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University of North Texas - Health Science Center BioHealth Research Imaging Suite

Final Feasibility Study
09.24.2019

24 September 2019

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No information to be shared outside of the team without UNT HSC's written permission.

Feasibility Study for the University of North Texas
Health Science Center - Center for BioHealth
Imaging Research Suite
Fort Worth, Texas

Feasibility Study

Executive Summary

Michael Franks
University of North Texas - Health Science Center
3500 Camp Bowie Boulevard
CBH Imaging Research Suite
Fort Worth, Texas 76107

RE: CBH - Imaging Research Suite Feasibility Center

Dear Mr. Franks,

This Feasibility Study is a review by the Gensler Team of the six-story Center for BioHealth (CBH) on the University of North Texas, Health Science Center (UNT HSC) in Fort Worth, Texas. The team has specifically reviewed the First Floor area of 11,027 square feet of the CBH building for the use as an Alzheimer's Imaging Research Suite for Dr. Sid O'Bryant, that will feature two, 3T Magnetic Resonance Imaging (MRI) suites and two Positron Emission Tomography – Computed Tomography (PET/CT) suites. The PET/CT will include a radioactive isotopes laboratory for this research.

The Gensler teams' findings of the existing first floor of the CBH building included architectural and interior design environments; the structural system; the mechanical, electrical, plumbing and fire protection systems; as well as, the vibration attributes of the existing built spaces for the for the use of the MRI and PET/CT medical equipment in the suite. The team has evaluated the space using the three equipment manufacturers UNT HSC shared with the team. The three manufacturers are: GE, Phillips, and Siemens. Please refer to Section 7 for manufacturers' information.

The team is using a combination of the most stringent requirements of the three equipment manufacturers that the UNT HSC team is considering. Our evaluation for the purpose of this study, the existing space is totally demolished and rebuilt for the specific purpose of this Research Imaging Suite Feasibility Study.

Architectural and interior design Findings:
The space is first floor of the CBH Building is suitable for a Research Imaging Suite. The existing space layout is desirable for the loading of the MRI and PET/CT equipment. Understanding that the floor structure will need to be reinforced. See Section 5d. And the floor to floor height of 16'-9" is ample for the infrastructure needed for the proposed equipment. The geometry of the space and square footage appears to be able to house the program of requirements developed, see Section 4 Test Fits.

UNT HSC also asked the team to consider the option of phased construction. Phasing the construction will impact the use of imaging magnet in the existing suite, as well as Phase I of the Research Imaging Suite when Phase II is constructed. The layout of the phased plan also adds operational challenges for the Research team.

The existing structural system of the CBH given the MRI and PET/CT equipment loads and vibration requirements additional structure will require to stiffen the slabs and carry the equipment loads. The new structure will be steel and concrete with steel rebar to minimize the magnetic material to allow world class research to be conducted in this suite.

The existing mechanical, electrical, plumbing and fire protection systems have been reviewed. All existing systems are considered to be removed, demolished and new for the purposes of this study.

The mechanical system will be designed for the equipment and operational loading which includes dedicated air cooled chillers for the equipment rooms. As well as, a quench exhaust system to the exterior for the MRIs.

The electrical system will be upgraded to include the additional electrical loads of the equipment. As well as an in-floor conduit system from the magnet to the control room the MRIs. The specific requirements, including the need and generator load, will be reviewed once UNT HSC selects the final equipment manufacturer.

The fire protection system in the space will be replaced and, in the MRI, and PET/CT Suite will require a pre-action system designed in copper pipe and coordinated with the selected equipment manufacturer.

The Gensler Team's findings represent general understandings of the space for use with any of the three equipment Manufacturers. UNT HSC selection of the specific equipment manufacturer will allow specific loads to be developed.

The schedule for this project was shared by UNT HSC to be moved in and operational by July of 2020. This represents a significant opportunity for the UNT HSC Team and the Team of consultants and contractor to work together to find an optimal solution. Currently the UNT HSC teams' selection of the specific equipment manufacturer, position on phased construction, and consultant contract timing are on the critical schedule path for this project.

Sincerely,

Gensler
Michael B. Ufer AIA, LEED AP

CC:
Team

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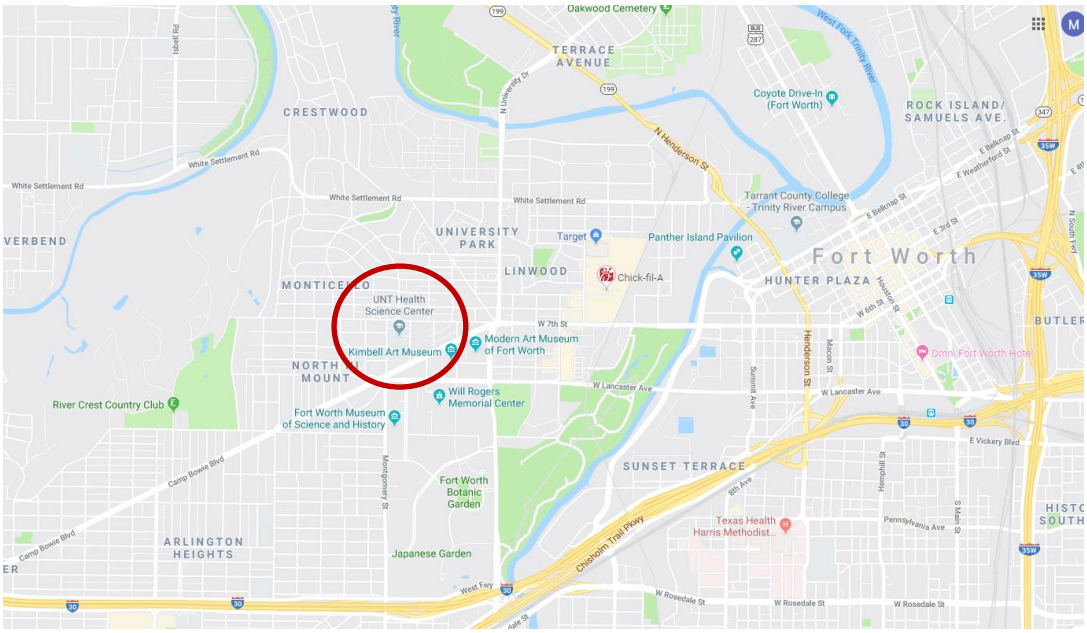
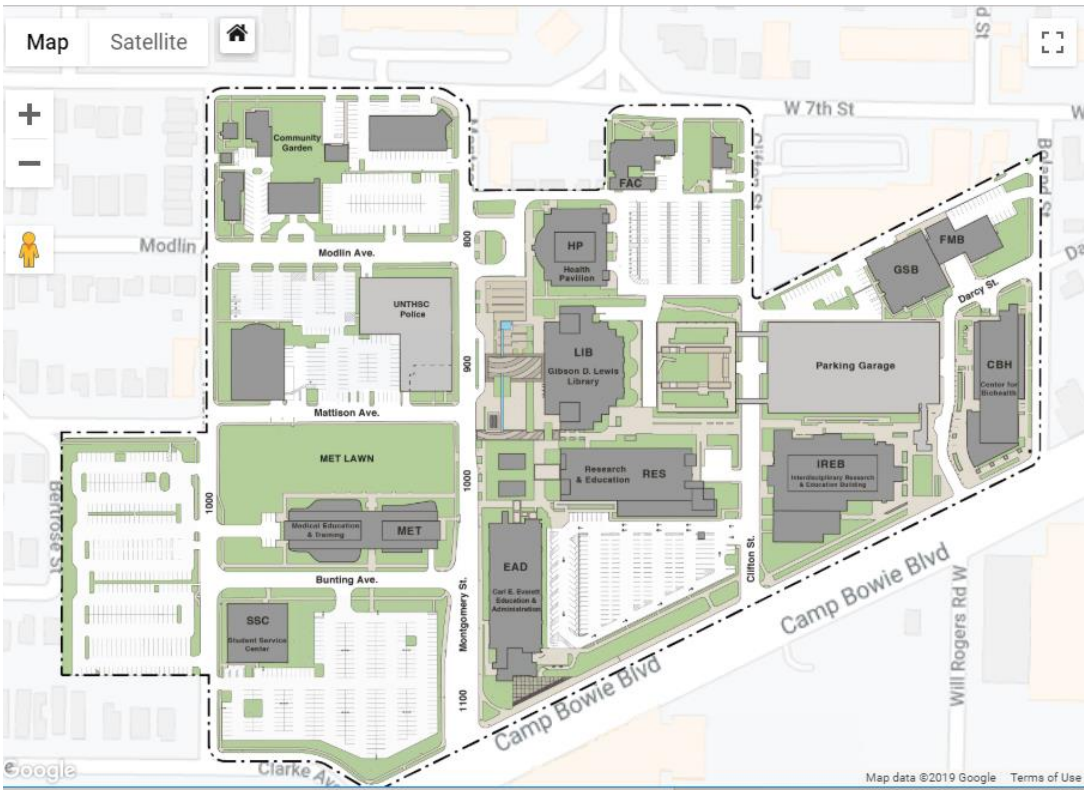
2. Understandings and Existing Conditions

Location



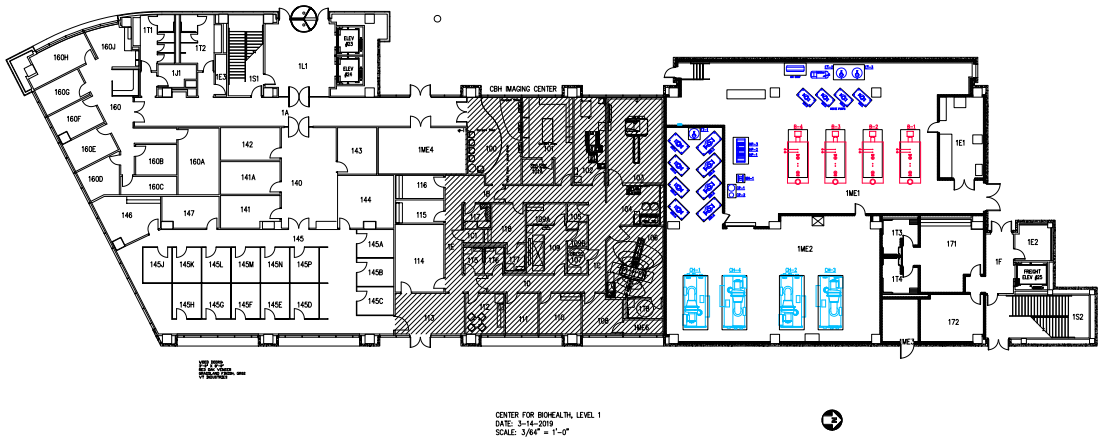
City of Fort Worth, Texas



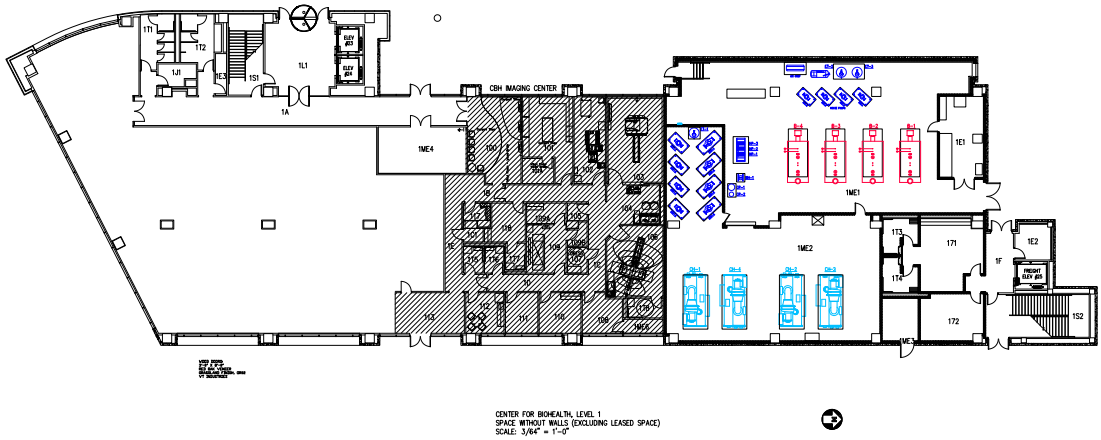
UNT Health Science Center Campus Map
UNT Health Science Center - Center for BioHealth (CHB)

