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ECHELON OVAL Standard Details

SN # Y100+

REVISED: MAY 20, 2014

It is the customer's responsibility to ensure that all appropriate design and construction personnel receive this document along with their site specific drawing.

This document contains information which is critical to the proper design and construction of a suite for the Hitachi ECHELON system. The information contained herein is to be used in conjunction with the site specific drawing provided by HMSA.

Contact the Site Planning Department with questions regarding this guide.

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ECHELON OVAL Y100+ MAY 20, 2014

PREVIOUS REVISIONS - JAN 27, 2014

THIS REVISED ECHELON OVAL STANDARD DETAIL SET CONTAINS UPDATED INFORMATION TO BE USED IN THE PLANNING OF A SUITE TO ACCOMMODATE THE HITACHI ECHELON MRI SYSTEM. BELOW, PLEASE NOTE THOSE SPECIFIC MODIFICATIONS THAT SHOULD BE REVIEWED BY THE CUSTOMER'S DESIGN AND CONSTRUCTION PERSONNEL. THE CUSTOMER IS RESPONSIBLE FOR ENSURING THEIR ECHELON SUITE IS BUILT TO THE REQUIREMENTS AND SPECIFICATIONS CONTAINED IN THIS DOCUMENT. THE MOST RECENT VERSION OF THIS DOCUMENT MAY BE FOUND AT www.hitachimed.com CONTACT THE SITE PLANNING DEPARTMENT AT 800-800-3106 TO OBTAIN APPROPRIATE USER NAME AND PASSWORD.

MAY 20, 2014 REVISIONS

- PG 3 OF 27: GENERAL SITING CRITERIA
1. REVISED NUMBER OF COMPONENTS TO 10 IN NOTE "A" UNDER "FLOOR SPACE"
- PG 4 OF 27: REPRESENTATIVE LAYOUTS
1. MOVED FAN UNIT CLOSER TO WALL IN SCAN ROOM
2. ADDED OPTIONAL SIDE COVERS AT REAR PATIENT TABLE
3. ADDED NOTE UNDER LEGEND REFERRING TO WIREWAY PAGES
- PG 5 OF 27: MINIMUM SUITE LAYOUT
1. MOVED FAN UNIT CLOSER TO WALL IN SCAN ROOM
2. REVISED NOTE 6
3. ADDED OPTIONAL SIDE COVERS AT REAR PATIENT TABLE
- PG 7 OF 27: FLOOR LOADING STRUCTURAL
1. ADDED NOTE REGARDING AVAILABILITY OF SEISMIC ANCHORAGE DETAILS
- PG 8 OF 27: RF SHIELDING
1. ADDED FAN UNIT IN SCAN ROOM
2. ADDED OPTIONAL SIDE COVERS AT REAR PATIENT TABLE
- PG 9 OF 27: ENVIRONMENTAL
1. CHANGED ACOUSTIC INSULATION IN LEGEND TO RECOMMENDED
2. ADDED FAN UNIT IN SCAN ROOM
3. CHANGED CONTROL ROOM NOISE LEVEL TO VARIABLE
4. CHANGED PLAN TO SHOW ACOUSTIC INSULATION ON ALL FINISH WALLS IN SCAN ROOM
5. ADDED OPTIONAL SIDE COVERS AT REAR PATIENT TABLE
- PG 10 OF 27: CHILLER REQUIREMENTS
1. ADDED OPTIONAL SIDE COVERS AT REAR PATIENT TABLE
- PG 11 OF 27: CHILLER INSTALLATION CHECKLIST
1. REPLACED REFERENCES TO HASKRIS AND HASKRIS COMPANY WITH HMSA
2. REPLACED INSTALLATION CHECKLIST UPDATED VERSION
- PG 13 OF 27: ELECTRICAL - LIGHTING
1. ADDED OPTIONAL SIDE COVERS AT REAR PATIENT TABLE
- PG 16 OF 27: WIREWAYS
1. ADDED OPTIONAL SIDE COVERS AT REAR PATIENT TABLE
2. ADDED FAN UNIT IN SCAN ROOM
3. REVISED VERBAGE IN NOTE 1
- PG 17 OF 27: WIREWAYS (CONT)
1. REVISED WIREWAY ISOMETRIC TO SHOW NON-FERROUS RAISED FLOOR
2. ADDED NOTE TO WIREWAY ISOMETRIC CONCERNING WIREWAY CONFIGURATION
3. DELETED NOTE 6 REGARDING SCAN/EQUIPMENT ROOM WALL MAXIMUM THICKNESS
4. ADDED RAISED FLOOR IN SCAN ROOM ELEVATION

- PG 18 OF 27: RIGGING AND DELIVERY
1. ADDED REQUIRED SQUARE FOOTAGE TO NOTE 7 UNDER CUSTOMER/CONTRACTOR/RIGGER RESPONSIBILITIES
- PG 24 OF 27: GAUSS FIELDS
1. ADDED OPTIONAL SIDE COVERS AT REAR PATIENT TABLE
- PG 25 OF 27: SYSTEM COMPONENTS
1. ADDED OPTIONAL SIDE COVERS AT REAR PATIENT TABLE
- PG 26 OF 27: SYSTEM COMPONENTS (CONT)
1. ADDED 8" TO SERVICE AREA BEHIND RFIP AND GRADIENT AMP CABINETS
- PG 27 OF 27: PRE-DELIVERY CHECKLIST
1. UPDATED CRYOGEN VENT HEIGHT
2. UPDATED CHILLER CHECKLIST SUBMITTAL INFORMATION

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TYPICAL PLANNING PROCESS

SITE SELECTION AND EVALUATION (4 WEEKS)

A) SITE SELECTION (1 WEEK)

- 1) **SALES:**
 - a. SUBMITS COMPLETED/PARTIALLY COMPLETED SITE SELECTION SURVEY WITH CUSTOMER INFORMATION
 - b. PROVIDES A SCALED DRAWING OR A DIMENSIONED SKETCH
 - c. REQUESTS EVALUATION ASSISTANCE FROM SITE PLANNING
- 2) **SITE PLANNING:**
 - a. RECORDS DATA AND ASSIGNS OPPORTUNITY
 - b. PROVIDES STANDARD DETAILS TO CUSTOMER AS REQUIRED.
 - c. PREPARES A PRELIMINARY EQUIPMENT LAYOUT WITH CLEARLY IDENTIFIED ISO-CENTER
 - d. REVIEWS PRELIMINARY DATA FOR SITING CONCERNS
 - e. SCHEDULES A SITE VISIT WITH THE CUSTOMER AND SALESPERSON
 - f. ARRANGES FOR SITE TESTING BY HMSA PERSONNEL

B) SITE EVALUATION (1 WEEK)

- 1) **SITE PLANNING:**
 - a. VISITS SITE AND VERIFIES PREVIOUSLY SUBMITTED INFORMATION
 - b. PREPARES A SITE EVALUATION REPORT WITH RECOMMENDATIONS AND FORWARDS IT TO THE SALES PERSON TO PRESENT TO THE CUSTOMER
 - c. CONFIRMS SUITE DIMENSIONS, MODIFY AS NEEDED
 - d. ASSISTS CUSTOMER / CONTRACTOR IN IDENTIFYING A 400 SF AREA TO BE DESIGNATED FOR CLEAN AND SECURE STORAGE OF COVERS AND ANCILLARY EQUIPMENT AT TIME OF DELIVERY
 - e. COORDINATES AND COMPLETES SITE TESTING
 - f. DISCUSSES CONCERNS WITH THE CUSTOMER (AND DESIGN TEAM / CONTRACTOR IF AVAILABLE)
 - g. ASSIST IN IDENTIFYING POSSIBLE ALTERNATE LOCATIONS IF APPROPRIATE
 - h. REVIEW STANDARD DETAILS WITH CUSTOMER (AND DESIGN TEAM / CONTRACTOR IF AVAILABLE)

NOTE:

- 1) **ALL TESTING MUST BE DONE DURING PERIODS OF TYPICAL ACTIVITY IN THE SURROUNDING AREA**
- 2) **ACTIVITY IN THE IMMEDIATE AREA OF THE PROBE MUST BE RESTRICTED DURING THE TEST**
- 3) **THERE ARE LIMITATIONS TO THE AMOUNT OF INTERFERENCE THAT THE ECHELON SYSTEM CAN CORRECT FOR. IF THE INTERFERENCE(S) EXCEED CORRECTABLE LEVELS, THE FOLLOWING MAY BE REQUIRED.**
 - a. DETERMINE AND ELIMINATE SOURCE OF INTERFERENCE
 - b. INSTALL MAGNETIC SHIELDING AND/OR COMPENSATION UNIT
 - c. SELECT NEW SITE

C) INFORMATION CONSOLIDATION (1 WEEK)

- 1) **SITE PLANNING:**
 - a. REVISES PRELIMINARY DRAWING/SKETCH AS NEEDED
 - b. SUBMITS TEST RESULTS AND CONFIRMED SITE DATA TO TECH SUPPORT FOR REVIEW
 - c. PREPARES SITE EVALUATION REPORT AND VIA TELEPHONE, DISCUSS ACTIONS AND RECOMMENDATIONS WITH SALESPERSON

CUSTOMER REVIEW AND PRELIMINARY PLANS (VARIES)

A) SITE EVALUATION REPORT

- 1) **SALES:**
 - a. REVIEWS THE REPORT WITH THE CUSTOMER (SITE PLANNING IS AVAILABLE VIA TELEPHONE IF NECESSARY)
 - b. REVIEWS REVISED LAYOUT WITH THE CUSTOMER
 - c. RETURNS CUSTOMER SIGNED LAYOUT AND REPORT TO SITE PLANNING

B) SITE DRAWING AND DETAILS

- 1) **SITE PLANNING:**
 - a. PREPARES A FINAL LAYOUT AND FOLLOWS UP ON THE SITE CONCERNS. THAT MAY INCLUDE:
 - 1. REQUESTING A MAGNETIC SHIELD DESIGN FOR FRINGE FIELD CONTROL
 - 2. REQUESTING A MAGNETIC SHIELD DESIGN TO CONTROL INTERFERENCE
 - 3. PROVIDING THE CUSTOMER WITH A CONTACT TO ADDRESS VIBRATION ISSUES

C) ON SITE MEETING (SCHEDULED BY CUSTOMER)

- 1) **SALES AND SITE PLANNING:**
 - a. MEET WITH THE CUSTOMER AND THEIR DESIGN TEAM TO:
 - 1. REVIEW AND FINALIZE THE EQUIPMENT LAYOUT
 - 2. REVIEW STANDARD DETAILS
 - 3. ADDRESS OUTSTANDING QUESTIONS OR CONCERNS
 - 4. IDENTIFY PRELIMINARY DELIVERY SCHEDULE

PRE-CONSTRUCTION (VARIES)

A) ARCHITECT PREPARES CONSTRUCTION DRAWINGS

- 1. INPUT MUST BE COORDINATED WITH VARIOUS CONSULTANTS
 - a. HMSA
 - b. ENGINEERS (STRUCTURAL, HVAC, ELECTRICAL)
 - c. RF SHIELDING VENDOR (REQUIREMENTS VARY WITH DIFFERENT VENDORS)

B) HMSA REVIEW OF ARCHITECTURAL DRAWINGS

- 1. ARCHITECT MUST SEND BID OR PERMIT DOCUMENTS TO HMSA SITE PLANNING

NOTE: THIS IS A REVIEW AND NOT AN APPROVAL. HMSA ACCEPTS NO LIABILITY FOR ERRORS OR OMISSIONS. IT IS THE RESPONSIBILITY OF THE CUSTOMER AND THEIR DESIGN TEAM TO PREPARE THE SUITE TO MEET THE GUIDELINES PRESENTED IN THIS DOCUMENT

PRE-CONSTRUCTION (CON'T)

C) SELECTION OF CONTRACTOR

- 1. THE DRAWINGS GO OUT TO BID AND A GENERAL CONTRACTOR WILL BE CHOSEN BY THE CUSTOMER. THE CUSTOMER/ARCHITECT MUST PROVIDE SITE PLANNING WITH A CONTACT AND TELEPHONE NUMBER. THE ARCHITECT OR GENERAL CONTRACTOR IS RESPONSIBLE FOR SECURING THE BUILDING PERMITS DURING THIS TIME.

D) PRE-CONSTRUCTION MEETING (SCHEDULED BY CUSTOMER/ARCHITECT)

- 1. PLANS ARE REVIEWED AND OUTSTANDING QUESTIONS ARE ADDRESSED. A CONSTRUCTION SCHEDULE SHOULD BE AGREED UPON AT THIS MEETING AND A DELIVERY DATE IDENTIFIED. THE HMSA FIELD SERVICE ENGINEER WILL ALSO BE INTRODUCED TO THE CUSTOMER AND CONTRACTOR AT THIS MEETING.

SITE CONSTRUCTION (6-8 WEEKS)

A) ON SITE EVALUATION

- 1) **FIELD SERVICE ENGINEER:**
 - a. VISITS SITE ON A ROUTINE BASIS TO VERIFY PROGRESS
 - b. ADVISES SITE PLANNING OF SITE STATUS AND ANY CONCERNS
- 2) **SITE PLANNING:**
 - a. ADDRESSES CONCERNS WITH ARCHITECT OR CONTRACTOR AS NEEDED

B) PRIOR TO DELIVERY

- 1. CUSTOMER CONTRACTED RIGGER PERFORMS ON-SITE INSPECTION 1-4 WEEKS PRIOR TO DELIVERY TO VERIFY OFF LOAD CONDITIONS.
- 2. CUSTOMER/CONTRACTOR INSTALLS R1600 CHILLER UNIT, COMPLETES INSTALLATION CHECKLIST AND RETURNS IT TO HASKRIS (SEE PG 11) AND SCHEDULES CHILLER STARTUP PRIOR TO DELIVERY DATE.
- 3. FINISH FLOORING MUST BE COMPLETELY INSTALLED. IT IS THE CUSTOMER/CONTRACTOR'S RESPONSIBILITY TO PROVIDE A PROTECTIVE COVERING (MASONITE IS RECOMMENDED) DURING THE INSTALLATION. IF FLOORING IS NOT INSTALLED PRIOR TO DELIVERY, IT MAY NOT BE LAID UNTIL AFTER THE ECHELON INSTALLATION IS COMPLETE. FLOORING INSTALLED AFTER THE INSTALLATION, MUST BE TRIMMED AROUND THE BOTTOM OF THE SYSTEM COVERS AND MAY NOT BE SLID UNDER THEM. THE MAGNET WILL BE LIVE AND AT FIELD AT THAT TIME.
- 4. THE CUSTOMER OR THEIR AUTHORIZED REPRESENTATIVE IS RESPONSIBLE FOR ENSURING THE PRE-DELIVERY CHECKLIST IS FILLED OUT AND ALL ITEMS ARE EITHER COMPLETED OR SCHEDULED FOR COMPLETION PRIOR TO DELIVERY OF THE SYSTEM (SEE PG 27). THE CHECKLIST MUST BE SUBMITTED TO HMSA 14 DAYS PRIOR TO THE SCHEDULED SYSTEM DELIVERY. IF THE CHECKLIST ITEMS ARE NOT COMPLETED AS REQUIRED, THE DELIVERY MAY HAVE TO BE DELAYED.

NOTE: THE ECHELON SYSTEM IS DELIVERED PRE-FILLED WITH CRYOGENS. THIS REQUIRES THAT THE CHILLER AND ELECTRICAL POWER BE OPERATIONAL AND READY FOR CONNECTION TO THE ECHELON SYSTEM TO AVOID A POTENTIAL AND COSTLY BOIL-OFF.

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TYPICAL PROJECT OVERVIEW

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TYPICAL PLANNING PROCESS (CON'T)

SYSTEM DELIVERY AND INSTALLATION (3 WEEKS)

A) SYSTEM DELIVERY (1 WEEK)

- 1) DAY 1
- a. RIGGER DELIVERS AND SETS ALL MAJOR COMPONENTS. ANCILLARY COMPONENTS PLACED IN A SECURE STORAGE AREA DESIGNATED AND PROVIDED BY CUSTOMER

b. SYSTEM IS INVENTORIED BY RIGGER AND HMSA PERSONNEL

c. RIGGER DISPOSES OF CRATING AND PACKING MATERIAL IN CUSTOMER PROVIDED DUMPSTER (40 YARD REQUIRED. MUST BE EMPTIED MORNING OF DAY AFTER DELIVERY FOR ADDITIONAL DEBRIS DISPOSAL)

d. RF VENDOR CLOSES DELIVERY OPENING IN SHIELD AND MOUNTS FILTER PANEL

e. RF VENDOR PERFORMS FINAL TEST TO VERIFY SHIELD INTEGRITY AND PERFORMANCE

f. BUILDING CONTRACTOR MAY BEGIN CLOSING MAGNET DELIVERY OPENING (END OF DAY)

- 2) DAY 2
- a. BUILDING CONTRACTOR CLOSES AND SEALS MAGNET DELIVERY OPENING AND RF SHIELD

b. ELECTRICIAN ON SITE TO CONNECT BUILDING POWER TO RFIP CABINET AND HEAT EXCHANGER IN EQUIPMENT ROOM

c. ELECTRICIAN INSTALLS ANY REMAINING WIREWAYS IN SCAN ROOM

d. SYSTEM CABLING BEGINS IN EQUIPMENT AND CONTROL ROOM

- 3) DAY 3
- a. COMPLETE EQUIPMENT ROOM CABLING

b. BEGIN SCAN ROOM CABLING

c. BUILDING CONTRACTOR COMPLETES REMAINING SCAN ROOM CLOSURE ITEMS

d. START COLD HEAD OPERATION (FUNCTIONAL USE OF CHILLER)

- 4) DAY 4
- a. COMPLETE SCAN ROOM AND CONTROL ROOM CABLING

b. PREPARE MAGNET FOR RAMP-UP

- 5) DAY 5
- a. RAMP UP MAGNET (MAGNETIC FIELD NOW ACTIVE)

b. BEGIN MAGNET SHIM

- 6) DAY 6
- a. COMPLETE MAGNET SHIM

b. TURN MAGNET OVER TO HMSA TECHNICAL TEAM

B) TECHNICAL INSTALLATION (2 WEEKS)

- 1) COIL TUNING
- 2) SOFTWARE INSTALLATION AND TESTING
- 3) IMAGE QUALITY TESTING

APPLICATIONS TRAINING (2 WEEKS)

- 1) AN HMSA APPLICATIONS SPECIALIST WILL WORK WITH THE SITE'S TECHNOLOGISTS TO FAMILIARIZE THEM WITH THE OPERATION AND PROTOCOLS OF THE ECHELON SYSTEM. AN ENTIRE WEEK IS SCHEDULED FOR INITIAL APPLICATIONS TRAINING WHICH INCLUDES A LIMITED SCHEDULE OF SCANNING VOLUNTEERS AND PATIENTS.

TYPICAL PROJECT SCHEDULE

TYPICAL PROJECT SCHEDULE																														
ACTIVITY	MONTH1				MONTH2				MONTH3					MONTH4				MONTH5				MONTH6					MONTH7			
	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W5	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W5	W1	W2	W3	W4
SITE SELECTION AND EVALUATION BY SALES	█																													
PRELIMINARY DRAWING BY SITE PLANNING		█																												
SITE TESTING BY HMSA			█																											
TEST EVALUATION BY HMSA				█																										
SALES REVIEW OF EVALUATION WITH CUSTOMER					█																									
HMSA PREPARES DETAIL SITE SPECIFIC DRAWINGS						█	█	█																						
ON SITE MEETING W/ KEY CUSTOMER PERSONNEL							█	█	█																					
CUSTOMER'S ARCHITECT PREPARES CONSTRUCTION DRAWINGS								█	█	█	█	█																		
HMSA REVIEW OF CONSTRUCTION DOCUMENTS													█	█																
OBTAIN AND AWARD CONSTRUCTION BID (BY CUSTOMER)														█	█	█	█													
SUBMISSION OF DRAWINGS TO CITY FOR PERMITS (VARIES)															█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
SITE CONSTRUCTION WORK (VARIES)																█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
DELIVERY CHECKLIST COMPLETED AND E-MAILED TO HMSA																									█					
ECHELON DELIVERY, ASSEMBLY AND RAMP-UP																											█	█	█	█
TECHNICAL INSTALLATION																												█	█	█
APPLICATIONS																													█	█

- NOTE:
- 1) SITE PLANNING IS AVAILABLE FOR TELEPHONE CONSULTATION AT ALL TIMES THROUGHOUT THIS PROCESS.
- 2) STANDARD DETAILS WILL BE PROVIDED AT ANY TIME AND ARE AVAILABLE AT [WWW.HITACHIMED.COM](#).
CONTACT THE SITE PLANNING DEPARTMENT FOR CURRENT ACCESS CODES.
- 3) THE ABOVE ESTIMATED TIME FRAME SHOULD BE AMPLE TIME TO COMPLETE THE PROJECT AND ENSURE A TROUBLE FREE DELIVERY AND INSTALLATION. THIS TIME FRAME WILL VARY FROM SITE TO SITE. THIS IS AN ESTIMATE ONLY. HMSA WILL NOT BE HELD ACCOUNTABLE FOR ANY CONSTRUCTION DELAYS DUE TO CONTRACTORS NOT SUPPLIED BY HMSA. PLEASE NOTE THAT SOME STEPS CAN OCCUR CONCURRENTLY AS INDICATED ON THE GANT CHART ABOVE.

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TYPICAL PROJECT OVERVIEW (CONT)

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GENERAL SITING CRITERIA

SITE SELECTION

- A. COORDINATION WITH THE ARCHITECT, ENGINEER, CONTRACTOR AND HMSA SITE PLANNING DEPARTMENT SHOULD BEGIN EARLY IN THE SITE PLANNING PROCESS.
- B. FOR PROPER EVALUATION OF A SITE, A SET OF DRAWINGS OF THE PROPOSED ECHELON OVAL LOCATION AND THE SURROUNDING AREA, ACCOMPANIED BY A COMPLETED SITE SELECTION SURVEY AND CONTACT LIST, SHOULD BE SENT TO HMSA SITE PLANNING FOR REVIEW.
- C. THE FOLLOWING ITEMS SHOULD BE DISCUSSED WITH THE HMSA SITE PLANNING DEPARTMENT FOR A THROUGH EVALUATION OF THE PROPOSED LOCATION.

1. LOCATION OF ANY MEDICAL IMAGING EQUIPMENT (CT, X-RAY, MAMMOGRAPHY, ULTRASOUND, NUCLEAR EQUIPMENT) OR COMPUTER EQUIPMENT IMMEDIATELY ADJACENT TO OR ABOVE / BELOW THE PROPOSED MRI SCAN ROOM.
2. LOCATION OF FRINGE FIELDS, PARTICULARLY THE 1.0 GAUSS FIELD OF ANY EXISTING OR FUTURE MRI SYSTEMS.
3. LOCATION OF ANY LARGE FERROUS MATERIAL (STRUCTURAL STEEL BEAMS, PIPES, DOORS, COLUMNS, ETC.) WITHIN 10 FEET IN ALL DIRECTIONS OF THE PROPOSED MAGNET ISOCENTER.
4. LOCATION OF EXISTING OR FUTURE AIR CONDITIONING UNITS, AIR HANDLERS, CHILLERS, CONDENSERS, OR ELECTRICAL SERVICE (50 AMPS OR HIGHER) WITHIN 20 FEET OF PROPOSED MAGNET ISOCENTER.
5. LOCATION OF ELECTRICAL SERVICE (200 AMP OR HIGHER), ANY ELECTRICAL OR MECHANICAL ROOMS, OR ANY ELEVATORS WITHIN 40 FEET OF THE PROPOSED MAGNET ISOCENTER.
6. LOCATION OF ANY HIGH VOLTAGE LINES IN THE AREA LESS THAN 200 FEET FROM PROPOSED MAGNET ISOCENTER.
7. LOCATION OF ANY VEHICULAR TRAFFIC, INCLUDING PARKING, WITHIN 40 LINEAR FEET OF THE PROPOSED MAGNET ISO-CENTER (NO MOVING STEEL WITHIN THE 1 GAUSS)
8. LOCATION OF ANY LARGE MOVING FERROUS OBJECTS (TRAINS, SUBWAYS, LOADING DOCK, ETC.) IN THE AREA.
9. LOCATION OF ANY ITEMS THAT COULD POTENTIALLY CAUSE VIBRATION AT THE SITE TO EXCEED THE ECHELON OVAL VIBRATION SPECIFICATION (ECHELON OVAL VIBRATION SPECIFICATION: LESS THAN 1,000 MICRO G IN THE FREQUENCY DOMAIN AND +/-2,000 MICRO G IN THE TIME DOMAIN). A VIBRATION TEST IS REQUIRED TO VERIFY SITE CONDITIONS.
10. THE ABILITY OF THE SELECTED LOCATION TO MEET THE VIBRATION AND INTERFERENCE REQUIREMENTS FOR AN MRI SUITE INTO THE FORESEEABLE FUTURE (TYPICALLY 8-10 YEARS)

PLANNING

- A. TO MAXIMIZE THE PERFORMANCE OF THE ECHELON OVAL MRI SYSTEM, CAREFUL PLANNING SHOULD TAKE PLACE FROM THE INITIAL SITE SELECTION STAGE, THROUGH DESIGN AND CONSTRUCTION, AND THROUGHOUT THE FINAL DELIVERY AND INSTALLATION PROCESS. PROPER PLANNING WILL HELP TO ENSURE HIGH SYSTEM PERFORMANCE STANDARDS, COMFORTABLE PATIENT HANDLING, AN EFFICIENT WORKING ENVIRONMENT, AND SUFFICIENT STORAGE SPACE. IT IS THE RESPONSIBILITY OF THE CUSTOMER'S DESIGN PROFESSIONALS TO ENSURE THAT THE FACILITY WILL COMPLY WITH BOTH RECOMMENDED AND GOVERNING REGULATIONS IN REGARD TO PATIENT PRIVACY AND SAFETY ISSUES.
- B. IN GENERAL, THE FOLLOWING SHOULD BE CONSIDERED WHEN DESIGNING A MRI SUITE:
1. THE 5 GAUSS FIELD SHOULD BE CONTAINED WITHIN THE MRI SCAN ROOM OR ACCESS RESTRICTIONS AND SIGNAGE MUST BE IN PLACE AS REQUIRED BY FDA REGULATIONS.
 2. THE MRI SCAN ROOM SHOULD BE LOCATED NEAR THE EXTERIOR OF THE BUILDING WHEN POSSIBLE TO FACILITATE DELIVERY. REFER TO THE RIGGING AND DELIVERY PAGE FOR ADDITIONAL DETAILS.
 3. A MINIMUM 3'-6"W X 7'-0"H FLAT ACCESS PATH INTO THE ECHELON OVAL SUITE MUST BE PROVIDED FOR THE DELIVERY OF CRYOGEN DEWARS. THIS PATH WILL BE USED THROUGHOUT THE LIFE OF THE SYSTEM AS PART OF ITS ROUTINE MAINTENANCE.
 4. ALL DOORS MUST BE A MINIMUM OF 36" WIDE (3'-4 1/2" CLEAR OPENING STOP TO STOP). THE DOOR MUST BE ABLE TO BE OPENED IN SUCH A MANNER THAT A STRAIGHT PATHWAY THROUGH THE DOOR FRAME IS NOT OBSTRUCTED IN ANY WAY BY THE DOOR'S HANDLE, PUSH BAR, HINGES, OTHER ACCESSORIES OR THE DOOR SLAB ITSELF.
 5. FULL HELIUM DEWARS AND OTHER SERVICE EQUIPMENT (RAMP POWER SUPPLY, GRADIENT LOADER)CAN WEIGH UP TO 800 LBS. DEWARS AND OTHER SIMILARLY HEAVY COMPONENTS WILL OCCASIONALLY BE REQUIRED TO SERVICETHE SYSTEM OVER ITS LIFETIME. CONSIDERATION SHOULD BE GIVEN TO SELECTING FLOORING MATERIAL IN THE SCAN ROOM AND ALONG ALL ACCESS PATHS THAT WILL NOT BE AFFECTED BY THE POINT LOADS GENERATED BY SMALL WHEELS ON SUCH COMPONENTS BEING ROLLED ACROSS IT.
 6. CONVENIENCE OUTLETS MUST BE LOCATED IN THE MRI SCAN ROOM AND THROUGHOUT THE SUITE FOR SERVICE.
 7. IT IS THE CUSTOMER'S RESPONSIBILITY TO MEET THE HMSA SPECIFICATIONS REGARDING THE ELECTRICAL SERVICE TO THE SYSTEM. IN REVIEWING POWER FOR THE SUITE, CONSIDERATION SHOULD BE GIVEN TO THE OPERATION OF THE SUPPORT FUNCTIONS. REFER TO THE ELECTRICAL SECTION OF THIS GUIDE FOR ADDITIONAL SPECIFICATIONS.
 8. THE ROOMS MUST BE SUFFICIENTLY SIZED TO ACCOMMODATE WORK ACTIVITIES AND SERVICE ACCESS FOR ALL EQUIPMENT.
 9. ALTHOUGH IT MAY BE LOCATED REMOTELY, A LASER IMAGER SHOULD BE LOCATED NEAR THE OPERATOR FOR CONVENIENCE. THE LASER IMAGER IS CUSTOMER PROVIDED AND MUST BE ACCESSIBLE VIA THEIR NETWORK.

OPERATIONS

1. STRONG VISUAL CONTACT BETWEEN THE OPERATOR AND THE PATIENT MUST BE MAINTAINED.
2. SUFFICIENT AND CONVENIENT WORK SURFACES AND STORAGE MUST BE INCLUDED IN AND NEAR THE MRI SCAN AND CONTROL ROOMS. VIEW BOXES SHOULD BE CONSIDERED IN THE CONTROL ROOM.
3. A SINK SHOULD BE LOCATED NEARBY, BUT IS NOT RECOMMENDED IN THE MRI SCAN ROOM UNLESS REQUIRED BY CODE.
4. THE ENVIRONMENT WITHIN THE SCAN SUITE MUST BE MAINTAINED 24 HOURS PER DAY, 7 DAYS PER WEEK. REFER TO THE ENVIRONMENTAL SECTION OF THIS GUIDE FOR SPECIFICATIONS REGARDING ALLOWABLE RANGES FOR TEMPERATURE AND HUMIDITY.

PATIENT COMFORT AND HANDLING

- A. TO FACILITATE PATIENT HANDLING AND PROVIDE FOR PATIENT SAFETY, THE FOLLOWING SHOULD BE CONSIDERED IN THE DESIGN OF THE MRI SUITE:
1. THE PATH FOR PATIENT ACCESS INTO THE MRI SCAN ROOM SHOULD BE ABLE TO ACCOMMODATE A STRETCHER OR GURNEY.
 2. THERE SHOULD BE SUFFICIENT SPACE TO ALLOW DOCKING AND UNDOCKING OF THE PATIENT TABLE.
 3. THERE SHOULD BE SUFFICIENT AREA AROUND THE PATIENT TABLE IN THE MRI SCAN ROOM FOR COMFORTABLE PATIENT HANDLING.
 4. ANCILLARY FUNCTIONS (DRESSING ROOMS, TOILETS, HOLDING AREAS, PREP ROOMS, ETC.) SHOULD BE LOCATED NEAR THE MRI SCAN ROOM.
 5. THE OPERATOR SHOULD HAVE DIRECT ACCESS TO THE PATIENT.

FLOOR SPACE

- A. THE HMSA ECHELON OVAL SYSTEM HAS BEEN SPECIFICALLY DESIGNED TO BE SITED WITHIN AN EXISTING FACILITY. **THE STANDARD SYSTEM CONSISTS OF 8 COMPONENTS, (EXCLUDING THE OUTDOOR CHILLER) WHICH CAN BE EASILY SITED WITHIN 795 SQUARE FEET.**

MR MAGNETIC FIELD

- A. AS WITH ALL MRI SYSTEMS, A MAJOR CONCERN IN PLANNING IS ACCOMMODATING THE SYSTEM'S MAGNETIC FIELD. THIS FIELD WILL AFFECT MAGNETICALLY SENSITIVE INSTRUMENTS AND CAN BE AFFECTED BY FERROMAGNETIC MATERIALS IN THE SURROUNDING AREA. THE SIZE OF THE FRINGE FIELD IS DETERMINED BY THE STRENGTH AND TYPE OF THE MAGNET.
- B. MAGNETIC SHIELDING CAN BE DESIGNED TO REDUCE THE DISTANCE THE GAUSS FIELDS EXTEND FROM THE ECHELON OVAL GANTRY OR TO DAMPEN FLUCTUATIONS CREATED BY THE ENVIRONMENT SURROUNDING THE SCAN ROOM. CONTACT HMSA SITE PLANNING DEPARTMENT FOR FURTHER INFORMATION.
- C. THE 5 GAUSS FIELD SHOULD BE CONTAINED WITHIN THE MRI SCAN ROOM OR ACCESS RESTRICTIONS AND SIGNAGE MUST BE IN PLACE AS REQUIRED BY FDA REGULATIONS.

