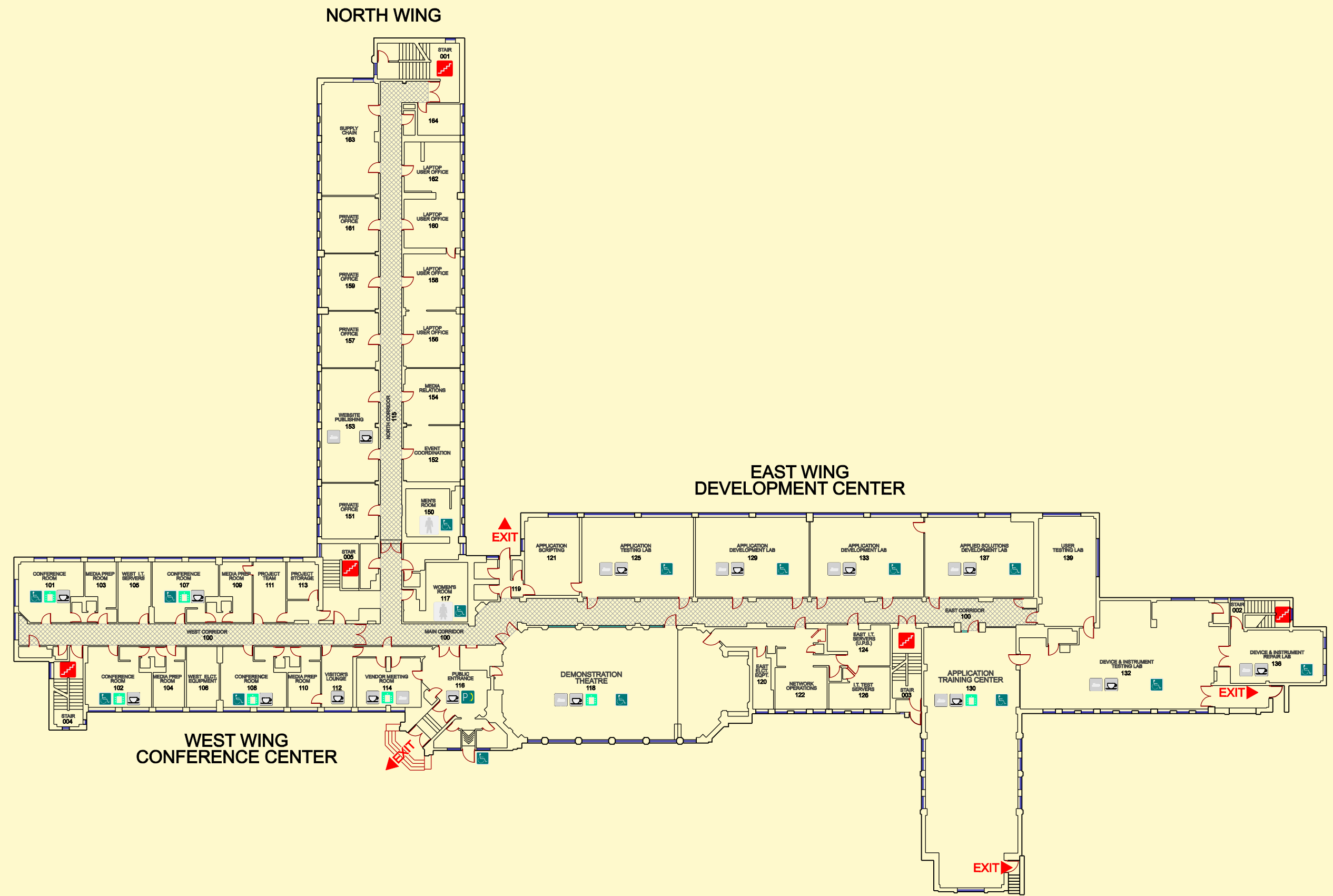
-  STAIRS
-  A.D.A. Accessible
-  Public Inter-Office Phone
-  Conference Room
-  Multi-Function Printer
-  Coffee / Snack Service

R&D.C.

1st Floor:
 IFMA Internal Area: 28,150 Sq.Ft.
 Floor Loading: 110 lbs./Sq.Ft. (Typical)
 Usage: (Primary) Research & Development
 (Secondary) Business Administration

Full Time Occupancy: 41 Persons (57%)
 Temporary Office Docking Stations: 22

- CONFERENCE ROOM 101**
 - Capacity: 6 - 8
 - PolyCon Video Conference
 - 48" X 48" SmartBoard Touch Screen
 - 42" Plasma Flat Panel TV (Network Connected)
- CONFERENCE ROOM 102**
 - Capacity: 6 - 8
 - PolyCon Video Conference
 - Dual 48" X 48" SmartBoard Touch Screens
 - Dual 42" LCD Flat Panel TVs (Network Connected)
- CONFERENCE ROOM 107**
 - Capacity: 6 - 8
 - PolyCon Video Conference
 - Dual 48" X 48" SmartBoard Touch Screens
 - 42" Plasma Flat Panel TV (Network Connected)
- CONFERENCE ROOM 108**
 - Capacity: 6 - 8
 - PolyCon Video Conference
 - Dual 48" X 48" SmartBoard Touch Screens
 - Dual 42" LCD Flat Panel TVs (Network Connected)
- MEETING ROOM 114**
 - Capacity: 8 - 10
 - PolyCon Conference Phone (Only)
 - 48" X 48" SmartBoard Touch Screen
 - 52" Plasma Flat Panel TV (CATV & Network Connected)