This Feasibility Study is for the first floor of the UNT Health Science Center – Center for BioHealth. The first floor is currently occupied by two users, The UNT HSC administration offices to the south, and Envision Health an imaging center. The remainder of the first floor

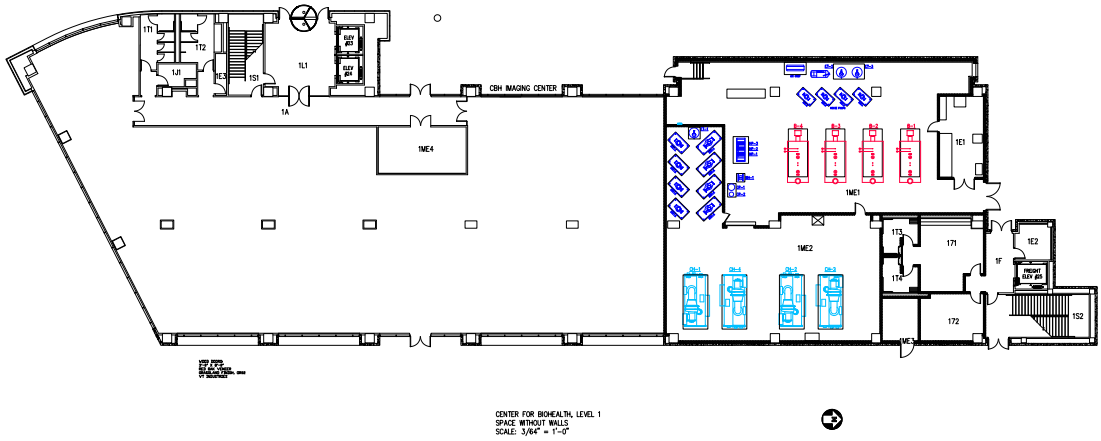
is a mechanical area and service entrance. The new UNT HSC Research Imaging Suite will occupy both occupied spaces for a total of 11,027 square feet.



UNT HSC - CBH – Existing Occupied First Floor



UNT HSC - CBH – Potential Phasing for the First Floor



UNT HSC - CBH –First Floor

Existing Conditions

3. Program of Requirements

The below program of requirements was developed in a meeting with Dr. O'Bryant and his team on 15 August 2019.

Overview of project spaces:

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CBH Building Program for Requirements
12 August 2019 **v2 15 August 2019**

UNT HEALTH SCIENCE CENTER

DIAGNOSTIC IMAGING

FUNCTIONAL ELEMENT	QTY	UNIT SF	PROPOSED TOTAL SF	COMMENTS
PUBLIC SPACES				
Main Participant Waiting	15	20	300	15 waiting seats plus circulation
Sub Participant Waiting	24	20	480	3 areas, 8 waiting seats
Nourishment Center	1	20	20	
Public Toilets	2	60	120	Mens and Womens, potentially use existing toilets
Wheelchair storage	1	40	40	
Reception Desk	1	65	65	1 front desk staff.
Consult Room	2	110	220	An area for consul-tation
SUBTOTAL			**1245**	

UNT HSC expressed a desire for operations scheduling management system to optimize the use and efficiency of the suite. UNT to direct the Gensler Team.

PARTICIPANT SPACES				
Changing area lockers + subwait	3	220	660	Separate Male and Female, Keyed lockers with override master key
Changing Room	2	35	70	
Changing room ADA	2	60	120	
Changing room toilet	2	60	120	
Pre Procedure Patient Care Area / Observation space	2	80	160	Min, 80 SF. 2'8" min clear at each side and at foot. Tracer ECG, vitals labs in other HSC
Patient toilet	2	60	120	unisex
Nourishment counter	2	40	80	Counter separate from the handwashing sink, workcounter, storage.
Patient injection room (PET)	3	100	300	A sheiled room with dedicated toilet to accommodate radioactive waste. Handwash station, recliner chair. Configured to minimize patient movement. Light and audio for use. Positive distraction desired.
Patient cooldown room (PET)	1	100	100	A sheiled room with dedicated toilet to accommodate radioactive waste. Handwash station, recliner chair. Configured to minimize patient movement.
Hot Toilet (PET)	2	70	140	Both ADA - Mens and Womens

SUBTOTAL			**1870**	
UNT Stated that the space must be participant experienced based.				
DIAGNOSTIC IMAGING TREATMENT ROOMS				
PET/CT	2	400	800	
PET/CT Equipment room	2	80	160	
PET/CT Control room	2	80	160	
MRI - 3.0	2	550	1100	4' on each side of the table.
MRI Control Room	2	160	320	
MRI Equipment room	2	180	360	
MRI Vestibule	2	80	160	Handwash sink
SUBTOTAL			**3060**	
CLINICAL SUPPORT				
Nurse Station	2	70	140	Designed to provide visual observation of all patient care stations. In view to injection rooms and sub-waiting areas.
Documentation / Team touchdown	6	65	390	
Private Office	2	110	220	
Medical records storage	1	110	110	if not on EMR
Reading Room	1	110	110	
Emergency Equip Alcove	1	40	40	Alcove for emergency equipment cart.
Hand washing station	3	10	30	At nurses station
Medication Prep room	1	120	120	Workcounter, hand-washing station, lockable ref, locked storage for controlled drugs, sharps containers.
Hot Lab	1	110	110	Sink, Counter, Storage to accommodate preparation of contrast media.
Clean supply room	1	80	80	A clean workroom or clean supply room shall be provided.
Soiled workroom	1	80	80	A soiled workroom or soiled holding room shall be provided.
Hot soiled holding	1	80	80	A contaminated soiled holding are shall be provided and operationally integrated to minimize incidental exposure to ionizing radiation by persons providing environ. Svcs in the PET suite. Near back door for service through secure vestibule.
Equipment Storage room	1	120	120	General
Stretcher/Wheelchair Storage	1	80	80	Space for storage of stretchers and wheelchairs shall be provided out of the direct line of traffic.

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CBH Building Program for Requirements
12 August 2019 **v2 15 August 2019**

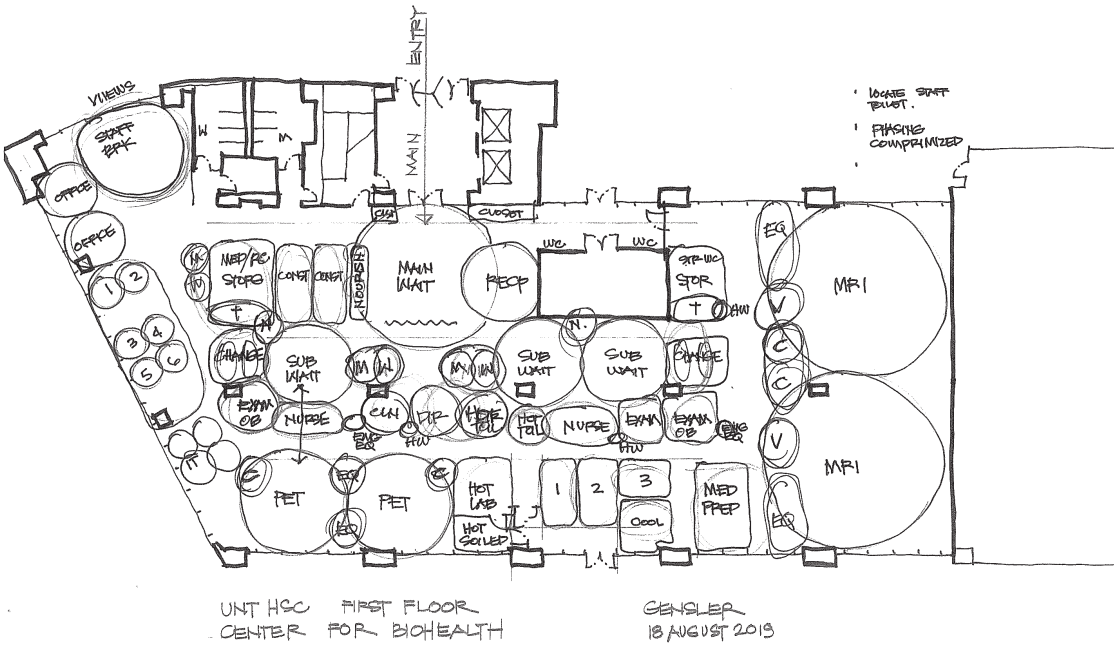
UNT HEALTH SCIENCE CENTER

Environmental Services Closet	1	60	60	
Imaging IT Closet	1	80	80	size and need to be confirmed, could be in HSC
SUBTOTAL			**1850**	
Staff Support				
Staff toilet	2	60	120	
Staff Breakroom	1	150	150	User expressed desire for dedicated staff lounge.
Changing room	0	60	0	
SUBTOTAL			**270**	
			8295	
SUITE GROSSING FACTOR			**1.50**	
TOTAL AREA, GSF			**12443**	Note only 11,073 available