COMMUNICATIONS

- A. TELEPHONES WITH ACCESS TO AN OUTSIDE LINE MUST BE LOCATED IN THE EQUIPMENT AND CONTROL ROOMS TO FACILITATE APPLICATIONS / SERVICE SUPPORT.
- B. A DATA PORT WITH A BROAD BAND 10/100 BASE T LINE CONNECTION TO THE INTERNET MUST BE LOCATED AT THE OPERATOR CONSOLE AREA. THIS CONNECTION WILL BE USED FOR REMOTE DIAGNOSTICS AND MONITORING OF THE ECHELON OVAL SYSTEM. THE CONNECTION MAY BE THROUGH THE SITE'S NETWORK PROVIDED THAT THE ECHELON OVAL IS ADDRESSABLE VIA THE INTERNET.
- C. IN ORDER TO MAINTAIN A TIMELY INSTALLATION SCHEDULE, **THE FOLLOWING INFORMATION MUST BE SENT TO: installchecklistgroup@hitachimed.com PRIOR TO THE DELIVERY OF THE ECHELON OVAL SYSTEM.**
1. MANUFACTURER AND SOFTWARE REVISION LEVEL FOR THE PACS SYSTEM
 2. MANUFACTURER, MODEL AND SOFTWARE REVISION LEVEL FOR THE DICOM PRINTER
 3. MANUFACTURER AND SOFTWARE REVISION LEVEL FOR RIS/MODALITY WORKLIST SERVER
 4. NAME AND TELEPHONE NUMBER FOR THE SITE'S NETWORK ADMINISTRATOR. .

HITACHI SENTINEL REMOTE

- A. HITACHI SENTINEL REMOTE IS USED TO MONITOR, ACCESS AND REMOTELY DIAGNOSE THE ECHELON OVAL MRI SYSTEM. FOR A COMPLETE AND UP TO DATE DESCRIPTION OF ALL OF THE SENTINEL REMOTES FUNCTIONS AND FEATURES, CONTACT A HITACHI SALES REPRESENTATIVE.
1. **SECURITY** - SENTINEL SERVERS ARE INSTALLED AT EXCLUSIVE DATA CENTERS THAT ARE MONITORED 24/7 BY SECURITY CAMERAS AND REQUIRE BIOMETRIC IDENTIFICATION FOR ENTRY.
 - a. COMMUNICATION IS ENCRYPTED USING SSL (SECURE SOCKET LAYERING) TO PROVIDE SECURITY
 - b. POLLING BETWEEN THE MRI SYSTEM AND THE SENTINEL SERVER IS PERFORMED REGULARLY. ONLY DEVICES THAT COMPLETE TWO WAY AUTHENTICATION ARE ABLE TO COMMUNICATE WITH THE ECHELON OVAL SYSTEM.
 - c. THE ECHELON OVAL SYSTEM WILL ATTEMPT TO AUTHENTICATE ONLY WHEN IT HAS INITIATED THE COMMUNICATION.
 2. **REQUIREMENTS** - THE FOLLOWING CUSTOMER SUPPLIED AND INSTALLED ITEMS ARE REQUIRED TO INTERFACE THE ECHELON OVAL MRI SYSTEM WITH SENTINEL REMOTE
 - a. INTERNET: T1 LINE OR FASTER
 - b. ETHERNET CABLE CONNECTION: CATEGORY 5, 100Base-TX OR CATEGORY 6, 1000Base-T
 - c. FIREWALL: THE FIREWALL ROUTER MUST BE CAPABLE OF CONFIGURING NETWORK ADDRESSES AND PORTS TO SPECIFIC IP ADDRESSES FOR INBOUND AND OUTBOUND INFORMATION EXCHANGE.
 - i. ONLY DEVICES THAT COMPLETE TWO WAY AUTHENTICATION ARE ABLE TO COMMUNICATE WITH THE ECHELON OVAL SYSTEM
 - ii. THE ECHELON OVAL MRI SYSTEM IS ONLY PERMITTED TO ESTABLISH EXTERNAL SESSIONS WITH THE SENTINEL SERVER
 - iii. ONLY HTTPS AND HTTP PROTOCOLS ARE PERMITTED
 - iv. NETSCREEN-5GT IS THE RECOMMENDED FIREWALL (OR SIMILAR)

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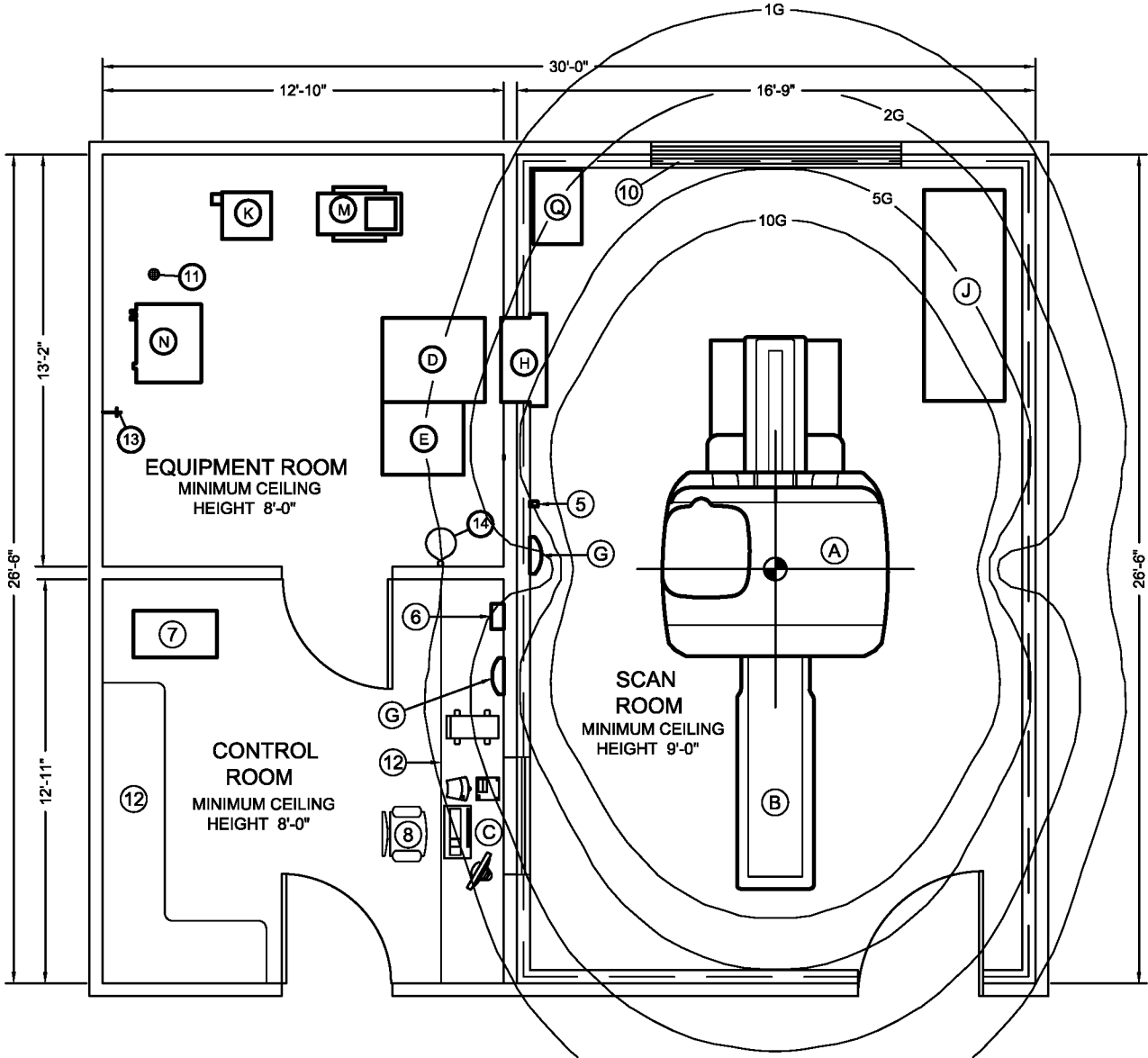
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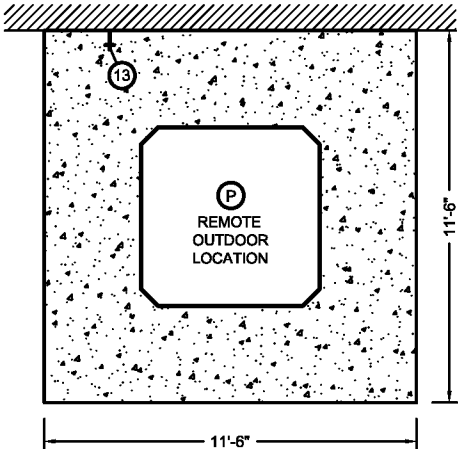
ECHELON OVAL STD. DETAILS

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REPRESENTATIVE SUITE LAYOUTS



TYPICAL FLOOR PLAN - 795 SQ FT
"NOT TO SCALE"



LEGEND

- RF SHIELD. ARCHITECT TO VERIFY WALL CONSTRUCTION WITH RF VENDOR. (TYPICAL 5" RF WALL THICKNESS REFLECTED.)
- RF VIEW WINDOW, TYPICALLY 4'w X 3'h (TYP 36" AFF)
- EQUIPMENT ACCESS PANEL FOR DELIVERY OF THE SYSTEM. MINIMUM 8'-0"w X 9'-0"h.
- JUNCTION BOX FOR AC POWER.
- 480V, 20A, 3PH, 4 WIRE, NEMA L16-20R FOR USE WITH RAMP-UP TOOL
- 120V, 20 AMP CONVENIENCE OUTLETS, AT LEAST ONE PER WALL REQUIRED FOR SERVICE AND MAINTENANCE.
- PHONE LINES - ONE (1) REQUIRED IN EQUIPMENT ROOM AND ONE (1) REQUIRED IN THE CONTROL ROOM.
- DATA PORT FOR BROAD BAND NETWORK CONNECTION TO A STANDARD 1G BASE-T LINE. MAY BE THROUGH CUSTOMER'S IN-HOUSE NETWORK.
- 6" X 30" ON-WALL WIREWAY WITH REMOVABLE COVER AND FOUR (4) DIVIDERS. METAL ONLY. MUST BE NON-FERROMAGNETIC IN SCAN ROOM.
- 6" X 30" ON-FLOOR WIREWAY WITH REMOVABLE COVER AND FOUR (4) DIVIDERS. METAL ONLY. MUST BE NON-FERROMAGNETIC IN SCAN ROOM.
- MAGNET ISOCENTER

EQUIPMENT BY HMSA

- (A) ECHELON GANTRY
- (B) PATIENT TABLE
- (C) OPERATOR'S WORKSTATION
- (D) RFIP CABINET
- (E) GCPA CABINET
- (G) EMERGENCY RUN-DOWN BUTTON (ERDU)
- (H) RFIP FILTER PANEL
- (J) COIL STORAGE CABINET
- (K) HELIUM COMPRESSOR
- (M) SENSE UNIT
- (N) HEAT EXCHANGER
- (P) R1600 OUTDOOR CHILLER
- (Q) REMOTE FAN UNIT

EQUIPMENT/ACCESORIES BY OTHERS

- (2) 6" X 30" ON-WALL WIREWAY
- (3) 6" X 30" ON-FLOOR WIREWAY
- (4) A.C.POWER PANEL (SIZED PER CODE)
- (5) OXYGEN PROBE
- (6) OXYGEN MONITOR
- (7) LASER IMAGER
- (8) CHAIR
- (9) WAVE GUIDE PAIR (SIZE VARIES)
- (10) DELIVERY ACCESS PANEL
- (11) FLOOR DRAIN
- (12) CASEWORK
- (13) HOSE BIBB
- (14) HELIUM TANK RESTRAINT
- (15) 3 1/2" x 6" OVERHEAD WIREWAY

NOTE: - SOME EQUIPMENT/ACCESORIES BY OTHERS MAY NOT BE SHOWN ON TYPICAL LAYOUTS
- SEE PAGES 16-18 FOR INTERCONNECTING CABLE WIREWAY INFORMATION

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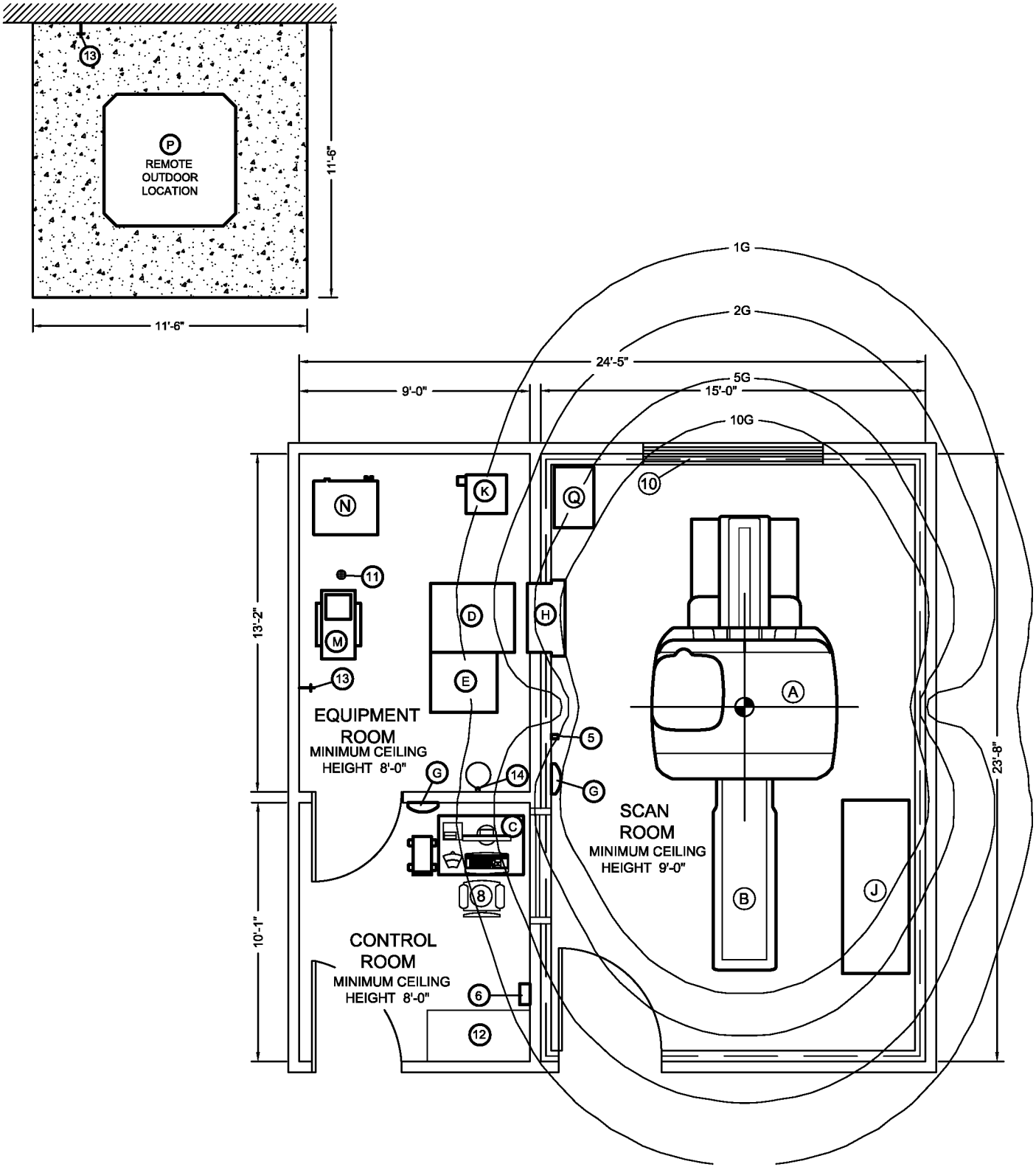
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REPRESENTATIVE SUITE LAYOUTS

NOTES

1. A 480V, 20A, 3PH, 4 WIRE, NEMA L16-20R RECEPTACLE JUST OUTSIDE OF THE SCAN ROOM IS REQUIRED FOR USE WITH THE RAMP-UP TOOL TO INITIALIZE THE MAGNETIC FIELD. THE ECHELON OVAL SYSTEM DRAWS ONLY MINIMAL POWER DURING INITIALIZATION OF FIELD. THE RAMP-UP TOOL LOAD SHOULD NOT BE INCLUDED WHEN CALCULATING TOTAL LOAD ON PANEL FROM WHICH THE ECHELON OVAL MRI SYSTEM DRAWS ITS POWER.
2. IN ORDER TO ENSURE ADEQUATE CLEARANCE TO INSERT THE TRANSFER LINE INTO THE HELIUM DEWAR, A 2'x2' AREA WITH A MINIMUM CLEAR HEIGHT OF 10'-6" MUST BE PROVIDED IN EITHER THE SCAN ROOM OR ITS IMMEDIATE VICINITY. THIS CLEARANCE MAY BE OBTAINED VIA THE REMOVAL OF A DROP-IN CEILING TILE. UNDER NORMAL OPERATING CONDITIONS, AFTER THE INITIAL MAGNET FILL, HELIUM REPLENISHMENT OCCURS ONLY ONCE EVERY 12-24 MONTHS.
3. **A CLEAN AND SECURE STORAGE AREA OF APPROXIMATELY 400 SF (20' X 20') IS REQUIRED FOR SYSTEM COVERS AND ANCILLARY EQUIPMENT AT THE TIME OF DELIVERY.** THIS AREA SHOULD BE NEAR AND HAVE CONVENIENT ACCESS FROM THE ECHELON OVAL SUITE. THIS STORAGE AREA IS TYPICALLY EMPTIED OF HMSA MATERIALS BY THE END OF THE FIRST WEEK OF THE SYSTEM INSTALLATION. ADDITIONALLY, SECURE STORAGE, EITHER INDOOR OR OUTDOOR, WILL BE NEEDED FOR UP TO THREE (3) HELIUM DEWARS DURING THE FIRST TWO WEEKS AFTER DELIVERY. A LEVEL ACCESS PATH FROM THIS STORAGE AREA TO THE SCAN ROOM IS REQUIRED. TO PROVIDE FOR PASSAGE OF THE GANTRY COVERS, **ANY DOORS BETWEEN THE SCAN ROOM AND THE STORAGE AREA MUST BE A MINIMUM OF 3'-6". REQUIRED CEILING HEIGHT IS 8'-6" IN THIS TRANSITION AREA.**
4. ALL DOORS IN THE DEWAR AND SERVICE EQUIPMENT DELIVERY PATH MUST BE A MINIMUM OF 36" WIDE (34 1/2" CLEAR STOP TO STOP). THE DOORS MUST BE ABLE TO OPEN IN SUCH A MANNER THAT A STRAIGHT PATHWAY THROUGH THE DOOR FRAME IS NOT OBSTRUCTED IN ANY WAY BY THE HANDLE, PUSH BAR, HINGES OR OTHER ACCESSORIES OR THE DOOR SLAB ITSELF.
5. CUSTOMER'S ARCHITECT/ENGINEER IS RESPONSIBLE FOR VERIFYING ALL POWER AND HVAC SPECIFICATIONS FOR EQUIPMENT NOT SUPPLIED BY HMSA.
6. THE DRAWINGS PROVIDED BY HMSA ARE NOT FOR CONSTRUCTION PURPOSES. CUSTOMER IS RESPONSIBLE FOR HIRING QUALIFIED DESIGN PROFESSIONALS TO PREPARE CONSTRUCTION DOCUMENTS. CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE CODES AND REGULATIONS.
7. HMSA RESERVES THE RIGHT TO HOLD THE APPROVAL OF A SITE PENDING AN ON-SITE REVIEW AND APPROPRIATE QUALIFICATION TESTING BY HMSA PERSONNEL.
8. CONSTRUCTION DRAWINGS ARE TO BE SUBMITTED TO THE HMSA SITE PLANNING DEPARTMENT FOR REVIEW PRIOR TO CONSTRUCTION.
9. THE LAYOUTS ON THESE PAGES ARE REPRESENTATIVE OF A TYPICAL AND MINIMUM SIZE ECHELON OVAL SUITE. FINAL SUITE CONFIGURATION IS DEPENDENT ON PHYSICAL SITE CONDITIONS AND MAY VARY FROM THOSE SHOWN. CONTACT THE SITE PLANNING DEPARTMENT AT 800-800-3106 FOR ASSISTANCE.
10. THESE DRAWINGS ARE THE PROPERTY OF HITACHI MEDICAL SYSTEMS AMERICA, INC. (HMSA) AND ARE NOT FOR CONSTRUCTION PURPOSES. THE DRAWINGS IN THESE STANDARD DETAILS ARE TO BE USED BY THE CUSTOMER'S DESIGN PROFESSIONALS TO PREPARE APPROPRIATE CONSTRUCTION DOCUMENTS. HMSA RESERVES THE RIGHT TO REFUSE TO INSTALL ANY OR ALL EQUIPMENT WHEN THE ROOM PREPARATION DOES NOT MEET SPECIFICATIONS. THE CURRENT STANDARD DETAILS MAY BE OBTAINED ON LINE AT www.hitachimed.com. CONTACT THE HMSA SITE PLANNING DEPARTMENT FOR THE CURRENT ACCESS CODES.

NOTE: MAXIMUM THRESHOLD HEIGHT WHEN MOVING PATIENT TABLE BETWEEN CORRIDOR AND SCAN ROOM IS 2". MAXIMUM RAMP ANGLE FROM FLAT FLOOR IS 5° (1:12).



MINIMUM FLOOR PLAN - 578 SQ FT
"NOT TO SCALE"

NOTE: GAUSS LINES REPRESENT UNSHIELDED FIELDS

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MINIMUM SUITE LAYOUT	
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ECHELON OVAL EQUIPMENT LEGEND					
COMPONENT		WIDTH	DEPTH	HEIGHT	WEIGHT (lbs)
A	GANTRY	7'-3"	5'-11"	7'-6"	10,582
	GANTRY REAR PEDESTAL	2'-0"	4'-4"	2'-6"	286
B	PATIENT TABLE	2'-6"	7'-5"	1'-8" - 2'-10"	750
C	OPERATORS CONSOLE *	4'-0"	2'-6"	2'-6"	75
	CPU	1'-1"	1'-6"	1'-7"	44
	SWITCH UNIT	9"	8"	2"	7
	MONITOR	1'-11"	9"	1'-7"	33
	KEYBOARD	1'-8"	10"	2"	5
	MULTIPLE TAP UNIT	9"	8"	3"	7
D	RFIP CABINET	2'-9"	3'-4"	6'-2"	1,356
E	GCPA CABINET	2'-7"	3'-8"	6'-2"	1,616
G	ERDU	4"	3"	5"	1
H	FILTER BOX	3'-0"	1'-6"	5'-1"	440
J	COIL CABINET	5'-0"	2'-3"	4'-3"	50
K	HELIUM COMPRESSOR	1'-6"	1'-11"	1'-11"	265
M	SENSE UNIT	2'-8"	1'-4"	3'-6"	155
N	HEAT EXCHANGER	2'-6"	2'-1"	2'-10"	420
P	R1600 OUTDOOR CHILLER ^a	5'-7"	5'-7"	6'-3"	3,500
Q	REMOTE FAN UNIT	2'-5"	1'-7"	2'-3"	110
COMPONENTS LISTED BELOW BY CUSTOMER-EQUIPMENT WILL VARY					
5	OXYGEN PROBE ^b	3"	2"	6"	1
6	OXYGEN MONITOR ^b	8"	7"	11"	30
7	LASER IMAGER ^c	2'-2"	2'-9"	5'-10"	550

a WEIGHT WHEN FILLED, SHIPPING WEIGHT - 3,200 LBS.
b EXAMPLE-TELEDYNE MODEL 3350 WITH BATTERY BACK-UP
c EXAMPLE-KODAK DRY VIEW MODEL # 8700/8500
* SEE NOTE 14

GENERAL SUITE CRITERIA

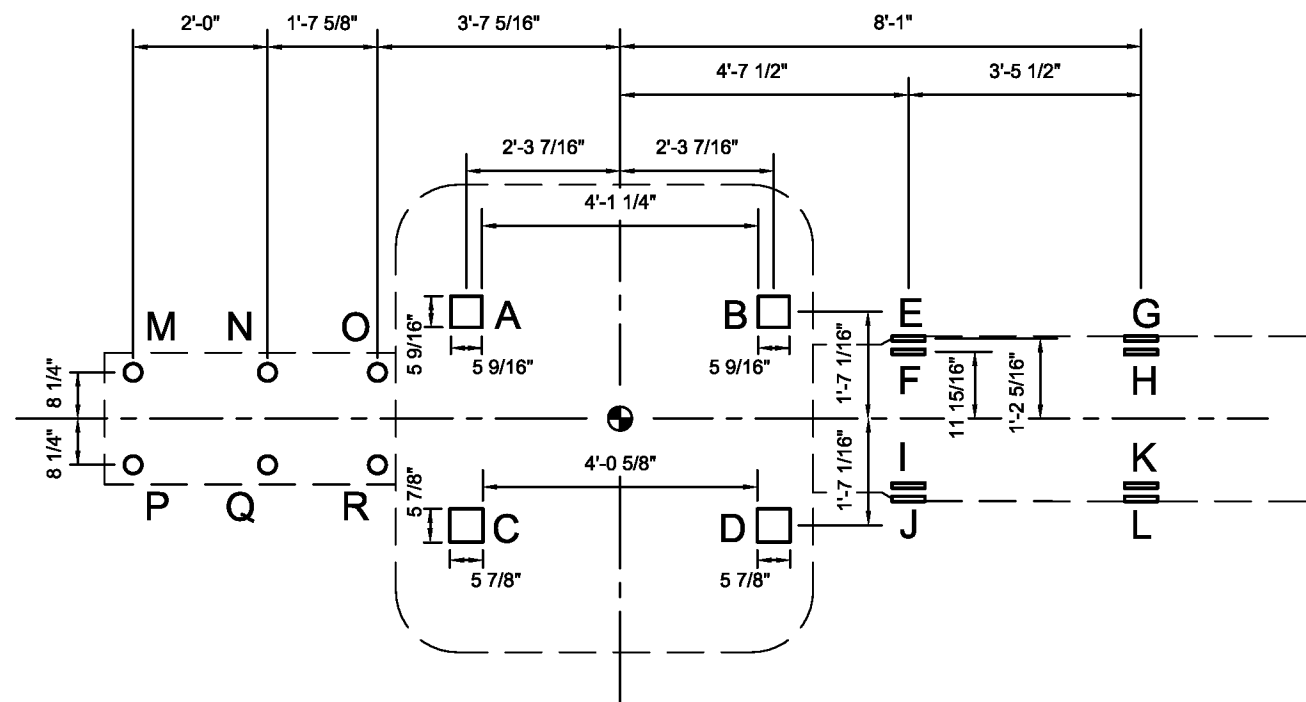
- 1) CARE MUST BE TAKEN TO ENSURE THE OPERATOR'S WORKSTATION, RFIP CABINET, GCPA CABINET AND HELIUM REFRIGERATOR ARE LOCATED MORE THAN 8'-0" FROM THE MAGNET ISOCENTER.
- 2) SOME COMPONENTS ARE FIXED IN PLACE. CARE MUST BE TAKEN TO ENSURE SUFFICIENT SERVICE AREA IS PROVIDED.
- 3) CLEAR ACCESS TO THE FILTER PANEL AND POWER PANEL MUST BE MAINTAINED IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC) AND LOCAL CODES.
- 4) POWER CONDITIONERS/UPS UNITS AND CHILLERS ARE POTENTIAL SOURCES OF INTERFERENCE. THESE SHOULD BE REMOTELY LOCATED AND MOUNTED ON VIBRATION DAMPENING PADS AS REQUIRED.
- 5) THE TYPICAL FLOOR PLAN REFLECTS THE MINIMUM DIMENSIONS REQUIRED TO HOLD THE 5 GAUSS FIELD WITHIN THE SCAN ROOM. A SCAN ROOM SMALLER THAN THAT SHOWN OR WITH THE MAGNET IN A DIFFERENT LOCATION WILL REQUIRE MAGNETIC SHIELDING TO CONTAIN THE 5 GAUSS FIELD.
- 6) CUSTOMER PROVIDED COMPONENTS (i.e. LASER IMAGER) SHOWN IN THE TYPICAL LAYOUT CAN GREATLY AFFECT THE ACCEPTABILITY OF YOUR PLANS AND THE SYSTEM OPERATION. COMPONENT SELECTIONS AND THEIR PLACEMENT MUST BE VERIFIED WITH SITE PLANNING PRIOR TO FINALIZATION OF THE DESIGN.
- 7) CONSTRUCTION MATERIALS (CEILING GRID, LIGHTS, STUDS, ETC.) SHOULD BE CHOSEN TO MINIMIZE THE FERROUS MATERIALS IN THE SCAN ROOM.
- 8) THE MINIMUM FINISHED CEILING HEIGHT FOR SERVICE IS 9'-0" CLEAR IN THE SCAN ROOM AND 8'-0" IN ALL OTHER ROOMS.
- 9) HMSA WILL PROVIDE A COIL STORAGE CABINET FOR THE CONVENIENCE OF THE CUSTOMER. THE CUSTOMER MAY CHOOSE TO HAVE CUSTOM STORAGE AND CASEWORK DESIGNED.
- 10) A 10/100 BASE T NETWORK CONNECTION WITH ACCESS TO THE INTERNET IS REQUIRED AT THE OPERATOR CONSOLE. THIS INTERNET ACCESS MAY BE THROUGH THE CUSTOMER'S EXISTING NETWORK OR PACS SYSTEM.
- 11) AN INTERCOM BETWEEN THE OPERATOR AND PATIENT IS PROVIDED INTERNALLY AS PART OF THE ECHELON OVAL SYSTEM. A FACILITY INTERCOM, IF DESIRED, SHOULD BE LINKED ONLY TO THE CONTROL ROOM.
- 12) DUE THE THE RISK OF STATIC SHOCK AND ISSUES REGARDING DUST, CLEANLINESS, AND SERVICEABILITY, CARPET SHOULD NOT BE USED IN THE MRI SUITE.
- 13) COMPUTER FLOORING MAY BE USED AS AN ALTERNATIVE TO WIREWAYS IN THE EQUIPMENT ROOM. THIS PROVIDES ADDITIONAL FLEXIBILITY IN EQUIPMENT PLACEMENT. THE UNDER FLOOR SPACE MAY ALSO BE USED AS A SUPPLY PLENUM FOR THE HVAC SYSTEM.
- 14) A TABLE FOR THE OPERATOR'S WORKSTATION IS PROVIDED WITH THE SYSTEM. CUSTOM CASEWORK WITH A BUILT-IN DESK FOR THE MONITOR AND KEYBOARD IS RECOMMENDED TO IMPROVE WORK AREA FUNCTIONALITY, ADD STORAGE SPACE AND ENHANCE SUITE AESTHETICS.
- 15) A MINIMUM 3'-6"W X 7'-0"H FLAT ACCESS PATH MUST BE DESIGNED INTO THE SUITE FOR DELIVERY OF THE CRYOGEN DEWARs. THIS PATH WILL BE USED THROUGHOUT THE LIFE OF THE SYSTEM AS PART OF ITS ROUTINE MAINTENANCE.

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FLOOR LOADING STRUCTURAL



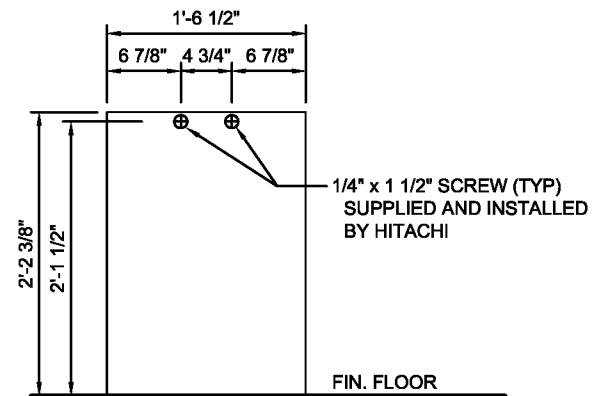
GANTRY / PATIENT TABLE FEET
NOT TO SCALE

WEIGHT DISTRIBUTION			
COMPONENT	FEET	WEIGHT (lbs)	TOTAL
MAGNET	A,B,C,D	2,646	10,584
PATIENT TABLE	E,F,I,J	139 (ea.)	1304* **
	G,H,K,L	187 (ea.)	
	M,N,O,P,Q,R,S	115 (ea.)	