FIRST FLOOR PLAN
 INTEGRATED SOLUTIONS INSTITUTION
 RESEARCH & DEVELOPMENT CENTER



PROCEED SOUTH AND AWAY FROM THE BUILDING ASSEMBLE AT FAR END OF THE PARKING LOT

PLEASE ALLOW ROOM FOR EMERGENCY RESPONSE VEHICLES

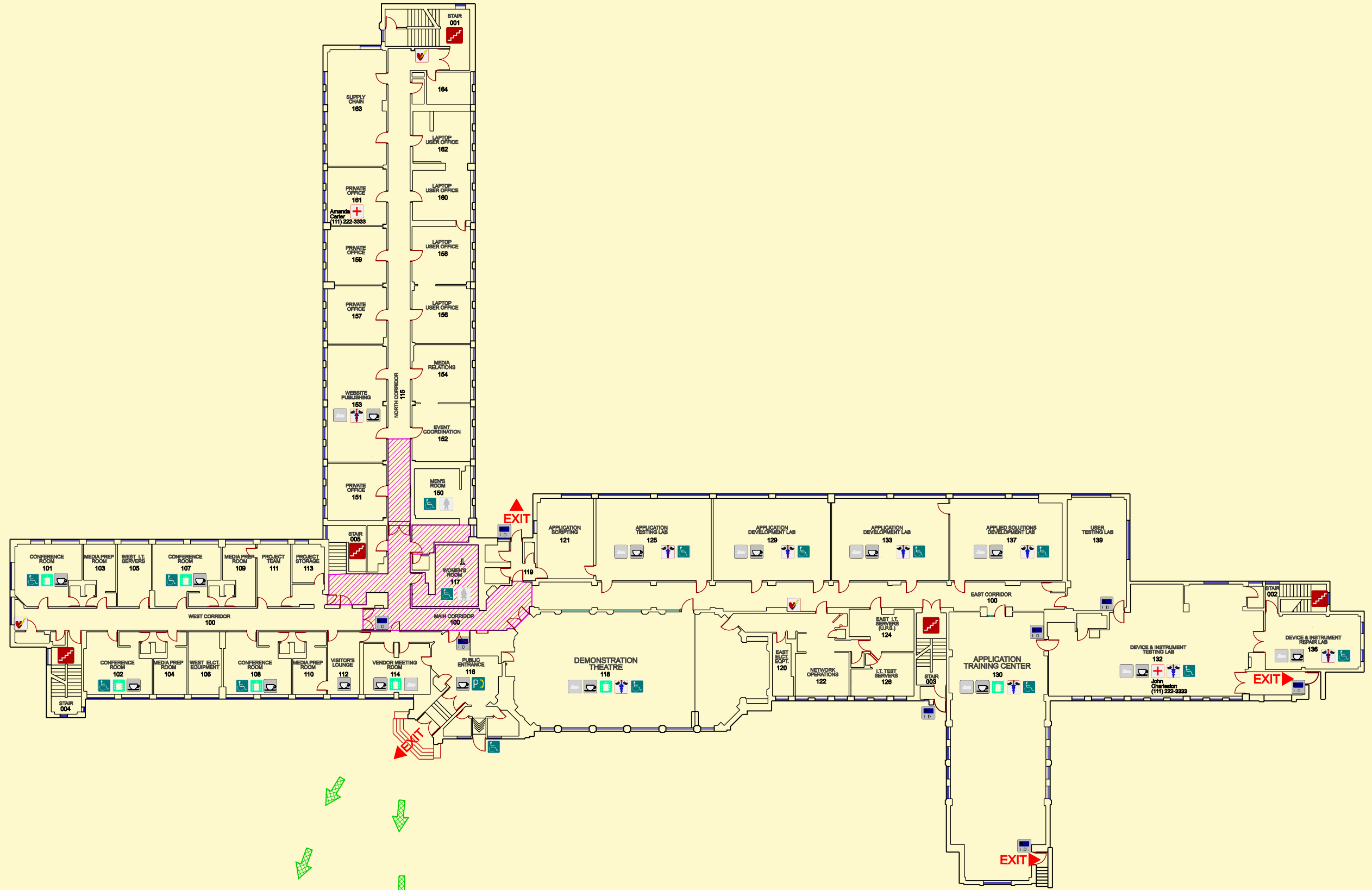
SEEK SHELTER IN MAIN CORRIDOR IN THE EVENT OF A TORNADO OR LIFE THREATENING WEATHER CLOSE ALL DOORS ALONG CORRIDOR

John Charleston (111) 222-3333 Amanda Carter (111) 222-3333

R&D.C.