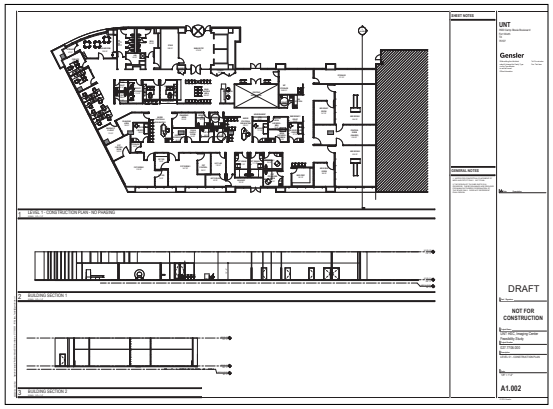
4. Test Fits

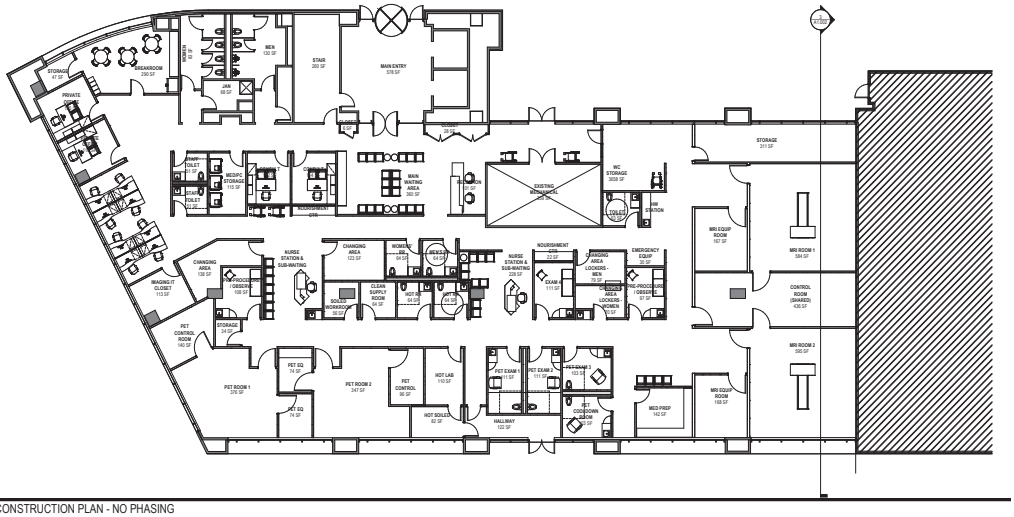
The following design diagrams and floor plan test fits are done using the 15 August 2019 program of requirements developed with the user.

a. Option 1 – Full Floor Adjacency Diagram



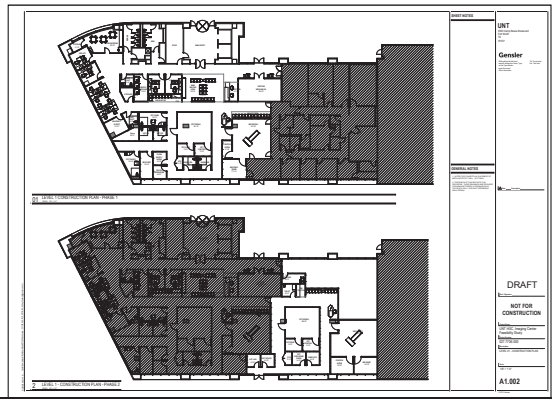
b. Option 1 - Full Floor



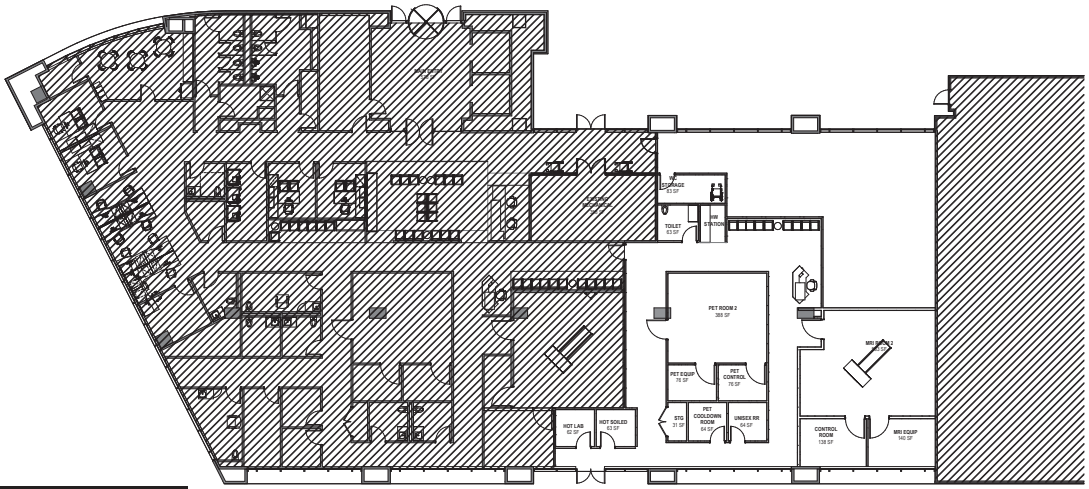


1 LEVEL 1 - CONSTRUCTION PLAN - NO PHASING

c. Option 2 - Phased Floor



01 LEVEL 1 CONSTRUCTION PLAN - PHASE 1



2 LEVEL 1 - CONSTRUCTION PLAN - PHASE 2

d. Manufacturers (See Section 7 for information from all three manufacturers)
Details from Manufacturers

5. Narratives, Charts, and Calculations

a. Architectural

This Feasibility Study is a review by the Gensler Team of the six-story Center for Bio Health (CBH) on the University of North Texas, Health Science Center (UNT HSC) in Fort Worth, Texas. The team has specifically reviewed the First Floor area of 11,027 square feet of the CBH building for the use as an Alzheimer's Imaging Research Suite for Dr. Sid O'Bryant, that will feature two, 3T Magnetic Resonance Imaging (MRI) suites and two Positron Emission Tomography – Computed Tomography (PET/CT) suites. The PET/CT will include a radioactive isotopes laboratory for this research. The location of the Research Imaging Suite in the CBH Building has easy access for participants and staff to the UNT HSC Campus and to the parking garage and street parking adjacent to the site.

The Gensler Team has had several meetings with the UNT HSC Team. The combined team developed a vision for the Research Imaging Suite that is participant based, focused on the recruitment and retention of the participants of the UNT HSC - NIH Grant for Alzheimer's research study. The team also developed a program of requirements for the suite that layout the spaces needed for a successful study environment that complies with the grant requirements. See Section 3.

The Gensler team visually reviewed the CBH first floor of the CBH, noting the existing space is occupied by two tenants: UNT HSC Administration Suite to the South and Envision Imaging Center to the North, which includes, one 1.5T MRI suite and one PET /CT suite.

The Gensler teams' findings of the existing first floor of the CBH building included architectural and interior design environments; the structural system; the mechanical, electrical, plumbing and fire protection systems; as well as, the vibration attributes of the existing built spaces for the for the use of the MRI and PET/CT medical equipment in the space. Noting that only visual exploratory discovery of the space and review of "as built" drawings were done in this exploration. The team has evaluated the space using the three manufacturers UNT HSC shared with the team. The three manufacturers are GE, Phillips, and Siemens. Please refer to Section 7 for manufacturers' provided information. The team is using a combination of the most stringent requirements of the three equipment manufacturers that the UNT HSC team is considering.

Our team's evaluation is of the existing space as a shell. No existing materials or system in the existing buildout will be reused. Reviewing the existing space as totally demolished and rebuilt for the specific purpose of this Research Imaging Suite Feasibility Study. The review notes these findings: architectural and interior design of the space is suitable and the existing first floor location is desirable for the move in / hoisting of the MRI and PET/CT equipment. As well as, the floor to floor height of 16'-9" is ample for the infrastructure needed for this equipment. The geometry of the space and square footage appear to be able to house the program of requirements developed, see Section 5 Test Fits.

UNT HSC team also asked the Gensler team to consider the option of phased construction. Sharing that the Envision suite is phase II of construction. See Section 4.b. Our initial findings share that further study is needed for phased construction given the Envision suite is to remain in operation. Construction of the UNT HSC Research Imaging Suite may impact the tests being done and requires study of the hours of construction. The potential for after-hours construction represents a potential solution but will impact the construction costs.

As well as, If the Research Imaging Center Phase II buildout, may not allow the Phase I suite to remain operational due to construction vibration and noise. Phase II may require nights and weekend construction as ANY construction in the proximity of the existing imaging MRI will impact results.

The existing structural system of the CBH has been reviewed (see calculations and studies in Section 6) and given the MRI and PET/CT equipment loads and vibration requirements additional structure will need to be added to the areas underneath this new equipment. Noting that a comparison between manufactures will further define the needed structure. The new structure will be steel and concrete with steel rebar and is only to meet the structural and vibration load requirements for world class research to be conducted in this suite. The steel structure to be coordinated with the equipment manufacturer to provide optimal performance.

The existing mechanical, electrical, plumbing and fire protection systems were reviewed. Once UNT HSC selects the manufacturer for the imaging systems equipment, further study will need to be done to establish if any of the existing systems can be reused. For the purposes of this study all tenant area systems should be considered demolished and new.

The mechanical system will be added for the additional equipment and operational loading which includes air cooled chillers. As well as a quench exhaust system to the exterior for the MRIs.

The electrical system will be upgraded to include the additional electrical loads of the equipment as well as an in floor conduit system for the controls for the MRIs. The specific requirements, including the need and generator load, will be reviewed once UNT HSC selects the final manufacturer. UNT HSC desires to use occupancy sensors (where applicable) and LED light fixtures throughout the suite with specialty ceiling elements in the MRI suites.

in the MRI and PET/CT suite the fire protection system will be a pre-action system designed in copper pipe and coordinated with the selected manufacturer.

The team has considered vibration of the suite and will coordinate with the structural system requirements of the equipment selected. Please see Section 6.

b. Project Kick-off and Visioning Session

Information developed with the UNT HSC Team on 8 August 2019.

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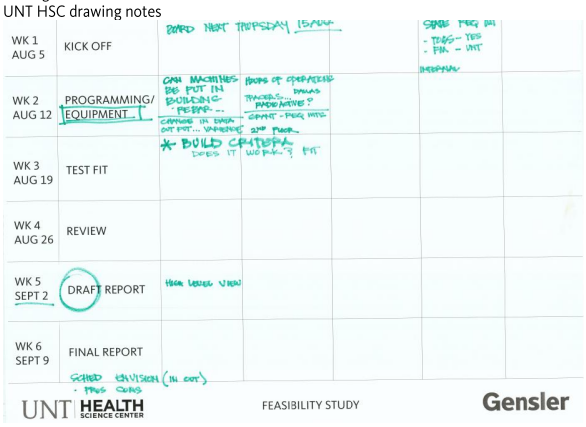
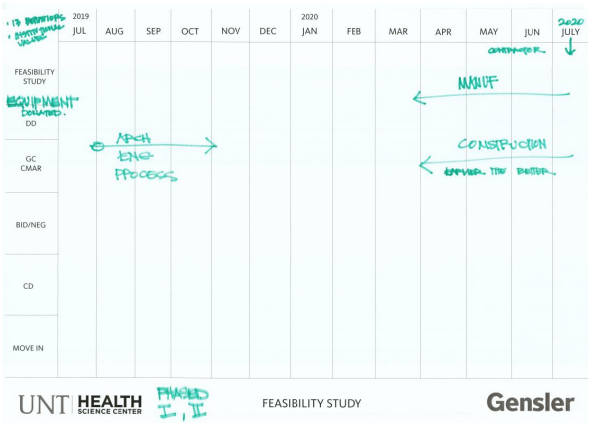
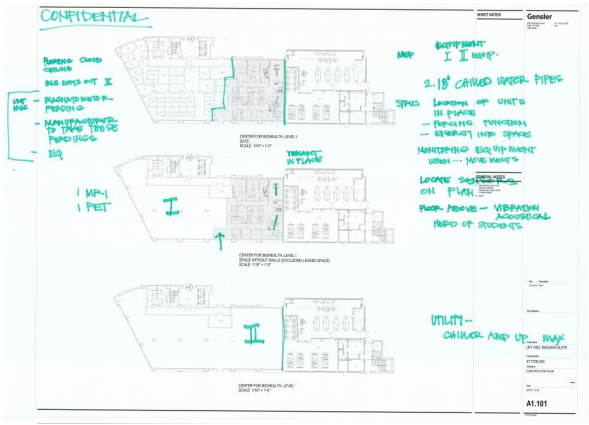
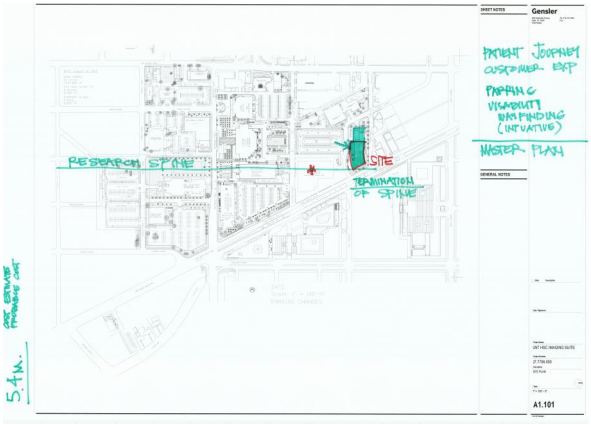
08 August 2019
UNT HSC drawing notes