THIS CHART AND DRAWING SHOULD BE USED IN CONJUNCTION WITH THE FINAL APPROVED FLOOR PLAN FOR PROPER PLANNING AND DESIGN

* PATIENT TABLE WEIGHTS INCLUDE MAXIMUM ALLOWABLE WEIGHT PATIENT (500 LBS WHEN MANUALLY OPERATED)

** FEET LABELED E-L ARE HARD RUBBER WHEELS 6" Ø x 1"W



CONTRACTOR TO PROVIDE BLOCKING IN WALL AS REQUIRED TO ACCOMODATE SCREWS FOR SECURING REMOTE FAN UNIT TO WALL

REMOTE FAN UNIT ANCHORAGE
NOT TO SCALE

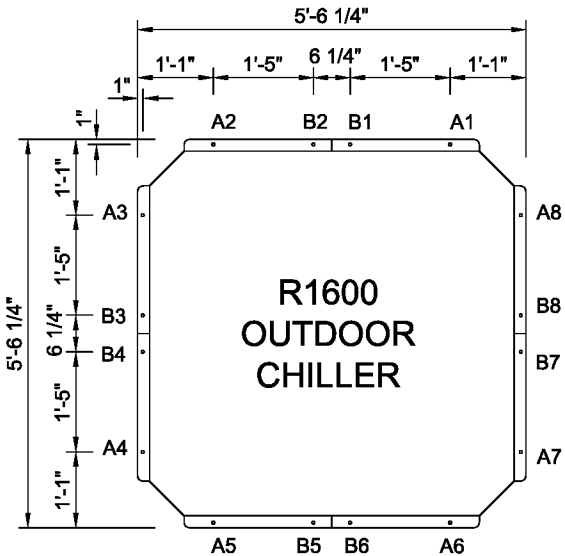
STRUCTURAL NOTES

- ALL STRUCTURAL SUPPORT IS THE CUSTOMER'S RESPONSIBILITY. A QUALIFIED PROFESSIONAL MUST REVIEW BOTH THE SCAN ROOM SLAB AND THE DELIVERY ROUTE TO ENSURE THE FOLLOWING HMSA SPECIFICATIONS ARE MET:
- 1) THE SCAN ROOM SHOULD BE SLAB ON-GRADE WHENEVER POSSIBLE. WHEN THE FLOOR IS NOT SLAB ON GRADE, THE STRUCTURAL SUPPORT MUST BE DESIGNED TO LIMIT VIBRATION AS NOTED BELOW.
 - 2) THE FLOOR SLAB MUST BE DESIGNED TO BEAR THE WEIGHT OF THE GANTRY DISTRIBUTED THROUGH THE FOUR (4) FEET AS SHOWN.
 - 3) THE MAXIMUM AMOUNT OF FERROUS REINFORCEMENT MATERIALS ALLOWED WITHIN FIVE FEET OF ISO-CENTER IS FIVE POUNDS PER SQUARE FOOT (5LB / SF), LOCATED AT A MINIMUM OF THREE AND ONE HALF INCHES (3 1/2") BELOW THE TOP OF THE SCAN ROOM FLOOR SLAB. REINFORCEMENT OR OTHER STEEL STRUCTURE IN EXCESS OF THIS AMOUNT MUST BE SUBMITTED TO HMSA FOR REVIEW.
 - 4) AN ISOLATED FLOOR SLAB FOR THE SCAN ROOM IS RECOMMENDED BY HMSA. DUE TO UNFORESEEN FUTURE CONDITIONS, THE SCAN ROOM SLAB SHOULD BE ISOLATED VERTICALLY FROM THE MAIN BUILDING SLAB. VIBRATION ABSORBENT MATERIAL SHOULD BE PLACED ALONG THE JOINT BETWEEN THE SLABS.
 - 5) THE SLAB MUST BE DESIGNED TO ENSURE THAT THE FOLLOWING VIBRATION CRITERIA ARE MET NOW AND IN THE FORESEEABLE FUTURE.
 - a. ALL VIBRATION INDUCING COMPONENTS IN THE AREA OF THE MAGNET SHOULD BE MOUNTED WITH VIBRATION ISOLATORS OR OTHER MEANS OF VIBRATION ISOLATION/DAMPENING.
 - 6) HMSA WILL PERFORM TESTING AT THE SELECTED SITE TO IDENTIFY THE EXISTING CONDITIONS. IF THE SITE FAILS TO MEET THE HMSA SPECIFICATIONS, THE FOLLOWING IS REQUIRED:
 - a. ESCALATE TESTING TO A VIBRATION/STRUCTURAL ENGINEER.
 - b. SELECT AN ALTERNATE SITE.
 - 7) THE SCAN ROOM FLOOR MUST BE FLAT AND LEVEL TO 1/8" +/- OVER 10' IN THE ENTIRE AREA OF THE MAGNET AND PATIENT TABLE.
 - 8) REFER TO DELIVERY AND RIGGING PAGE FOR ANCILLARY EQUIPMENT WEIGHTS.
 - 9) FOR ROOF TOP INSTALLATION OF THE CHILLER, THE MOUNTING CURB IS TO BE DESIGNED, SUPPLIED AND INSTALLED BY THE CUSTOMER'S ENGINEERS AND CONTRACTOR. IF DESIRED, A COPY OF THE HASKRIS R1600 ROOF CURB ILLUSTRATION MAY BE REQUESTED FROM THE HMSA SITE PLANNING DEPARTMENT.

NOTE: HMSA WILL PERFORM AN INITIAL VIBRATION TEST FOR THE CONVENIENCE OF THE CUSTOMER AT THE SAME TIME THAT THE MAGNETIC FLUCTUATION TEST IS PERFORMED, THIS WILL HELP TO IDENTIFY SITES WHERE A CONCERN ABOUT VIBRATION EXISTS. IF THERE IS A CONCERN, THE CUSTOMER WILL NEED TO HAVE A QUALIFIED CONSULTING/ENGINEERING FIRM THAT SPECIALIZES IN VIBRATION CONTROL PERFORM A SEPARATE TEST AND PROVIDE A REPORT WITH RECOMMENDATIONS FOR REMEDIATION THROUGH THE SLAB/ FOUNDATION DESIGN. YOUR SITE PLANNER CAN PROVIDE YOU WITH A LIST OF QUALIFIED FIRMS.

THE TEST THAT HMSA (AND THE INDEPENDENT CONSULTING/TEST FIRM IF REQUIRED) PERFORMS CAN ONLY MEASURE EXISTING CONDITIONS. AS MODIFICATIONS ARE MADE TO THE BUILDING IN THE FUTURE (ADDITION OR EXCHANGE OF HVAC EQUIPMENT, CHILLERS, ETC.), THE CHANGES MUST BE REVIEWED TO ENSURE THAT ANY COMPONENT THAT MAY INDUCE VIBRATION IS PROPERLY MOUNTED ON SHOCK ABSORBING MOUNTS TO PREVENT POTENTIAL INTERFERENCE.

IF REQUIRED BY LOCAL CODE, OR DEEMED NECESSARY BY THE CUSTOMER'S DESIGN PROFESSIONALS, A SIESMIC ANCHOR DESIGN HAS BEEN DEVELOPED FOR THE ECHELON OVAL. CONSULT WITH THE SITE PLANNING SPECIALIST FOR FURTHER INFORMATION AND DETAILS.



OUTDOOR CHILLER BASE
NOT TO SCALE

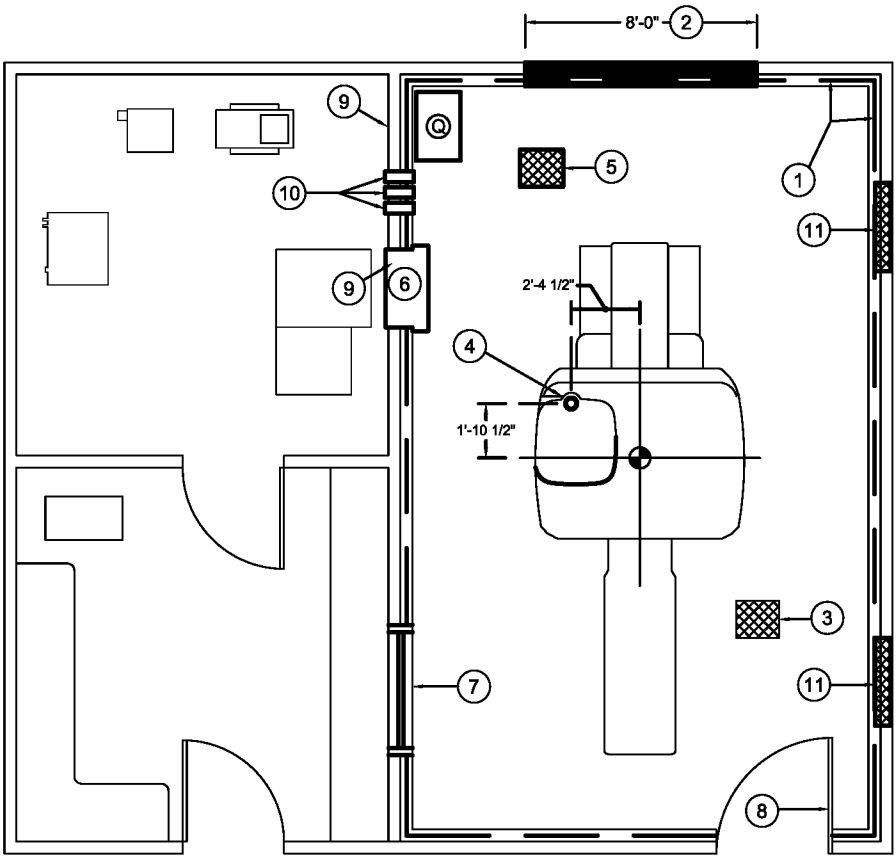
CHILLER BOLT POINT LOAD			
BOLT	LOAD IN LBS.	BOLT	LOAD IN LBS.
A1	197	B1	188
A2	186	B2	186
A3	187	B3	189
A4	203	B4	193
A5	213	B5	225
A6	230	B6	229
A7	227	B7	223
A8	206	B8	218

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RF SHIELDING

- A RADIO FREQUENCY (RF) SHIELD IS REQUIRED FOR THE OPERATION OF THE ECHELON OVAL SYSTEM AND IS NOT PROVIDED BY HMSA. THIS SIX (6) SIDED SHIELD IS REQUIRED FOR ALL MRI SYSTEMS. COORDINATION WITH THE SHIELDING VENDOR IS OF THE UTMOST IMPORTANCE. CONTACT SITE PLANNING FOR A LIST OF RF VENDORS. THE FOLLOWING IS A LISTING OF SOME OF THE DESIGN REQUIREMENTS AND CRITERIA WHICH MUST BE CONSIDERED.
- 1) THE RF SHIELDED ROOM MUST HAVE AN INSULATION RESISTANCE OF MORE THAN 5000 OHMS (AS MEASURED WITH A 500 V-DC MEGGER), WITH RESPECT TO THE BUILDING GROUNDING FACILITY AND OTHER EQUIPMENT INSTALLED IN THE BUILDING.
 - 2) THE RF SHIELD MUST PROVIDE 80 dB ATTENUATION OR BETTER FROM 1.0-80 MHz.
 - 3) IF A SPRINKLER SYSTEM IS REQUIRED, THE DESIGN AND CONSTRUCTION MUST BE COORDINATED WITH THE RF VENDOR TO ENSURE ITS ISOLATION FROM THE SHIELDING. HMSA RECOMMENDS THAT ANY PORTION OF THE SPRINKLER SYSTEM THAT PENETRATES THE RF SHIELD BE DRY. FINAL DESIGN APPROVAL AND ACCEPTANCE IS THE RESPONSIBILITY OF THE RF VENDOR.
 - 4) SINKS AND OTHER PLUMBING FIXTURES SHOULD BE AVOIDED IN THE SCAN ROOM UNLESS REQUIRED BY CODE. IF A SINK IS REQUIRED, THE PLUMBING MATERIALS, ROUTING AND INSTALLATION MUST BE COORDINATED BETWEEN THE PLUMBING CONTRACTOR AND RF SHIELDING VENDOR TO ENSURE THAT THE INTEGRITY OF THE RF SHIELD IS MAINTAINED.
 - 5) THE RF VENDOR WILL BE RESPONSIBLE FOR PROVIDING THE FOLLOWING:
 - a. INSTALLATION OF THE HMSA FILTER PANEL
 - b. SUPPLY AND INSTALL AN RF DOOR (4'-0"w X 7'-0"h TYP.)
 - c. SUPPLY AND INSTALL AN RF WINDOW (4'-0"w X 3'-0"h TYP.)
 - d. SUPPLY AND INSTALL WAVEGUIDES FOR HVAC SUPPLY AND RETURN DUCTS
 - e. SUPPLY AND INSTALL FOUR (4) WAVEGUIDES FOR HMSA WATER AND HELIUM LINES. TWO (2) @ 1 1/2" LOCATED AT FLOOR LEVEL (CENTERLINE @ 3" AFF) FOR WATER LINES AND TWO (2) @ 2" (MIN) LOCATED ABOVE THE FILTER PANEL FOR HELIUM LINES WHERE INDICATED ON CUSTOMER SITE SPECIFIC DRAWING.
 - f. SUPPLY AND INSTALL WAVEGUIDE FOR THE EMERGENCY EXHAUST VENT
 - g. SUPPLY AND INSTALL WAVEGUIDE TO SERVE AS A PRESSURE RELIEF
 - h. SUPPLY AND INSTALL HIGH PERFORMANCE EMI ELECTRICAL FILTERS FOR ELECTRICAL OUTLETS AND LIGHTING
 - i. SUPPLY AND INSTALL A CRYOGEN VENT PIPE (WAVEGUIDE) WITH NON-CONDUCTIVE HARDWARE (I.E. NUTS, BOLTS, WASHERS). THE COMPONENTS MUST BE NON-FERROUS STAINLESS STEEL AND MAINTAIN THE RF ROOM INTEGRITY.
 - j. SUPPLY, INSTALL AND TEST HIGH PERFORMANCE ELECTRICAL FILTERS AND WAVEGUIDES FOR NON-HMSA EQUIPMENT
 - k. INITIAL AND FINAL RF SHIELD VERIFICATION TESTS
 - l. DETAILED RF SHIELD INSTALLATION DRAWINGS FOR APPROVAL BY ARCHITECT OR CONTRACTOR
 - m. ENSURE FILTER FOR OXYGEN MONITOR REMOTE PROBE (SUPPLIED BY CUSTOMER) IS INSTALLED PER MONITOR MANUFACTURER SPECIFICATIONS (IF OPTIONAL OXYGEN MONITOR IS TO BE INSTALLED)
 - n. A 8'-0"w X 9'-0"h ACCESS PANEL IN THE SHIELD FOR DELIVERY OF THE SYSTEM
 - o. REINSTALLATION OF THE ACCESS PANEL AND PERFORMING A FINAL TEST OF COMPLETED ROOM THE DAY OF DELIVERY
 - p. MAGNETIC SHIELDING AS DIRECTED BY CUSTOMER AND TO SPECIFICATIONS PROVIDED BY HMSA
 - q. VERIFICATION THAT THE FINISH SUB-FLOOR OF THE RF SHIELD (SCAN ROOM) MEETS HMSA'S SPECIFICATION FOR LEVELNESS AND FLATNESS IN THE AREA OF THE GANTRY AND PATIENT TABLE
 - 6) THE RF SHIELDING VENDOR MUST BE CONTACTED FOR ADDITIONAL WALL PENETRATIONS, WAVE GUIDES AND/OR EMI FILTERS AS REQUIRED IF A SOUND SYSTEM IS DESIRED (SOUND SYSTEM IS AVAILABLE FROM HMSA AS AN OPTION)
 - 7) WHEN POSSIBLE, THE CONCRETE SLAB SHOULD BE RECESSED TO ACCOMMODATE THE RF SHIELD'S FLOOR THICKNESS. THIS AMOUNT WILL VARY BY VENDOR. IF THE SLAB CANNOT BE RECESSED, A SMALL RAMP THAT EXTENDS OUT FROM THE DOOR THRESHOLD IS TYPICALLY SUPPLIED BY THE RF VENDOR. **NOTE:** MAXIMUM THRESHOLD HEIGHT WHEN MOVING PATIENT TABLE BETWEEN CORRIDOR AND SCAN ROOM IS 2". MAXIMUM RAMP ANGLE FROM FLAT FLOOR IS 5° (1:12)
 - 8) METHODS OF RF ROOM CONSTRUCTION VARY. THE VENDOR SHOULD BE SELECTED PRIOR TO THE FINAL PLANNING OF THE ROOM. CONTACT HMSA SITE PLANNING FOR A LIST OF VENDORS EXPERIENCED WITH HITACHI MRI SYSTEMS.
 - 9) IF OXYGEN OR OTHER MEDICAL GAS LINES ARE DESIRED IN THE SCAN ROOM, THE PENETRATIONS MUST BE INTEGRATED INTO THE RF SHIELD AND OCCUR WITHIN FOUR (4) FEET OF THE FILTER PANEL. CONSULT WITH THE RF SHIELD VENDOR
 - 10) ADDITIONAL AND OPTIONAL CONCERNS SUCH AS (OUTSIDE WINDOWS, EXTRA DOORS, ETC. SHOULD BE DISCUSSED WITH THE RF VENDOR AND REVIEWED BY HMSA PRIOR TO FINALIZATION OF THE PLANS.
 - 11) IF NECESSARY, IT IS THE CUSTOMERS RESPONSIBILITY TO COORDINATE SUITE CONSTRUCTION, THE RF VENDOR AND DELIVERY TIMING TO ACCOMMODATE AN INDIRECT DELIVERY PATH.



- ① RF SHIELD-FOUR (4) WALLS, CEILING AND FLOOR REQUIRED TO PROVIDE 80dB ATTENUATION FROM 1-80MHz. TYPICAL 5" WALL THICKNESS SHOWN, WILL VARY WITH VENDOR.
- ② ACCESS PANEL: 8'-0"w X 9'-0"h CLEAR OPENING REQUIRED. LOCATION MAY VARY.
- ③ WAVE GUIDE FOR EMERGENCY EXHAUST VENT FAN. SIZED BY ARCHITECT, PROVIDED BY RF VENDOR. LOCATION MAY VARY.
- ④ CRYOGEN VENT (WAVEGUIDE). CONNECTED TO GANTRY AS PART OF THE DELIVERY PROCESS.
- ⑤ WAVEGUIDE TO SERVE AS PRESSURE RELIEF. SIZE AND LOCATION MAY VARY. SIZED BY ARCHITECT
- ⑥ FILTER PANEL FOR SYSTEM INTERCONNECTION. PROVIDED BY HMSA AND INSTALLED BY RF VENDOR PRIOR TO FINAL ROOM TEST.
- ⑦ RF WINDOW: 4'-0"W X 3'-0"H (TYP.), MOUNTED AT 36" AFF
- ⑧ RF DOOR: 4'-0"W X 7'-0"H (TYP.)
- ⑨ FOUR (4) WAVE GUIDES PROVIDED AND INSTALLED BY RF VENDOR. TWO (2) @ 1 1/2" LOCATED IN LOWEST SECTION OF WIREWAY (CL @ 3" AFF), TWO (2) @ 2" (MIN) LOCATED ABOVE FILTER PANEL. MOUNTED FLUSH ON SCAN ROOM SIDE OF WALL
- ⑩ HIGH PERFORMANCE EMI ELECTRICAL FILTERS BY RF VENDOR QUANTITY AND LOCATION MAY VARY
- ⑪ WAVEGUIDE FOR HVAC SUPPLY AND RETURN DUCTS. SIZE AND LOCATION MAY VARY.

NOTE: VERIFY ALL ROUGH-IN OPENINGS WITH RF VENDOR.

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RF SHIELDING

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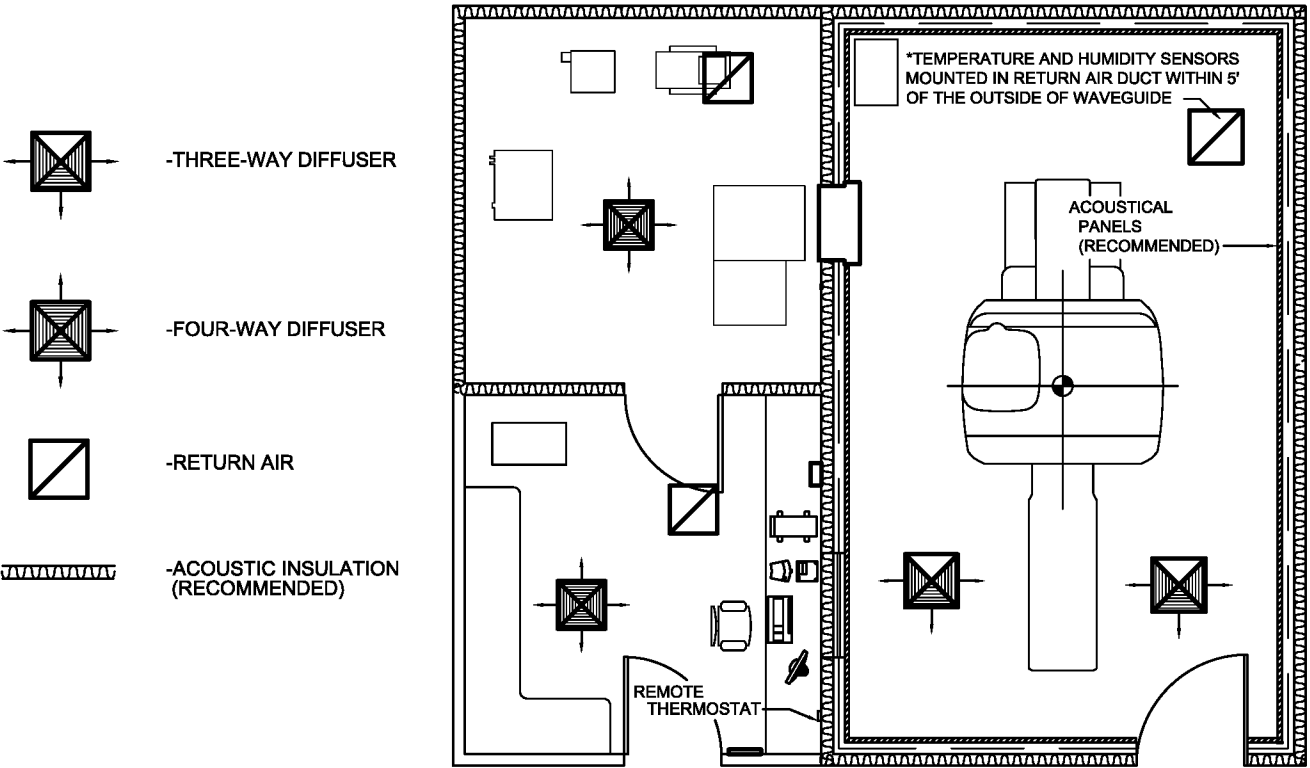
ENVIRONMENTAL

HVAC NOTES:

- 1) THE MRI SCAN ROOM TEMPERATURE MUST BE MAINTAINED BETWEEN 68-75 DEGREES F. WITH A MAXIMUM ALLOWABLE FLUCTUATION OF (+/-) 2-1/2 DEGREES PER HOUR.
- 2) ALL ROOMS MUST BE MAINTAINED AT THE RELATIVE HUMIDITY, AS SHOWN IN THE CHART BELOW, NON-CONDENSING.
- 3) CHANGES TO THE SCAN ROOM TEMPERATURE WILL AFFECT THE SYSTEM IMAGING. THEREFORE, THE ENVIRONMENT MUST BE MAINTAINED AT ALL TIMES (24HRS/DAY; 7 DAYS/WEEK).
- 4) THERMOSTATS MAY NOT BE USED IN THE SCAN ROOM. A REMOTE SENSOR IN THE RETURN AIR DUCT OUTSIDE OF THE RF SHIELD MUST BE UTILIZED FOR CONTROLLING THE SCAN ROOM ENVIRONMENT. THE REMOTE SENSOR MUST BE LOCATED WITHIN FIVE FEET (5') OF THE OUTSIDE OF THE WAVEGUIDE. THE THERMOSTAT SHOULD BE LOCATED IN THE CONTROL AREA.
- 5) IT IS THE RESPONSIBILITY OF THE HVAC DESIGNER TO ENSURE THERE IS ADEQUATE AIRFLOW ACROSS THE REMOTE SCAN ROOM SENSOR TO MAINTAIN PROPER ENVIRONMENTAL CONDITIONS.
- 6) AC UNITS, CONDENSERS, AND AIR HANDLERS MUST BE LOCATED OUTSIDE OF 20 FEET FROM MAGNET ISOCENTER AS SHOWN ON THE SITE SPECIFIC DRAWING AND SHOULD BE MOUNTED ON VIBRATION ISOLATORS.
- 7) A FLEXIBLE, NON-CONDUCTIVE BOOT PROVIDED BY THE HVAC CONTRACTOR MUST BE USED TO CONNECT DUCTWORK TO THE EXTERIOR SIDE OF HVAC WAVEGUIDES.
- 8) DUCTWORK AND DIFFUSER GRILLS WITHIN THE SCAN ROOM MUST BE NON-FERROMAGNETIC.
- 9) CARE SHOULD BE TAKEN TO ENSURE THE SUPPLY AIR IS DIRECTED AWAY FROM THE GANTRY AND PATIENT TABLE. DIFFUSER PLACEMENT SHOULD BE DESIGNED TO ENSURE EVEN AIR DISTRIBUTION.
- 10) IF A FLOOR MOUNTED COMPUTER ROOM HVAC SYSTEM IS USED, PLEASE NOTIFY HMSA SITE PLANNING TO ENSURE ADEQUATE SERVICE SPACE IS AVAILABLE FOR THIS UNIT AS WELL AS THE ECHELON OVAL COMPONENTS IN THE EQUIPMENT ROOM.
- 11) COMPUTER FLOORING IN THE EQUIPMENT ROOM MAY BE USED FOR A SUPPLY PLENUM.

LOCATION	COMPONENT	HEAT LOAD	TEMP. (F)	dB LEVEL (MAX)	RELATIVE HUMIDITY
SCAN ROOM	Ⓐ ECHELON GANTRY	20,302 BTUH	68-75° MAXIMUM CHANGE 2.5° PER HOUR	120	45-60%
	Ⓑ PATIENT TABLE				
CONTROL ROOM	Ⓒ OPERATOR'S WORKSTATION	2,048 BTUH	68-78°	VARIES WITH DESIGN	20-60%
	Ⓓ LASER IMAGER	BY CUSTOMER			
EQUIPMENT ROOM	Ⓓ RFIP CABINET	41,185 BTUH	68-78°	86	20-60%
	Ⓔ GCPA CABINET				
	Ⓚ HELIUM COMPRESSOR				
	Ⓜ SENSE UNIT				
	Ⓝ HEAT EXCHANGER				

12) IT IS THE CUSTOMER'S RESPONSIBILITY TO ENSURE THAT A PROPER ENVIRONMENT IS CONTINUOUSLY MAINTAINED FOR THE ECHELON OVAL SYSTEM. THE CHART ABOVE MUST BE USED BY THE ARCHITECT/ENGINEER DESIGNING THE HVAC SYSTEM. CUSTOMER SUPPLIED AND OPTIONAL COMPONENTS MUST BE IDENTIFIED. THE HVAC DESIGNER IS RESPONSIBLE FOR VERIFYING THE LOADS BASED ON ACTUAL UNITS TO BE USED. OTHER LOADS (I.E., PEOPLE, LIGHTS, OUTSIDE CONDITIONS, ETC.) MUST ALSO BE CONSIDERED IN THE DESIGN. ALTHOUGH THE DESIGN OF THE HVAC SYSTEM IS THE RESPONSIBILITY OF THE CUSTOMER, HMSA STRONGLY SUGGESTS THE USE OF A ZONED SYSTEM DUE TO THE LARGE VARIANCE OF HEAT LOADS FROM ROOM TO ROOM.



ACOUSTICAL NOTES

- 1) SIMILAR TO OTHER MR IMAGING SYSTEMS, THE ECHELON OVAL PRODUCES NOISE LEVELS (WHILE SCANNING) THAT ARE GENERALLY CONSIDERED UNACCEPTABLE FOR A NORMAL OFFICE ENVIRONMENT. DAILY PERMISSIBLE NOISE EXPOSURE LEVELS SHOULD BE CONSIDERED WHEN PLANNING A FACILITY. THE ADJACENT CHART PROVIDES THE MAXIMUM NOISE LEVELS CREATED DURING THE SCAN PROCESS.
- 2) ACOUSTICAL DAMPENING FOR BOTH THE SCAN AND EQUIPMENT ROOM IS HIGHLY RECOMMENDED FOR THE COMFORT OF OCCUPANTS OF SURROUNDING AREAS INCLUDING THE TECHNICIAN. SOUND INSULATION IN THE WALLS AND THE ADDITION OF ACOUSTICAL DAMPENING PANELS TO THE SCAN ROOM WALLS ARE TWO MEANS OF LIMITING NOISE TRANSMISSION. SCAN ROOM SOUND PANELS SHOULD BE CONSTRUCTED OF NON-FERROUS MATERIALS (WOOD FRAMES, VELCRO HANGING SYSTEMS). THE ARCHITECT MAY WISH TO CONSULT AN ACOUSTICAL ENGINEER FOR ADDITIONAL METHODS OF SOUND DAMPENING.
- 3) IF SURFACE MOUNTED ACOUSTIC PANELS ARE SPECIFIED IN THE SCAN ROOM, HMSA RECOMMENDS THAT FINAL FIELD MEASUREMENTS BE DELAYED UNTIL AFTER THE FILTER PANELS HAVE BEEN INSTALLED TO ENSURE PROPER FITMENT. THE EXTENT OF WALL COVERAGE MAY VARY FROM THAT SHOWN ABOVE DEPENDENT ON ROOM LAYOUT, PANEL CONSTRUCTION AND AMOUNT OF ACOUSTIC DAMPENING DESIRED.
- 4) SOME RF SHIELDING VENDORS OFFER OPTIONS THAT INTEGRATE SOUND REDUCTION MATERIALS INTO THE RF SHIELD ITSELF. CONTACT THE RF SHIELDING VENDOR FOR FURTHER INFORMATION.

THE ECHELON OVAL MRI SYSTEM REQUIRES CHILLED WATER FOR COOLING OF THE CRYOGEN COMPRESSOR, GRADIENT AMPLIFIER AND COILS. WITH EACH ECHELON OVAL SYSTEM HMSA WILL PROVIDE A HEAT EXCHANGER UNIT LOCATED IN THE ECHELON OVAL EQUIPMENT ROOM. TWO OPTIONS ARE AVAILABLE TO PROVIDE COOLING WATER TO THE ECHELON OVAL HEAT EXCHANGER AND MRI SYSTEM.

CONTACT THE SITE PLANNING DEPARTMENT FOR ADDITIONAL DETAILS ON OPTION 2.

THE INSTALLATION AND CONNECTION OF THE HASKRIS R1600 CHILLER SUPPLIED BY HMSA IS A RESPONSIBILITY SHARED BETWEEN THE CUSTOMER, GENERAL CONTRACTOR AND HMSA.

- 1) IDENTIFY AN OUTDOOR LOCATION FOR THE R1600 CHILLER AND PAD.
- 2) RECEIVE AND UNLOAD CHILLER SYSTEM AT DESIRED LOCATION AND SET IT IN PLACE AT THE SITE
 - a. CHILLER CAN BE DELIVERED TO MRI SITE OR CONTRACTOR FACILITY, IF DELIVERED TO LOCATION OTHER THAN MRI SITE, CONTRACTOR IS RESPONSIBLE FOR TRANSPORTING EQUIPMENT TO FINAL LOCATION
 - b. **WHEN CHILLER IS DELIVERED, CONTRACTOR IS RESPONSIBLE FOR PROVIDING NECESSARY EQUIPMENT TO OFF LOAD IT FROM THE TRUCK AND MOVING THE UNIT INTO PLACE. A FORKLIFT W/ A MINIMUM CAPACITY OF 2.5 TONS AND EXTENDED LENGTH FORKS IS REQUIRED TO PROPERLY OFFLOAD, LIFT AND MOVE THE R1600 CHILLER.**
- 3) PROVIDE AND INSTALL ELECTRICAL POWER AS REQUIRED FOR THE R1600 CHILLER AND HEAT EXCHANGER.
- 4) PROVIDE AND INSTALL A HOSE BIBB AND FLOOR DRAIN IN THE EQUIPMENT ROOM.
- 5) PROVIDE ANY FACILITY CONSTRUCTION / UPGRADE REQUIRED FOR CHILLER INSTALLATION
- 6) PROVIDE SUB-CONTRACTOR(S) TO PERFORM INSTALLATION OF THE R1600 INCLUDING ALL PLUMBING, WIRING AND STARTUP ITEMS LISTED UNDER INSTALLING CONTRACTOR RESPONSIBILITIES ON PAGE 11 OF 27.
- 7) INSTALL, FILL, TEST AND HAVE CHILLER OPERATIONAL PRIOR TO THE DELIVERY OF THE ECHELON OVAL SYSTEM.
- 8) PROVIDE AND INSTALL A TEMPERATURE GAUGE, PRESSURE GAUGE AND FLOW METER AS LISTED UNDER CUSTOMER/INSTALLING CONTRACTOR RESPONSIBILITIES ON PG. 11 OF 27.
- 9) PROVIDE AND INSTALL A 12' LONG LOOP OF 1 1/2" OPAQUE FIBER REINFORCED HOSE BETWEEN SUPPLY AND RETURN OUTLETS IN EQUIPMENT ROOM TO ALLOW FOR START-UP AND NO LOAD TESTING OF R1600 CHILLER. HOSE WILL BE USED BY HMSA FOR CONNECTION OF HEAT EXCHANGER AT TIME OF INSTALLATION (MCMMASTER-CARR PN# 5405K17 OR EQUAL).

- 1) COORDINATE WITH THE CUSTOMER / CONTRACTOR TO ARRANGE DELIVERY DATE AND ADDRESS FOR THE R16000 CHILLER AT THE APPROPRIATE TIME DURING THE CONSTRUCTION PHASE OF THE PROJECT.
- 2) PROVIDE AND INSTALL ALL PLUMBING AND CONNECTIONS BETWEEN THE HEAT EXCHANGER AND THE ECHELON OVAL MRI SYSTEM.
 - a) HEAT EXCHANGER TO SENSE UNIT
 - b) SENSE UNIT TO HELIUM COMPRESSOR
 - c) GRADIENT POWER AMPLIFIER LOOP
 - d) GRADIENT COIL LOOP
 - e) HELIUM LINES



NOTE: RUNS SHOWN ARE SCHEMATIC ONLY AND DO NOT INDICATE ACTUAL CONNECTION POINTS

PIPING FROM CHILLER TO HEAT EXCHANGER MUST BE COPPER. BLACK PIPE, PVC AND OTHER MATERIALS ARE NOT ACCEPTABLE

480V (+5%, - 10%), 3 PH, 60 Hz, 4 WIRE,
54.4 MCA*, 70 MOCP** w/ TIME DELAY BREAKER

480V (+/- 10%), 3 PH, 60 Hz, 4 WIRE,
7.9 MCA*, 15 MOCP**

* - MINIMUM CIRCUIT AMPACITY
** - MAXIMUM OVERCURRENT PROTECTION

AMBIENT AIR TEMPERATURE EXCEEDS 120° F

AMBIENT AIR TEMPERATURE FALLS BELOW -20° F

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CHILLER REQUIREMENTS	
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CHILLER INSTALLATION CHECKLIST

CHILLER CHECKLIST REQUIREMENTS

THE START UP OF THE CHILLER MUST BE PERFORMED BY AN AUTHORIZED AGENT OF HMSA IN ORDER TO ENSURE IT IS DONE PROPERLY AND TO MAINTAIN THE FACTORY WARRANTY. HAVING THE CHILLER INSTALLED AND OPERATIONAL WHEN THE HITACHI ECHELON ARRIVES ON SITE IS ESSENTIAL FOR A SUCCESSFUL DELIVERY BECAUSE IT IS SHIPPED WITH ITS CRYOSTAT PRE-COOLED (FILLED WITH CRYOGENS). THE FOLLOWING STEPS MUST BE PERFORMED IN ORDER TO ENSURE THAT THE CHILLER IS READY FOR CONNECTION TO THE ECHELON.