LEGEND:

- STAIRS
FIRST RESPONDER (C.P.R. CERTIFIED)
FIRST AID KIT
HEART DEFIBRILLATOR
A.D.A. ACCESS
PUBLIC INTER-OFFICE PHONE
MULTI-FUNCTION PRINTER
COFFEE / SNACK SERVICE
MEETING ROOM
CARD READER ACCESS
I.D.
SEVERE WEATHER SAFETY ZONE
EVACUATION ASSEMBLY MEETING AREA



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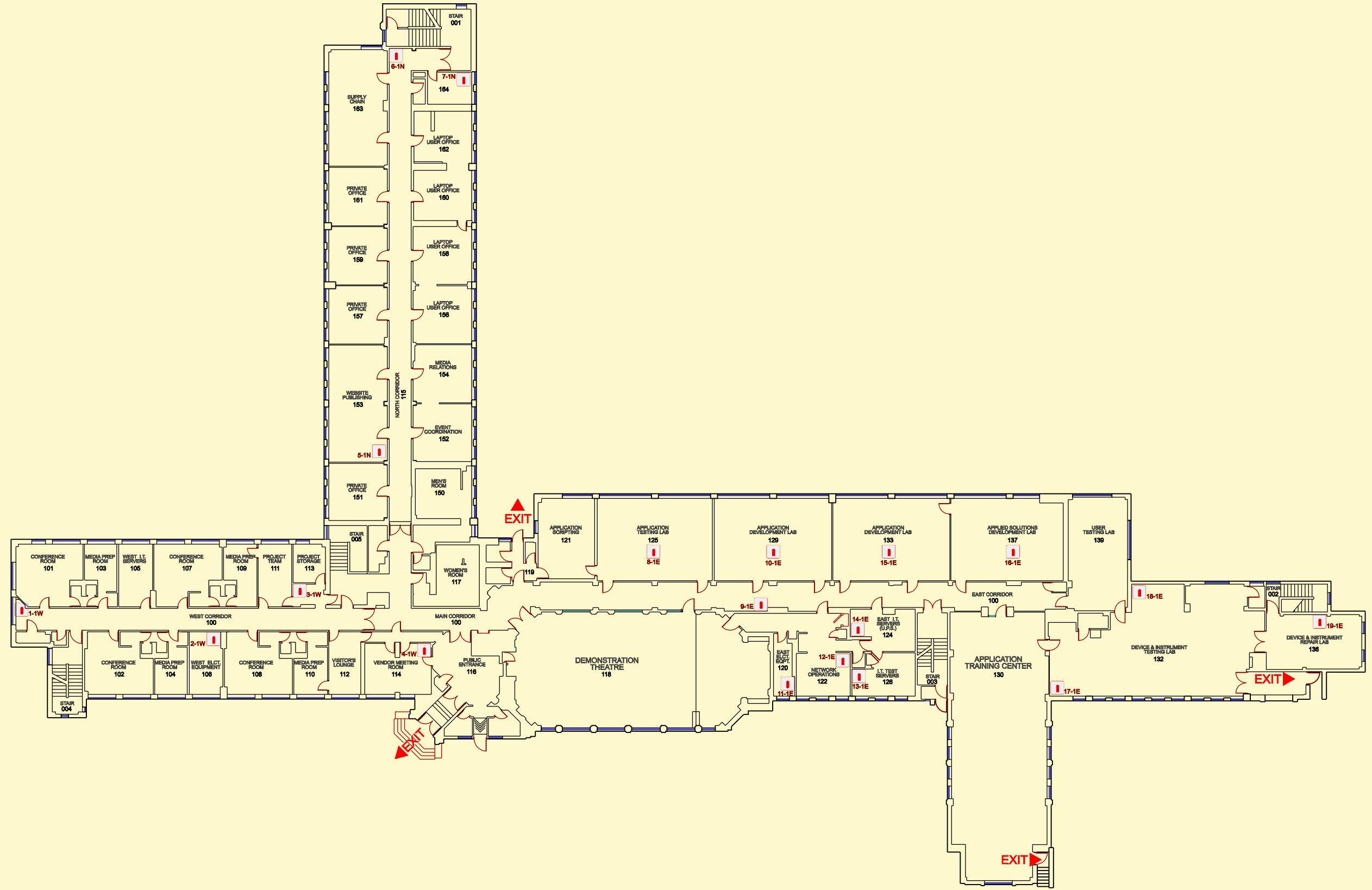
LEGEND:

 FIRE EXTINGUISHER

R&D.C.
FIRE EXTINGUISHERS

FIRST FLOOR PLAN

Station No.	Equipment Type	Class Hazard
1-1E	10# CO2	A B C
2-1E	2-1/2 Gal. P.W.	A B C
3-1E	15# CO2	B C
5-1E	10# CO2	B C
6-1E	10# CO2	B C
7-1E	10# Dry Chem.	A B C
8-1E	10# CO2	B C
10-1E	10# CO2	B C
11-1E	5# CO2	B C
12-1E	2-1/2 Gal. P.W.	A
13-1E	5# CO2	B C
14-1E	20# CO2	B C
15-1E	20# Dry Chem.	A B C
16-1E	10# CO2	B C
17-1E	15# CO2	B C
19-1E	1-1/2 Gal. P.W.	A