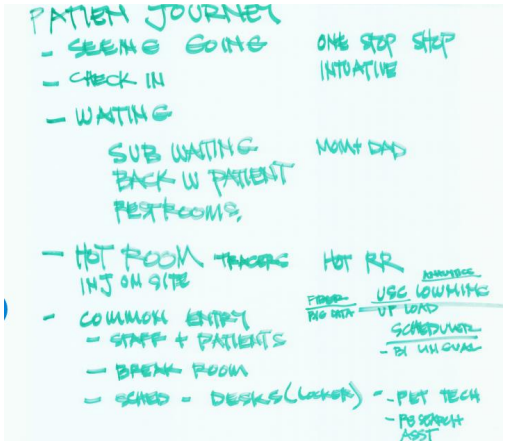


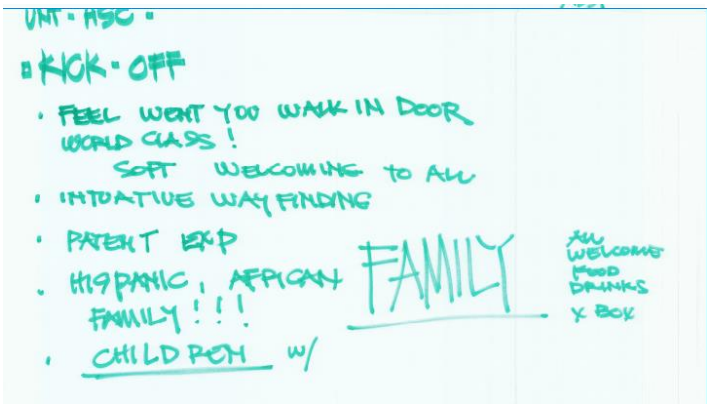






Design vision and participant journey





Conclusions:

1. The entry sequence for the participants in the research study are developed with ease of movement and use of the amenities in the space. Taking into consideration nourishment of the participants and their family members with them, restroom facilities and positive distractions in the suite.
2. The circulation for participants is separate. Based on test compliance and dignity of the participants. Noting the Hot lab will have hot toilet faculties and a cool down space.
   a. UNT HSC shared that the finishes or the IREB should be considered in this design.

c. Interior Environments

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The interior environments should be warm and welcoming with a modern design feel. The finishes will be appropriate for the use and durability is of primary importance. Taking cost and operational maintenance into consideration.
The entry lobby will have major signage and the suite will include branding and graphic wayfinding for ease of navigation.

d. Structural

DatumRios
Evaluation

NEW IMAGING EQUIPMENT

The new level one imaging center will house two new MRIs and two new PET CTs. The equipment weights, which were provided by cutsheets from GE and Phillips, are as follows:

GE 3T MRI magnet weight	16,790 lb
GE 3T MRI total equipment weight	28,980 lb
Phillips 3T MRI magnet weight	13,448 lb
Phillips 3T MRI total equipment weight	19,335 lb
GE PET / CT equipment weight	10,916 lb
Phillips PET CT equipment weight	10,882 lb

In addition to the equipment weights, both the MRIs and PET CTs have floor vibration limits. Based upon the GE and Phillips data, the peak velocity for the lowest vibration mode at the MRIs shall be equal to or less than 800 micro inches per second. The peak velocity for the lowest vibration mode at the PET CTs shall be equal to or less than 1,900 micro inches per second.

EXISTING LEVEL 1 FLOOR SYSTEM

The existing level 1 floor system, which is above a crawl space, is cast-in-place concrete consisting of a 4.5" slab over 7" x 24.5" (= 20" deep pans + 4.5" slab) joists at 5'-0" on center and 48" x 24.5" girders. The calculated floor system's natural frequencies in the 33' and 39' bays are 8.77 Hz and 11.6 Hz respectively. See figures 1 and 2 the mode shapes. The same analytical model can be utilized to estimate the floor vibration responses from a moderate walking pace and the results of this analysis are shown in figure 3. The vibration responses are smaller in the 33' bay since it is stiffer in comparison to the 39' bay. Based upon its position in plan, we anticipate MRI room 1 will be have the largest vibration responses in comparison to MRI room 2, PET room 1, or PET room 2.

Sources of floor vibration obviously extend beyond occupants walking. Mechanical equipment and / or ground motions from nearby roadways also contribute. Site vibration measurements are required by each manufacturer to quantify the in-place floor vibration responses.

NEW STRUCTURAL RETROFITS

Due to both the magnet weight and vibration criteria, new structural retrofits are anticipated below the existing level 1 framing. At the two MRI rooms, the retrofit will consist of new concrete beams to support the in-place joist framing. In addition, localized slab reinforcement will be necessary to support the magnet base loads. This concept is shown in figure 5.

Structural retrofit may also be necessary below the two new PET CTs. A similar retrofit concept can be utilized and is shown in figure 4.

The final retrofit scheme must be coordinated with in-place and proposed MEP systems that extend through the existing crawl space. This will require adjustments to MEP systems and / or the locations of new structural elements.

SITE VIBRATION TESTING

Phillips conducted level 1 floor vibration measurements at two locations on August 30th. The peak acceleration measured divided by the peak acceleration limit was only 7 percent. While the submitted data are positive, they also require more study during the project's design phase. The measured

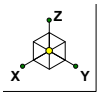
accelerations did not address walking excitations within the space and these will increase the 7 percent value noted above. Further, were the mechanical pumps, etc. in the adjacent mechanical room running when these tests were taking place? If not, these too will likely increase the measured accelerations in the level one structure. Lastly, the site vibration assessments by GE and / or Siemens may reach different conclusions based upon different imposed excitations (walking (footfall), MEP equipment, ground motions, etc.) in the level one structure and / or the locations where the vibration measurements are taken.

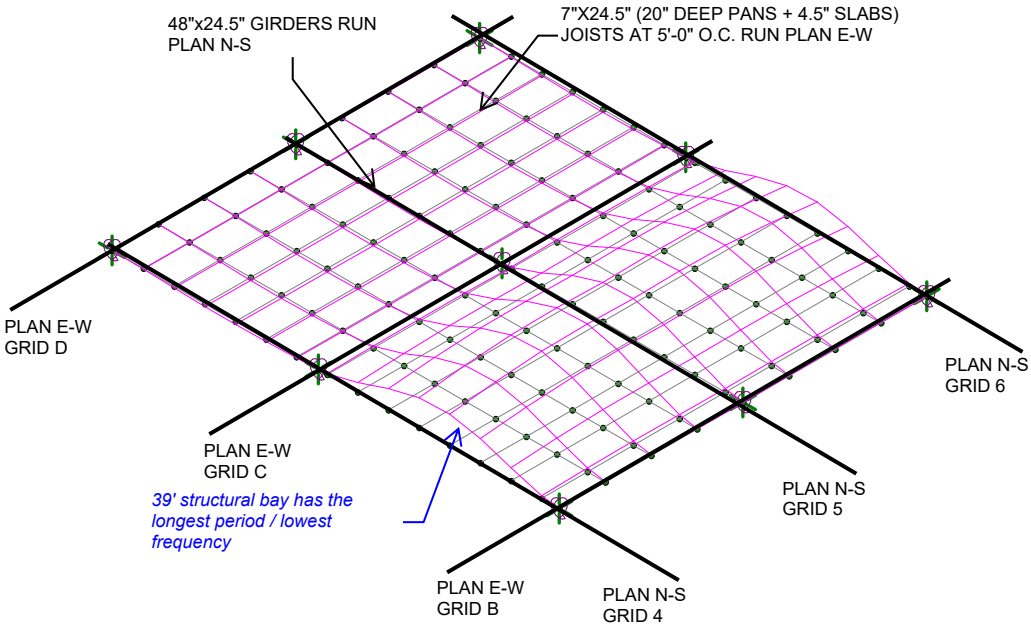
NEW EQUIPMENT INSTALLATION

The existing imaging equipment shall be removed prior to installation of the new imaging equipment. Due to the magnet weight, the travel paths below the magnets will likely require shoring from the existing level 1 slabs to the crawl space gravel below. The travel dolly below the magnet shall have a wide wheel base in each direction (5'-0" +) to minimize imposed bending stresses during the moving process. Floor protection below the dolly should be installed and its layout consistent with successful past projects.