CUSTOMER/ INSTALLING CONTRACTOR RESPONSIBILITIES

- 1) INSTALL ALL WATER PIPING RUNS AND COMPONENTS USING THE FOLLOWING GUIDELINES:

a. CARE MUST BE TAKEN TO MAINTAIN THE INTERNAL CLEANLINESS OF THE PIPE. EXCESSIVE PARTICLES IN THE WATER SYSTEM CAN REDUCE THE EFFICIENCY OF, OR CAUSE DAMAGE TO THE SYSTEM. CARE SHOULD BE TAKEN TO MAINTAIN THE INTERNAL CLEANLINESS OF THE PIPING.

b. INSTALL TYPE "L" HARD COPPER PIPING IN AS SHORT AND DIRECT A PATH AS POSSIBLE TO MINIMIZE THE PRESSURE DROP ACROSS THE PIPING. REFER TO THE PIPE SIZING CHART ON THE FOLLOWING PAGE (12 OF 27).

c. INSTALL PIPE VIBRATION ISOLATORS AT THE R1600 CHILLER (P) ON BOTH SUPPLY AND RETURN LINES.

d. INSTALL A DRAIN AT THE BASE OF EVERY RISE TO ALLOW FOR COMPLETE DRAINAGE OF PIPING.

e. INSTALL AIR VENTS AT ALL HIGH POINTS IN THE SYSTEM TO ELIMINATE AIR FROM THE SYSTEM.

f. PROPERLY SUPPORT ALL PIPING WHERE REQUIRED.

g. INSTALL HEAT TRACE ON ALL PIPING EXPOSED TO LOW AMBIENT TEMPERATURES (34°F [1°C] OR BELOW) AND COVER WITH A SUITABLE THICKNESS OF CLOSED-CELL, UV RESISTANT INSULATION. ROUTE POWER FOR HEAT TRACE FROM A SEPARATELY FUSED DISCONNECT. IDENTIFY DISCONNECT AS HEAT TRACE POWER SOURCE WITH A WARNING THAT POWER MUST NOT BE TURNED OFF EXCEPT WHEN UNIT IS BEING SERVICED.

h. PROPERLY SLEEVE AND INSULATE PIPE PENETRATIONS THROUGH ALL ROOF AND/OR WALL PENETRATIONS TO PROTECT PIPE FROM POTENTIAL DAMAGE.

j. PROVIDE AND INSTALL A 12' LONG LOOP OF 1 1/2" FIBER REINFORCED HOSE BETWEEN SUPPLY AND RETURN OUTLETS IN EQUIPMENT ROOM TO ALLOW FOR START-UP AND NO LOAD TESTING OF R1600 CHILLER. HOSE WILL BE USED BY HMSA FOR CONNECTION OF HEAT EXCHANGER AT TIME OF INSTALLATION.
- 2) PROVIDE AND INSTALL A BALL VALVE ON BOTH THE THE SUPPLY AND RETURN LINES AT THE HEAT EXCHANGER (N) UNIT TO ALLOW ISOLATION FOR SERVICE OR UNIT REPLACEMENT IF NECESSARY. THE R1600 CHILLER INCLUDES FACTORY INSTALLED ISOLATION VALVES AT BOTH THE SUPPLY AND RETURN CONNECTIONS.
- 3) PROVIDE AND INSTALL A PRESSURE GAUGE (0-100 PSI) AND A TEMPERATURE GAUGE (0-100° F) ON THE SUPPLY SIDE BETWEEN THE BALL VALVE AND HEAT EXCHANGER (N) TO MEASURE SUPPLY PRESSURE AND TEMPERATURE AT THE UNIT.
- 4) PROVIDE AND INSTALL A TEMPERATURE GAUGE (0-100° F) AND AN IN-LINE FLOW METER (10-50 GPM) ON THE RETURN SIDE BETWEEN THE HEAT EXCHANGER (N) AND BALL VALVE TO MEASURE RETURN TEMPERATURE AND FLOW. A BLUE-WHITE SERIES F-42050LN VARIABLE AREA FLOW METER SIZED TO MATCH THE PIPING LINE SIZE IS RECOMMENDED. PROVIDE A MOVEABLE SLEEVE OVER THE FLOW METER TO PREVENT EXPOSURE TO LIGHT WHEN METER IS NOT BEING READ. PROLONGED EXPOSURE TO LIGHT MAY PROMOTE BIOLOGICAL GROWTH IN THE WATER LINES.
- 5) COMPLETE THE INSTALLATION OF THE R1600 CHILLER PER THE REQUIREMENTS IN THE R1600 INSTRUCTION MANUAL PROVIDED WITH THE SYSTEM. **THE R1600 CHILLER MUST BE INSTALLED AND STARTED NO LATER THAN 60 DAYS AFTER DELIVERY. FAILURE TO DO SO WILL RESULT IN ADDITIONAL EXPENSE TO THE END USER FOR MANDATORY REPLACEMENT OF PUMP SEALS.**
- 6) CLOSE ISOLATION VALVES ON R1600 AND FLUSH PIPING WITH CITY WATER UNTIL STREAM BECOMES CLEAR. FLUSH FOR AN ADDITIONAL 20 MINUTES. CLOSE DRAIN AND PERFORM LEAK CHECK FOR A MINIMUM OF 30 MINUTES AT CITY WATER PRESSURE. IT IS RECOMMENDED TO FILL THE SYSTEM THROUGH A WATER METER TO HELP ESTABLISH THE CORRECT QUANTITY OF GLYCOL SOLUTION REQUIRED AT FILL. OPEN ALL DRAINS (INCLUDING DRAINS INSTALLED AT THE BASE OF EVERY RISE) AND DRAIN ALL PIPING RUNS. USE COMPRESSED DRY AIR OR DRY NITROGEN TO DRY PIPING PRIOR TO CHARGING SYSTEM WITH GLYCOL SOLUTION.
- 7) FILL 30 GALLON TANK AND ENTIRE WATER PIPING LOOP WITH A MIXTURE OF PROPYLENE GLYCOL (35% BY VOLUME) AND POTABLE DISTILLED WATER. PURGE ALL AIR FROM THE LINES. **DO NOT USE AUTOMOTIVE ANTIFREEZE. USE OF AUTOMOTIVE ANTIFREEZE WILL DAMAGE SYSTEM.** THE USE OF AN EXTERNAL PUMP MAY BE REQUIRED TO PROPERLY FILL THE SYSTEM WITH GLYCOL SOLUTION. IF CITY WATER IS USED IN PLACE OF POTABLE DISTILLED WATER, IT MUST BE RUN THROUGH A DE-IONIZATION FILTER. DO NOT ENERGIZE R1600 CHILLER. DO NOT USE THE PUMP ON THE R1600 TO FILL THE SYSTEM. SEE THE LIST OF ACCEPTABLE PROPYLENE GLYCOL VENDORS ON FOLLOWING PAGE (12 OF 27).
- 8) PROVIDE ADDITIONAL PROPYLENE GLYCOL (35% BY VOLUME) AND DISTILLED WATER MIXTURE FOR USE BY START-UP AGENT TO TOP OFF SYSTEM WHEN NO LOAD START-UP IS PERFORMED. ADDITIONAL GLYCOL/WATER MIXTURE (APPROXIMATELY 5 GALLONS) WILL ALSO BE REQUIRED FOR USE BY HITACHI WHEN THE MAGNET IS DELIVERED.
- 9) POWER MUST BE APPLIED TO CHILLER A MINIMUM OF 24 HOURS PRIOR TO FIRST OPERATION TO PROPERLY HEAT COMPRESSOR CRANK CASE. POWER IS ALSO REQUIRED TO PROPERLY COMPLETE CHILLER INSTALLATION CHECKLIST.
- 10) COMPLETE AND FAX THE INSTALLER'S PRE-STARTUP CHECKLIST (INCLUDED WITH SYSTEM DOCUMENTATION, ADDITIONAL COPY AT RIGHT) TO HMSA NO LESS THAN 5 BUSINESS DAYS PRIOR TO DESIRED NO LOAD START-UP DATE FOR CHILLER.
- 11) SCHEDULE NO LOAD START-UP WITH LOCAL HMSA AUTHORIZED START-UP AGENT AT LEAST 2 DAYS IN ADVANCE. NO LOAD START-UP SCHEDULING IS SUBJECT TO TECHNICIAN AVAILABILITY.

INSTALLER'S CHECKLIST HASKRIS OUTDOOR CHILLER R1600 FOR THE HITACHI ECHELON MRI

Haskris R1600 Chiller Install Checklist

Installer’s Checklist for Haskris R1600, S/N HB _____

Project Name _____ Location _____

Note: Checklist must be completed for “no load” Start-up to be scheduled and performed. R1600 should not be started until completed checklist has been returned via fax or e-mail to Hitachi Medical Systems America, Inc. no less than 5 business day prior to desired no load start-up date.

Directions: Upon checklist completion e-mail both completed pages to chillerteam@hitachimed.com or fax to **978-313-6145** no less than **5 business days** prior to preferred no load start-up date. Hitachi will be responsible for notifying an authorized start-up agent to schedule the no load start-up. Start-ups are to be performed during regular business hours and are subject to technician availability. Installer will be required to issue a credit card purchase order to Hitachi’s start-up agent if any items are found incomplete and cause a delay in system start-up.

Checklist:

- ☐ Unit is securely mounted and level.
- ☐ No Refrigeration Service Contractor labels have been affixed to exterior of chiller.
- ☐ Clearances for service, ventilation, and access to control panels are adequate per R1600 Instruction manual.

Nominal Power: 480V-3Ø-60Hz,+5%/-10% MCA:54.3A, MOCP 70A				
Record Voltage at Dis-Connect (V)	L1-L2		Confirm and Record Size of Time Delay Breaker (Fusing) Supplying Chiller (A)	
	L2-L3			
	L1-L3			

- ☐ Confirm proper phase wiring by verifying red “**FAULT**” LED is not lit. (see section 2.5.1)
- ☐ Hard copper piping with vents/drains as required and properly supported.
- ☐ Vibration isolators installed on R1600 on both water supply and return lines. **INCLUDE PICTURES**
- ☐ Separately fused heat trace covered with suitable thickness of closed cell, UV resistant insulation on all piping exposed to low ambient temperatures, as required. **INCLUDE PICTURES**
- ☐ Supply and return lines labeled over insulation.
- ☐ A 12’ long loop of 1-1/2” reinforced opaque hose is provided between supply and return outlets in equipment room.
- ☐ Supply and return ball valves provided in equipment room. **INCLUDE PICTURES**
- ☐ Supply side temperature (0-100°F) and pressure (0-100psig) gauges provided in indoor equipment room.
- ☐ Return side temperature (0-100°F) and flow (0-25gpm) gauges provided in indoor equipment room. **INCLUDE PICTURES**
- ☐ All external piping flushed with water per manufacturer instruction manual.
- ☐ System (30 gallon tank and entire piping loop) is filled with_____ gallons of **propylene glycol**/distilled water mixture and the reservoir is at full tank level.
- ☐ Glycol manufacturer_____ Glycol type_____
- ☐ Leak check performed and no leaks in external piping loop per manufacturer instruction manual.
- ☐ Reservoir is at full tank level. **INCLUDE PICTURE**
- ☐ Lines air purged per R1600 manual.
- ☐ Glycol Solution % _____ (record actual measurement here)
- ☐ Glycol Solution pH level _____ (record actual measurement here)
- ☐ Installer has provided an additional 10 gallons of propylene glycol/distilled water at site for topping off system if necessary.
- ☐ **Confirm compressor crankcase heaters have been energized. (see section 3.1)**

Installation Completed By:

Company: _____

Service Tech: _____ Title: _____

Phone: _____ E-mail: _____

Signature _____ Date: _____

Please Contact Hitachi Medical Systems America, Inc. if you have any questions.
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CHILLER INSTALLATION CHECKLIST

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CHILLER INSTALLATION SPECIFICATIONS

PIPE SIZE CALCULATION

THE CUSTOMER'S ARCHITECT/ENGINEER IS RESPONSIBLE FOR UTILIZING THE FOLLOWING INFORMATION TO CALCULATE THE APPROPRIATE NOMINAL SIZE OF THE COPPER WATER LINES BETWEEN THE R1600 OUTDOOR CHILLER UNIT AND THE HEAT EXCHANGER LOCATED IN THE EQUIPMENT ROOM.

PIPE CALCULATION FACTORS				
NOMINAL PIPE SIZE	PIPE FACTOR	90° ELBOW	90° LONG RADIUS ELBOW	45° ELBOW
1 1/2"	3.72	4.2	2.1	2.9
2"	0.95	5.1	2.6	3.6
2 1/2"	0.32	5.4	2.7	3.8
3"	0.13	6.7	3.4	4.7

1. CALCULATE THE ENTIRE APPARENT LENGTH OF THE PIPING FROM THE LOCATION OF THE R1600 (OUTDOOR CHILLER) TO THE HEAT EXCHANGER LOCATED IN THE EQUIPMENT ROOM. THE "TOTAL RUN" USED FOR THESE CALCULATIONS IS THE SUM OF THE SUPPLY AND RETURN LINE LENGTH (i.e.: A 50' RUN EACH WAY BETWEEN UNITS WOULD BE A 100' TOTAL RUN). STARTING WITH 1 1/2" PIPE AND LONG RADUS 90° ELBOWS WHERE POSSIBLE, CALCULATE THE FOLLOWING:

TOTAL RUN (FT.)_____ X FACTOR FROM CHART_____ = _____ (A)

2. FIND THE TOTAL NUMBER OF FITTINGS (LONG RADIUS 90° ELBOWS SHOULD BE USED WHERE POSSIBLE)

90° ELBOWS_____ X FACTOR FROM CHART_____ = _____ (B)

90° LR ELBOWS_____ X FACTOR FROM CHART_____ = _____ (C)

45° ELBOWS_____ X FACTOR FROM CHART_____ = _____ (D)

3. ADD (A) + (B) + (C) + (D) = _____ (E)

4. MULTIPLY (E) BY 1.26 (GLYCOL FACTOR) = _____ (F) (MAXIUM ALLOWABLE VALUE: 335)

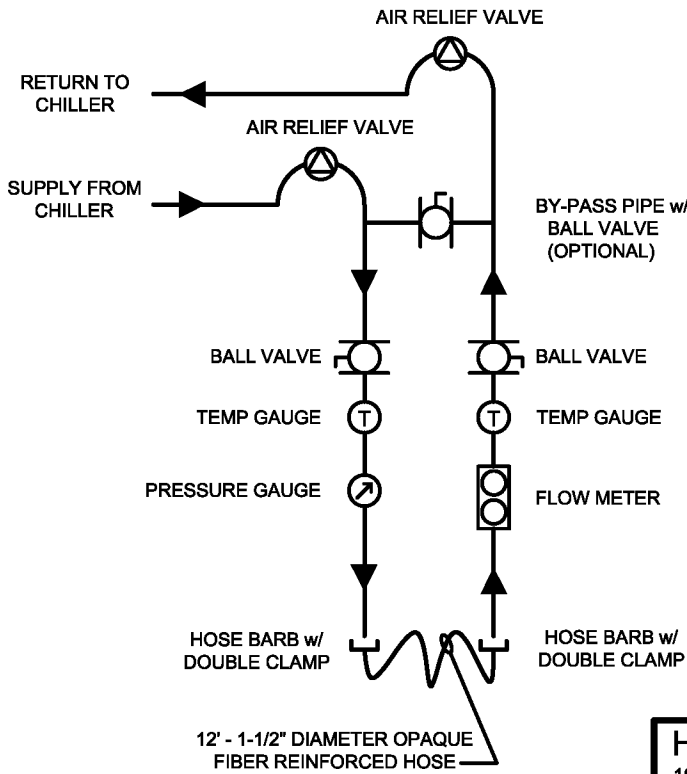
5. IF "F" IS LESS THAN OR EQUAL TO 335, THEN YOUR PIPE SIZE IS 1 1/2". IF "F" IS GREATER THAN 335, REPEAT THE CALCULATIONS AGAIN USING THE NEXT LARGER NOMINAL PIPE SIZE. CONTINUE IN THIS MANNER UNTIL "F" IS LESS THAN OR EQUAL TO 335 TO FIND THE REQUIRED PIPE SIZE.

APPROXIMATE VOLUME OF PIPE RUNS	
NOMINAL SIZE (INCHES)	GALLONS/ 100 FEET
1 1/2"	9.5
2"	16.75
2 1/2"	26
3	36.5

CHILLER ANTI-FREEZE

IT IS CRITICAL THAT THE R1600 CHILLER BE FILLED WITH A PROPER MIXTURE PROPYLENE GLYCOL ANTI-FREEZE AND DISTILLED WATER (35% PROPYLENE GLYCOL BY VOLUME). AN IMPROPERLY MIXED SOLUTION WILL HAVE A NEGATIVE IMPACT ON THE EFFICIENCY OF THE CHILLER. **ONLY APPROVED BRANDS MAY BE USED (SEE CHART BELOW). DO NOT USE AUTOMOTIVE ANTIFREEZE. USE OF AUTOMOTIVE ANTIFREEZE WILL DAMAGE THE SYSTEM.**

PROPYLENE GLYCOL SUPPLIER LIST	
SUPPLIER	BRAND NAME
DOW CHEMICAL (RECOMMENDED)	DOWFROST
HOUGHTON CHEMICAL	SAFE-T-THERM
INTERSTATE CHEMICAL CO	INTERCOOL NFP
HUNTSMAN PETROCHEMICAL	JEFFCOOL P-155
NOBLE COMPANY	NO-BURST-100



EQUIPMENT ROOM PIPING

SEE CUSTOMER/INSTALLING CONTRACTOR RESPONSIBILITIES (pg 11 of 27) FOR COMPLETE DETAILS

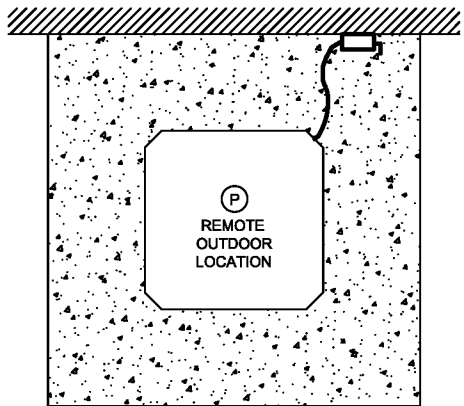
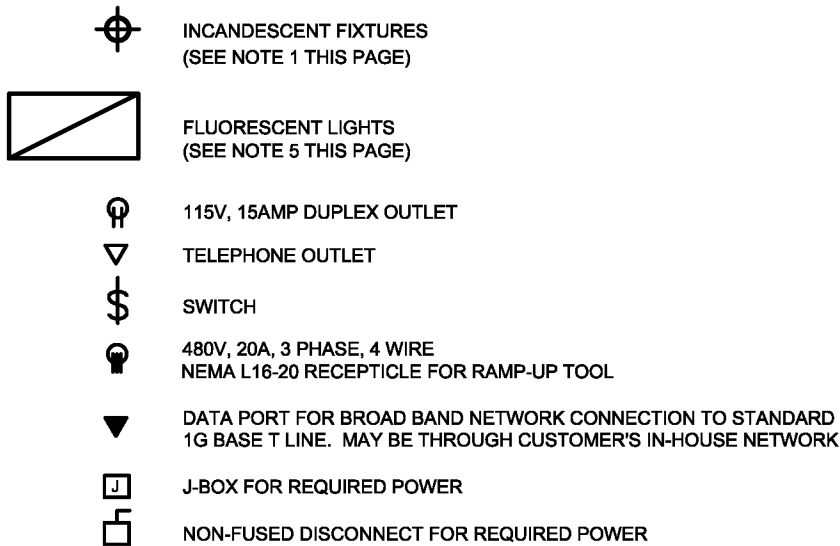
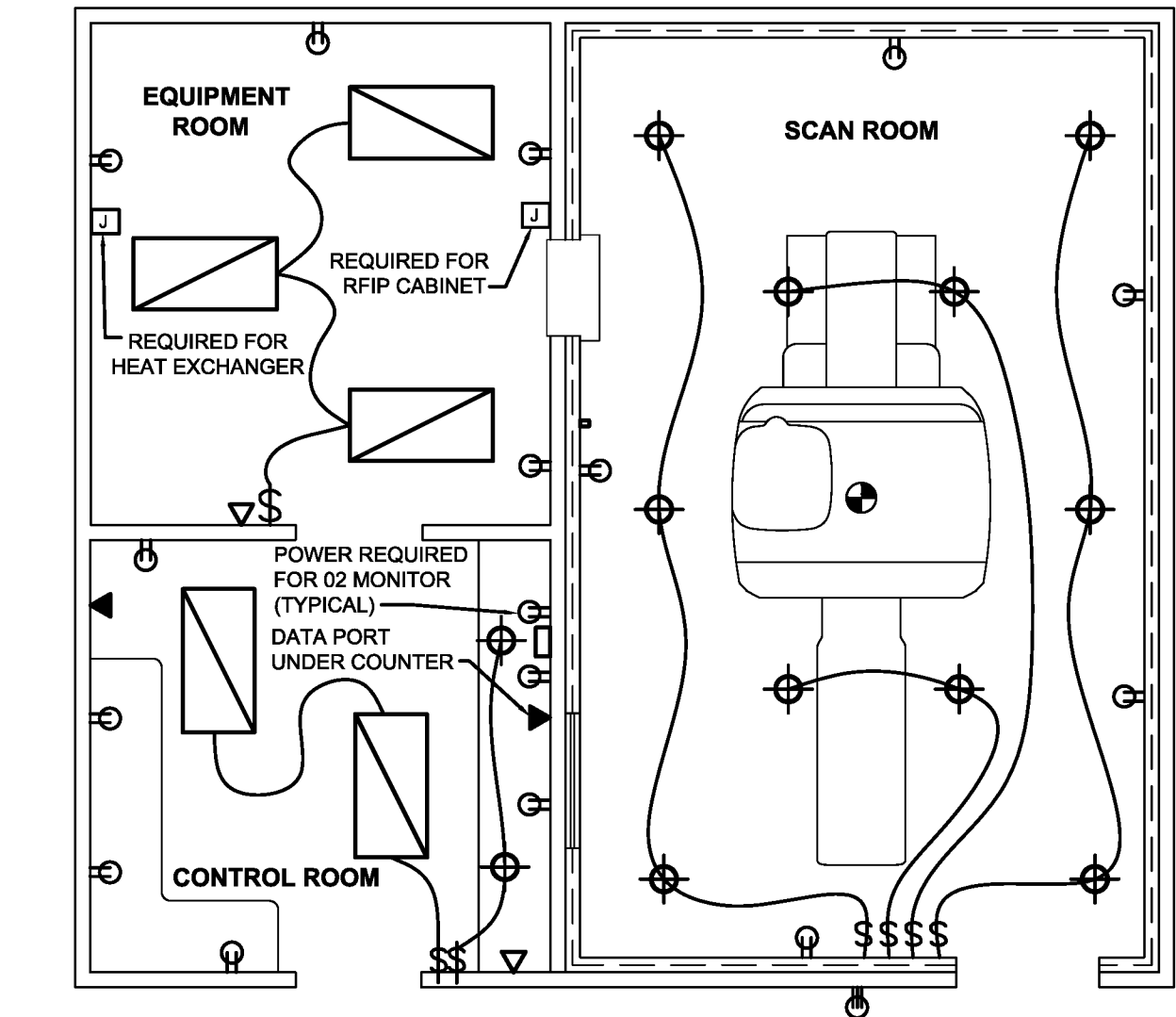
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CHILLER INSTALLATION SPECIFICATIONS

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ELECTRICAL - LIGHTING



LIGHTING NOTES

THE LIGHTING IN THE SUITE SHOULD BE DESIGNED TO ALLOW MULTIPLE LEVELS OF BRIGHTNESS. THE FOLLOWING POINTS MUST BE REVIEWED TO ENSURE THE PROPER DESIGN OF THE LIGHTING AND ELECTRICAL SYSTEMS FOR THE SUITE.

- 1) RECESSED CANS AND/OR WALL SCONCES ARE SUGGESTED. WHILE MRI SPECIFIC UNITS ARE HIGHLY RECOMMENDED FOR THE SCAN ROOM, STANDARD INCANDESCENT LIGHT FIXTURES MAY BE USED AS WELL, BUT, FERROMAGNETIC MATERIAL SHOULD BE AS MINIMAL AS POSSIBLE. REMOVABLE ACCESSORIES (GRILLES, BAFFLES, ETC.) MUST BE NON-FERROMAGNETIC.
- 2) THE USE OF LED LIGHTING AND SPECIFICALLY MRI COMPATIBLE LIGHT FIXTURES IS HIGHLY RECOMMENDED FOR THE SCAN ROOM. THERE ARE SEVERAL BENEFITS WHEN USING MRI SPECIFIC LIGHTING FIXTURES AND LED LAMPS. WHEN CONFIGURING LIGHTING SCHEMES UTILIZING LED LIGHTING, CARE MUST BE TAKEN TO ENSURE THE NUMBER OF FIXTURES AND THEIR LOCATION WILL PROVIDE THE LUMEN LEVELS DESIRED.
 - a. UTILIZATION OF EITHER OR BOTH OF THESE PRODUCTS WILL HELP ELIMINATE POTENTIAL SOURCES OF NOISE ARTIFACTS CAUSED BY ITEMS WITHIN THE SCAN ROOM.
 - b. STANDARD INCANDESCENT BULBS (INCLUDING THOSE WITH A ROUGH USAGE RATING) TEND TO BURN OUT RAPIDLY IN A MRI ENVIRONMENT. LED'S HAVE A SIGNIFICANTLY LONGER LIFE (UP TO 100,000 HRS), GREATLY REDUCING MAINTENANCE COSTS FOR RE-LAMPING.
 - c. ENERGY USAGE WITH LED LIGHTING IS SUBSTANTIALLY REDUCED IN COMPARISON WITH INCANDESCENT BULBS.
- 3) WALL SCONCES MAY BE HELPFUL WHEN THE CEILING HEIGHT IS A CONCERN OR TO OBTAIN LOW LEVEL AMBIENT LIGHT.
- 4) CARE SHOULD BE TAKEN WHEN LOCATING LIGHT FIXTURES. LIGHTS SHOULD NOT BE POSITIONED DIRECTLY ABOVE THE MAGNET OR THE PATIENT TABLE.
- 5) TRACK LIGHTING IS NOT PERMITTED IN THE SCAN ROOM.
- 6) FLUORESCENT LIGHTS (INCLUDING LONG LIFE COMPACT FLUORESCENT BULBS) ARE NOT PERMITTED IN THE SCAN ROOM. USE ONLY INCANDESCENT OR MRI RATED LED LIGHTING. REDUCED INCANDESCENT BULB LIFE CAN BE EXPECTED DUE TO THE PULSING OF THE MAGNETIC FIELD IN THE SCAN ROOM. IF USING INCANDESCENT LIGHTS, ROUGH USAGE BULBS ARE RECOMMENDED. FLUORESCENT LIGHTS IN THE CONTROL AND EQUIPMENT ROOMS SHOULD NOT BE ON WHEN SCANNING.
- 7) AC DIMMERS ARE NOT PERMITTED IN THE MRI SUITE (SCAN, CONTROL AND EQUIPMENT ROOMS). A MULTI-SWITCH DESIGN SHOULD BE USED TO ADJUST LIGHTING LEVELS.
- 8) LIGHTING CIRCUITS MUST NOT CREATE A PERIPHERAL LOOP AROUND THE MAGNET. THIS WILL CAUSE INTERFERENCE TO THE SYSTEM WHEN IMAGING.
- 9) EQUIPMENT ROOM LIGHTING SHOULD BE A MINIMUM OF 40 LUMENS/SQ.-FT.
- 10) THE ELECTRICAL POWER FOR THE LIGHTING AND RECEPTACLES IN THE SUITE IS TO BE DERIVED FROM THE MRI SUB PANEL AND SHARE A COMMON GROUND (SEE THE ELECTRICAL SHEETS FOR FURTHER DETAILS). THE ELECTRICAL CONTRACTOR MUST COORDINATE BOTH THE NUMBER AND LOCATION OF EMI FILTERS WITH THE RF VENDOR.
- 11) IF AN EMERGENCY LIGHT IS REQUIRED IN THE SCAN ROOM, THE BATTERY AND CHARGER MUST BE LOCATED OUTSIDE OF THE SCAN ROOM AND THE POWER LEADS PROPERLY FILTERED. BATTERY CHARGERS ARE A SIGNIFICANT SOURCE OF EMI NOISE THAT WILL INTERFERE WITH THE OPERATION OF THE MRI SYSTEM.
- 12) WHILE SPECIFIC COMPONENTS MAY REQUIRE OUTLETS AS NOTED, ADDITIONAL CONVENIENCE OUTLETS ARE REQUIRED IN THE SUITE (MINIMUM ONE PER WALL) FOR SERVICING AND MAINTENANCE.
- 13) OUTLETS LOCATED ON WALLS WITH SURFACE MOUNTED WIREWAYS MUST BE INSTALLED HIGH ENOUGH TO ENSURE THEY WILL NOT BE COVERED BY THE WIREWAY (TOP AT 30" A/FF).
- 14) LOCATION OF NETWORK CONNECTIONS, TELEPHONE LINE JACKS, REQUIRED OUTLETS, ETC. WILL VARY. REFER TO SITE SPECIFIC DRAWING FOR ACTUAL PLACEMENT. NETWORK CONNECTIONS AND TELEPHONE JACKS ARE **NOT** PERMITTED IN THE SCAN ROOM.
- 15) REQUIREMENTS FOR ALL NON HITACHI SUPPLIED COMPONENTS MUST BE VERIFIED WITH EQUIPMENT VENDOR OR MANUFACTURER FOR ACTUAL PLACEMENT.