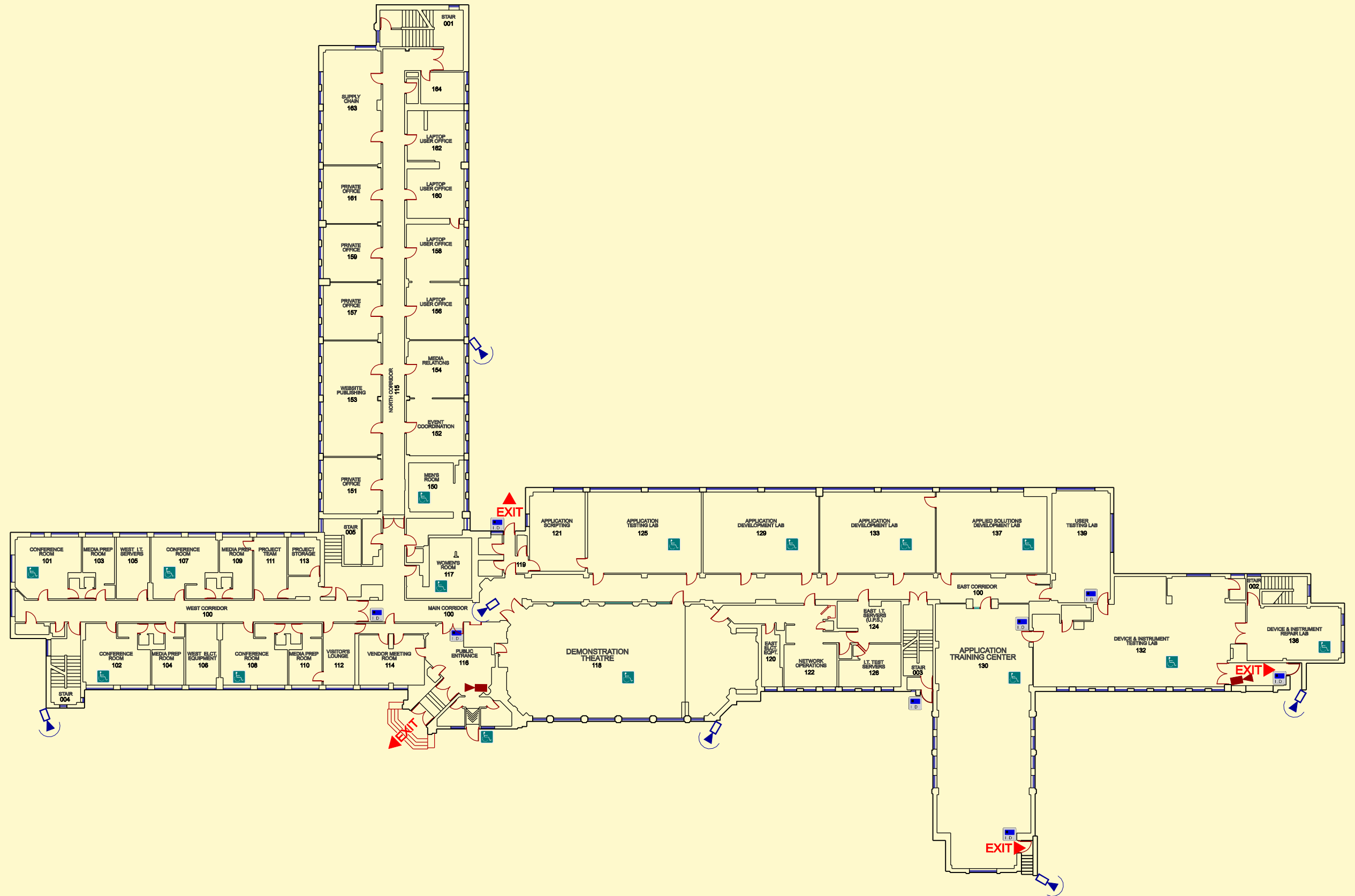


(N.T.S.)

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R&D.C.



LEGEND:

- PAN / TILT / ZOOM CAMERA
- FIXED POSITION CAMERA
- CARD READER ACCESS
- A.D.A. ACCESS



(N.T.S.)

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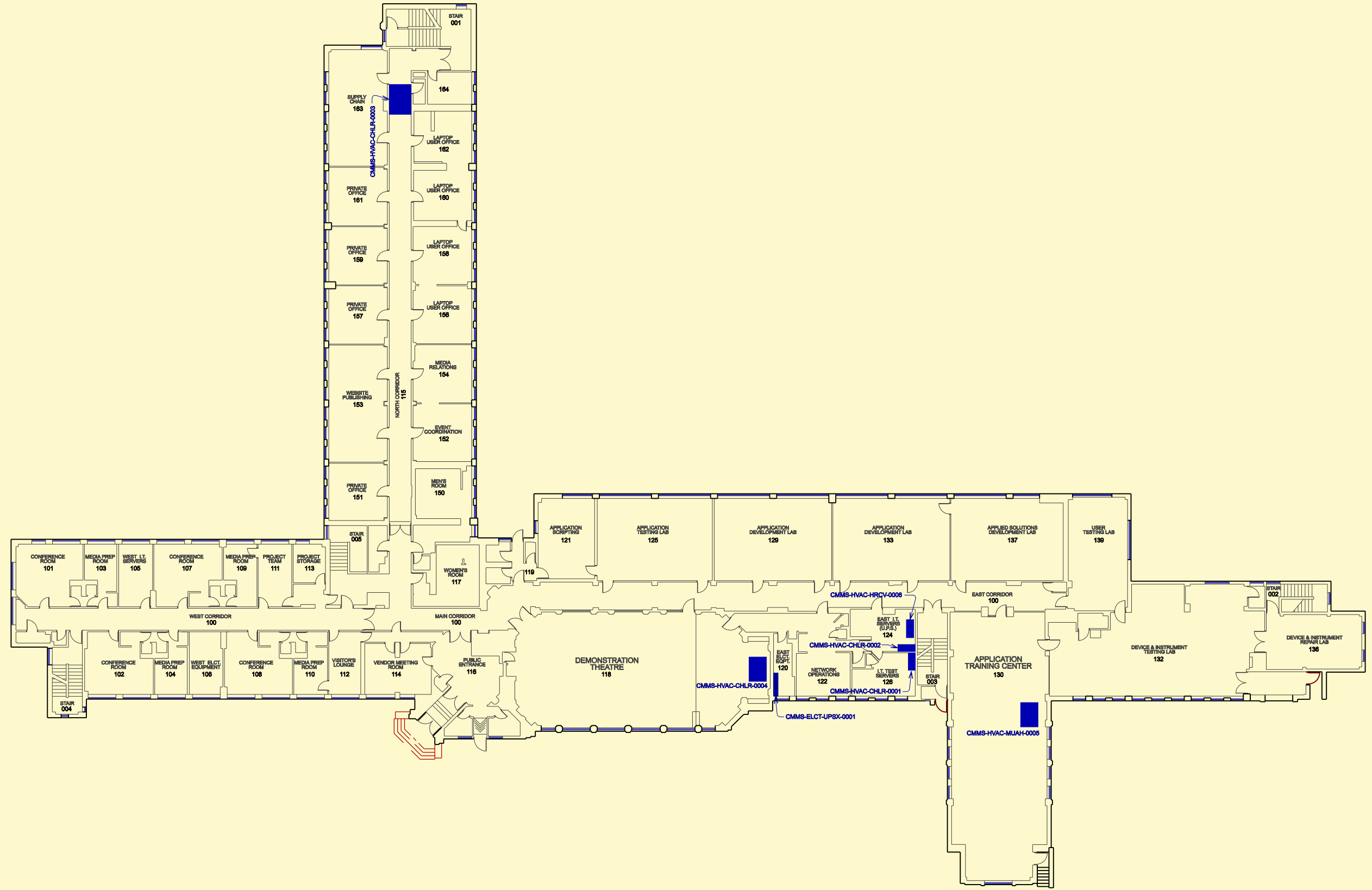
LEGEND:

■ LOCATION OF CMMS EQUIPMENT

R&D.C.

CMMS EQUIPMENT SCHEDULE

Building System	Eqpt. Type	Eqpt. I.D. #	Location	Eqpt. Description
ELCT	UPSX	0001	Room 120	Uninterruptible Power System
HVAC	CHLR	0001	Room 124	Chiller
HVAC	CHLR	0002	Room 126	Chiller
HVAC	CHLR	0003	Roof Top	Chiller
HVAC	CHLR	0004	Roof Top	Chiller
HVAC	MUAH	0005	Roof Top	Make-Up Air Handler
HVAC	HRCV	0006	Roof Top	Heat Recovery Unit



(N.T.S.)

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Reciprocating Heat Reclaim Units Double-Bundle Models

These instructions supplement the installation, Start-Up and Service Instructions furnished with the standard 30HS chiller (Model D) which is to be mounted on this Double Bundle condenser section to make the complete Heat Reclaim unit. The designation for the complete unit is 30H (see Table 1).

Table 1 — Heat Reclaim Unit/Sections

HEAT RECLAIM UNIT MODEL NO.	HEAT RECLAIM UNIT SECTIONS PACKAGE NUMBERS	
	Double Bundle Condenser Section	Condenserless Chiller
30H070D-00DB	09RJ070001	30HS070D-00
30H080D-00DB	09RJ080001	30HS080D-00
30H090D-00DB	09RJ090001	30HS090D-00
30H100D-00DB	09RJ100001	30HS100D-00
30H110D-00DB	09RJ110001	30HS110D-00
30H120D-00DB	09RJ120001	30HS120D-00
30H140D-00DB	09RJ140001	30HS140D-00
30H160D-00DB	09RJ160001	30HS160D-00

IMPORTANT: Be sure to follow the instructions under Variations from Standard 30HS Installation.

All discussion on the condensers is covered in these instructions. Except where noted, do not use the instructions with the 30HS chiller with respect to condensers.

INSTALLATION

Rigging — These instructions apply to the rigging and installation of the Double Bundle condenser section and the mounting and hook-up of the standard 30HS compressor/cooler section on the condenser section.

The condenser section should be left on the shipping skid until the unit is at the place of installation. *All rigging and moving force should be applied to the frame or the skid. Avoid contact with piping and fittings.*

Placement — The floor must be strong enough to support the operating weight of the complete Heat Reclaim unit (see Table 2). Sufficient clearance

must be allowed all around the unit for service access as follows:

Front — 3 to 4 ft (914 to 1219 mm)

Rear — 2 ft (610 mm)

Ends — space for cooler and condenser tube removal from one (either) end with 2 ft (610 mm) at the opposite end (see dimension drawing in 30HR,HS Installation Instructions, with 30HS unit.)

Top — sufficient for rigging equipment

Figure 2 shows the location of 6 mounting holes. Approximately 1/6 of the operating weight of the unit is supported at each of these points.

The mounting surface should be level before the unit is placed. Position and level the condenser section and bolt this section to the floor before mounting the 30HS section. Raise the 30HS section using the 2-in. (51 mm) diam holes in the cooler end flanges (see instructions with 30HS section) and place it on the condenser section. Align the 4 mounting holes at the corners and secure with the 3/4-in. bolts, nuts and washers shipped with the condenser section (see Fig. 3, 4, 5, 6).

Variations from Standard 30HS Installation — Although the compressor/cooler section is a standard 30HS unit, the close coupling of this section with the condenser section causes the 30H Heat Reclaim Double-Bundle unit to be similar to a 30HR chiller.