CONTIGENCY

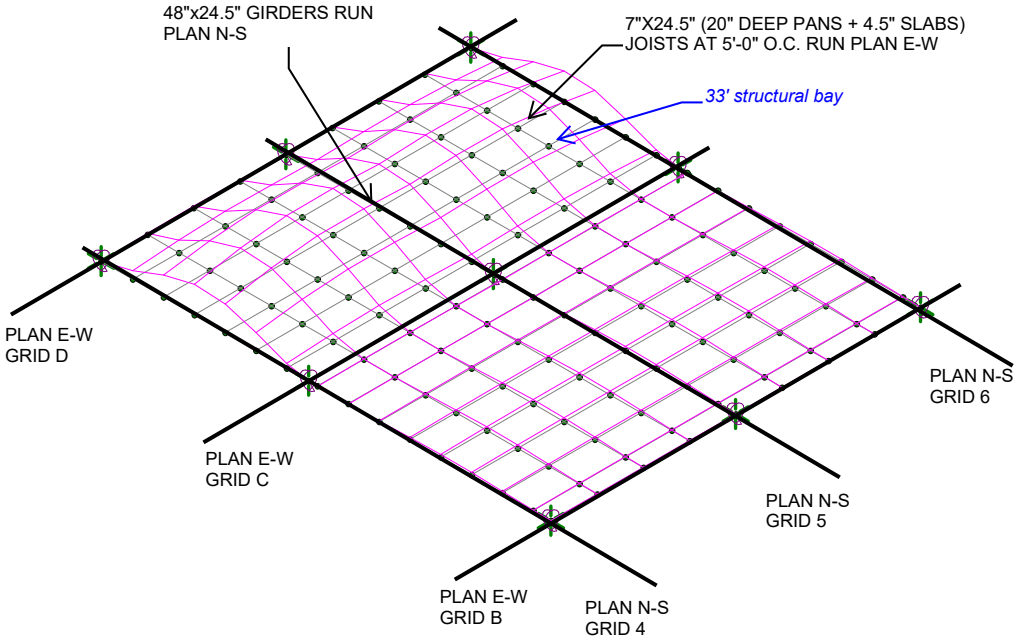
We recommend a contingency be held for the architecture and engineering team that is separate from the contingencies of the Owner and general contractor. Given the early phase of this project, contingencies are both expected and necessary. Once a manufacturer is selected, their site-specific drawings will likely have criteria and / or details that increase project scope and therefore project cost.





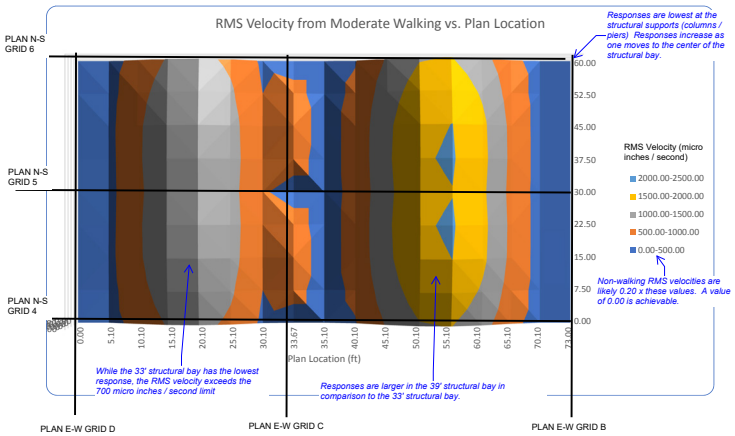
Mode 1 Period = 0.114 seconds

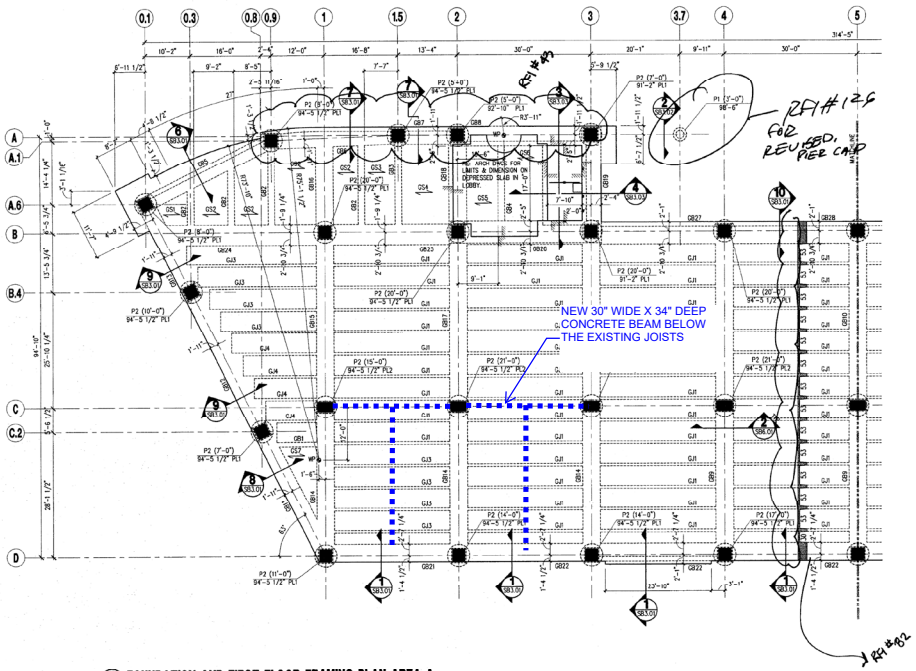
Mode 1 Frequency = 8.77 Hz



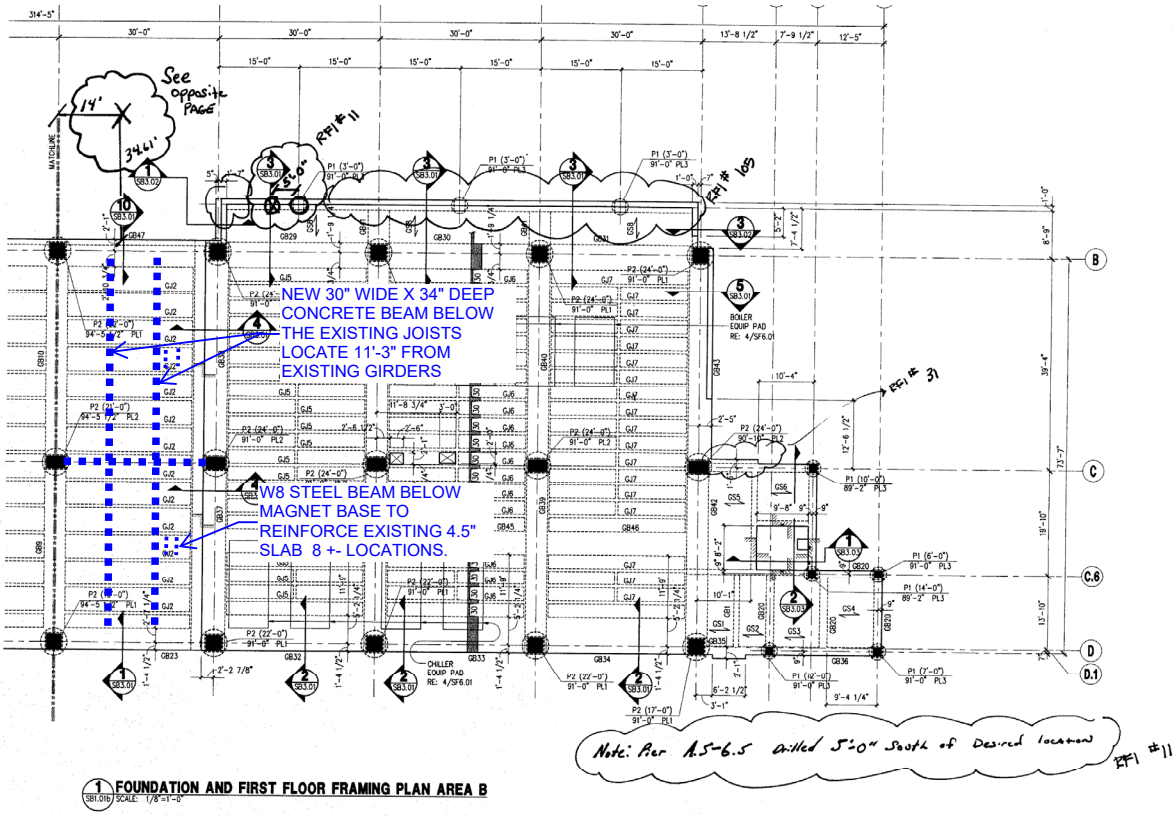
Mode 2 Period = 0.086 seconds

Mode 2 Frequency = 11.6 Hz





1 FOUNDATION AND FIRST FLOOR FRAMING PLAN AREA A
S81.01a SCALE: 1/8"=1'-0"



1 FOUNDATION AND FIRST FLOOR FRAMING PLAN AREA B
S81.01b SCALE: 1/8"=1'-0"

SSA
e. MEP / FP

a. Mechanical
Mechanical System Design

Code Analysis

The following Standards and Codes, with addendums shall be used on this project for mechanical and plumbing design and construction:

1. ASHRAE 62-2013, Ventilation for Acceptable Indoor Air Quality;
2. International Energy Conservation Code – 2012
3. International Mechanical Code – 2012
4. 2012 Edition of the International Building Code
5. All applicable 2012 Codes from the National Fire Protection Association (NFPA);
6. The University of North Texas Guideline Specification.

Building Cooling and Heating Block Loads

1.	Estimated Cooling Load	60 tons
2.	Estimated Heating Load:	300 MBH

Note: Cooling and heating loads are estimates. Both cooling and heating loads will be dependent on the options selected for the MRIs and the PET CT Equipment and if they will be provided with air-cooled or water-cooled equipment.

Chilled water and hot water piping will connect to the 3" taps provided for each system within the level 1 renovation space.

Energy Consumption Monitoring
UNT to confirm desire for this

Consumption of thermal utilities (chilled water, heating water) shall be measured with flow and temperature measurements. The building control system shall calculate and monitor building energy consumption of the thermal utilities.

Consumption of thermal utilities (chilled water, heating water) shall be measured with flow and temperature measurements. The building control system shall calculate and monitor building energy consumption of the thermal utilities.

Load Calculation Criteria

Design Conditions - Outdoor Design Conditions

Summer: (Based on 0.4% dry bulb and 0.4% Enthalpy conditions for Fort Worth NAS JRB, as published by ASHRAE)

Dry Bulb	=	100.4 °F
Wet Bulb	=	79.85 °F

Winter:

Dry Bulb	=	18.8 °F

Preheat coils will be selected on 10°F ambient air and no pickup factor will be applied.

Indoor Design Conditions

Temperature and Relative Humidity Design Conditions

Office Spaces
Summer:
Dry Bulb = 75 °F +/- 2 °F
Relative Humidity = 50%
Winter:
Dry Bulb = 70 °F +/- 2 °F

PET CT
Summer:
Dry Bulb = 72 °F +/- 2 °F
Relative Humidity = 30-60%
Winter:
Dry Bulb = 72 °F +/- 2 °F
Relative Humidity = 30-60%

MRI/MRI Equip. Room
Summer:
Dry Bulb = 70 °F +/- 2 °F
Relative Humidity = 40-70%
Winter:
Dry Bulb = 68 °F +/- 2 °F
Relative Humidity = 40-70%

Telecommunications Room
Summer: (No heating)
Dry Bulb = 72 °F +/- 2 °F

Electrical Equipment Rooms
Summer: (No heating)
Maximum Dry Bulb = 80 °F

Mechanical Equipment Rooms
Summer:
Maximum Dry Bulb = 80 °F
Winter:
Dry Bulb = 60 °F (minimum)

Occupants

Offices: Number of occupants to be determined
Imaging Spaces: Number of occupants to be determined
Occupant Heat Rejection:
Sensible = 250 Btuh/person
Latent = 200 Btuh/person

U-Values for Building Components

1. The following "R"-Values will be the minimum criteria used for calculating HVAC loads:
a. Exterior Walls Minimum R-13
b. Roof Minimum R-20
c. Window Glass– (Vision) Minimum "U" = 0.46
Minimum Solar Heat Gain Coefficient = 0.25

Building Occupancy

The mechanical systems will be designed to operate 24 hours per day.