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ELECTRICAL - LIGHTING

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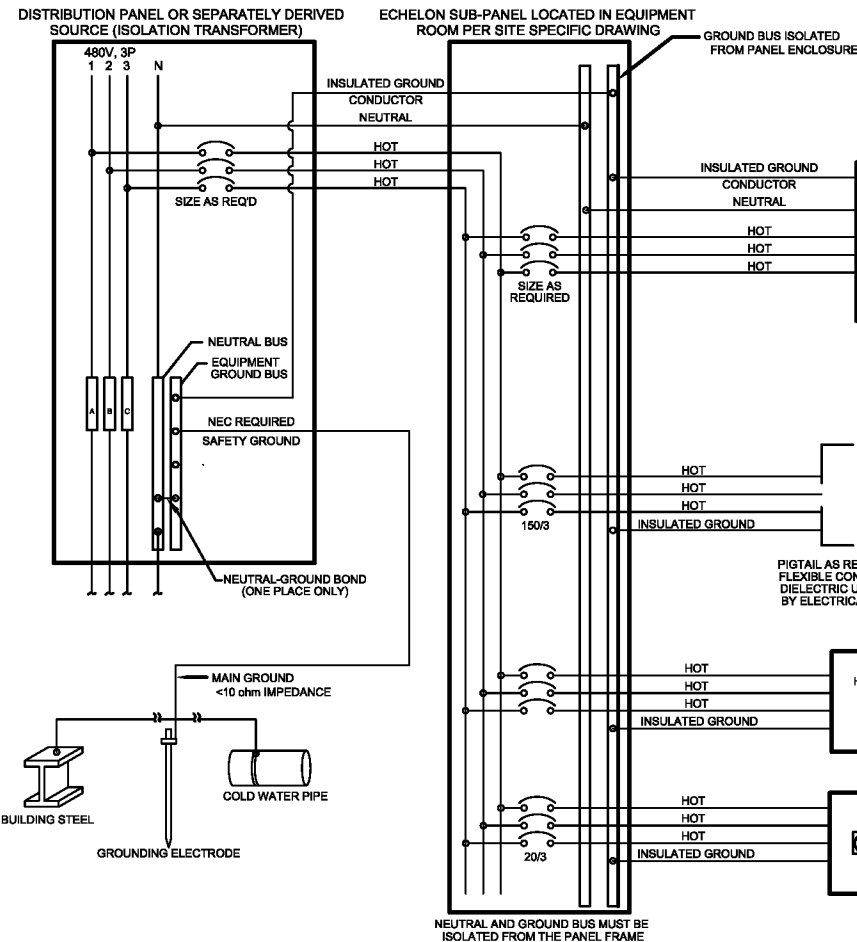
ECHELON OVAL STD. DETAILS

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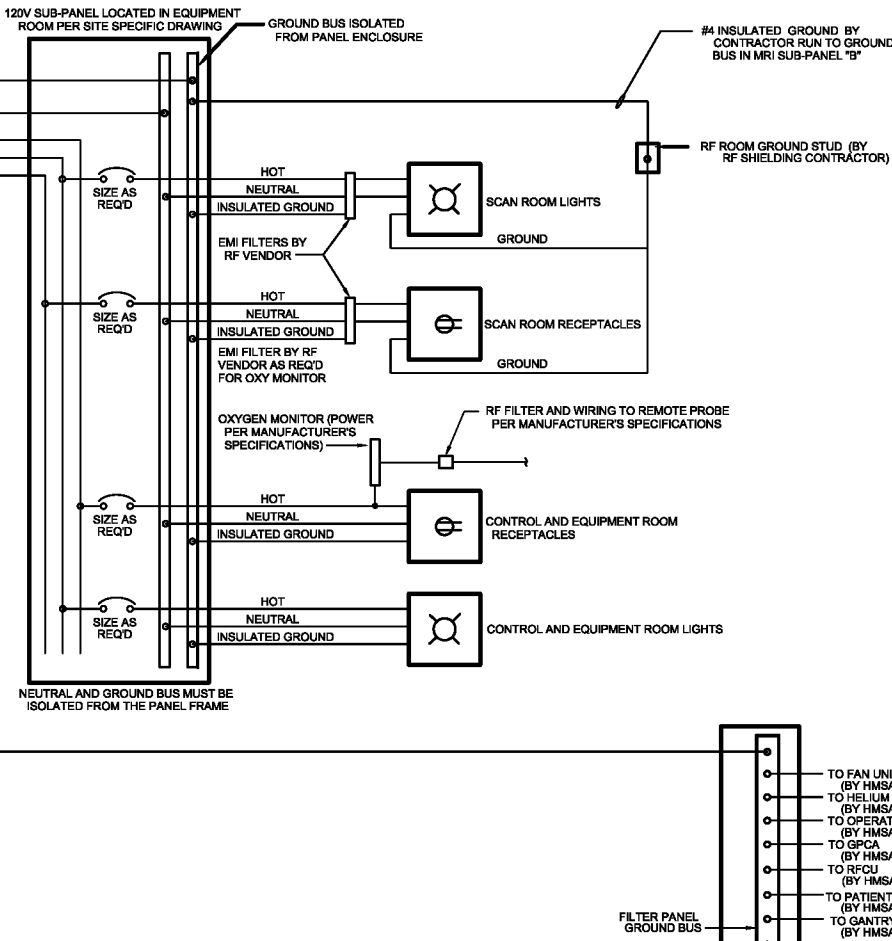
ELECTRICAL - PANEL SCHEMATIC

ECHELON MRI SUITE

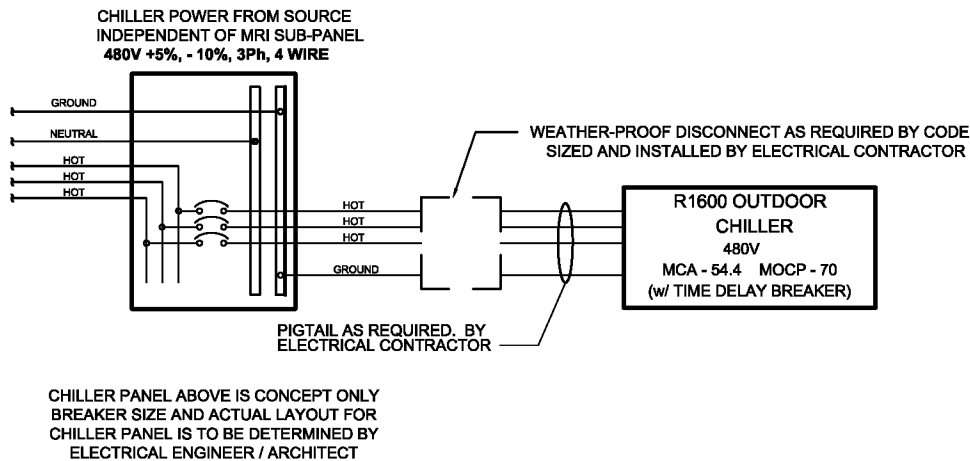
SUB PANEL "A"



SUB PANEL "B"



CHILLER SYSTEM WHEN SUPPLIED BY HMSA



NOTE:

- 1) CUSTOMER'S ELECTRICAL ENGINEER IS RESPONSIBLE FOR SIZING PANELS, CIRCUITS, AND WIRE SIZE AS REQUIRED.
- 2) QUANTITY AND LOCATION OF RF FILTERS FOR CIRCUITS TO SCAN ROOM TO BE COORDINATED BETWEEN THE CONTRACTOR AND RF SHIELDING VENDOR.
- 3) ALL WORK SHALL CONFORM TO APPLICABLE BUILDING CODES.
- 4) ALTHOUGH THE MRI SUB-PANEL SHOWN ON THIS PAGE MAY BE LOCATED IN CLOSE PROXIMITY TO THE GANTRY, IT DOES NOT EFFECT SYSTEM PERFORMANCE. OTHER THREE PHASE PANELS OR WIRING WITHIN THE 20" RESTRICTED AREA ON THE SITE SPECIFIC PLAN MAY HAVE AN ADVERSE EFFECT ON IMAGE QUALITY. REFER TO PROXIMITY CHARTS FOR FURTHER INFORMATION.
- 5) THE USE OF STANDARD FERROUS RIGID CONDUIT AND WORK BOXES WITHIN THE SCAN ROOM IS ACCEPTABLE AND PREFERRED. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR SECURING ALL CONDUITS (INCLUDING FLEXIBLE WHIPS) TO PREVENT CONTACT WITH OTHER METALLIC ITEMS (I.E.: CEILING GRID, RF SHIELD) OR MOVEMENT CAUSED BY THE PULSATION OF THE MAGNETIC FIELD.
- 6) IF A FACILITY'S ONLY POWER IS 208V, 3 PHASE, AN ALTERNATE PANEL SCHEMATIC UTILIZING 208V, 3 PHASE AS THE PRIMARY POWER IN CONJUNCTION WITH STEP-DOWN TRANSFORMERS IS AVAILABLE. CONTACT THE SITE PLANNING DEPARTMENT TO OBTAIN A COPY.

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ELECTRICAL - PANEL SCHEMATIC

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ECHELON OVAL STD. DETAILS

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ELECTRICAL - GENERAL NOTES

ECHELON OVAL POWER REQUIREMENTS:

VOLTAGE: 480V, 3 PHASE, 4 WIRE, DELTA or WYE
REGULATION: +/- 10% WITH 5% REGULATION NO LOAD TO FULL LOAD
FREQUENCY: 50/60 HZ +/- LESS THAN 1%
LOAD CAPACITY: 100 KVA
CIRCUIT BREAKER SIZE: 150 AMPS

NOTE: THIS IS THE LOAD FOR THE ECHELON SYSTEM ONLY. IF A STEP-UP TRANSFORMER IS REQUIRED TO ATTAIN 480V SERVICE, A RATING OF 150 KVA OR GREATER IS REQUIRED. THE LOADS FOR THE CHILLER, HEAT EXCHANGER AND SUITE LIGHTS/OUTLETS ARE ADDITIONAL AND MUST BE CALCULATED SEPARATELY AND ADDED . TOTAL ELECTRICAL SERVICE REQUIREMENTS FOR THE SUITE AND EQUIPMENT MUST BE DETERMINED BY AN ELECTRICAL ENGINEER OR OTHER QUALIFIED INDIVIDUAL.

ECHELON OVAL POWER CONSUMPTION:

IN RUSH AT POWER ON: 60 KVA
SYSTEM "OFF" AT NIGHT: 11 KVA
SYSTEM "ON" AT IDLE DAY: 19 KVA
LOW LEVEL SCAN (S/N SCAN): 31 KVA
MAXIMUM PEAK POWER DEMAND: 130 KVA

PROVIDED BY HITACHI MEDICAL SYSTEMS AMERICA:

HMSA WILL BE RESPONSIBLE FOR THE FOLLOWING:

- 1) AC POWER WIRING AND CONNECTIONS FROM THE RFIP CABINET TO ALL SYSTEM COMPONENTS EXCEPT THE HEAT EXCHANGER.
- 2) GROUNDING CONDUCTORS FROM RFIP CABINET TO ALL SYSTEM COMPONENTS EXCEPT HEAT EXCHANGER.
- 3) PROVIDING AND INSTALLING ALL SYSTEM INTERCONNECT CABLES.

PROVIDED BY THE ELECTRICAL CONTRACTOR:

THE ELECTRICAL CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLYING AND INSTALLING THE FOLLOWING:

- 1) CIRCUIT BREAKER PANEL (MRI SUB-PANEL) TYPICALLY LOCATED IN THE EQUIPMENT ROOM. THIS PANEL SHALL ONLY SERVE LOADS AS SHOWN ON THE WIRING SCHEMATIC (PG. 14 OF 27). THE MRI SUB-PANEL SHALL BE PROVIDED WITH BOLT-ON BRANCH CIRCUIT BREAKERS AND AN ISOLATED GROUND BUS.
- 2) THE MRI SUB-PANEL FEEDER SHALL BE COPPER CONDUCTOR, SIZED AS REQUIRED BY NEC AND AS REQUIRED TO PROVIDE NECESSARY VOLTAGE LEVEL AT RFIP CABINET. THE FEEDERS SHALL BE FROM A CIRCUIT BREAKER OR FUSED SWITCH SIZED PER NEC IN A DISTRIBUTION PANEL AT THE SERVICE ENTRANCE OR THE SOURCE OF THE SEPARATELY DERIVED SYSTEM.
- 3) BRANCH CIRCUIT WIRING FROM THE MRI SUB PANEL TO THE RFIP CABINET AS SHOWN ON THE SCHEMATIC (PG14 OF 27), A PIGTAIL LONG ENOUGH TO ALLOW THE RFIP TO BE MOVED 6' PLUS AN ADDITIONAL 5' FOR USE INTERNAL TO THE CABINET IS REQUIRED. A FLEXIBLE CONDUIT FROM THE JUNCTION BOX TO THE CABINET WITH A DIELECTRIC UNION AT ONE END IS ALSO REQUIRED. OPENING AT THE REAR OF THE RFIP CABINET IS 2 1/2" DIAMETER.
- 4) INSTALL CRIMP TERMINAL LUGS ON POWER WIRING TO RFIP CABINET. SIZE AS APPROPRIATE FOR WIRE GAUGE AND MOUNTING TO AN M10 ATTACHMENT STUD IN RFIP CABINET. GROUND STUD IN RFIP CABINET IS M8.
- 5) IF THE MRI SUB PANEL IS NOT LOCATED IN THE EQUIPMENT ROOM, A SURFACE MOUNTED DISCONNECT SWITCH (NON-FUSED) IS REQUIRED IN CLOSE PROXIMITY TO THE RFIP CABINET. SIZE AS REQUIRED BY CODE.
- 6) BRANCH CIRCUITS AND WIRING TO BOTH THE OUTDOOR COMPONENT OF THE CHILLER SYSTEM (TYPICALLY SUPPLIED BY HMSA) AND THE HEAT EXCHANGER IN THE EQUIPMENT ROOM (PG 14 OF 27).
- 7) L-16-20R RECEPTACLE FOR MAGNET RAMP UP TOOL. LOCATION AS SHOWN ON SITE SPECIFIC DRAWING.
- 8) LIGHTING AND CONTROLS IN MRI SCAN, CONTROL, AND EQUIPMENT ROOMS (PG. 13 OF 27).
- 9) 120V RECEPTACLES WITH ISOLATED GROUND TERMINALS IN MRI SCAN, CONTROL, AND EQUIPMENT ROOMS.
- 10) ISOLATED GROUNDING SYSTEM FOR ALL LOADS FED BY MRI SUB-PANEL (SEE GROUNDING NOTES).
- 11) RF SHIELD GROUNDING WITH AN INSULATED #4 AWG COPPER GROUNDING CONDUCTOR FROM RF SHIELD GROUND STUD TO THE FILTER PANEL OR TO ISOLATED GROUND BUS IN MRI SUB-PANEL.
- 12) 1" x 1/8" FLAT BRAIDED GROUND STRAP FROM FILTER PANEL TO SCAN ROOM WIREWAY AND BONDING BETWEEN WIREWAY SECTIONS IN SCAN ROOM.
- 13) CONDUIT AND ENCLOSURE GROUNDING FOR ALL FEEDER AND BRANCH WIRING PER NEC REQUIREMENTS (SEE GROUNDING NOTES).
- 14) CONFIGURATION AND INSTALLATION OF ANY POWER CONDITIONING OR UPS EQUIPMENT. SEE NOTE BELOW AND CONTACT THE SITE PLANNING DEPARTMENT FOR FURTHER INFORMATION.
- 15) BRANCH CIRCUIT WIRING FROM BUILDING DISTRIBUTION SYSTEM FOR LASER IMAGER AND EMERGENCY EXHAUST FAN PER MANUFACTURER'S SPECIFICATION AS REQUIRED PER NEC REQUIREMENTS.
- 16) WIREWAYS AS SPECIFIED ON HMSA SITE SPECIFIC DRAWING. WIREWAYS MUST BE NON-FERROUS METAL AND ARE TYPICALLY 6 " X 30" WIREWAY WITH FOUR (4) DIVIDERS (FIVE [5]- 6" X 6" SECTIONS) WITH REMOVABLE COVERS.
- 17) OUTLETS, CONDUITS, JUNCTION BOXES AS NOTED ON HMSA SITE SPECIFIC DRAWING.
- 18) **THE USE OF STANDARD FERROUS RIGID CONDUIT AND WORK BOXES WITHIN THE SCAN ROOM IS ACCEPTABLE AND PREFERRED. WHIPS TO AND BETWEEN LIGHT FIXTURES WITHIN THE SCAN ROOM SHOULD BE FLEXIBLE ENT (BLUE PLASTIC "SMURF" TUBING) IF PERMISSIBLE BY CODE. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR SECURING ALL CONDUITS (INCLUDING FLEXIBLE WHIPS TO PREVENT CONTACT WITH OTHER METALLIC ITEMS (I.e.: CEILING GRID, RF SHIELD) OR MOVEMENT CAUSED BY THE PULSATION OF THE MAGNETIC FIELD.**

NOTE: SHOULD A UPS SYSTEM BE REQUIRED, ONLY SYSTEMS THAT HAVE BEEN TESTED AND FOUND ACCEPTABLE BY HMSA ARE RECOMMENDED. MINIMUM RECOMMENDED CAPACITY IS 150 KVA. CONTACT THE SITE PLANNING DEPARTMENT FOR ADDITIONAL INFORMATION.

PROVIDED BY THE RF SHIELDING VENDOR:

THE RF VENDOR WILL BE RESPONSIBLE FOR SUPPLYING AND INSTALLING THE FOLLOWING:

- 1) EMI FILTERS AT EACH LOCATION WHERE AN ELECTRICAL FEED PASSES THROUGH THE RF SHIELDING. THE LOCATION AND NUMBER OF THESE FILTERS MUST BE COORDINATED WITH THE ELECTRICAL CONTRACTOR.
- 2) EMI FILTER AS REQUIRED TO MOUNT OPTIONAL OXYGEN MONITOR PROBE IN SCAN ROOM WITH MONITOR IN REMOTE LOCATION.
- 3) RF WAVEGUIDES AT EACH LOCATION WHERE AN HVAC DUCT OR AIR INLET PASSES THROUGH THE RF SHIELDING. THE LOCATION AND NUMBER OF THESE WAVEGUIDES MUST BE COORDINATED WITH THE HVAC CONTRACTOR
- 4) A GROUND STUD ON THE RF SHIELD. THIS GROUND STUD SHALL BE CONNECTED TO THE GROUND BUS OF THE FILTER PANEL (OR ISOLATED GROUND BUS IN THE MRI SUB-PANEL) WITH AN INSULATED #4 AWG COPPER GROUNDING CONDUCTOR AS NOTED IN THE ELECTRICAL CONTRACTOR SECTION.

GROUNDING NOTES

AN ISOLATED GROUNDING SYSTEM SHALL BE PROVIDED FOR ALL LOADS CONNECTED TO THE MRI SUB-PANEL AS FOLLOWS:

- 1) AN ISOLATED GROUND BUS SHALL BE PROVIDED IN THE MRI SUB-PANEL. THIS BUS SHALL BE INSULATED FROM THE PANEL ENCLOSURE.
- 2) AN INSULATED COPPER CONDUCTOR SHALL BE RUN FROM THE SYSTEM MAIN GROUND BUS (THE POINT WHERE THE NEUTRAL CONDUCTOR OF THE ELECTRICAL SERVICE OR SEPARATELY DERIVED POWER SOURCE IS BONDED TO THE GROUNDING ELECTRODE CONDUCTOR) TO THE ISOLATED GROUND BUS IN THE MRI SUB-PANEL. THIS CONDUCTOR SHALL BE SIZED AS A NEUTRAL CONDUCTOR AND SHALL BE RUN IN CONDUIT ALONG WITH THE FEEDER CONDUCTORS SUPPLYING THE PANEL.
- 3) AN INDIVIDUAL INSULATED COPPER CONDUCTOR SHALL BE RUN FROM THE ISOLATED GROUND BUS FOR EACH CIRCUIT ORIGINATING IN THE MRI SUB-PANEL TO THE GROUND TERMINAL OF THE LOAD SERVED. GROUNDING CONDUCTORS SHALL BE THE SAME SIZE AS NEUTRAL CONDUCTORS AND RUN IN CONDUIT WITH BRANCH CIRCUIT CONDUCTORS.

RACEWAY AND ENCLOSURE GROUNDING SHALL BE PROVIDED AS REQUIRED BY NEC FOR ALL FEEDER AND BRANCH CIRCUIT WIRING AS FOLLOWS:

- 1) ALL FEEDER AND BRANCH CIRCUIT CONDUCTORS SHALL BE INSTALLED IN STEEL CONDUIT AND BOXES TO SHIELD CONDUCTORS FROM MAGNETIC INTERFERENCE. ALL CONDUITS SHALL BE SECURED IN SUCH A MANNER AS TO PREVENT POTENTIAL MOVEMENT AND ENSURE PROPER GROUNDING.
- 2) METALLIC CONDUIT AND BOXES SHALL BE BONDED TOGETHER BY MEANS OF APPROVED CONNECTORS INSTALLED IN ACCORDANCE WITH NEC REQUIREMENTS WITH BONDING JUMPERS WHERE NECESSARY TO PROVIDE A CONDUCTIVE GROUNDING PATH FROM EACH OUTLET BACK TO MAIN SYSTEM GROUND AT ELECTRICAL SERVICE OR SOURCE OF SEPARATELY DERIVED SYSTEM.
- 3) GROUNDED METALLIC RACEWAY SYSTEM SHALL BE ISOLATED FROM THE RFIP CABINET AND OTHER SYSTEM COMPONENTS AS WELL AS EMI FILTERS BY COUPLING WITH DIELECTRIC CONNECTORS OR NON-METALLIC CONDUIT. THE GROUNDING OF EQUIPMENT ISOLATED FROM METALLIC RACEWAY SYSTEM SHALL BE BY MEANS OF ISOLATED GROUNDING SYSTEM CONDUCTOR.
- 4) RF SHIELD GROUNDING SHALL BE PROVIDED BY INSTALLATION OF AN INSULATED #4 AWG COPPER CONDUCTOR RUN FROM RF ROOM GROUND STUD TO THE ISOLATED GROUND BUS IN THE MRI SUB-PANEL. GROUNDING OF THE BUS IN FILTER PANEL TO RFIP CABINET WILL BE PROVIDED BY HMSA.
- 5) ELECTRICAL SYSTEM GROUNDING SHALL BE VERIFIED BY ELECTRICAL CONTRACTOR. THE SYSTEM NEUTRAL SHALL BE GROUNDED AT ONE POINT ONLY. THE NEUTRAL MAY BE GROUNDED AT EITHER THE SERVICE ENTRANCE OR AT THE SOURCE OF THE SEPARATELY DERIVED SYSTEM BY CONNECTION TO A NEC REQUIRED GROUNDING ELECTRODE SYSTEM.
- 6) GROUNDING ELECTRODE SYSTEM SHALL BE VERIFIED AND SUPPLEMENTED IF NECESSARY BY THE ELECTRICAL CONTRACTOR. THE GROUNDING ELECTRODE SYSTEM SHALL BE PROVIDED AS REQUIRED BY NEC AND SHALL INCLUDE THE FOLLOWING (WHERE AVAILABLE) AND BONDED TOGETHER: METAL UNDERGROUND WATER SERVICE PIPE, METAL FRAME OF BUILDING AND OTHER ELECTRODES REQUIRED BY NEC. IF NOT EXISTING, THE ELECTRICAL CONTRACTOR SHALL PROVIDE ONE OR MORE DRIVEN GROUND ROD OR PLATE ELECTRODES BONDED TO THE EXISTING GROUNDING ELECTRODE SYSTEM BY MEANS OF A CONDUCTOR SIZED PER NEC. THE RESISTANCE TO GROUND OF THE MAIN ELECTRODE SHALL BE NO MORE THAN 10 OHMS.

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ELECTRICAL - GENERAL NOTES

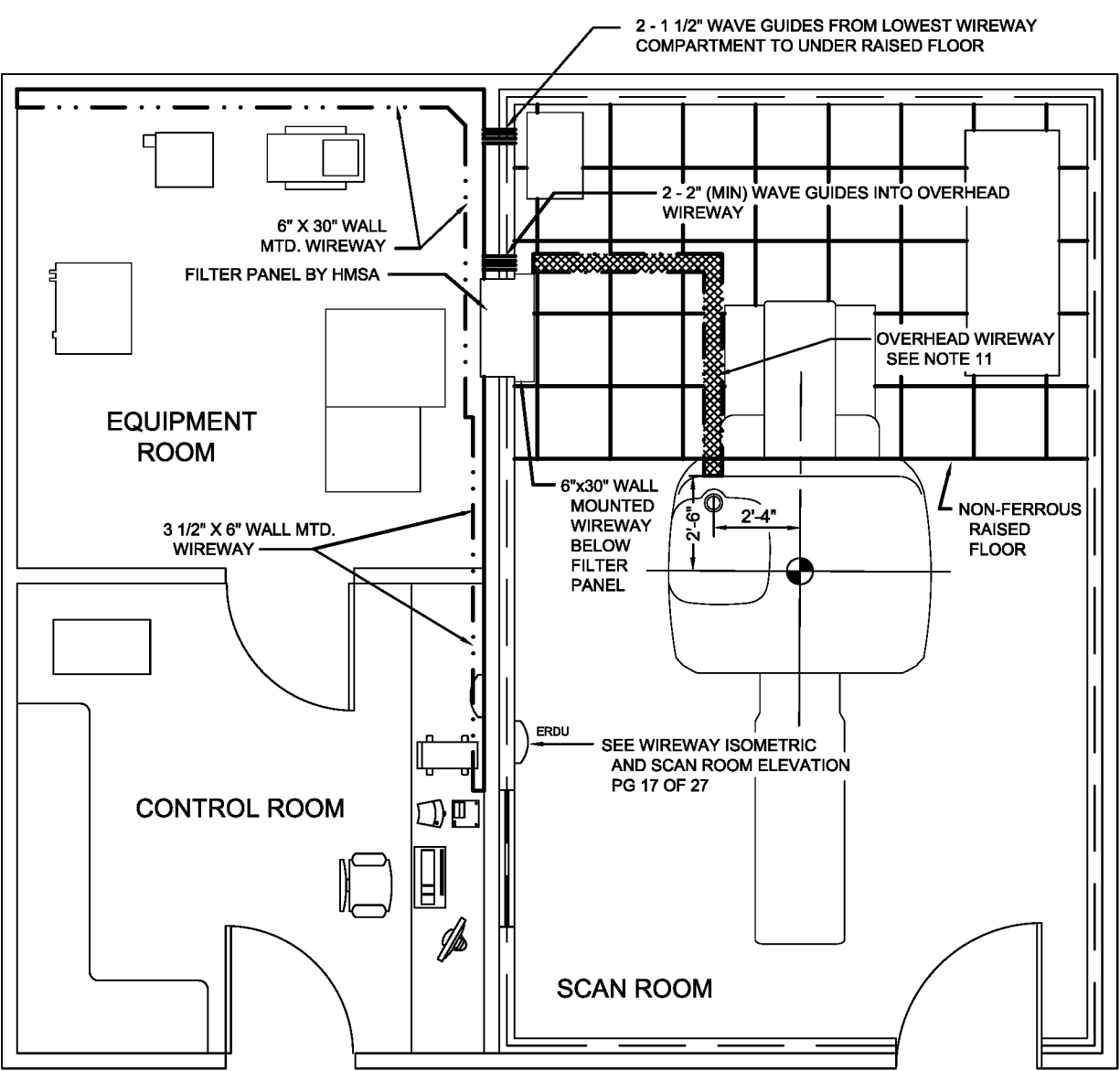
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WIREWAYS

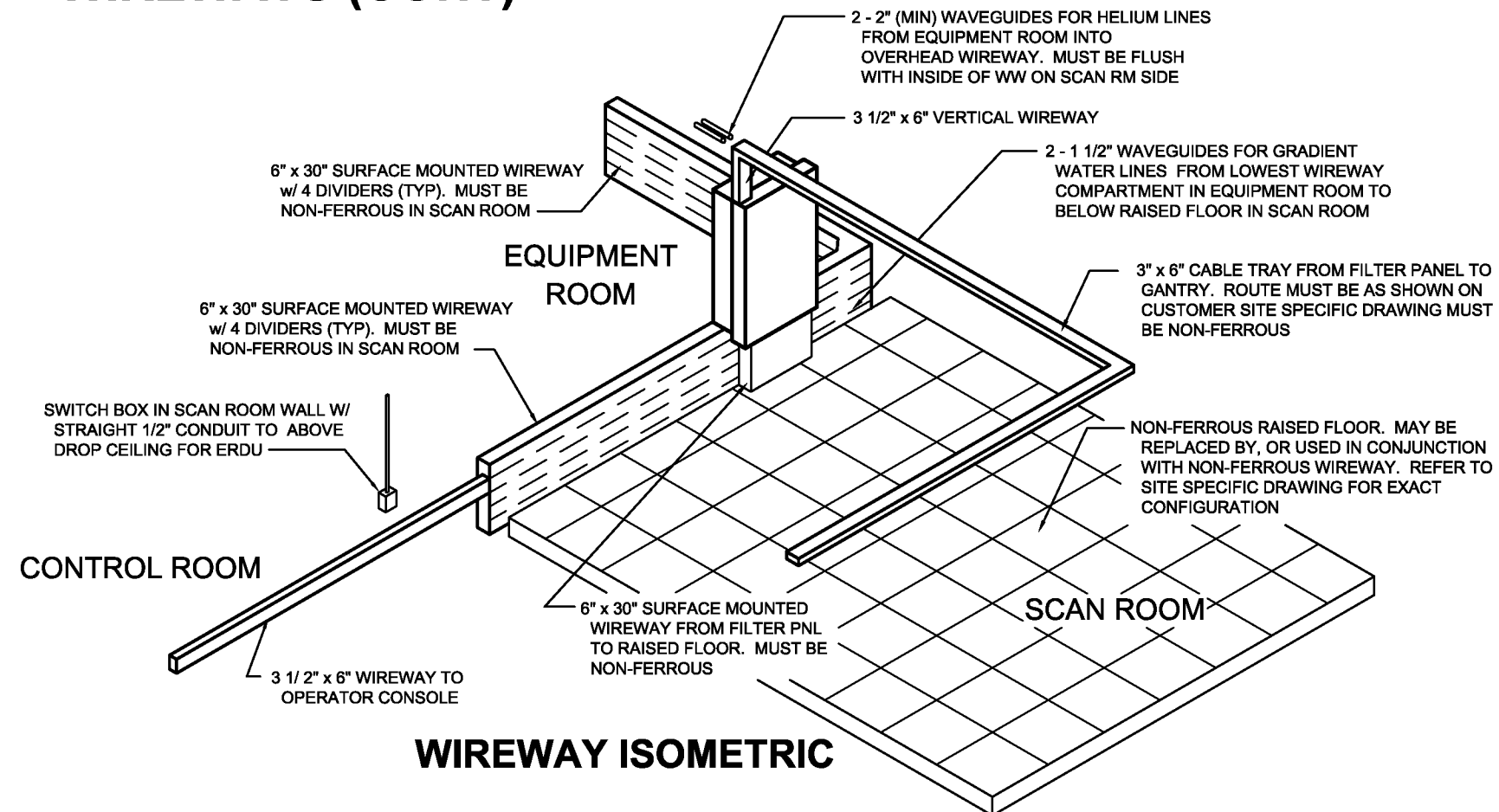
WIREWAY NOTES

- ALL WORK IS TO CONFORM TO APPLICABLE BUILDING CODES. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL WIREWAYS, JUNCTION BOXES, AND CONDUITS AS INDICATED IN THESE STANDARD DETAILS AND AS SHOWN ON THE CUSTOMER'S SITE SPECIFIC HMSA DRAWING.
- 1) THE WIREWAYS AND RAISED FLOORING PROVIDE THE METHOD AND MEANS TO HOUSE AND PROTECT THE SYSTEM INTERCONNECTION CABLING. EACH WIREWAY COMPARTMENT HOUSES CABLES THAT PERFORM DIFFERENT SPECIFIC FUNCTIONS. DUE TO THE VARIATIONS FROM SITE TO SITE, REFER TO THE HMSA SITE SPECIFIC DRAWING FOR THE EXACT RUNS REQUIRED.
 - 2) THE WIREWAYS FOR THE SYSTEM MUST BE METALLIC AND PROVIDE FOR RF SEPARATION OF THE CABLES. WOOD AND PVC WIREWAYS ARE NOT ACCEPTABLE. NON-FERROMAGNETIC (ALUMINUM OR STAINLESS STEEL) WIREWAYS MUST BE USED IN THE SCAN ROOM. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THE MATERIAL CHOSEN COMPLIES WITH APPLICABLE BUILDING CODES.
 - 3) THE WIREWAY MUST PROVIDE FIVE (5) INDIVIDUAL COMPARTMENTS. THIS MAY BE ACCOMPLISHED USING A SINGLE 6" x 30" DUCT WITH FOUR (4) DIVIDERS. THE DIVIDERS MUST BE CAPABLE OF SUPPORTING FOUR POUNDS PER LINEAR FOOT. AT THE DIRECTION OF THE HMSA INSTALLER, THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR CUTTING OUT DIVIDERS OR DUCTS FOR ALL CABLE TRANSITION AREAS. ELECTRICAL CONTRACTOR SHALL ALSO PROVIDE GROMMET MATERIAL FOR ALL OPENINGS CUT IN WIREWAY.
 - 4) THE WIREWAY MUST HAVE A REMOVABLE COVER. THE DIVIDERS MUST MAKE CONTACT WITH THE COVER TO FORM RF TIGHT COMPARTMENTS. **NOTE: SCREWS USED TO SECURE COVER MUST BE AS SHORT AS POSSIBLE AND SELF TAPPING SCREWS ARE NOT ALLOWED. CAUTION MUST BE USED WHEN SECURING COVERS TO ENSURE SCREWS DO NOT PENETRATE CABLES, WATER LINES OR HELIUM LINES.**
 - 5) ALL WIREWAYS MUST BE BONDED TO THE RF SHIELD. A FLAT GROUND STRAP (MIN. 1") TO THE HMSA FILTER PANEL MUST ALSO BE PROVIDED.
 - 6) A RAISED FLOOR WITH REMOVABLE PANELS BETWEEN THE FILTER PANEL AND REAR OF THE GANTRY IS REQUIRED FOR SYSTEM INTERCONNECT CABLES.
 - 7) A WIREWAY WITH A REMOVABLE COVER AND ONE (1) DIVIDER (MIN. 3 1/2" X 6") IS REQUIRED FROM THE EQUIPMENT ROOM WIREWAY TO THE OPERATOR WORKSTATION LOCATION (REFER TO SITE SPECIFIC DRAWING FOR EXACT CONFIGURATION). MOUNTING HEIGHT MUST BE BETWEEN 3 1/2" A/FF (MIN.) AND 24" A/FF (MAX.). FOR SITES WHERE THE EQUIPMENT ROOM IS REMOTE FROM THE CONTROL ROOM, A 4" CONDUIT WITH MINIMUM 3'-0" RADIUS BENDS OR PULL BOXES MAY BE UTILIZED. THE CONDUIT IS RUN FROM THE EQUIPMENT ROOM WIREWAY AND MUST TERMINATE IN A 8" X 8" X 6"d (MINIMUM SIZE) JUNCTION BOX AT THE OPERATOR WORKSTATION LOCATION. THE JUNCTION BOX MOUNTING HEIGHT IS AS SPECIFIED ABOVE FOR WIREWAY. MAXIMUM CABLE LENGTH AVAILABLE FOR A CONDUIT RUN IS 78' BETWEEN THE REAR OF THE RFIP CABINET AND THE OPERATOR WORKSTATION LOCATION. A FISH LINE MUST BE PROVIDED BY THE ELECTRICAL CONTRACTOR IF CONDUIT IS USED.
 - 8) **THE ROUGH OPENING FOR THE FILTER PANEL IS BASED ON THE TOP OF THE WIREWAY BEING AT 30" A/FF (SEE PG. 17 OF 27).** DIFFERENCES BETWEEN WIREWAY MANUFACTURERS MAY EFFECT ACTUAL HEIGHT. AFTER SELECTING AND DESIGNING WIREWAY BASED ON CUSTOMER'S SITE SPECIFIC HMSA DRAWING, CONFIRM AND ADJUST FILTER PANEL ROUGH OPENING HEIGHT ABOVE FLOOR AS REQUIRED. COORDINATE ROUGH OPENING LOCATION WITH RF VENDOR.
 - 9) A COMPUTER FLOOR MAY BE UTILIZED IN THE EQUIPMENT ROOM IN LIEU OF WIREWAYS. IN SOME INSTANCES, A COMPUTER FLOOR MAY BE REQUIRED DUE TO INTERCONNECTING CABLE LIMITATIONS (SEE CUSTOMER'S SITE SPECIFIC HMSA DRAWING). IF A COMPUTER FLOOR IS USED, A MINIMUM CLEAR HEIGHT OF 8" BELOW THE FLOOR IS REQUIRED. ADDITIONALLY, IT IS THE CUSTOMER'S/CONTRACTOR'S RESPONSIBILITY TO PROVIDE THE NECESSARY KNOCKOUTS (WITH PROTECTIVE GROMMET MATERIAL) AT ALL EQUIPMENT LOCATIONS, AS DIRECTED BY THE HMSA INSTALLATIONS REPRESENTATIVE. THE CONTRACTOR, OR HIS REPRESENTATIVE MUST BE AVAILABLE DURING THE FIRST WEEK OF SYSTEM INSTALLATION.
 - 10) ALL WIREWAYS, JUNCTION BOXES, CONDUITS, AND COMPUTER FLOOR MUST BE IN PLACE AND COMPLETE PRIOR TO DELIVERY OF THE SYSTEM.
 - 11) A 3" X 6" OVERHEAD CABLE TRAY IS REQUIRED INSIDE THE SCAN ROOM SUSPENDED 6" OR MORE BELOW THE RF CEILING. THE WIREWAY RUNS FROM THE FILTER PANEL, UP THE WALL TO ABOVE THE CEILING AND TERMINATES ABOVE THE GANTRY BEHIND THE CRYOGEN VENT CONNECTION. THIS OVERHEAD WIREWAY MUST FOLLOW THE PATH INDICATED ON THE SITE SPECIFIC LAYOUT TO PREVENT THE MAGNETIC FIELD FROM CAUSING INTERFERENCE. TWO 2" (MIN) WAVEGUIDES FOR THE HELIUM LINES ARE ALSO REQUIRED FROM THE EQUIPMENT ROOM TO THE OVERHEAD WIREWAY AT THE HEIGHT OF THE HORIZONTAL RUN TO THE GANTRY
 - 12) THE WIREWAY FOR CUSTOMER SITES WILL VARY FROM THAT SHOWN ON THESE PAGES. REFER TO THE SITE SPECIFIC HMSA ECHELON DRAWING FOR FURTHER CLARIFICATION AND EXACT REQUIREMENTS. REFER TO THE ELECTRICAL SECTION OF THESE STANDARD DETAILS FOR THE ECHELON A.C. POWER WIRING SPECIFICATIONS.
 - 13) THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL WORK CONFORMS TO APPLICABLE BUILDING CODES.
 - 14) REFER TO HMSA DRAWING FOR SITE SPECIFIC WIREWAY LAYOUT.