Therefore, the following variations from a standard 30HS installation are of noted importance:

1. Remove the relief valves that are factory installed on the 30HS unit (relief valves are factory installed on the condensers in the Double Bundle section).
2. Do not use the 2 check valves shipped loose with the 30HS unit.
3. Do not install liquid line shutoff valves (these valves are factory installed on the Double Bundle condensers).
4. See additional variations under Piping.

DOUBLE-BUNDLE DESCRIPTION

In the 4-condenser bundle, the lower 2 are tower condensers and the upper 2 are Heat Reclaim condensers (see Fig. 2). All are shell-and-tube type with removable heads for easy tube servicing. Each Tower condenser has an internal subcooler designed to provide 12-15 F (7-8 C) total liquid subcooling at average tower water conditions. The Heat Reclaim condensers do not require subcooling; therefore, the subcooler baffling is removed. For further condenser data, refer to Table 2, Physical Data.

PIPING

Refrigerant — Discharge gas piping from the compressors to the Heat Reclaim condensers is factory supplied for field installation. Also, piping for liquid lines from the Tower condensers to the connections on the filter driers is factory supplied for field installation.

As received, the 30HS chiller has capped stub tubes at the rear of the compressor section for connecting discharge piping to remote condensers. For the Heat Reclaim piping, the capped stub tubes must be removed back to the point where the standard 30HR piping is connected. On 4-compressor units, remove the tube back to the Tee at the tube coming from the muffler on both circuits. On 3-compressor units, remove the tube back to the Tee on circuit No. 1 and all the way back to the muffler on circuit No. 2.

The packaged discharge and liquid line piping is shipped with the Double Bundle condenser section.

Figures 3, 4, 5 and 6 give detailed instructions for connecting the discharge and liquid line piping to the Heat Reclaim units.

Water — Three water systems are connected to the Heat Reclaim unit:

1. To and from the cooling tower (bottom condensers).
2. To and from heated areas (top condensers).
3. Chilled water leaving and returning to the cooler.

Interconnecting piping must be flexible enough to prevent vibration transmission. If a vibration condition exists that cannot be stopped by this method or if installation is on an upper floor where vibration cannot be transmitted to the ground, use field-purchased isolator springs under each unit mounting hole.

CAUTION: Retighten all condenser head bolts before filling system with water. Minimum — maximum bolt torques: 09RP033 — 40-45 ft-lb; 09RP043,054,070 — 45-50 ft-lb; 09RP084 — 50-65 ft-lb.

HEAT RECLAIM CONDENSERS

It is recommended that on these dual-circuit units the water circuiting thru the Heat Reclaim

condensers be piped in parallel. Figure 1 shows parallel piping for 3- and 6-pass water circuiting. Water connection data is given in Table 2 under condensers.

TOWER CONDENSERS

IMPORTANT: Water must enter at bottom connections shown in Fig. 2 for proper function of the internal sub-cooler in bottom of each condenser.

Water connection data is given in Table 2 under condensers.

Run water supply lines as short as possible. Lines should be sized according to the required flow rate for operation at design conditions (not necessarily connection size). See Carrier System Design Manual, Part 3, Piping Design.

A cooling tower bypass valve is usually used to regulate the temperature of the water entering the condensers. This may be controlled by sensing either outdoor air temperature or temperature of water leaving the Heat Reclaim condensers. For further information on Systems Controls, refer to the Engineering Guide for Reciprocating Chiller Heat Reclaim Systems.

Accessory water manifold packages are available to manifold 2 condensers on 30H070-140 units. Connections are shown in Fig. 2. Each package contains 2 manifolds, each in 2 sections to be field welded.

Water leaving condenser is under pressure; drain piping should not be connected directly into sewer lines. Check local codes. A 3/8-in. drain plug is located in the head at each end of the condenser.

Refer to Pressure Relief Devices in the Installation, Start-Up and Service Instructions furnished with the standard 30HS chiller package concerning connections for these components.

ELECTRICAL DATA

The electrical data for the 30H070-160 Double Bundle Heat Reclaim chillers is the same as for the standard 30HS condenserless models used. Table 3 for 60-Hz and Table 4 for 50-Hz are included in these instructions for your convenience. Table 3 is on page 5 and Table 4 is on page 8.

ADDITIONAL DATA FOR EXPORT APPLICATION

In the basic Installation, Start-Up and Service Instructions supplied with the standard 30HS units there is no metric data. The following information shows English/S.I. Metric data listed under the applicable section in the basic instructions:



Installation Operation Maintenance

**RTUB 207-224 - Liquid chillers with
helical rotary compressors**

**RTCA 108-216 - Remote air-cooled
condenser**



RLC-SVX03A-E4

General information

- Notify the Trane sales representative and arrange for repair. Do not repair the unit, however, until damage is inspected by the carrier's representative.

Loose Parts Inventory

Check all the accessories and loose parts that are shipped with the unit against the shipping list. Included in these items will be water vessel drain plugs, rigging and electrical diagrams, and service literature, which are placed inside the control panel and/or starter panel for shipment.

Description of the Unit



The RTUB units are liquid chillers equipped with two helical rotary compressors and an evaporator designed to operate with remote RTCA air-cooled condensers or other manufacturers' remote condensers. The RTUB is shipped once it has

been assembled and wired in the factory. The discharge piping is blocked at the oil separator outlet. Water connections - chilled water inlet and outlet - are blocked for transportation. Both RTUB and RTCA units are dried and vacuum-pumped in the factory, and contain a nitrogen holding charge when shipped.