Building Ventilation

Ventilation Air Supply
1. As per IMC ventilation requirements:

		People Rate	Area Rate
a.	Offices/ Conference Rooms	5 CFM/person	0.06 CFM/ft2
b.	Multi-use Room	7.5 CFM/person	0.06 CFM/ft2
c.	Imaging spaces	5 CFM/person	0.06 CFM/ft2
d.	Lobbies	7.5 CFM/person	0.06 CFM/ft2
e.	Storage Rooms		0.12 CFM/ft2

Exhaust
1. As per IMC ventilation requirements:

a. Women's and Men's Rooms 10 ACH or
50 CFM/Fixture (WC or urinal)
70 CFM/Fixture (WC or urinal)
heavy use
b. Janitor's Closet Min 1.0 CFM/ft2 or 10ACH
c. Copy/Print rooms Min 0.5 CFM/ft2
d. Kitchenettes Min 0.3 CFM/ft2
e. Locker/Dressing rooms Min 0.25 CFM/ft2
f. Hot Lab/Hot Rooms Min 6 ACH

Noise Criteria

The noise and sound requirements shall be reviewed by Acoustical Consultant and will be translated into design requirements for the design team to implement.

Heating System

System Description
The heating water system will utilize the existing CBH boilers. The system will consist of 100% redundant base mounted, double suction circulating pumps for the reheat piping system, preheat coils, and domestic water heaters. There are existing 3" taps in the level 1 area that will feed the preheat and reheat coils for the level 1 renovation.

Isolation valves for sizes 2" and smaller will be ball valves, and for sizes 2-1/2" and larger, will be butterfly valves.

Heating water piping will be Schedule 40 black steel on 2-1/2" and larger and copper Type L on 2" and smaller.

Chilled Water System

System Description
The chilled water system will consist of existing water-cooled centrifugal chillers with roof mounted cooling towers. Each chiller is sized at 500 tons per chiller and there are 4 chillers currently in the CUP. The temperature of the chilled water to be utilized as the design temperature is 42°F with a 16-degree delta T. There are existing 3" taps in the level 1 area that will feed the cooling coils for the level 1 renovation.

Existing building chilled water pumps with variable speed drives are provided in the level 1 CBH mechanical room.

Isolation valves for sizes 2" and smaller will be ball valves, and for sizes 2-1/2" and larger, will be butterfly valves.

Chilled water piping will be Schedule 40 black steel on 2-1/2" and larger and copper Type L on 2" and smaller.

If it is determined, that either the of imaging manufacturers and the owner would prefer to put the cooling on the chilled water system, then a separate process chilled water system shall be provided. This system will be located in an additional mechanical room that is sized at 20 foot by 10 foot. This room would house two 100% redundant, plate and frame heat exchangers, and two process chilled water pumps. Flowmeters shall be provided on the PCHW and CHW side of the HXs.

System Criteria
The chilled and heating water flow to the coils in the air handling units will be controlled utilizing two-way control valves.

Supply Air Systems

Air Handling Unit System

System Description
Air handling units serving the level 1 imaging spaces will be 20-30% outside air, variable air volume, factory-fabricated, custom air handling units and will include the following components:

- MERV 13 Pre-filters
- Hot Water Preheat Coil
- Chilled Water-Cooling Coil
- Fan Array Supply Fans – Draw-thru configuration
- Inertia Bases and Vibration Isolation
- Fan Discharge Side Sound Attenuators
- Variable Frequency Drive.

Fan array (N+1 redundancy for supply air fans) is planned for the AHU system to maintain airflow during a single fan failure. The system will be provided with either a single or double inline return fans. Per IECC 2015, economizer is required and therefor the AHU system will be provided with the applicable controls and the OA and REA ductwork shall be sized accordingly.

In the imaging suite, a single duct variable air volume air system will be utilized, with medium pressure galvanized ductwork to transport the supply air from the air handling units to the airflow control devices supplying air to diffusers serving each space. The air from the imaging suite will be recirculated to the air handling unit via a plenum return system provided this suite will be a B-occupancy.

Low pressure ductwork will be utilized downstream of airflow control device to transport supply air to the spaces.

Air Handling Unit Design Criteria

The cooling coils serving the air handling units will be sized based on a maximum face velocity of 375 feet per minute. Individual cooling coils will be six rows or less with a maximum of 10 fins per inch consisting of copper fins on copper tubes.

Air handling unit fan motors will have a maximum speed of 3,600 rpm. Fan arrays shall be served by redundant VFDs without bypasses.

AHU preliminary size is 22,500 cfm supply air and 5,000 cfm maximum of outside air in normal mode. This is assuming all of the level 1 imaging spaces will be served by the AHU.

Fan Coil Units (If applicable)

If determined during the design process that certain spaces would be better served by a fan coil unit in lieu of the AHU, then the following will apply. A single zone fan coil unit shall be provided with a VFD driven or ECM motor, MERV 8 filters, heating and cooling coil. The fan coil unit shall be a vertical fan coil unit and shall be located within the space or in an adjacent fan coil mechanical room.

Exhaust Air Systems

System Description

A separate exhaust system will be provided to serve the hot labs, a separate system for the general exhaust and a separate exhaust for the MRI purge exhaust. The exhaust fans will consist of single fans without redundancy unless requested by the owner. The discharge location for the exhaust system for the Hot labs and MRI purge will be either routed to the roof or located at a location on level 1 where it is deemed acceptable.

The MRI purge fan system will be normally off and will engage during an MRI purge event.

Ductwork will be constructed of galvanized steel.

Preliminary sizes for the exhaust fans are as follows:

Hot Exhaust	1,500 cfm
MRI Purge Exhaust	2,000 cfm
General Exhaust	1,750 cfm

Control Systems

System Description

A building temperature control/building automation system will be provided for space temperature control and monitoring of defined environmental conditions.

Building Temperature Control/Building Automation System:

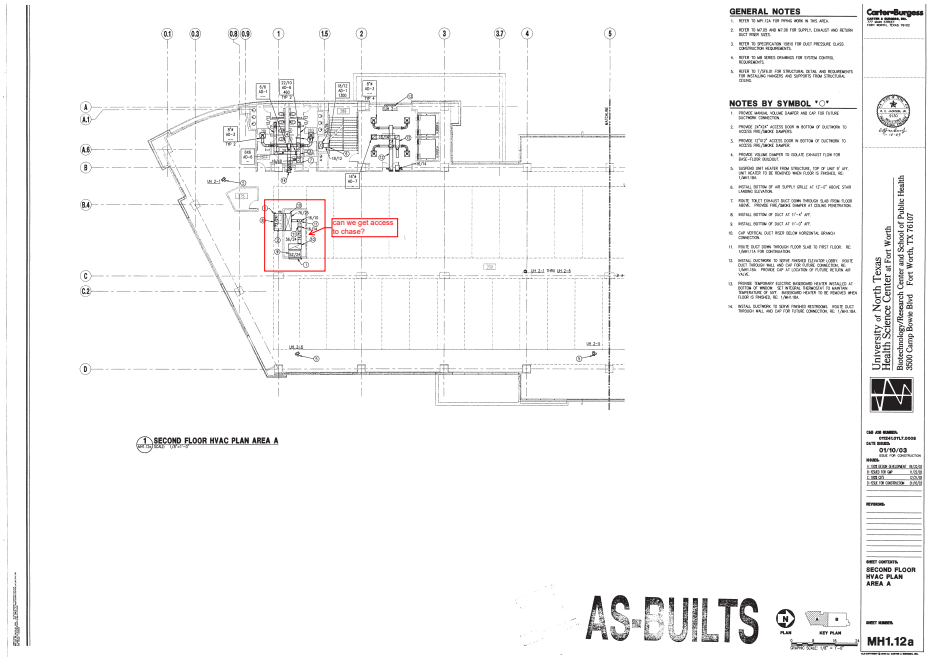
Temperature control/building automation will be accomplished utilizing a BACnet direct digital control system that is in full compliance with ANSI/ASHRAE Standard 135.

Actuation of dampers, control valves, and air terminals will be accomplished utilizing electronic actuation for the majority of devices.

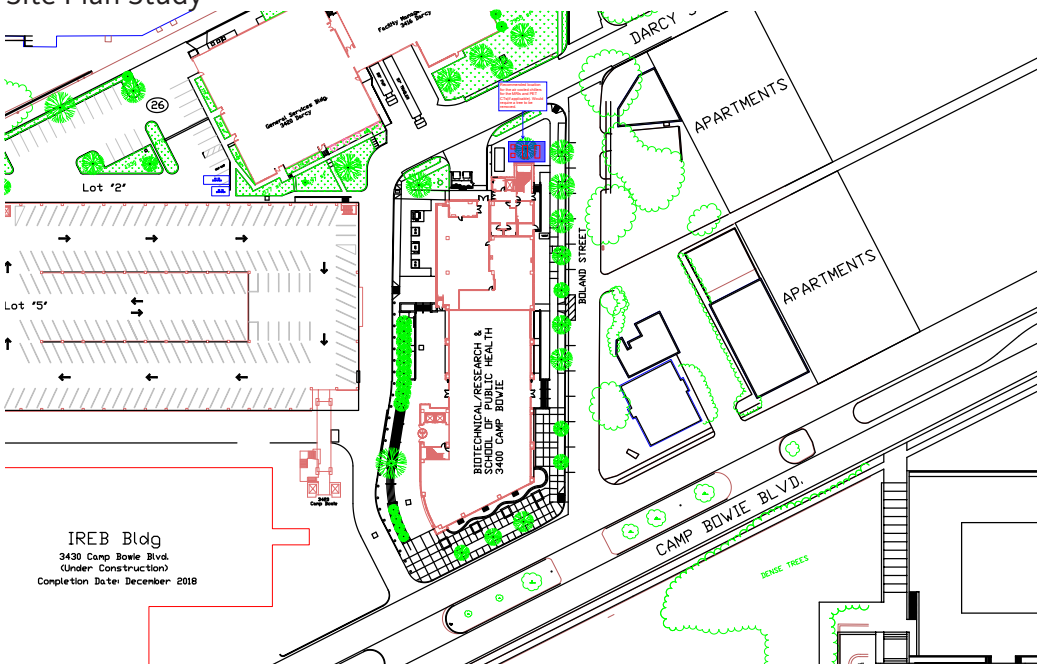
The building temperature control system actuators will be electric, and no control air system is anticipated.

The building automation system will be used for the lighting control.

Level 2 Core



Site Plan Study



b. Electrical

Electrical System Design

Code Analysis

All electrical systems will be designed and constructed in accordance with the following codes and standards.

1. 2014 Edition of the National Electric Code
2. 2012 Edition of the International Building Code
3. 2012 Edition of National Fire Protection Association (NFPA)
4. Americans with Disabilities Act
5. International Energy Conservation Code 2015

Normal Electrical Distribution

Normal electrical service to the Center for Biohealth building (CBH) is derived from a pad mounted switch and transformer by Oncor located northwest of the building.