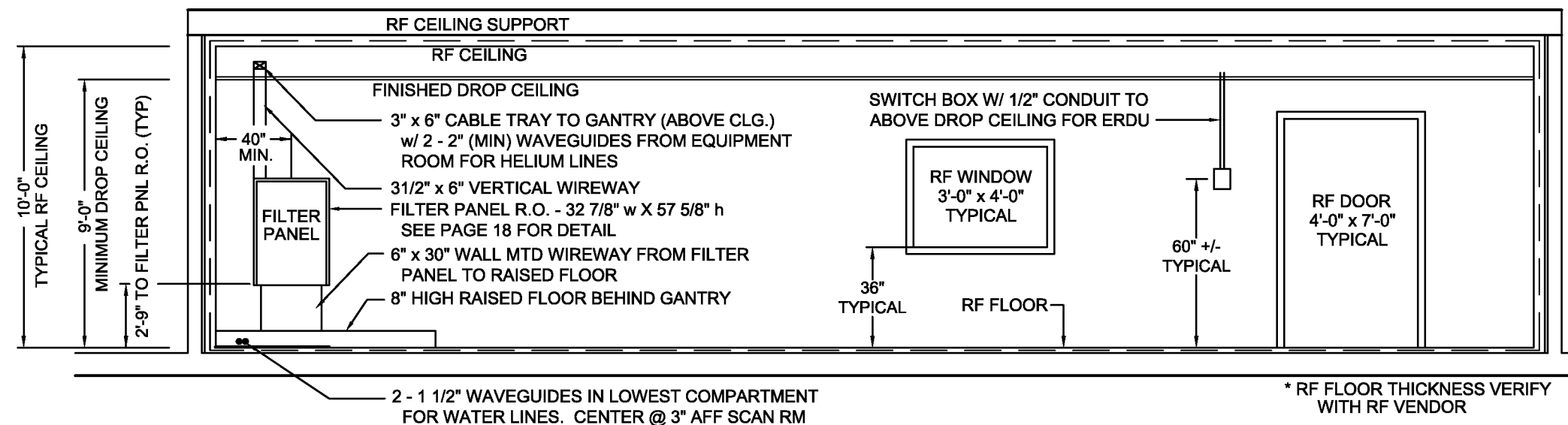
WIREWAY PLAN
NOT TO SCALE

WIREWAYS (CONT)



FILTER PANEL NOTES

- 1) THE FILTER PANEL SHOULD BE SURFACE MOUNTED ON THE SCAN ROOM FINISHED WALL. THIS ASSURES THE CABLES WILL DROP CLEANLY INTO THE WIREWAY.
- 2) THE FILTER PANEL SHOULD BE MOUNTED SO THAT AN RF TIGHT SEAL IS PROVIDED AROUND THE PERIMETER . THE RF VENDOR MUST EXTEND THE RF SHIELD TO THE FINISHED SIDE OF THE SCAN ROOM WALL TO ENSURE A PROPER SEAL IS POSSIBLE.
- 3) THE FILTER PANEL SHOULD BE MOUNTED USING NON-CONDUCTIVE FRAMING TO MAINTAIN THE GROUNDING INTEGRITY.
- 4) IF METAL STUDS ARE USED, ROUGH OPENING (R.O.) MUST BE FRAMED IN WOOD ON BOTH SCAN AND EQUIPMENT ROOM SIDES.
- 5) **FILTER PANEL ROUGH OPENING HEIGHT AFF SCAN ROOM FLOOR IS BASED ON TOP OF WIREWAY BEING 30" AT AFF. IF TOP OF WIREWAY IS DIFFERENT, ADJUST OPENING ACCORDINGLY. 3" GAP BETWEEN TOP OF WIREWAY AND FILTER PANEL ROUGH OPENING MUST BE MAINTAINED TO ENSURE FILTER PANEL COVER FITS PROPERLY.**



SCAN ROOM ELEVATION

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WIREWAYS (CONT)

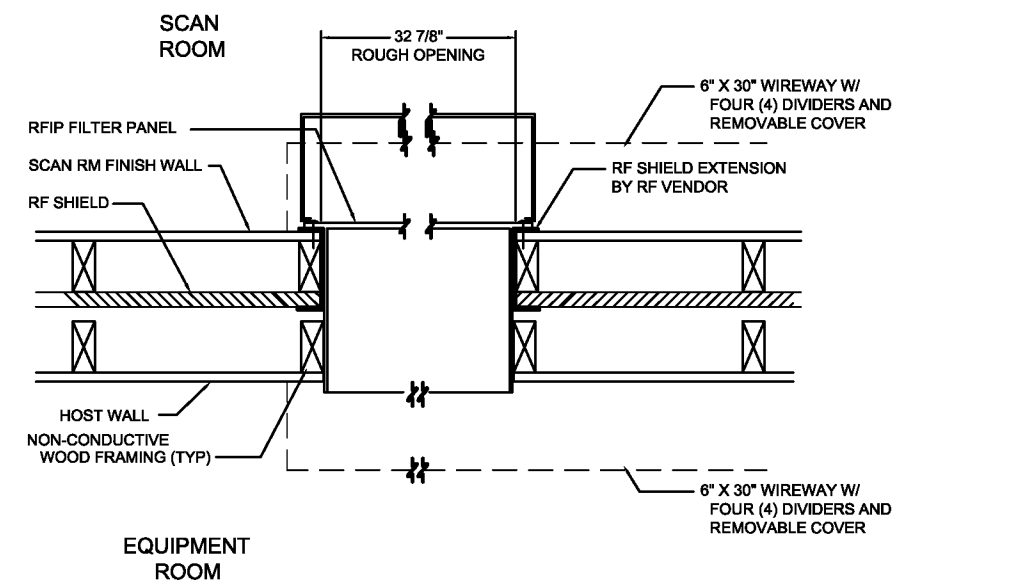
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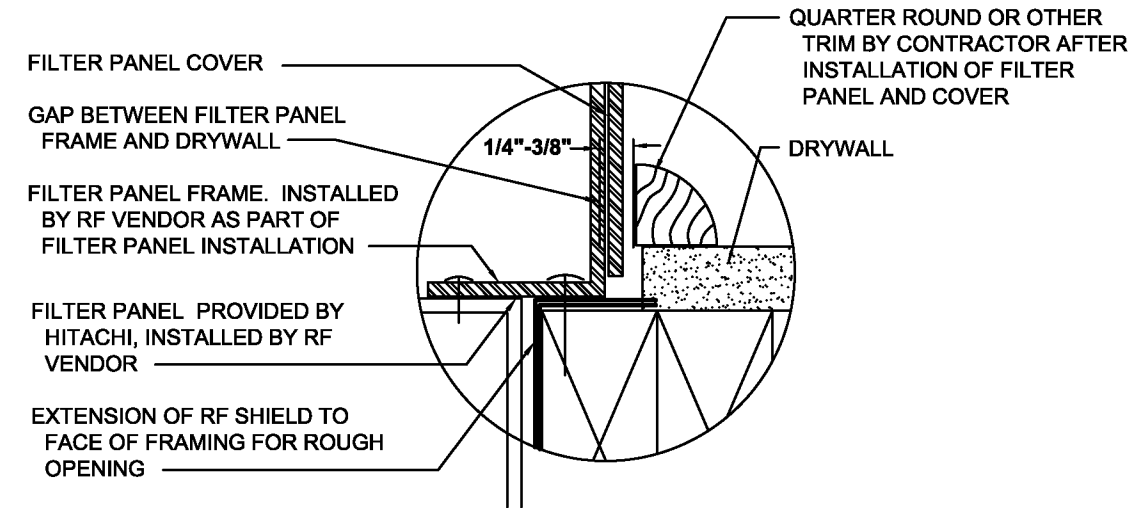
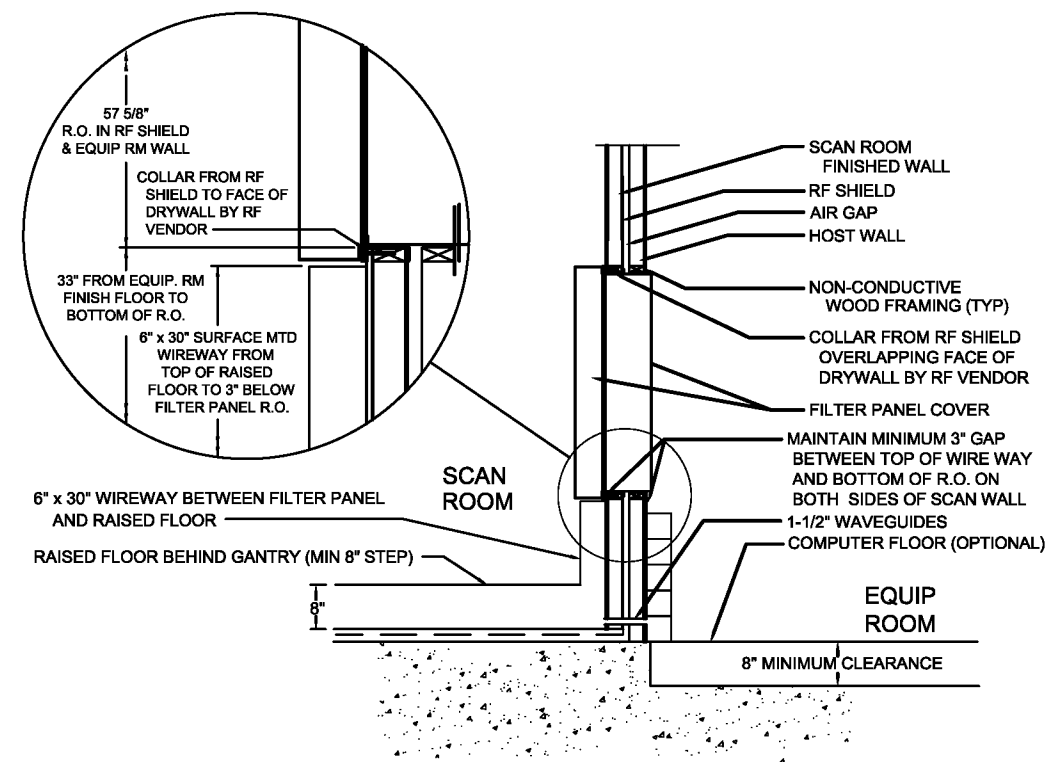
ECEHLON OVAL STD. DETAILS

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WIREWAYS (CONT)



NOTE: IF METAL STUDS ARE USED, ROUGH OPENING (R.O.) MUST BE FRAMED IN WOOD.



FILTER PANEL OPENING - FINISH DETAIL

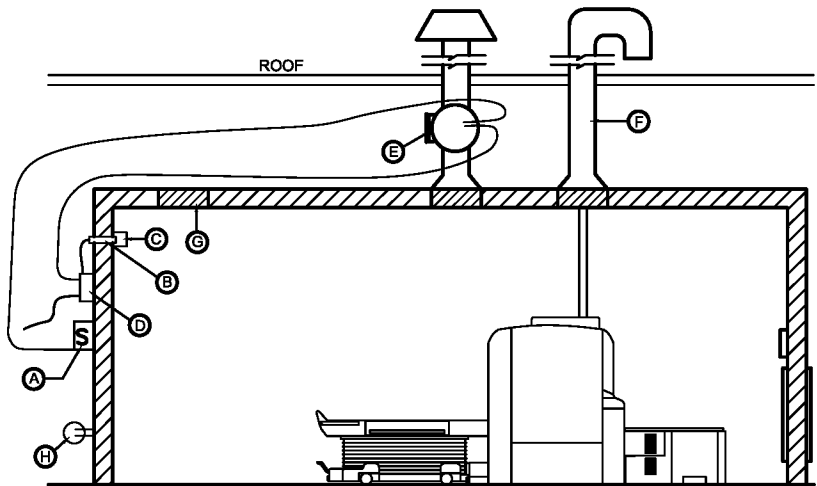
SECTION: MAIN FILTER PANEL @ SCAN / EQUIP ROOM WALL

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WIREWAYS (CONTINUED)		
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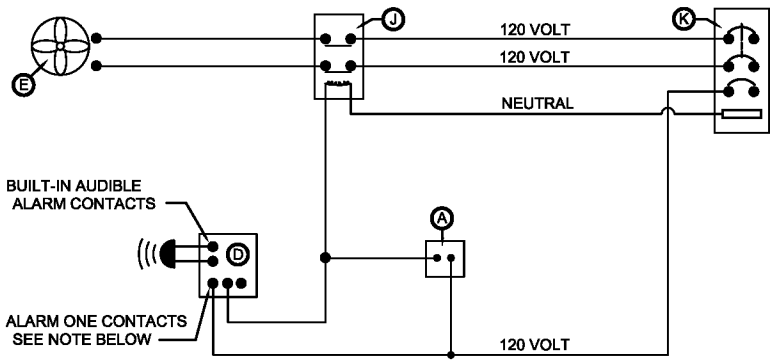
SAFETY

THE ECHELON SYSTEM IS A HIGH FIELD SUPER CONDUCTIVE MAGNET THAT USES CRYOGENS FOR OPERATION. THE FOLLOWING MUST BE REVIEWED BY THE ARCHITECT OR ENGINEER, AND THE APPROPRIATE DESIGN SOLUTIONS INCORPORATED INTO THE SUITE.

- 1) A CRYOGEN VENT PIPE TO THE OUTSIDE MUST BE PROVIDED. THE VENT IS A MULTI-RESPONSIBILITY ITEM TO BE CONSTRUCTED AS FOLLOWS:
 - a. HMSA WILL PROVIDE AND INSTALL THE CONNECTION TO THE MAGNET WITH FLEXIBLE VENT PIPE.
 - b. THE RF VENDOR WILL PROVIDE A WAVE GUIDE (A PIPE WITH FLANGES) TO MAKE THE PENETRATION THROUGH THE RF ROOM FOR ATTACHMENT TO THE VENT.
 - c. THE CONTRACTOR WILL CONNECT TO THE WAVE GUIDE USING NON-CONDUCTIVE FASTENERS AND TAKE THE VENT TO THE OUTSIDE.
 - d. REFER TO THE SIZING CALCULATIONS ON PAGES 20 AND 21 FOR SIZE REQUIREMENTS.
- 2) FOR PROTECTION OF ALL OCCUPANTS AND IN ACCORDANCE WITH OSHA REGULATIONS, HMSA REQUIRES AN EMERGENCY EXHAUST FAN IN THE SCAN ROOM. THE DUCT MUST EXTEND TO THE FINISHED CEILING. USE OF A CEILING PLENUM IS NOT ACCEPTABLE. THIS FAN SHALL BE CONTROLLED BY AN OXYGEN MONITOR AND BY A MANUAL SWITCH. **THE CONTRACTOR IS RESPONSIBLE FOR SUPPLYING AND INSTALLING ALL OF THE COMPONENTS OF THE OPTIONAL OXYGEN MONITOR.** THE OXYGEN MONITOR MUST HAVE A BATTERY BACK-UP. THE CONTRACTOR MUST WORK WITH THE RF VENDOR TO COORDINATE THE PROPER RF ROOM PENETRATIONS. AN AIR INLET MUST ALSO BE INSTALLED TO MAINTAIN A BALANCED ROOM PRESSURE.
- 3) FILLING THE ECHELON WITH CRYOGEN (LIQUID HELIUM) IS ACCOMPLISHED USING "DEWARs" DELIVERED TO THE SITE. THESE DEWARs, BOTH FULL AND EMPTY, PRESENT A SAFETY CONCERN WHILE ON SITE. THE AMOUNT OF TIME ON SITE WILL VARY WITH LOCATION AND THE CUSTOMER MUST IDENTIFY A SECURE AND SAFE CRYOGEN STORAGE AREA. THIS MUST BE ADDRESSED DURING THE PLANNING STAGES OF THE PROJECT. A CLEAR AND LEVEL DELIVERY ROUTE (3'-6" w X 7'h) FROM THE STORAGE AREA TO THE SCAN ROOM MUST BE PROVIDED.
- 4) **THE ONLY APPROVED OXYGEN MONITORS ARE A TELEDYNE 3350 OR MSA TOXGARD II.** THE OXYGEN MONITOR REFLECTED IN THESE PLANS IS A TELEDYNE 3350. THIS UNIT PROVIDES AN AUDIBLE ALARM AND TWO (2) CONTACTS FOR INTERCONNECT. ONE CONTACT WILL BE USED TO ACTIVATE THE EMERGENCY EXHAUST FAN. THE SECOND CAN BE USED TO ACTIVATE OTHER ALARMS TO ENSURE APPROPRIATE PERSONNEL ARE NOTIFIED IF A LOW OXYGEN ATMOSPHERE EXISTS. ONLY THE SENSOR PORTION OF THE OXYGEN MONITOR MAY BE MOUNTED IN THE SCAN ROOM. THE CONTROL PORTION OF THE OXYGEN MONITOR MUST BE MOUNTED IN THE CONTROL ROOM OR OTHER SPACE. CHECK TOTAL LENGTH OF CABLE NEEDED BEFORE ORDERING UNIT.
- 5) EMERGENCY QUENCH (RAMP DOWN) BUTTONS ARE INSTALLED AS PART OF THE ECHELON OVAL SYSTEM. ONE IS LOCATED IN THE CONTROL ROOM, THE OTHER IN THE SCAN ROOM (REFER TO THE SITE SPECIFIC DRAWING FOR EXACT LOCATION). ACTIVATION OF EITHER SWITCH WILL RESULT IN A CRYOGEN RELEASE (VIA THE CRYOGEN VENT PIPE) DROPPING THE MAGNETIC FIELD TO .2 GAUSS IN UNDER 20 SECONDS. IF A CRYOGEN RELEASE OCCURS, THE MAGNET CAN NOT BE BROUGHT BACK UP TO FIELD WITHOUT SERVICING AND REFILLING THE SYSTEM. **THE QUENCH BUTTON ONLY CAUSES THE FIELD TO DROP, IT DOES NOT REMOVE POWER FROM THE SYSTEM.**
- 6) IF CODE REQUIRES A SPRINKLER SYSTEM, THE DESIGN MUST BE COORDINATED WITH THE RF VENDOR TO ENSURE THE INTEGRITY OF THE RF SHIELD IS NOT COMPROMISED.
- 7) GUIDELINES SUCH AS THOSE PUBLISHED BY HMSA, CONCERNING THE PROXIMITY OF FERROUS OBJECTS TO THE MAGNET SHOULD BE OBSERVED. THE MAGNET'S FIELD IS CAPABLE OF RAPIDLY ACCELERATING UNRESTRAINED FERROUS ITEMS. THE GREATER THE MASS OF AN ITEM, THE STRONGER THE ATTRACTION CLOSE TO THE MAGNET. HUMAN STRENGTH MAY BE INSUFFICIENT TO RESTRAIN LARGER OBJECTS SUCH AS OXYGEN BOTTLES, CRASH CARTS AND PATIENT GURNEYS. SUCH ITEMS WILL BE DRAWN INTO (OR ONTO) THE MAGNET, POTENTIALLY CAUSING SEVERE INJURY OR DEATH TO PEOPLE IN THE ROOM AND DAMAGE TO THE MRI SYSTEM. SUCH OBJECTS MUST NOT BE ALLOWED INTO THE SCAN ROOM. SPECIAL NON-FERROUS EQUIPMENT SHOULD BE OBTAINED AND IDENTIFIED AS SAFE FOR USE IN THE SCAN ROOM.
- 8) IT IS THE CUSTOMER'S RESPONSIBILITY TO DISCUSS WITH AND ORIENT THEIR CLINICAL / MAINTENANCE STAFFS AND LOCAL EMERGENCY PERSONNEL TO MAGNET SAFETY.



- | | |
|---|--|
| (A) MANUAL SWITCH (OUTSIDE SCAN ROOM DOOR) | (F) CRYOGEN VENT |
| (B) RF FILTER FOR TELEDYNE 3350 (9 PIN, D CONNECTOR BY RF VENDOR OR SUPPLIER REQUIRED) OR 1/2" WAVE GUIDE FOR MSA TOXGARD II (BY RF VENDOR) | (G) AIR INLET |
| (C) OXYGEN PROBE: 5'-0" A/F/F MINIMUM | (H) 120V, 20A, REQUIRED POWER |
| (D) OXYGEN MONITOR
- OPEN CONTACT FOR CUSTOMER USE | (J) CONTACTOR/RELAY
- 120V CONTACTOR WITH 120V COIL FOR PULL IN |
| (E) EMERGENCY EXHAUST FAN 1765 FT ³ /MIN OR GREATER RECOMMENDED | (K) MAIN PANEL |



NOTE: WHEN LOW O₂ LEVEL OR A POWER FAIL OCCURS, ALARM ONE CONTACTS CLOSE. ALARM 1 CONTACTS ARE ONLY RATED FOR 500mA @120V.
DO NOT RUN FULL PURGE FAN AMPERAGE THROUGH O₂ SENSOR.
THE DIAGRAM ABOVE REFLECTS THE SCHEMATIC FOR THE TELEDYNE 3350 OXYGEN MONITOR. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE INSTALLATION OF THE OXYGEN MONITOR AND ALARM CIRCUIT CONFORMS WITH THE MANUFACTURER'S SPECIFICATION WHICH MAY VARY FROM WHAT IS SHOWN HERE.

IT IS THE RESPONSIBILITY OF THE CUSTOMER/CONTRACTOR TO SUPPLY AND INSTALL THE OXYGEN MONITOR

Echelon Safety Information for Police, Fire, Emergency Service and Cleaning/Maintenance Personnel

All Magnetic Resonance Imaging (MRI) equipment operates using a large magnet. MRI magnets are very powerful and pose a serious danger for police, firefighters and EMS, as well as cleaning and maintenance personnel.

Warning

Obey the warning signs posted at the entry of the magnet scan room to avoid potential injury.

MRI systems pose a serious danger for personnel carrying metallic objects into the scan room. These objects can be **uncontrollably** attracted to the magnetic field. The force is stronger the closer the object is to the magnet and the larger the object.

Warning

Do not enter the scan room with metallic objects. Such objects become "missiles" that could cause serious injury.

Firefighters' equipment containing iron, such as axes, tools, oxygen bottles, fire extinguishers, ladders, and even smaller objects will be forcefully pulled into the magnet if they get too close.

Police firearms, handcuffs, and other metallic equipment may similarly become missiles by the attractive force of the MR magnet.

Large equipment, such as floor sweepers, waxers, vacuum cleaners, and pails will be drawn toward and into the magnet with such force that they

cannot be held back nor removed from the magnet. Standard tools containing iron, such as hammers, pipe, screwdrivers, knives, pliers, nails, screws, and staples, will similarly be drawn into the magnet.

Electronic equipment not specifically made for use in a MRI environment may not work properly if brought close to the magnet. This includes pacemakers or other implanted devices.

Warning

Do not enter the magnet room if you have a pacemaker or other implanted device. The implanted device may fail and cause a serious injury.

This facility has a MRI system that uses a super-conducting magnet containing liquid helium. Because it is super-conducting, the magnet is **difficult to turn off**. In some cases, the liquid helium can escape the magnet. The helium turns to gas that can cause severe burns on skin contact.

Warning

Do not enter the scan room if alarms are activated. Escaping helium can displace the air in the room, creating an asphyxiation hazard.

As an emergency or service person, you must become acquainted with the safety precautions and procedures associated with this equipment. See the facility administrator for more information.

Warning



No Pacemakers

Warning



No Metal Implants

Warning



No Fire Extinguishers

Warning



No Wheelchairs

Warning



No Metallic Carts

Warning



No Metallic Objects

Warning



No Tools

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SAFETY

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ECHELON OVAL STD. DETAILS

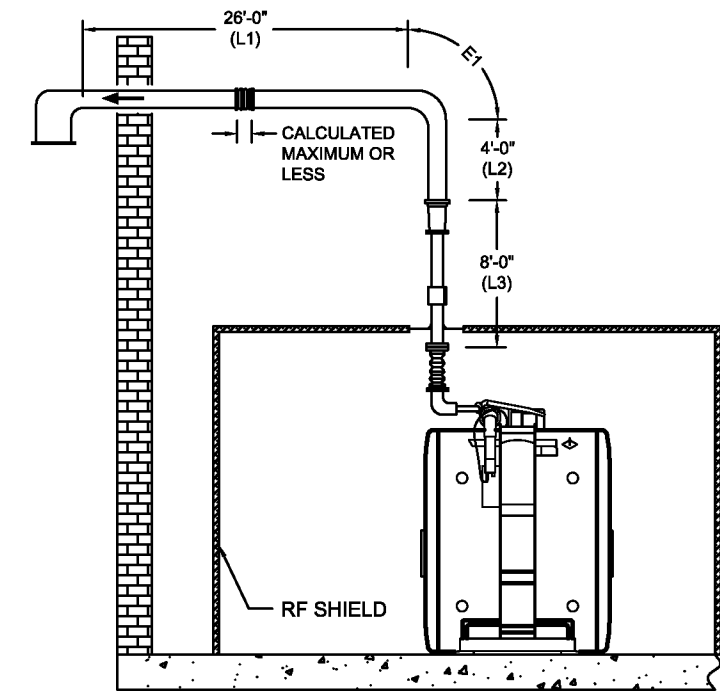
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QUENCH VENT SIZING

CALCULATING PIPE LENGTH AND DIAMETER:

THE CUSTOMERS ARCHITECT / ENGINEER IS RESPONSIBLE FOR UTILIZING THE FOLLOWING INFORMATION TO CALCULATE AND DESIGN THE CRYOGEN VENT LINE.

- 1) CALCULATE THE TOTAL APPARENT LENGTH OF THE QUENCH VENT. START THE CALCULATION ASSUMING A SMOOTH ELBOW (SEE TABLE 2) AND 5" ID PIPE.
A. $L1 + E1 + (L2 + L3) = LA$ $(26'-0") + (4'-9" \text{ (FROM TABLE 2)}) + (12'-0") = 42'-9"$
- 2) APPARENT LENGTH (LA) = 42'-9". FROM TABLE 1, 6" ID PIPE IS REQUIRED.
- 3) PIPE SIZES MAY BE MIXED.
A. THE PERCENTAGE OF ACTUAL TO ALLOWABLE LENGTH FOR EACH DIAMETER OF PIPE MUST BE CALCULATED.
B. THE COMBINED TOTAL OF PERCENTAGES MUST NOT EXCEED 100%.
C. WHEN CHANGING PIPE SIZES, A DIFFUSER IS REQUIRED (SEE DIFFUSER SIZING DIAGRAM THIS PAGE).
D. THE LENGTH OF THE DIFFUSER IS INCLUDED IN THE LENGTH OF THE SMALLER DIAMETER PIPE TO WHICH IT IS ATTACHED.
- 4) FROM THE MAXIMUM PERMISSIBLE LENGTH CHART, THE ALLOWABLE LENGTH OF 5" PIPE IS 30'.
A. THE 8' SECTION SHOWN IN THE ADJACENT DIAGRAM ACCOUNTS FOR $8/30 = 26.66\%$ OF THIS ALLOWABLE LENGTH.
- 5) THE REMAINING LENGTH OF 6" PIPE MUST BE LESS THAN 73.33% OF THE ALLOWABLE 6" LENGTH.
A. $58' \times 73.33\% (.7333) = 42'-6"$.
- 6) THE APPARENT LENGTH OF 6" PIPE IS:
A. $L1 + E1 + L2 = LA$ $(26'-0") + (5'-8" \text{ (FROM TABLE 2)}) + (4'-0") = 35'-8"$
B. THIS IS LESS THAN THE ALLOWED 42'-6" (73.33% OF 58') OF 6" PIPE SO THE VENT PIPE AS SHOWN IN THE DIAGRAM IS ACCEPTABLE.
- 7) THE TOTAL LENGTH OF THE VENT PIPE EXCEEDS 30'; THEREFORE A BELLOWS (EXPANSION JOINT) SECTION IS REQUIRED TO ALLOW FOR CONTRACTION AND MOVEMENT OF THE PIPE.
A. THE MAXIMUM LENGTH OF A BELLOWS SECTION MUST BE LESS THAN 2% OF THE ALLOWABLE PIPE LENGTH.
B. IN THE EXAMPLE ABOVE MAXIMUM LENGTH IS $8'-0" + 42'-6" = 50'-6"$
C. $50'-6" (606") \times .02 = 12"$



MAXIMUM PERMISSABLE VENT LENGTHS	
(a) SMOOTH PIPE	
DIAMETER OF PIPE	MAXIMUM LENGTH OF PIPE
INCHES	FEET
5	30
6	58
8	171
10	447
(b) FLEXIBLE CONVOLUTED TUBE	
DIAMETER OF PIPE	MAXIMUM LENGTH OF PIPE
INCHES	FEET
5	9
6	18
8	54

TABLE 1.
MAXIMUM PIPE LENGTHS

EFFECTIVE LENGTH OF BENDS (TOTAL FRICTION LOSS OF BEND)					
PIPE DIAMETER	EFFECTIVE LENGTH PER ELBOW				
INCHES	90° SMOOTH	90° SEGEMENTED	45° SMOOTH	45° SEGEMENTED	MITERED
5	5'-7"	9'-6"	3'-7"	6'-3"	27'-10"
6	5'-11"	10'-2"	3'-11"	6'-7"	33'-5"
7	7'-10"	13'-5"	5'-3"	8'-10"	39'-1"
8	8'-10"	15'-9"	5'-11"	10'-2"	44'-4"
9	13'-1"	22'-8"	8'-6"	14'-9"	50'-11"

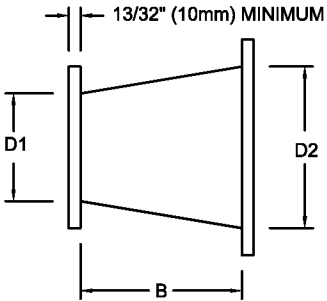
TABLE 2.
EFFECTIVE LENGTH OF BENDS

NOTE: INTERPOLATE FOR VALUES BETWEEN 0°- 45° AND 45°- 90°.

DATA ONLY TO BE USED FOR BENDS WHERE THE RADIUS TO DIAMETER RATIO IS IN THE RANGE OF 1.5 TO 5.0, EXCEPT FOR RIGHT ANGLE MITERED JOINTS.