Figure 1 - Typical Unit Nameplates

RTUB

RTCA

TYPE ①	_____			
	CRC	N° SERIE ②	CCYY	N° ORGANISME NOTIFE ③
	_____	_____	_____	_____
	QTE-QTY	V / Hz / Ph	A max / FLA	kW max
	C1	_____	_____	_____
	C2	_____	_____	_____
	CONTROL - CONTROL	_____	_____	VA
	INTENSITE DEMARRAGE - STARTING AMPS	_____	_____	_____
	FLUIDE ④	_____	C1/C2	kg
		_____	C1/C2	l
	PS	BP-LP	bar	HP-HP
		_____	bar	_____
	EVL/DE/FL/ES/DW/FI/HL/NO/PI/SI/CZ/PO/HI/EL			
①	Type / Typ / Tipo / Tipo / Type / Tyyp / Type / Tipo / Typ / Typ / Typ / Tipus / Τύπος			
②	Serial nb / Seriennummer / Numero di serie / Numero de serie / Seriennummer / Sarjanumero / Seriennummer / Seriennummer / Numero di serie / Tillyverkningsnummer / Sé rovié / éislo / Number fabryczny / Sorozatszám / Αριθμός σειράς			
③	Notified body / Benannte Stelle / Organismo notificato / Organismo notificado / Bemyndiget organ / Imolteltetjen latosten / Aangemelde Instanste / Ramme nr. / Organismo notificado / Amfält organ / Autorizovaná osoba / Organizacja notyfikowana / Regisztráció száma / Հնդրա պատրաստիչ			
④	Fluid / Fluide / Fluido / Fluido / Fluidum / Fluid / Stof / Kuldemedium / Fluido / Fluid / Kapitalina / Czynnik / Közeg / περσός			
		88130 CHARMES - FRANCE		
		AN AMERICAN STANDARD COMPANY		

N° DE MODELE - MODEL NUMBER				

N° SERIE - SERIAL NUMBER	_____	MOIS-MONTH / ANNEE-YEAR	_____	_____
	QTE-QTY	V / Hz / Ph	A max / FLA	kW max
COMPRESSOR	C1-C3	_____	_____	_____
COMPRESSOR	C2-C4	_____	_____	_____
VENTILATEUR - FANS	_____	_____	_____	_____
POMPE A HUILE - OIL PUMP	_____	_____	_____	_____
AUXILIAIRES - AUXILIARY	_____	_____	_____	_____
CONTROL - CONTROL	_____	_____	_____	VA
INTENSITE DEMARRAGE - STARTING AMPS	_____	_____	_____	_____
INTENSITE NOMINALE / RATED LOAD AMP	C1-C3 / C2-C4	_____	A	BP/HP / LP/HP
	_____	_____	_____	b
REFRIGERANT	_____	QTE - QTY	C1/C3/C2-C4	kg
HUILE - OIL	_____	QTE - QTY	C1/C3/C2-C4	l
PRESSION MAXI D'UTILISATION / MAX WORKING PRESSURE	(bar)	BP	LP	HP
	_____	_____	_____	_____
		88190 GOLBEY - FRANCE		
		AN AMERICAN STANDARD COMPANY		

**MAKEUP AIR
DEHUMIDIFICATION
DESIGN MANUAL**



MAKEUP AIR DEHUMIDIFICATION DESIGN MANUAL

The energy crisis of the mid 1970's gave birth to a movement to conserve energy. Over the ensuing years much has been done to reduce the energy consumption of new and existing buildings. Lighting efficiency has improved so much that today we use 1/2 the wattage without sacrificing lumens. Improved construction methods, better insulation and high efficiency windows have also helped reduce energy consumption. However, all of these measures have resulted in a reduction of Sensible heat gains while Latent heat gains have increased. This is the reason that humidity related issues have surfaced since the mid 1970's.

One of the methods for dealing with this issue is to dehumidify and "neutralize" the moisture level of outdoor air used for makeup. This can be partially done using Latent energy recovery devices, such as desiccant enthalpy rotors. However, dedicated dehumidification component is needed to reduce the outdoor air grain level equal to or lower than indoor grain level. *It is important to note that a Latent energy recovery device alone can never bring the outdoor air humidity below that of indoors.*

Conventional makeup air dehumidifiers are and costly to operate. The refrigeration controls are sensitive, susceptible to failure and difficult for field technicians to troubleshoot.

Nautica has resolved these problems by developing a more energy efficient and reliable makeup air dehumidification system. Driven by many years of practical refrigeration experience, the Nautica makeup

air dehumidification system is designed to be simple and less expensive to install, operate, maintain, troubleshoot and service.

Makeup air dehumidifiers have been around for several decades and the basic concept, to remove humidity by overcooling pool air, and then compensate with re-heating, has not changed.

The Nautica dehumidifier uses a regenerative heat exchanger to reduce the load on the cooling coil by pre-cooling. This unique feature reduces energy consumption by up to 50%.

Conventional makeup air dehumidifiers use hot refrigerant gas to reheat the air after cooling. This process use automatic solenoid valves, check valves and piping to route the refrigerant hot gas to the appropriate device. On paper it looks good. However, excessive amounts of costly refrigerant are needed to fill the system and the devices in the refrigerant circuit are subject to malfunction if a slight amount of dirt is present.

Designing dehumidification systems for makeup air is a specialized area of HVAC design engineering. This design manual provides a simple method for sizing dehumidification equipment for makeup air.