This transformer serves a 4000A switchboard “MSB” on the northwest corner of the central plant on the first floor of the building. There appears to be sufficient space in this existing switchboard to place a new 1200A circuit breaker to serve the new Imaging Suite on the first floor of the building

Normal power distribution shall originate at this new 1200A breaker in MSB and shall feed a new 1200A distribution panel that will serve a 480Y/277V lighting class panelboard for lighting, a 112.5kVA 480V-208Y/120V transformer and 400A two section, 208Y/120V branch circuit panelboard for receptacle and equipment needs.

Offices shall have at least 50% of the receptacles switched per ASHRAE 90.1 2010 and later standards via an accessory receptacle control pack that is tied into the lighting occupancy sensor controls.

Emergency Distribution

Emergency and standby power to the space will be as needed. Standby power is anticipated for any refrigerators, freezers, or critical lab equipment in the suite and shall feed down from panels 2CLA and 2CLB on the floor above. A new 208Y/120V panel may be provided should the quantities of branch circuits exceed the available spaces in panel 2CLA and 2CLB. Standby power is not anticipated for imaging equipment, equipment coolers, or office equipment in the space.

Egress lighting shall be served by single circuit, 2000W inverter fed from normal power distribution.

Lighting

Office areas, imaging areas, and laboratory areas will be provided with recessed 2’ X 4’ volumetric or prismatic lensed light fixtures with LED lamps. Lighting will be controlled via occupancy sensor with local override switch in all public areas. Lighting in the imaging rooms shall be dimmable for occupant comfort.

Corridors will be provided with a 2’ X 4’ recessed prismatic lensed fixture with tube LED lamps. Lighting will be controlled via occupancy sensor and local override switch.

New mechanical, electrical, and communications equipment rooms will be provided with chain

or pendant mounted, open industrial fixtures with wire guards with LED lamps. Lighting will be switched at the wall with no automatic off provision for safety of maintenance personnel per the exception in ASHRAE 90.1.

Fire Alarm System

An addressable fire alarm system exists within the building. The existing fire alarm system is manufactured by Notifier.

The fire alarm system buildout in the imaging suite will meet ADA and TDLR requirements for pull station and audible/visual notification devices. This system shall be an extension of the existing building fire alarm system with new initiation and notification device circuits and fire alarm power supplies as required to serve the new first floor buildout.

c. Plumbing

Plumbing and Fire System Design

Code Analysis

All plumbing systems will be designed and constructed in accordance with the following codes and standards.

1. 2012 Edition of the International Plumbing Code
2. 2012 Edition of the International Building Code
3. 2013 NFPA 101 - Life Safety Code
4. 2013 NFPA 13 - Automatic Sprinkler Systems
5. American Society of Sanitary Engineers Standards as applicable
6. American Society of Plumbing Engineers Data Book for design standards
7. Americans with Disabilities Act of 2010

System Descriptions

Domestic Cold and Hot Water

Domestic cold and hot water will be provided for all toilet rooms, emergency shower/eyewash units, to any equipment that requires domestic water supply.

Service valves will be provided at each branch line serving two or more plumbing fixtures. All plumbing fixtures and equipment connections will be provided with local stop valves. Additional service valves will be provided, to isolate the system for maximum maintainability.

Access panels will be provided with adequate space to operate the valve(s) in walls and non-accessible ceilings.

A shock arrestor will be provided on all water rough-ins serving individual plumbing fixtures. Where multiple plumbing fixtures are served by the same domestic water branch line a single shock arrestor shall be installed per the manufacturer's installation instructions.

A reduced pressure type backflow preventer will be provided on the make-up water connections to mechanical equipment.

Sanitary and Lab Waste and Vent

A complete waste and vent system will be provided for the imaging build-out to collect sanitary waste from plumbing fixtures, floor drains and floor sinks in accordance with the International Plumbing Code, unless indicated otherwise. The drainage piping system will be designed with a minimum slope of 1/4-inch per foot for pipe sizes less than 3-inch and 1/8-inch per foot for sizes 3-inch and larger.

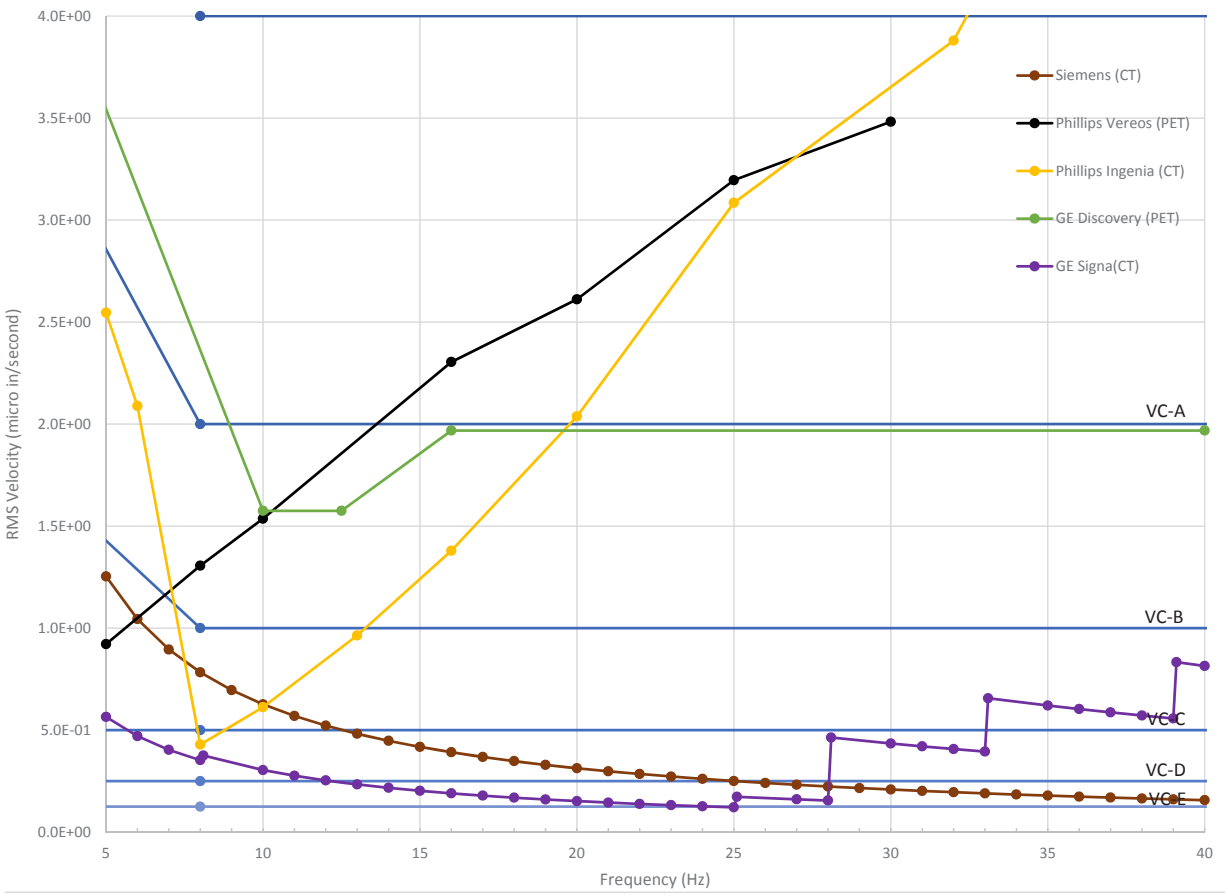
Floor drains will be provided for each air handling device, equipment requiring drains, toilet rooms with water closets, and mechanical equipment rooms. In each mechanical room a floor drain will be provided for each air handling unit condensate drain and an additional floor drain will be provided for

general wash down of the floor.

Trap guards will be provided to each floor drain and floor sink. Electronic type trap primers will be provided only for floor drains that are anticipated to receive a large volume of drainage that will exceed the capacity of trap guards.
Compressed Air
An existing central compressed air system is located in the building. New compressed air piping will tie in to the existing main compressed air service and will be provided for the MRI/PT room pneumatically operated doors (if required).
Fire Protection
The new build-out will be protected by a wet automatic sprinkler system per NFPA 13 requirements. The existing sprinkler system currently serving this area of the building will be modified per the renovated layout of the space. In areas where accidental discharge is an issue due to the equipment in the room, such as the MRI/PT rooms, a double interlocking pre-action fire suppression system will be used.

f. Vibration

DataCom
Any new mechanical, plumbing or electrical equipment should be properly vibration isolation according to AHSRAE standards.
This section will be updated to include any required vibration mitigation once the vibration testing has been conducted.



1. Schedule

The Gensler team has developed three schedules:
First the Feasibility Schedule based on a 6 to 8-week study and,
Second, a full project schedule using July 2020 as the date of completion.
And Third the three manufactures timelines shared with the Gensler team.
UNT HSC provided the Gensler Team with the MRI and PET / CT equipment manufactures contact information. The time represents their responses, with the target of a July 31, 2020 operational date.

a. Feasibility Study
   a. 6 to 8 weeks study, this report.
   5 August 2019 start final draft sent 13 September 2019

b. Full Schedule

Based on a July 2020 date of completion, with the understanding that the manufacturers and General Contraction are integral parts of the success of achieving this schedule. There are three critical path schedule items to determine the full schedule: 1. The UNT HSC selection of the equipment Manufacturer. 2. The consultant team and contractor under UNT HSC contract. And 3. The phasing of construction. The Gensler team recommends a team meeting once contracts are in place and the equipment manufacturer is selected to explore the opportunity to optimize the project schedule.

Opportunities for team discussion:
1. UNT HSC Contracts for Services:

a. Architectural and Consultants
b. Contractor, CMaR or Conventional Design Bid Build.
2. Phasing of this construction provides several opportunities.
a. There are several phasing options being discussed.
b. The current Imaging tenant (Envision) remaining in place during the first phase of build out of the Research Imaging Suite. This may require nights and weekend construction as ANY construction in the proximity of the existing imaging MRI will impact results.
c. If the Research Imaging Center is built in phases. The first phase of work with an MRI and PET / CT being operational may be impacted by construction of the second phase of the suite. This may require nights and weekend construction as ANY construction in the proximity of the existing imaging MRI will impact results.
Also noting that the configuration of the space in two phases is not operationally ideal.

c. Equipment Manufacturers Timeline
   a. The three equipment Manufacturers time lines have been provided below.
   GE from e-mail 8/21/2019

IGNA Premier 3T MRI:

- Average 17 week lead time
- Dust- free environment and chiller in place
- 1 day Magnet delivery (approx 1 week prior to Electronics delivery)
  - Wall or roof hatch removed and replaced before and after magnet delivery
  - Chilled water and quench vent pipe connected to magnet
- 1 day Electronics delivery
- 5 days Mechanical installation
- 15 days Calibration & testing
- 10 days Applications Training

iscovery MI PET/CT:

- Average 14 week lead time
- 1 day System delivery (dust- free environment)
- 5 days Mechanical installation
- 10 days Calibration & testing
- 5 days Applications

Siemens

Siemens Timeline
E-mail received 26 August 2019
From Matt Wied

I have attached the typical drawings, the CAD files for the two systems, and the cutsheets. These contain all the information about our systems. The schedule is show below:

MRI Vida
Lead time(this varies show current lead time) 10-12 Weeks this includes manufacture and shipping time.
Mechanical installation 5 days includes one day for delivery
Calibration 8 days
Ready for patient use 13 days after delivery

PET Vision
Lead time(this varies show current lead time) 20 Weeks this includes manufacture and shipping time.
Mechanical installation 7 days includes one day for delivery
Calibration 7 days
Ready for patient use 14 days after delivery

As far as the testing for vibration and EMI this will need to be scheduled once the current magnet is out of the room or at least ramped down.

b. The Philips team response is below:

Phillips Timeline
E-mail received 19 August 2019
From Tracy Stallings

Good morning,

Thank you for your quick reply.
We are going through the information sent.