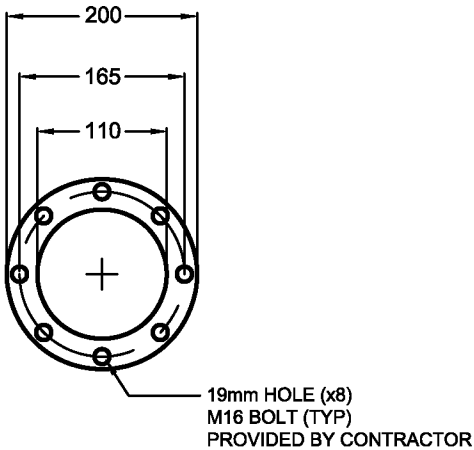
VIBRATION DECOUPLING TUBE AND QUENCH VALVE 90° ELBOW (DELIVERED AS PARTS OF THE MAGNET) HAVE BEEN ACCOUNTED FOR IN THESE CALCULATIONS.

NOTE THAT A SECOND QUENCH VALVE ELBOW WOULD TAKE 16% OF THE MAXIMUM PERMISSABLE LENGTH



QUENCH PIPE DIFFUSER

A DIFFUSER IS USED WHENEVER AN INCREASE IN PIPE DIAMETER IS REQUIRED.
DESIGN CRITERIA: DISTANCE "B" MUST BE GREATER THAN 2.5 x (D2 - D1)



*DIMENSIONS SHOWN IN MILLIMETERS)

CRYOGEN VENT FLANGE

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CRYOGEN VENT SIZING

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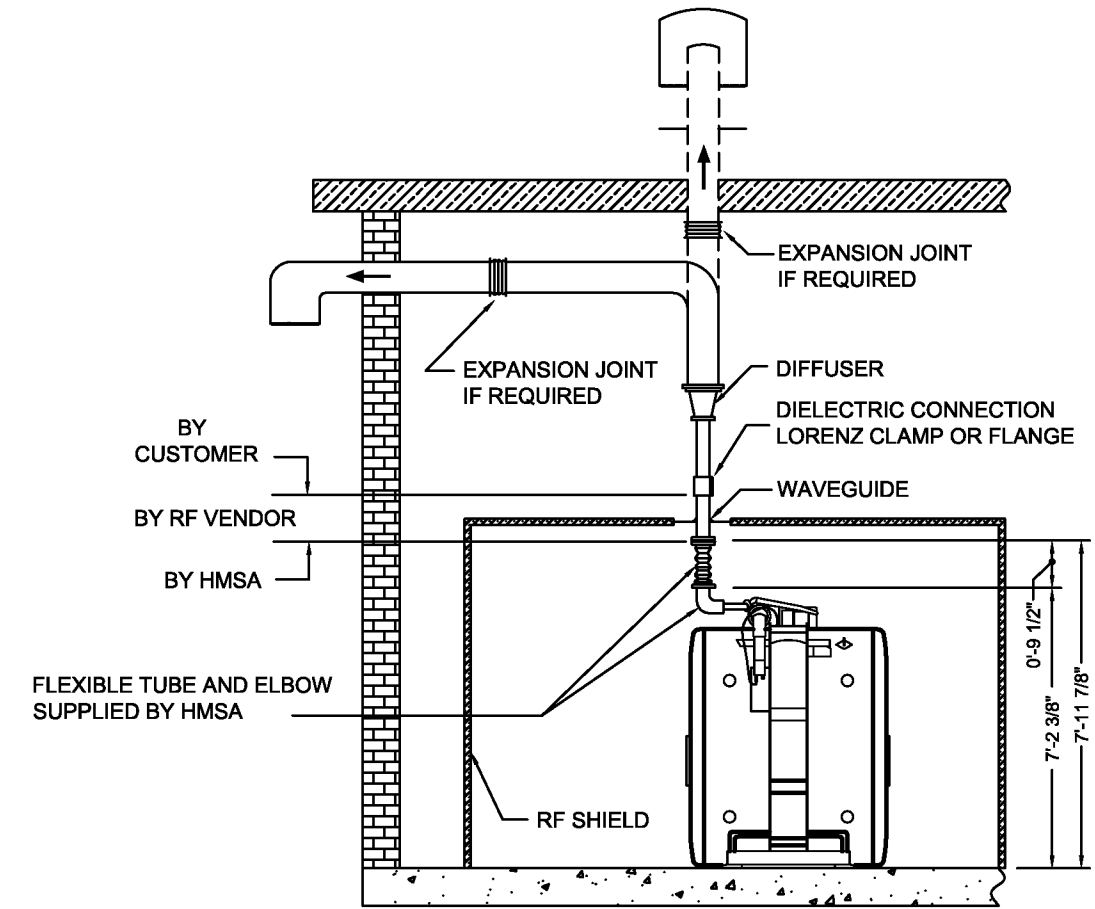
ECHELON OVAL STD. DETAILS

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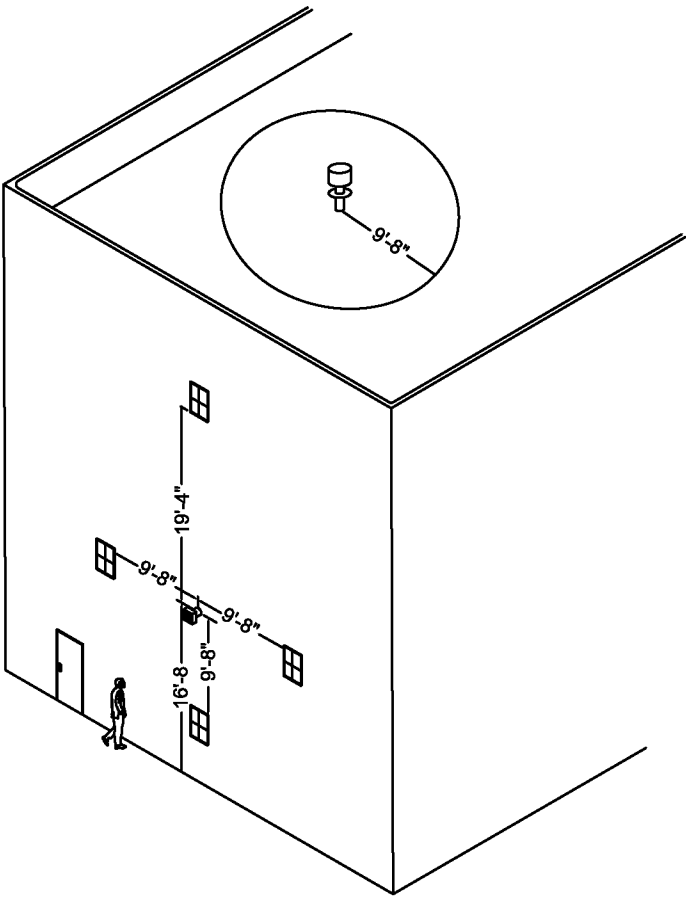
CRYOGEN VENT NOTES

THE VENT PIPE IS CRITICAL TO THE SAFE OPERATION OF THE SYSTEM. HELIUM GAS, WHICH IS EXHAUSTED IN THE EVENT OF A QUENCH IS EXTREMELY COLD AND DISPLACES OXYGEN. THE POSSIBILITY OF ASPHYXIATION EXISTS IF IT IS NOT PROPERLY VENTED. CONSIDERATION MUST BE GIVEN NOT ONLY TO THE DESIGN OF THE VENT PIPE ITSELF, BUT ALSO THE LOCATION OF ITS END POINT. **THE VENT PIPE MUST BE DESIGNED BY THE CUSTOMERS ARCHITECT / ENGINEER** IN ACCORDANCE WITH THE INFORMATION PROVIDED IN THIS SECTION OF THE ECHELON STANDARD DETAILS.

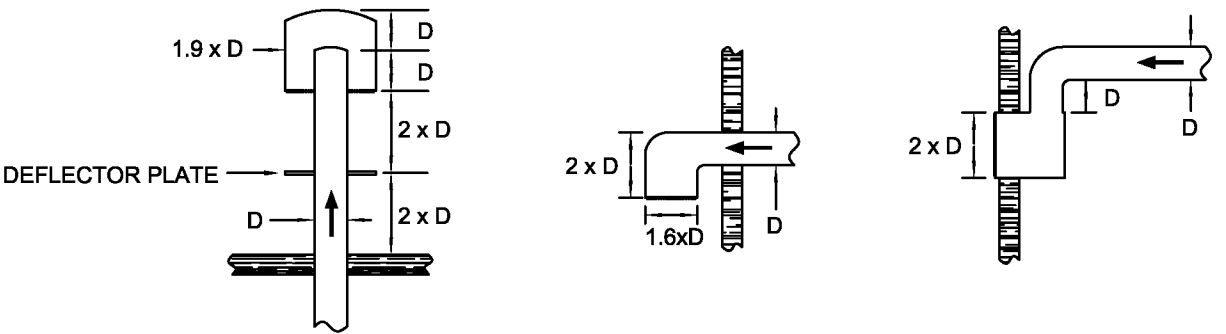
- 1) THE QUENCH VENT WAVEGUIDE MUST BE CONSTRUCTED OF NON-MAGNETIC STAINLESS STEEL ONLY. THE MINIMUM WALL THICKNESS FOR STRAIGHT TUBE IS 22 GAUGE (.0299"). ACCEPTABLE GRADES ARE: AISI 304, 309, 316 AND 321 OR THEIR EN EQUIVALENTS. NO OTHER MATERIALS ARE ALLOWED DUE TO EXTREME TEMPERATURES. FROM THE DIELECTRIC UNION TO THE EXTERIOR OF THE BUILDING, EITHER STAINLESS STEEL OR 6061-T6 ALUMINUM MAY BE USED FOR THE VENT PIPE. MINIMUM WALL THICKNESS OF THE VENT PIPE IS .5MM (.0197") FOR STAINLESS STEEL AND 3MM (.118") FOR ALUMINUM.
- 2) DETERMINING THE ROUTING OF THE VENT TO THE OUTSIDE IS THE RESPONSIBILITY OF THE ARCHITECT/CONTRACTOR. THE LENGTH OF THE VENT RUN TO THE OUTSIDE WILL DICTATE ITS REQUIRED DIAMETER. REFER TO THE FORMULA FOR DETERMINING THE EFFECTIVE LENGTH OF THE VENT AND DIAMETER (PG 19 OF 25).
- 3) THE CRYOSTAT CONTAINS 1400 LITERS OF LIQUID HELIUM WHEN FILLED. IN THE EVENT OF A QUENCH, APPROXIMATELY 980 CUBIC METERS (37,300 FT³) OF HELIUM GAS WILL BE EXHAUSTED THROUGH THE VENT PIPE OVER A PERIOD OF 20-30 MINUTES. THE HELIUM GAS RELEASED IS AN ASPHYXIANT IN ADDITION TO BEING EXTREMELY COLD.
- 4) EXPANSION TO A LARGER DIAMETER PIPE REQUIRES THE USE OF A DIFFUSER (REFER TO PG 19 OF 25). PIPE DIAMETER MAY NOT BE REDUCED IN THE DOWNSTREAM DIRECTION.
- 5) THE VENT PIPE AND ALL JOINTS MUST BE DESIGNED TO WITHSTAND PRESSURES UP TO 4 BAR.
- 6) THERMAL CONTRACTION (APPROXIMATELY 1/16" PER FOOT FOR STAINLESS STEEL, GREATER FOR ALUMINUM) MAY OCCUR. A BELLOW MUST BE FITTED AT A MINIMUM OF EVERY 30' TO ALLOW FOR THIS. THE TOTAL LENGTH OF ALL BELLOWS MAY NOT EXCEED 2% OF THE MAXIMUM ALLOWED PIPE LENGTH. THE MATERIAL USED TO SUSPEND THE PIPE MUST BE FLEXIBLE ENOUGH TO ACCOMMODATE THIS MOVEMENT. ADDITIONALLY, THROUGH WALL PENETRATIONS SHOULD NOT BE HARD ATTACHED TO THE WALL.
- 7) ALL BENDS MUST HAVE A CENTERLINE RADIUS TO INTERNAL DIAMETER RATIO BETWEEN 1.5 AND 5.0. ALL BENDS MUST BE SMOOTH WALLED. IF A SMOOTH WALL BEND IS NOT POSSIBLE, ELBOWS MAY BE FABRICATED FROM STRAIGHT PIPE PROVIDED THAT A MINIMUM OF 4 SECTIONS ARE USED FOR A 90 DEGREE ELBOW.
- 8) JOINTS MAY ONLY BE MADE BY WELDING OR FLANGES. FLANGES MUST BE A MINIMUM OF 13/32" (10MM) THICK AND SHALL BE CONTINUOUSLY WELDED ON THE INSIDE WITH A MINIMUM 50% STITCH WELD ON THE OUTSIDE. ROTARY FLANGES ARE PERMITTED. GASKET MATERIAL MUST BE UHMW-PE, PTFE OR FIBER.
- 9) THE VENT PIPE IS TO BE INSULATED ITS FULL INDOOR LENGTH. MINERAL FIBER INSULATION NOT LESS THAN 1" THICK AND COVERED WITH A VAPOR BARRIER IS RECOMMENDED. IF INSULATION IS USED ON OUTDOOR PORTIONS OF THE VENT PIPE (RECOMMENDED) IT MUST BE WEATHER-PROOF. WITHIN THE SCAN ROOM, AN ADDITIONAL 1" THICK LAYER OF CLOSED CELL FOAM INSULATION (ARMAFLEX CLASS "O" OR EQUAL) IS DESIRED.
- 10) THE TERMINATION OF THE VENT MUST BE DESIGNED TO PREVENT THE INTRUSION OF WEATHER (RAIN, SNOW OR DRIFTING SNOW), ANIMALS OR OTHER FOREIGN OBJECTS. IF MESH IS USED IT SHOULD BE 1/2" WITH 3/64" ROUND WIRE. THE **GROSS AREA** COVERED BY MESH MUST BE AT LEAST 2.5 TIMES THE CROSS SECTION OF THE VENT PIPE. FLAT SHEET STOCK WITH 3/8" ROUND OR SQUARE HOLES MAY ALSO BE USE AS MESH, HOWEVER DUE TO A GREATER FLOW RESISTANCE, THE **TOTAL FREE FLOW AREA** OF MESH MUST BE 2.5 TIMES THE CROSS SECTION OF THE VENT.
- 11) A SIDE WALL CRYOGEN VENT OUTLET MUST BE MOUNTED NO LESS THAN 16'-8" ABOVE A SIDEWALK. ADDITIONALLY, OPERABLE WINDOWS OR AIR INLETS MUST BE RESTRICTED FROM AN AREA 9'-8" TO THE SIDES OR BELOW AND 19'-3" ABOVE A SIDE WALL EXIT OF THE VENT PIPE. WHERE A VERTICAL EXHAUST EXITS THROUGH A FLAT ROOF, ACCESS SHOULD BE RESTRICTED OR WARNING SIGNS POSTED IN A 9'-8" RADIUS AROUND THE VENT. THE VENT PIPE INTERNAL TO THE BUILDING SHOULD ALSO BE MARKED WITH WARNINGS STATING ITS FUNCTION. IT IS THE ARCHITECT/CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE OUTLET AND WARNING SIGNS MEET ALL APPLICABLE CODES.



CRYOGEN VENT CONNECTION DIAGRAM
NOT TO SCALE



RESTRICTED AREA SURROUNDING CRYOGEN VENT
NOT TO SCALE



TYPICAL CRYOGEN VENT OUTLETS

NOTE: ULTRA COLD GAS FROM THE VENT MAY CAUSE THERMAL SHOCK AND DAMAGE TO BUILDING MATERIALS CLOSE TO THE EXIT

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CRYOGEN VENT NOTES

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MAGNET PROXIMITY

DEVICES AFFECTED BY MAGNETIC FIELDS	
1 GAUSS	NUCLEAR CAMERAS, PET SCANNER, COLOR MONITORS, IMAGE INTENSIFIER, LINEAR ACCELERATOR, ULTRASOUND, CT SCANNER, MRI SCANNER, ELECTRON MICROSCOPE
3 GAUSS	MULTI FORMAT CAMERA (LASER IMAGER), COMPUTER HARD DRIVES, ELECTRONIC MEMORY CARD, FERROUS CARD, WATCH
5 GAUSS	PACE MAKER, CREDIT CARDS, ANALOG CELLULAR PHONE, DEFIBRILLATORS, IMPLANTS

REQUIRED DISTANCE FROM ISOCENTER TO ITEMS THAT MAY AFFECT MAGNET	
10'	LARGE FERROUS OBJECTS OVER 400 LBS., MAJOR STRUCTURAL STEEL, FERROUS CART
20'	AUTOMOBILES, SMALL TRUCKS, HVAC AIR HANDLERS, HVAC CONDENSERS, WATER CHILLERS, ELECTRICAL SUB-PANELS OVER 50 AMP, LARGE MOTORS (GAS AND ELECTRIC)
40'	LARGE TRUCKS AND BUSES, ELEVATORS, ESCALATORS, LARGE ELECTRICAL TRANSFORMERS, LARGE ELECTRICAL PANELS (OVER 200 AMP), MAIN ELECTRICAL FEEDER LINES (INCLUDING UNDERGROUND)
200'	HIGH TENSION ELECTRICAL LINES, RAILROAD TRACKS, HELICOPTER PAD

NOTE:
THE ABOVE CHARTS ARE INTENDED SOLELY AS A GUIDELINE AND NOT AS AN ALL-INCLUSIVE CHECKLIST. IT MAY BE POSSIBLE TO DAMPEN THE EFFECT OF SOME OF THE DC TYPE INFLUENCES (CAUSED BY MOVING OBJECTS) THROUGH THE USE OF MAGNETIC SHIELDING. THE EFFECT OF MAGNETIC SHIELDING AGAINST A.C. TYPE INTERFERENCE (ELECTRICAL POWER) IS SIGNIFICANTLY LESS THAN FOR D.C. TYPES. CONSULT WITH THE HMSA SITE PLANNER FOR FURTHER INFORMATION.

MAGNET PLACEMENT

THE AREA COVERED BY THE MAGNET'S FRINGE FIELDS IS OF PRIME CONCERN WHEN SELECTING AN MRI SITE. CONSIDERATION MUST BE GIVEN TO THE FOLLOWING CONCERNS:

- 1) USE OF THE SURROUNDING AREAS, INCLUDING SPACE ABOVE AND ADJACENT TO THE MAGNET. IT MAY BE POSSIBLE TO REDUCE THE INFLUENCE OF THE MAGNETIC FIELD ON ADJACENT SPACES WITH THE USE OF MAGNETIC SHIELDING. CONSULT WITH THE SITE PLANNING SPECIALIST FOR FURTHER INFORMATION.
- 2) TYPE OF CONSTRUCTION MATERIALS USED IN THE EXISTING STRUCTURES, PARTICULARLY COLUMNS, BEAMS, JOISTS, REINFORCEMENT STEEL, AND CAST IRON PIPES.
- 3) LOCATION OF MECHANICAL EQUIPMENT AND OTHER MEDICAL MODALITIES.
- 4) LOCATION OF ELEVATORS, LOADING DOCKS, PARKING LOTS, DRIVEWAYS, AND ELECTRICAL SERVICES (INCLUDING BURIED UTILITIES).
- 5) A MAGNETIC FLUCTUATION TEST MUST BE PERFORMED AT ALL SITES TO ASSIST IN IDENTIFYING POSSIBLE SOURCES OF INTERFERENCE. A SITE CANNOT RECEIVE FINAL APPROVAL BY HMSA SITE PLANNING WITHOUT THIS TEST.

MAGNETIC SHIELDING

RF SHIELDING (PG 8 OF 27) WHICH ELIMINATES RADIO SIGNALS FROM REACHING THE SYSTEM IS DIFFERENT THAN MAGNETIC SHIELDING AND IS REQUIRED FOR AN ECHELON MRI SYSTEM WHETHER MAGNETIC SHIELDING IS USED OR NOT. MAGNETIC SHIELDING PROVIDES A MEANS OF LIMITING THE DISTANCE THE GAUSS FIELDS EXTEND OUT FROM AN ECHELON SYSTEM'S ISO-CENTER OR DAMPING THE EFFECTS THE SURROUNDING ENVIRONMENT (SEE CHART THIS PAGE) MAY HAVE ON IT.

MAGNETIC SHIELDING IS CONSTRUCTED OF FERROUS METAL AND IS TYPICALLY MOUNTED TO THE EXTERIOR OF THE RF SHIELD. IT IS NORMALLY SUPPLIED AND INSTALLED BY THE RF SHIELDING VENDOR AT THE TIME THE RF SHIELD IS INSTALLED. LIKE ANY OTHER FERROUS OBJECT, ITS MAGNETIC PROPERTIES AFFECT THE SHIM OF THE MAGNET (SEE MAGNETIC SHIMMING THIS PAGE)

MAGNET SHIMMING

ONCE THE MRI SYSTEM IS INSTALLED, THE MAGNETIC FIELD IS SHIMMED TO COUNTERACT THE EFFECT OF ANY PERMANENT FERROMAGNETIC OBJECTS AROUND IT. THE WEIGHT OF THE OBJECT AND ITS DISTANCE FROM THE ISO-CENTER OF THE GANTRY DETERMINE THE INFLUENCE IT WILL HAVE ON THE MAGNETIC FIELDS. IN ORDER TO PROPERLY EVALUATE A SITE AND DETERMINE THE AFFECT OF SUCH OBJECTS ON THE ABILITY TO SHIM THE MAGNET, THE FOLLOWING INFORMATION MUST BE PROVIDED:

- 1) THE SIZE (I.E.: W24 X 76) AND LOCATION OF STRUCTURAL STEEL COLUMNS AND BEAMS ADJACENT TO THE SCAN ROOM. THIS INFORMATION IS NORMALLY FOUND ON THE STRUCTURAL DRAWINGS FOR A BUILDING.
- 2) THE THICKNESS AND LOCATION OF MAGNETIC SHIELDING THAT WILL REMAIN IN PLACE IF THE ECHELON IS TO BE INSTALLED IN AN EXISTING MRI SCAN ROOM. THIS INFORMATION CAN BE NORMALLY BE FOUND ON THE RF SHIELD DRAWINGS OR BY CONTACTING THE RF SHIELDING VENDOR WITH THE SERIAL NUMBER OF THE ROOM.
- 3) THE WEIGHT OF ANY OTHER LARGE PERMANENT FERROUS OBJECTS (I.E. WALK-IN SAFE) ADJACENT TO THE SCAN ROOM.

MAGNET AFFECT ON LOOSE OBJECTS

ATTRACTION OF LOOSE FERROMAGNETIC OBJECTS IS OF CONCERN WITHIN THE MRI SCAN ROOM. THE MAGNET'S FIELD STRENGTH IS CAPABLE OF ACCELERATING UNRESTRAINED FERROUS OBJECTS. THE GREATER THE MASS OF THE OBJECT AND THE CLOSER IT GETS TO THE MAGNET, THE STRONGER THE ATTRACTION. NEAR THE MAGNET, HUMAN STRENGTH MAY NOT BE SUFFICIENT TO RESTRAIN FERROUS OBJECTS SUCH AS OXYGEN TANKS AND CRASH CARTS. SUCH OBJECTS WILL BE DRAWN INTO (OR ONTO) THE MAGNET, POTENTIALLY CAUSING INJURY OR DEATH TO PERSONS AND DAMAGE TO THE MRI SYSTEM. SUCH OBJECTS MUST NOT BE ALLOWED IN THE SCAN ROOM. SPECIAL NONFERROUS EQUIPMENT SHOULD BE OBTAINED AND IDENTIFIED FOR USE IN THE SCAN ROOM.

ACCESS RESTRICTION

FDA REQUIREMENT RESTRICTS PUBLIC ACCESS WITHIN THE 5 GAUSS FIELD UNLESS INDIVIDUALS HAVE BEEN PROPERLY SCREENED.

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MAGNET PROXIMITY

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RIGGING AND DELIVERY

DURING THE INITIAL PLANNING OF THE ECHELON SUITE, A SYSTEM DELIVERY PATH MUST BE IDENTIFIED. THE DESIGN TEAM SHOULD REVIEW THE INFORMATION PRESENTED ON THIS PAGE TO ENSURE A STAGING AREA AND A CLEAR DELIVERY PATH IS AVAILABLE. WHILE THE MAGNET IS THE MAJOR CONCERN, CLEARANCES MUST ALSO BE ASSURED FOR THE DELIVERY OF ANCILLARY SYSTEM COMPONENTS, SERVICE / INSTALLATION TOOLS AND THE ONGOING REQUIREMENT OF HELIUM DEWARs. SITE PLANNING WILL ASSIST IN IDENTIFYING THE MOST APPROPRIATE DELIVERY PATH.

THE DELIVERY PROCESS IS AS FOLLOWS:

1. SITE PLANNING AND THE DESIGN TEAM WILL IDENTIFY A STAGING AREA AND A DELIVERY PATH.
2. AN INITIAL DELIVERY DATE WILL BE SCHEDULED USING INPUT FROM THE DESIGN TEAM. (CONSTRUCTION SCHEDULE)
3. TIMELY VISITS WILL BE MADE BY THE LOCAL HMSA FIELD SERVICE ENGINEER (FSE) CONFIRMING THE SITE PROGRESS.
4. THE CONTRACTOR AND FSE WILL REVIEW THE ECHELON PRE-DELIVERY CHECKLIST AGAINST THE ACTUAL SITE STATUS. SITE PLANNING IS TO BE CONTACTED WITH ANY CONCERNS THAT MAY AFFECT THE DELIVERY.
5. FOURTEEN (14) DAYS PRIOR TO THE SCHEDULED DELIVERY, THE CONTRACTOR WILL SUBMIT A COMPLETED CHECKLIST TO SITE PLANNING NOTING THE STATUS OF THE SITE.
 - a. IF COMPLETION OF THE CHECKLIST REQUIREMENTS CANNOT BE GUARANTEED BY THE CONTRACTOR, THE DELIVERY WILL BE RESCHEDULED.
 - b. IF THE CONTRACTOR CAN VERIFY THAT THE SITE IS ON SCHEDULE AND THAT ALL CHECKLIST REQUIREMENTS WILL BE COMPLETE, THE DELIVERY DATE WILL BE SET WITHIN 10 DAYS OF THE SUBMITTAL.
6. SITE PLANNING WILL CONFIRM ADMINISTRATIVE APPROVAL.
7. SITE PLANNING WILL CO-ORDINATE SCHEDULING OF THE SYSTEM DELIVERY WITH THE APPROPRIATE PARTIES, ADJUSTING THE DELIVERY DATE TO MEET EVERYONE'S SCHEDULE.

RESPONSIBILITIES:

HMSA RESPONSIBILITIES:

1. ASSIST THE CUSTOMER / CONTRACTOR IN IDENTIFYING A DELIVERY STAGING AREA (TRUCK PARKING, CRATE UNPACKING).
2. ASSIST THE CUSTOMER / CONTRACTOR IN IDENTIFYING A DELIVERY PATH FROM THE STAGING AREA TO THE SUITE.
3. ASSIST THE CUSTOMER / CONTRACTOR IN LOCATING AN ADEQUATE / ACCESSIBLE STORAGE SPACE (IF REQUIRED)
4. COORDINATE THE DELIVERY DATE WITH THE CUSTOMER / CONTRACTOR AND APPROPRIATE PARTIES.
5. INSPECT AND APPROVE THE SITE PRIOR TO DELIVERY TO CONFIRM THE ADEQUATE ACCESS IS AVAILABLE.
6. INSTALL THE ECHELON OVAL SYSTEM.

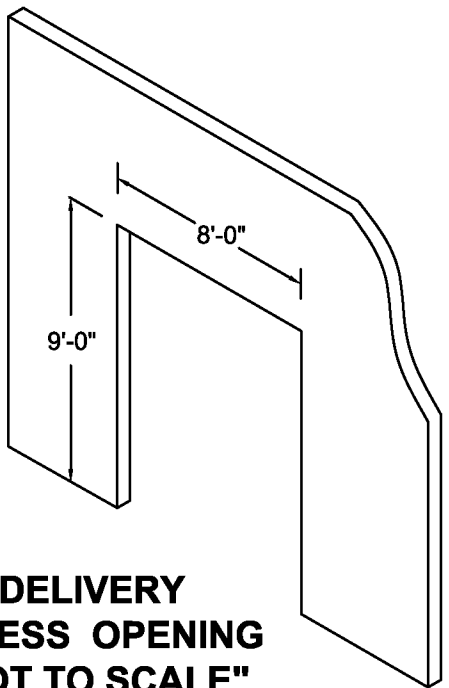
CUSTOMER / CONTRACTOR / RIGGER RESPONSIBILITIES:

1. ARRANGE WITH HMSA FOR DELIVERY OF THE CHILLER SYSTEM PRIOR TO SYSTEM DELIVERY.
2. HAVE THE CHILLER SYSTEM INSTALLED AND TESTED PRIOR TO DELIVERY OF THE SYSTEM.
3. PROVIDE AN OBSTRUCTION FREE DELIVERY PATH MEETING THE DELIVERY REQUIREMENTS.
4. PROVIDE AN OBSTRUCTION FREE STAGING AREA.
5. HAVE A FACILITY REPRESENTATIVE AVAILABLE AT THE TIME OF DELIVERY TO SIGN SHIPPING DOCUMENTS.
6. SECURE INSURANCE COVERAGE FOR THE SYSTEM, EFFECTIVE UPON DELIVERY.
7. **PROVIDE AN ADEQUATE / ACCESSIBLE STORAGE AREA OF APPROXIMATELY 400 SF (20' X 20') WITHIN THE FACILITY AS REQUIRED.**
8. ARRANGE FOR THE DISPOSAL OF ALL PACKING AND CRATING MATERIALS (40 YARD DUMPSTER REQUIRED, WILL ALSO REQUIRE BEING EMPTIED DURING THE FIRST DAY)
9. TAKE THE NECESSARY PRECAUTIONS TO PROTECT THE FACILITY AND EQUIPMENT.
10. IDENTIFY AND PROVIDE NECESSARY EQUIPMENT FOR THE DELIVERY (I.E. CRANE, FORKLIFT, MANPOWER, TOOLS)
11. UNLOAD AND UNCRATE ALL OF THE EQUIPMENT AND PLACE IT IN THE SUITE.
12. SET MAGNET AND ANCILLARY EQUIPMENT PER THE HMSA SITE PLAN.