Nautica dehumidifiers utilize MSP® heat transfer technology, that is compatible with chilled water, or refrigerant based systems and can be served by a wide range of conventional chillers and condensing units, using any fuel source.

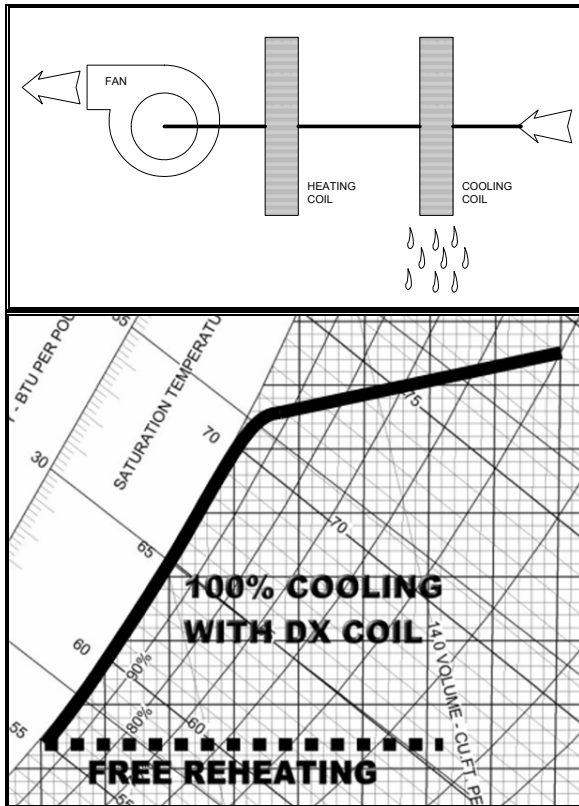
KEY FEATURES AND BENEFITS

BENIFIT	EXPLANATION OF BENIFIT
OPERATING SAVINGS	Energy consumption up to one-half that of conventional dehumidification systems. No reheating to compensate for over-cooling.
INSTALLATION SAVINGS	Lower cooling load. Lower power requirements.
HIGH RELIABILITY	Eliminates complicated and temperamental refrigerant-side controls, reduces breakdowns, and simplifies troubleshooting.
LOW MAINTENANCE	Simple design results in reduced chance for breakdowns and low maintenance costs.



NAUTICA vs. CONVENTIONAL DEHUMIDIFICATION TECHNOLOGY

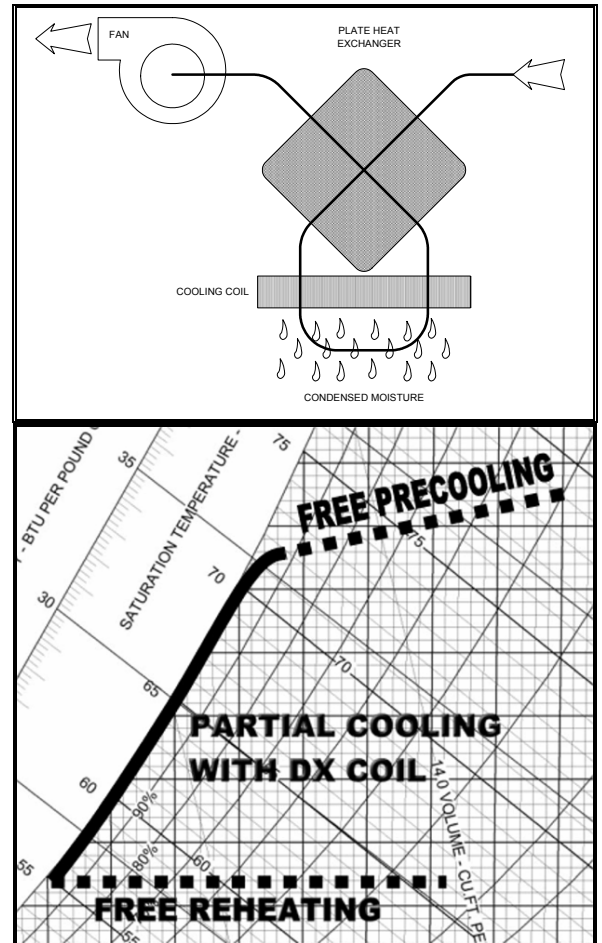
FIGURE 1 CONVENTIONAL DEHUMIDIFIER



With conventional dehumidification technology (Figure 1, above), warm humid air, flows through a cooling coil where it is cooled and dehumidified. The dehumidified and cooled air is then reheated through a heating coil prior to entering the conditioned space.

In the regenerative dehumidification technology (Figure 2, above), warm, humid air flows through the first pass of an air-to-air heat exchanger for pre-cooling and dehumidification by thermal exchange with the cooler leaving air. The air then passes through a cooling coil for final cooling and dehumidification. The dehumidified and cooled air is then drawn back through the opposite side of the air-to-air heat exchanger to be heated, prior to entering the conditioned space.

FIGURE 2 REGENERATIVE DEHUMIDIFIER



As in conventional dehumidification, the regenerative technology uses ordinary refrigerants or chilled water. However, in the energy-efficient regenerative dehumidifier, a lower temperature air enters the cooling coil as a result of pre-cooling and dehumidification through the air-to-air heat exchanger. This innovative combination of an air-to-air heat exchanger with conventional cooling coil results in reduced compressor capacity, requiring half the energy for dehumidification compared with conventional dehumidification systems.