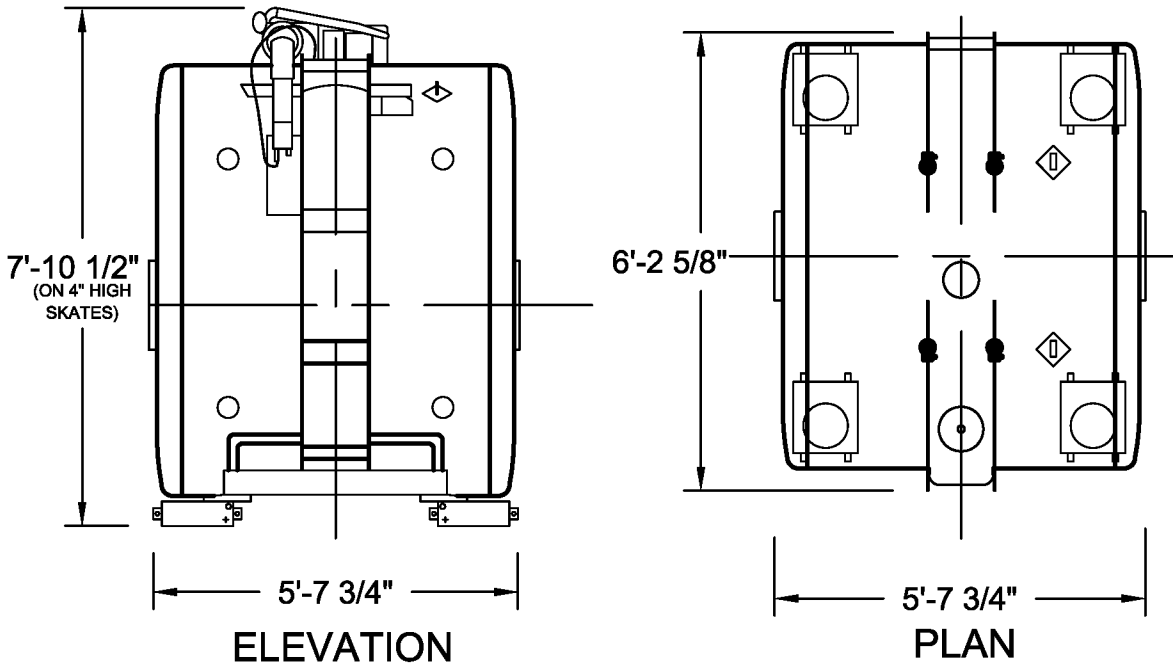
NOTE: SITE PLANNING WILL NOT CONFIRM A SCHEDULED DELIVERY DATE WITHOUT:

1. A SUBMITTED PRE-DELIVERY CHECKLIST
2. ADMINISTRATIVE APPROVAL

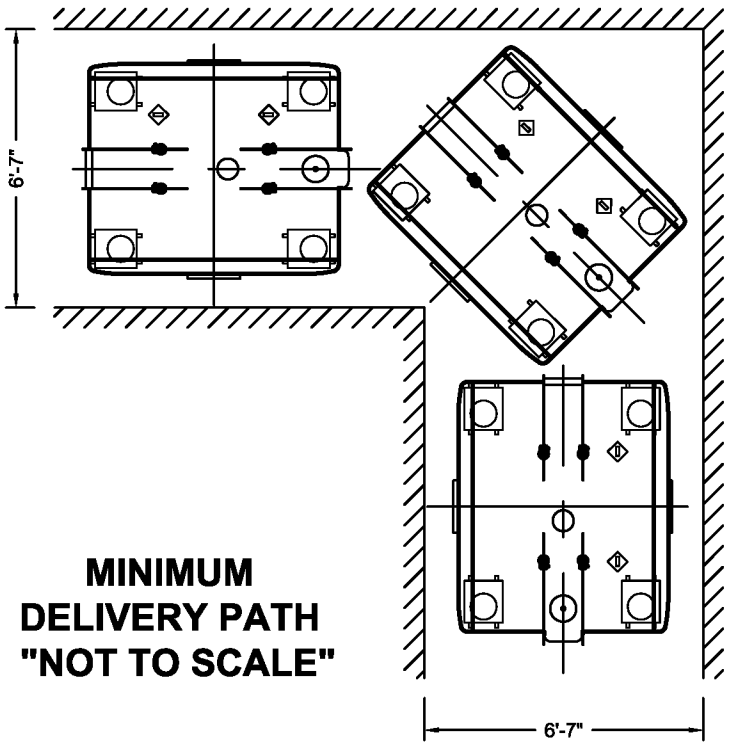
ECHELON COMPONENT LIST					
CRATE #	COMPONENT	LENGTH (CRATED)	WIDTH (CRATED)	HEIGHT (CRATED)	WEIGHT (CRATED)
	MAGNET	5'-5"	6'-9"	7'-8"	10,805 lbs
2	FRONT COVER	8'-3"	7'-2"	2'-8"	474 lbs
3	REAR COVERS	8'-3"	7'-2"	2'-8"	441 lbs
4	MISC COVERS	9'-1"	4'-5"	4'-8"	529 lbs
5	PATIENT TABLE	9'-1"	3'-0"	3'-7"	970 lbs
6	RFIP CABINET	3'-9"	3'-2"	7'-0"	1521 lbs
7	GCPA CABINET	4'-1"	3'-1"	7'-1"	2007 lbs
8	SENSE UNIT	3'-4"	2'-2"	4'-4"	243 lbs
9	FILTER BOX	5'-7"	3'-8"	2'-7"	320 lbs
10	CABLES	6'-1"	3'-6"	2'-6"	1136 lbs
11	REAR TABLE	4'-11"	3'-6"	2'-6"	618 lbs
12	MISC	7'-1"	3'-6"	3'-8"	992 lbs
13	MISC	7'-1"	3'-6"	3'-8"	1125 lbs
14	MISC	7'-1"	3'-6"	3'-8"	265 lbs
15	TRANSMIT COIL	3'-0"	2'-8"	4'-4"	188 lbs
ITEMS SHIPPED SEPARATELY PRIOR TO MAGNET DELIVERY					
	R1600 CHILLER	6'-5"	6'-1"	7'-5"	3980 lbs
NOTE: CHILLER MUST BE DELIVERED, INSTALLED AND FUNCTIONAL PRIOR TO MAGNET DELIVERY DELIVERY REQUIRES MINIMUM 2 1/2 TON FORK LIFT W/ MINIMUM 72" FORKS					



DELIVERY
ACCESS OPENING
"NOT TO SCALE"



GANTRY DIMENSIONS
"NOT TO SCALE"



MINIMUM
DELIVERY PATH
"NOT TO SCALE"

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RIGGING AND DELIVERY

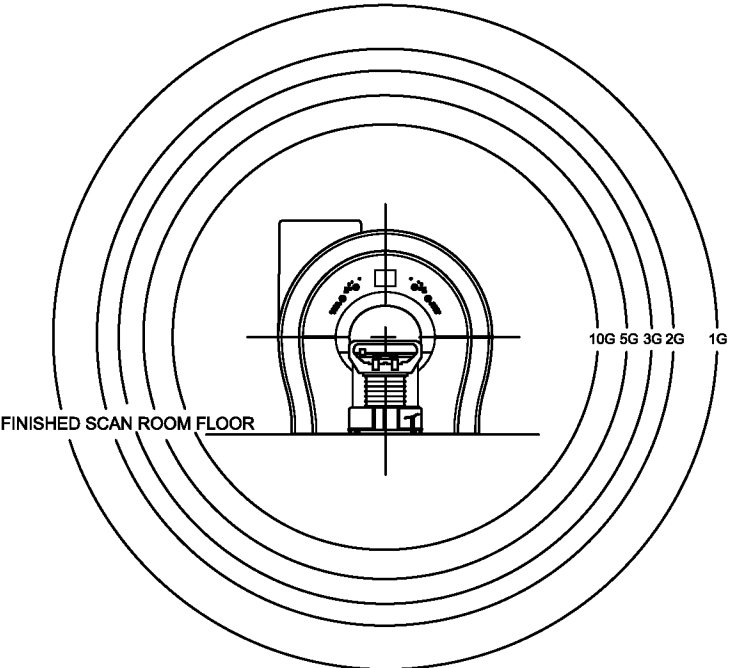
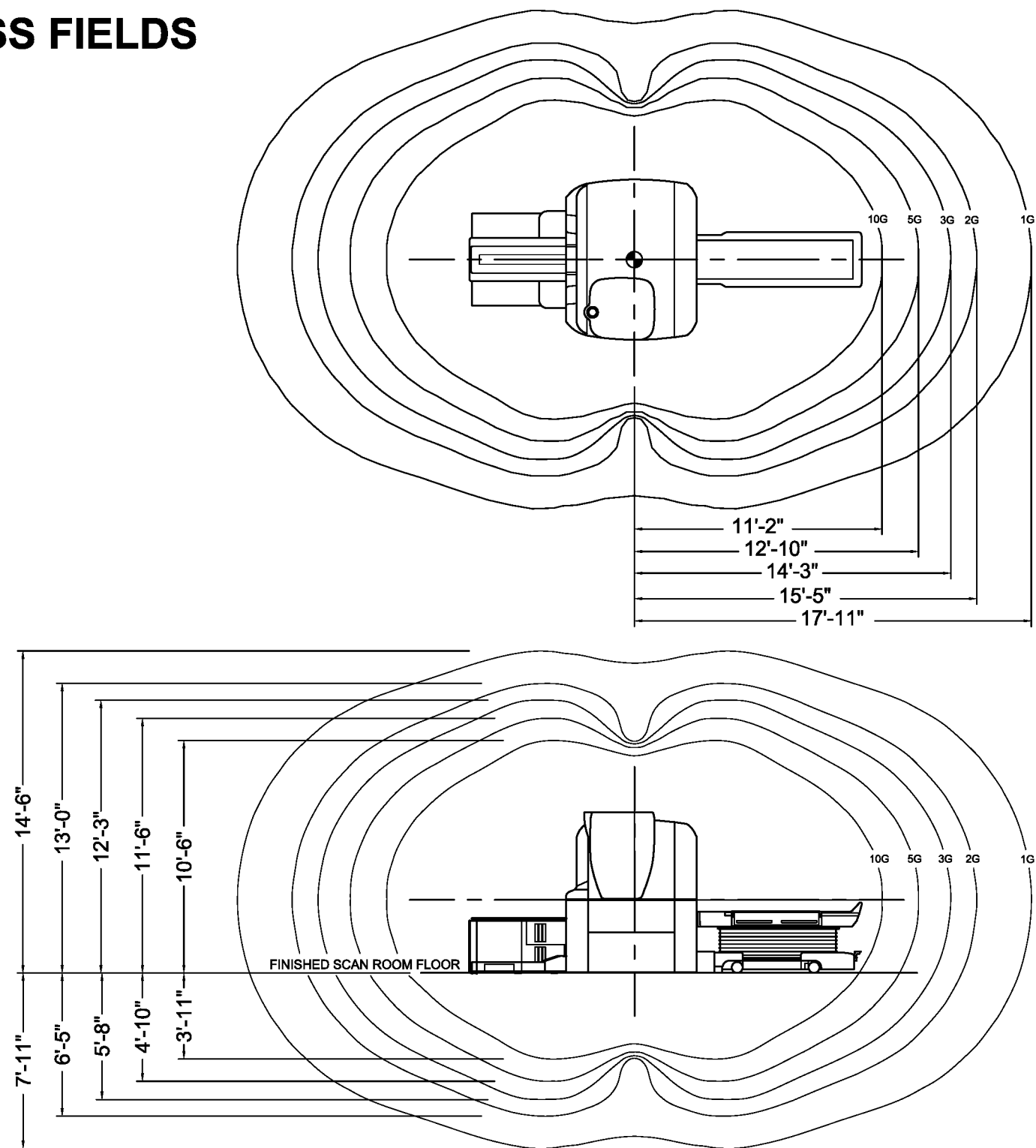
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ECHELON OVAL STD. DETAILS

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GAUSS FIELDS



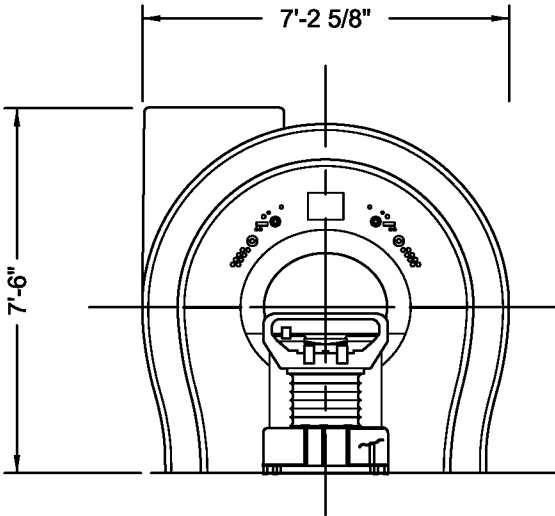
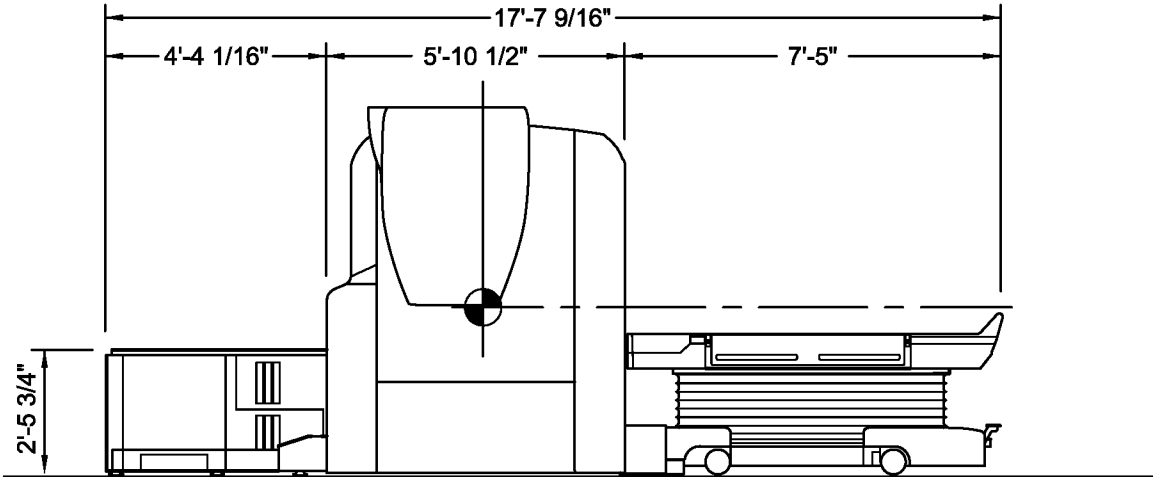
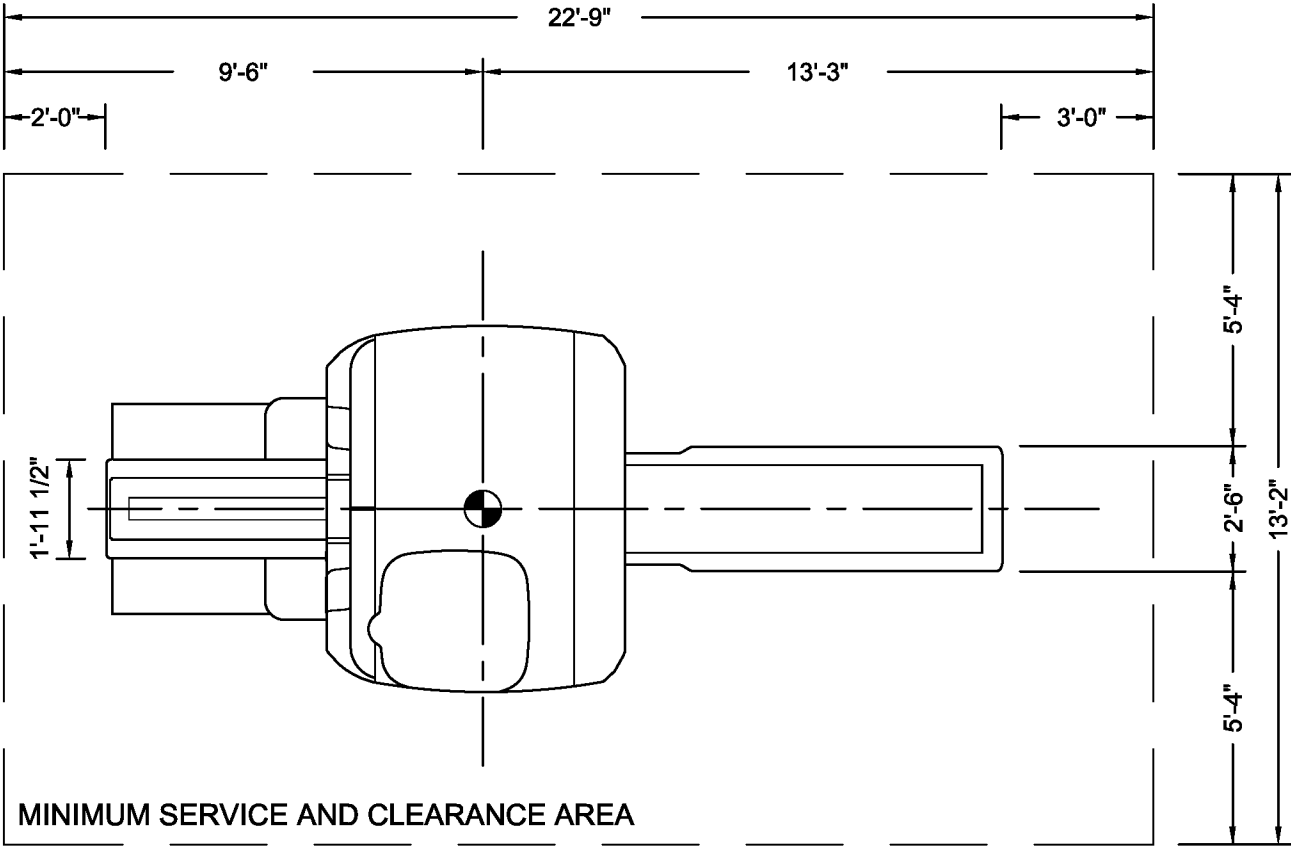
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GAUSS FIELDS

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SYSTEM COMPONENTS



ECHELON GANTRY AND PATIENT TABLE

MULTIPLE CABLE CONNECTIONS AT REAR OF GANTRY.
SERVICE AREA MUST BE MAINTAINED WHEN SITING.

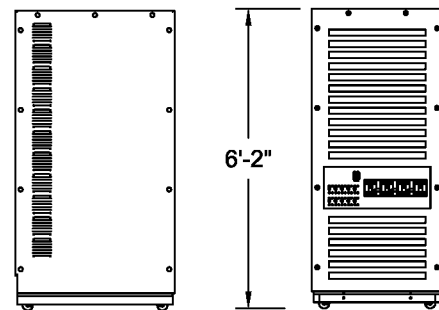
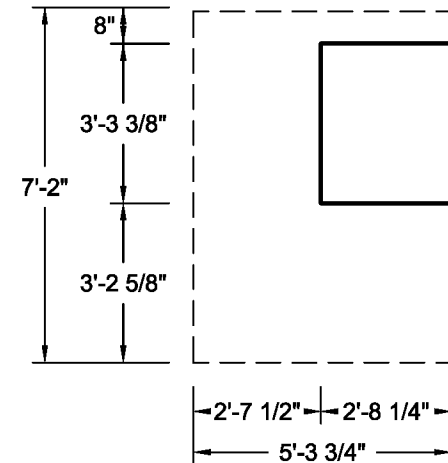
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SYSTEM COMPONENTS

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SYSTEM COMPONENTS (CONT)

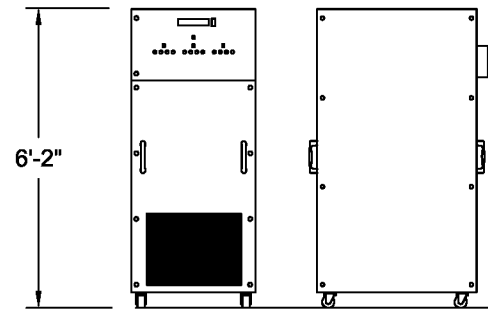
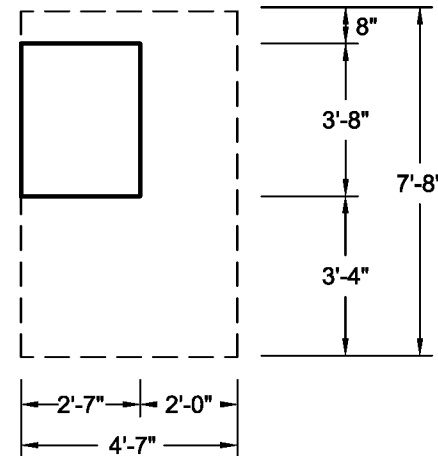


SIDE VIEW

FRONT VIEW

RFIP CABINET

MULTIPLE CABLE CONNECTIONS AND MAIN POWER CONNECTION WILL LIMIT CABINET MOVEMENT FOR SERVICING. SERVICE AREA MUST BE MAINTAINED WHEN SITING.

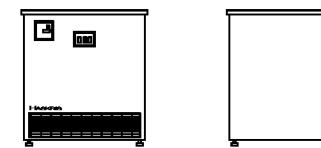
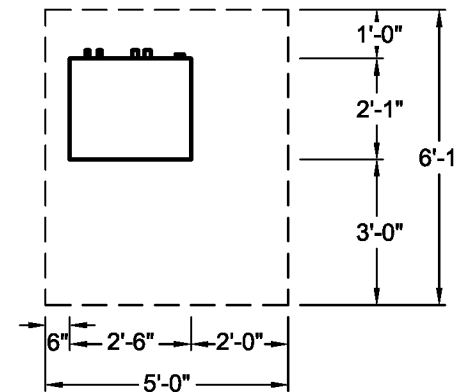


FRONT VIEW

SIDE VIEW

GRADIENT AMPLIFIER CABINET

MULTIPLE CABLE CONNECTIONS, GRADIENT CABLE CONNECTIONS, AND WATER HOSE CONNECTIONS WILL LIMIT CABINET MOVEMENT FOR SERVICING. SERVICE AREA MUST BE MAINTAINED WHEN SITING.

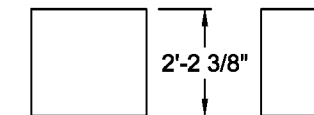
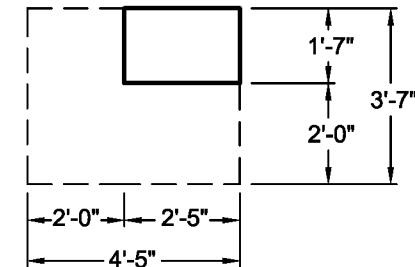


FRONT VIEW

SIDE VIEW

WW4 HEAT EXCHANGER

PLUMBING / WATER HOSE CONNECTIONS AND WEIGHT WILL LIMIT CABINET MOVEMENT FOR SERVICING. SERVICE AREA MUST BE MAINTAINED WHEN SITING.

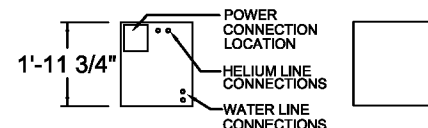
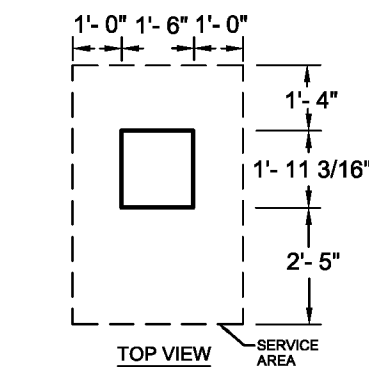


FRONT VIEW

SIDE VIEW

REMOTE FAN UNIT

AIR HOSE CONNECTIONS WILL LIMIT CABINET MOVEMENT. SERVICING SERVICE AREA MUST BE MAINTAINED WHEN SITING. SERVICE FROM FRONT AND EITHER SIDE.

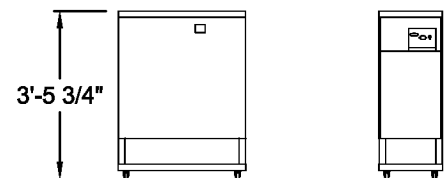
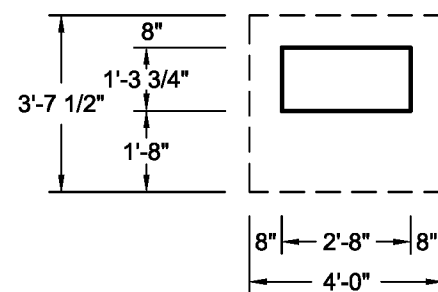


FRONT VIEW

SIDE VIEW

HELIUM COMPRESSOR UNIT

MULTIPLE CABLE CONNECTIONS, HELIUM AND PLUMBING LINES RESTRICT ALLOWABLE MOVEMENT FOR THIS UNIT. SERVICE AREA MUST BE MAINTAINED WHEN SITING.

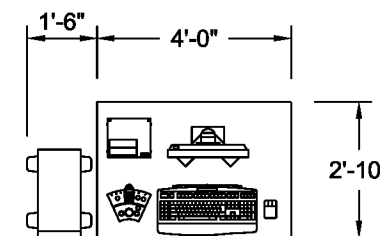


FRONT VIEW

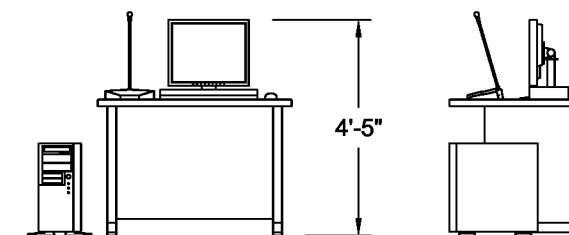
SIDE VIEW

SENSE UNIT

MULTIPLE CABLE CONNECTIONS, HELIUM AND PLUMBING LINES RESTRICT ALLOWABLE MOVEMENT FOR THIS UNIT. SERVICE AREA MUST BE MAINTAINED WHEN SITING.



TOP VIEW



FRONT VIEW

SIDE VIEW

OPERATOR CONSOLE

MULTIPLE CABLE CONNECTIONS. COMPONENTS ARE SEPARATE AND MAY BE PLACED ON CASEWORK/COUNTERTOP SUPPLIED AND INSTALLED BY CUSTOMER.

NOTE: OTHER SUPPORT COMPONENTS MAY NOT BE LOCATED WITHIN THE EQUIPMENT ROOM WITHOUT APPROVAL OF THE SITE PLANNING DEPARTMENT. REQUIRED EQUIPMENT SERVICE AREAS MAY NOT BE COMPROMISED.

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SYSTEM COMPONENTS (CONT)

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ECHOLON OVAL STD. DETAILS

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HITACHI ECHELON OVAL Y100+ PRE-DELIVERY CHECKLIST

The successful delivery of the Hitachi ECHELON OVAL with the cryostat pre-cooled (filled with cryogenes) requires that certain items and systems **MUST** be completed and/or operational prior to the unit arriving on site. The items in this checklist **MUST** be completed in order to ensure a proper environment for maintaining the system once it is on site. The Magnet, though filled with cryogenes, will not be at field until later in the installation process. A clear schedule with a suite completion plan must also be in place to ensure a smooth room closure process during Installation. **ALTHOUGH ITEMS ON THIS CHECKLIST DO NOT NEED TO BE COMPLETED AT THE TIME IT IS FILLED OUT, THEY MUST BE COMPLETED PRIOR TO DELIVERY.**

THIS CHECKLIST MUST BE COMPLETED AND RETURNED TO HMSA TWINSBURG A MINIMUM OF FOURTEEN (14) CALENDAR DAYS AND TEN (10) WORKING DAYS PRIOR TO DELIVERY

	Done	To be completed by
GENERAL CONSTRUCTION		
All Rooms are clean of construction dust and debris (broom clean)		
Contractor / Customer advised no construction may take place during shimming process (days 5 - 7 after delivery)		
Contractor advised and prepared for system delivery/room closure schedule (see pg 2 of 27 ECHELON Std. Details)		
RF SHIELD		
Preliminary test completed and shield verified ground free		
Floor levelness verified by RF vendor: +/- 1/8" over entire area of gantry and patient table		
3"+ distance from top of wireway to bottom of filter panel rough opening on scan room side		
Wave Guides (2) installed in btm. wireway compartment. Must be flush to inside face of wireway on scan room side		
Wave Guides (2) installed above filter panel. Must connect to (flush to wall on scan rm side) overhead ww to gantry		
Filter Box openings prepped and ready for installation (R.O. 32 7/8" X 57 5/8" W X H)		
RF Vendor scheduled by contractor for access panel and filter panel installation and final test on 1 st day of delivery		
SCAN ROOM		
All walls complete, sanded and painted (except access opening)		
Flooring complete. Protection to be provided by contractor and ready at start of delivery day 1		
Ceiling complete		
Lighting and power outlets installed and functioning		
Wireway on-site and available for installation (electrician to complete any remaining wireway day after delivery)		
Cryogen vent flange at 8'-4 3/4" AFF and vent pipe run to exterior, complete and ready for connection to magnet		
Emergency exhaust fan (w/wall switch) operational		
Oxygen monitor installed (optional)		

	Done	To be completed by
CONTROL AND EQUIPMENT ROOMS		
Walls sanded and painted (except access opening if required)		
Flooring complete		
Ceiling installed		
Wireway installed (with min 3" distance from top of ww to btm of filter panel rough opening on scan room side)		
Customer/contractor advised that only pre-approved punch list items may be addressed after delivery		
Floor drain (4" min) and hose bibb installed		
CHILLER AND HEAT EXCHANGER		
Chiller installed (hard wired, plumbed, and ready for no-load start-up)		
Chiller checklist completed and returned to HMSA (fax 978-313-6145)		
ELECTRICAL		
480V, 20Amp, 3 phase receptacle for Magnet Ramp supply (NEMA L16-20R outside of scan room door)		
480V, 150 Amp, 3 phase supply line pulled to planned location of RFIP cabinet		
480V, 7.9 MCA, 15MOCP, 3 phase supply line pulled to planned location of Heat Exchanger		
Single point ground has been verified for MRI sub-panel		
Electrician scheduled to connect power to RFIP cabinet on 2 nd day of delivery		
ENVIRONMENTAL		
HVAC operational in all rooms		
COMMUNICATIONS		
Phone lines available in control and equipment rooms for use by service personnel Phone #:		
Network interface information sent to installchecklistgroup@hitachimed.com (pg 3 of 27 Echelon Standard Details)		
Network connections in place and functional with access to internet Network contact name:		
FACILITIES		
HMSA has 24 hour access		
Functional restroom facilities available in work area		
Empty 40 yd. dumpster on site morning of delivery with empty scheduled for 2 nd morning		
Storage area for 3 cryogen dewars (36" x 48" each) availabled with unrestricted path to Scan Room (46" width)		
Storage area approximately 400 sq. ft. (20' x 20') available near Scan Room for misc. equipment and parts		

PRE-DELIVERY CHECKLIST

NOTE:

Please be advised that the site preparations as outlined in Site Planning Standard Details and related checklists are essential for delivery and installation. Because all arrangements for the delivery of your system must be completed two weeks in advance of delivery, any delay caused by incomplete site preparation will result in unavoidable additional cost related to scheduling and transportation of Riggers, delivery and installation personnel, cryogenes, re-filling costs, storage costs, rescheduling fees, etc. These additional charges could exceed \$25,000.

Planned Delivery Date:_____

Site Name:_____

Address:_____

NOTE:

1. Planned delivery date must be no less than fourteen (14) calendar days and ten (10) working days after this document is received by HMSA
2. The delivery date will be confirmed only after the signed checklist is received/accepted by HMSA and the availability of the rigging and installation teams is established.
3. By signing you acknowledge your acceptance of the requirements and responsibilities as explained above.

Key On-Site Contact Name:_____ Title:_____

Phone: _____

Date:_____ HMSA FSE Signature: _____

Name printed_____

Date:_____ Customer Signature:_____

(or authorized representative)

Name printed_____

Notes:

1. Scan and e-mail PDF file to: InstallChecklistGroup@HitachiMed.com
2. Contact assigned Site Planner with any questions

NOTE: A COPY OF THE PRE-DELIVERY CHECKLIST CAN BE PROVIDED IN PDF FORMAT BY THE SITE PLANNING DEPARTMENT. A COPY IS ALSO PROVIDED WHEN DOWNLOADING THE ECHELON STANDARD DETAILS FROM www.hitachimed.com, CONTACT THE SITE PLANNING DEPARTMENT FOR THE CURRENT ACCESS CODE.

HITACHI MEDICAL SYSTEMS AMERICA

1959 SUMMIT COMMERCE PARK TWINSBURG, OH 44087-2371
(800) 800-3106 WWW.HITACHIMED.COM

PRE-DELIVERY CHECKLIST

DATE: 05/01/2012

REVISION: 05/20/2014

ECHELON OVAL STD. DETAILS

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OEM PRODUCTS AND SERVICES

OEM PRODUCT AND SERVICE VENDORS ARE KEY TO YOUR SUITE PREPARATION. THEY SHOULD BE INVOLVED EARLY IN THE PLANNING PROCESS WHEN POSSIBLE. WHILE VENDORS LISTED BELOW HAVE DEMONSTRATED ACCEPTABLE CUSTOMER SERVICE IN THE PAST, THIS IN NO WAY IS TO BE CONSTRUED AS AN ENDORSEMENT OR A GUARANTEE OF FUTURE SERVICE. THIS LISTING IS PROVIDED AS A CONVENIENCE ONLY AND IS BY NO MEANS ALL-INCLUSIVE. THE CUSTOMER IS RESPONSIBLE FOR CHOOSING THEIR VENDORS.

UPON IDENTIFYING YOUR VENDORS, PROVIDE CONTACT INFORMATION TO HMSA SITE PLANNING.

RF VENDORS:

MULTIPLE VENDORS. CONTACT YOUR SITE PLANNER FOR VENDORS IN YOUR REGION.

OXYGEN MONITOR SYSTEMS

BAKER INDUSTRIAL EQUIPMENT INC.
(TELEDYNE REPRESENTATIVE)
PHONE: (330) 928-8877

* NOTE: BAKER IS ABLE TO PROVIDE THE TELEDYNE UNIT WITH A SITE SPECIFIC KIT CONTAINING THE NECESSARY FILTER AND SPECIAL LENGTH CABLES TO MEET SITE SPECIFIC REQUIREMENTS

MSA TOXGARD II
PHONE: (800) 672-4678
www.MSAnet.com

* NOTE: MSA TOXGARD II REQUIRES AN ADDITIONAL 1/2" WAVEGUIDE FOR THE AIR SUPPLY HOSE (SEE PG 19 OF 27, ITEM B)

HELIUM VENT CONNECTOR MATERIAL:

VENT FABRICS-VENT GLASS
PHONE: (773) 775-4477

LORENZ CLAMP
PHONE: (905) 372-2240

HELIUM VENT:

ERNIE'SWELDING AND FABRICATING, INC.
PHONE: (727) 536-6661
(888) 394-2754
WWW.QUENCHLINE.COM
WWW.ERNIESWELDING.COM

MECHANICAL EQUIPMENT ISOLATION

MATERIAL AND MOUNTINGS:

HAMMOND KINETICS - DUBLIN, OH
PHONE: (614) 889-0480
WWW.KINETICSNOISE.COM

SORBOTHANE, INC. - KENT, OH
PHONE: (330) 678-9444
WWW.SORBOTHANE.COM

UNISORB INSTALLATION TECHNOLOGIES
PHONE: (517) 764-6060
WWW.UNISORB.COM

MASON INDUSTRIES, INC.
PHONE: (631) 348-0282
WWW.MASON-IND.COM

VIBRATION ATTENUATION:

STS CONSULTANTS, LTD. - VERNON HILLS, IL
PHONE: (847) 279-2500
PHONE: (847) 279-2481 (DIRECT LINE)
CONTACT: BERNARD HERTLEIN

GEOVISION - CORONA, CA
PHONE: (909) 549-1234

WIREWAYS:

WIREMOLD / WALKER
PHONE: (800) 621-0049 ext. 4
CONTACT: WALKER WIREMOLD INFLOOR
AND PRE-WIRE PROJECT TEAM

ECHELON OVAL SYSTEM COLORS

COMPONENTS: SIDE AND TOP COVERS, TABLE
TOP SUPPORT AND TABLE BASE
COLOR: SELENA WHITE
MUNSELL VALUE: 7.2Y-8.6/0.3

COMPONENTS: FRONT AND REAR COVERS,
TUNNEL AND TABLE BELLOWES
COLOR: SELENA WHITE LIGHT
MUNSELL VALUE: 3.5Y-9/0.3

COMPONENTS: TRIM RING FRONT
COLOR: SILVER
MUNSELL VALUE: 0.2Y-7.6/0.2

COMPONENTS: TABLE PADS
COLOR: YELLOW
MUNSELL VALUE: 5.8Y-9.0/5.0

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OEM PRODUCTS AND SERVICES

DATE: 05/01/2012 REVISION: 05/20/2014

ECHELON OVAL STD. DETAILS OEM ADDENDUM