We have a few additional questions for you and your team.

1. MRI Specifications, all available
   Size, weight, specialty requirements, utility connections / need, shielding...see attached Standard Reference Drawings (SRD's) for the Elition 3.0T MR. These show the MR, Chiller specifications and MEP requirements for a Generic Site. They also discus Shielding Requirements and Quench Pipe Design in general terms, but we will do a Site Specific Shielding Design for both the RF and any Magnetic Shielding required once we have the Preliminary Equipment Layout drawn and approved by the Customer.

2. BIM model to be used in planning for the MRI and PET equipment in the research suite. We currently do not support BIM or REVIT...only AutoCAD.

3. Special **ASK** of manufacturers:
   a. MRI Equipment Schedule, start to finish...without a Project Schedule to work from, Construction duration, Requested Delivery Date and Go Live Date this is difficult to gage at this time. We can talk in generalities once we have been able to discuss the tentative Project Timeline.
   MRI design with user, confirmation of space equipment is to be located, fabrication, shipping, installation and construction, commissioning and calibration, every step, ready for use for research...Philips will proved a Preliminary Equipment Layout for Customer review and signoff. Once we have this we can move to an RF and Magnetic Shielding Design and next a full MEP Site Specific Drawing Package. We are happy to discuss these topics with you, but again will need to know a Tentative Timeline for Construction and GO Live Date.

HI Michael,

Good to hear from you. I know we had a couple conversation about time line. We can not sent a time line with no idea on your project completion date but I will share with you again what we discussed verbally.

4-5 month ship time on new Elition 3T MRI and new Vereos Pet/CT systems from date we receive PO to when it is shipped to arrival at UNT HSC.
3 weeks for the installation.
1 week for any other 3rd party products to be installed and training.
5-6 months total from PO to first patient use estimate.

Once you have a set completion date for a total clean room ready for install, then Tracy can work with the factory to arrange the exact day the system will arrive. This will be highly organized and arrive on time. Hope this helps with your planning. If you need anything else please let Tracy and I know.

All the best,

Don Birdsey

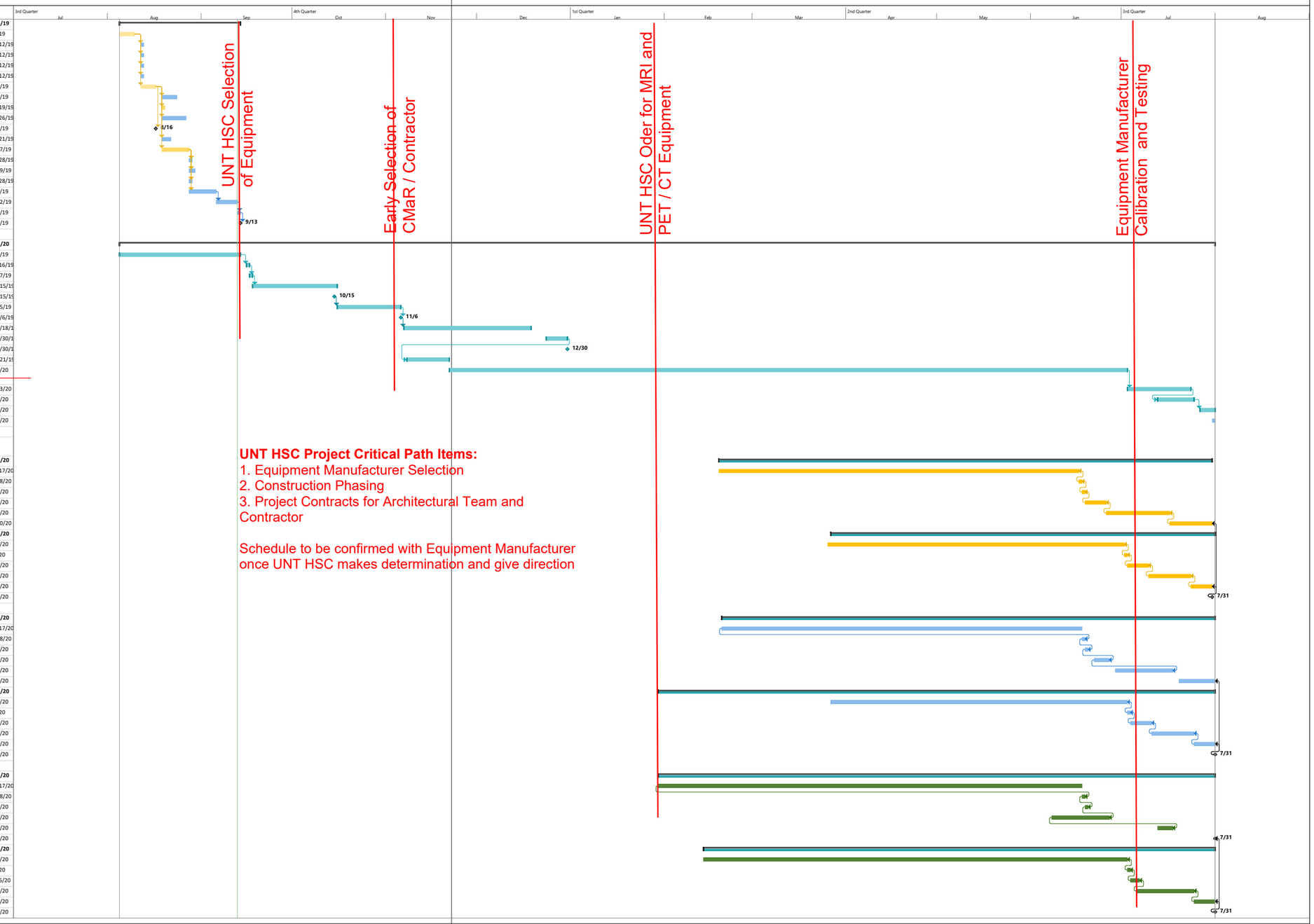
Philips HealthTech
Don Birdsey
Card/Rad Account Manager
817-917-0067 cell
don.birdsey@philips.com

University of North Texas Health Science Center
Research imaging Suite
Fri 9/13/19

DRAFT SCHEDULE

Gensler

ID	Task Mode	Task Name	Duration	Start	Finish
1		**Feasibility Study 6 weeks**	**30 days**	**Mon 8/5/19**	**Fri 9/13/19**
2		**Kick-Off Meeting**	5 days	Mon 8/5/19	Fri 8/9/19
3		Project Measures of success	1 day	Mon 8/12/19	Mon 8/12/19
4		Existing Project Site Survey	1 day	Mon 8/12/19	Mon 8/12/19
5		Program of Requirements	1 day	Mon 8/12/19	Mon 8/12/19
6		Open Iems Log	1 day	Mon 8/12/19	Mon 8/12/19
7		**Meeting / Call 2**	5 days	Mon 8/12/19	Fri 8/16/19
8		Vibration Testing locations	5 days	Mon 8/19/19	Fri 8/23/19
9		Program v2	1 day	Mon 8/19/19	Mon 8/19/19
10		Existing Utility Requirements	6 days	Mon 8/19/19	Mon 8/26/19
11		UNT HSC Equipment Selection	0 days	Fri 8/16/19	Fri 8/16/19
12		Draft of Project Schedules	3 days	Mon 8/19/19	Wed 8/21/19
13		**Meeting / Call 4**	7 days	Mon 8/19/19	Tue 8/27/19
14		Test Fit Diagram / Floor Plan	1 day	Wed 8/28/19	Wed 8/28/19
15		Existing Facility Findings	2 days	Wed 8/28/19	Thu 8/29/19
16		Narrative Draft	1 day	Wed 8/28/19	Wed 8/28/19
17		**Meeting / Call 5**	7 days	Wed 8/28/19	Thu 9/5/19
18		Draft Study Findings	5 days	Fri 9/6/19	Thu 9/12/19
19		**Final Call / Meeting**	1 day	Fri 9/13/19	Fri 9/13/19
20		Final Study Findings	0 days	Fri 9/13/19	Fri 9/13/19
21					
22		**Full Project Schedule**	**260 days?**	**Mon 8/5/19**	**Fri 7/31/20**
23		Feasibility Study	30 days	Mon 8/5/19	Fri 9/13/19
24		UNT HSC Approvals	1 day	Mon 9/16/19	Mon 9/16/19
25		Equipment Manufacturer Selection	1 day	Tue 9/17/19	Tue 9/17/19
26		Schematic Design	20 days	Wed 9/18/19	Tue 10/15/19
27		UNT HSC Approvals	0 days	Tue 10/15/19	Tue 10/15/19
28		Design Development	15 days	Wed 10/16/19	Tue 11/5/19
29		UNT Approvals	0 days	Wed 11/6/19	Wed 11/6/19
30		Construction Documents	30 days	Thu 11/7/19	Wed 12/18/19
31		UNT HSC Approvals	5 days	Tue 12/24/19	Mon 12/30/19
32		UNT HSC Approval to proceed	0 days	Mon 12/30/19	Mon 12/30/19
33		General Contractor / CMaR	10 days	Fri 11/8/19	Thu 11/21/19
34		Construction (includes equipment order coordination)	160 days	Fri 11/22/19	Thu 7/2/20
35		Commissioning	15 days	Fri 7/3/20	Thu 7/23/20
36		Callibration and make ready	10 days	Mon 7/13/20	Fri 7/24/20
37		Move in Use	5 days	Mon 7/27/20	Fri 7/31/20
38		Start Use	1 day	Fri 7/31/20	Fri 7/31/20
39					
40		**UNT HSC Equipment Time Line (working backwards)**			
41		**GE MRI**	**117 days**	**Wed 2/19/20**	**Fri 7/31/20**
42		MRI Average lead time	85 days	Wed 2/19/20	Wed 6/17/20
43		MRI Magnet Delivery	1 day	Wed 6/17/20	Thu 6/18/20
44		MRI Electronics Delivery	1 day	Thu 6/18/20	Fri 6/19/20
45		MRI Mechanical Installation	5 days	Fri 6/19/20	Fri 6/26/20
46		MRI Callibration & Testing	15 days	Fri 6/26/20	Fri 7/17/20
47		MRI Applications Training	10 days	Fri 7/17/20	Thu 7/30/20
48		**GE PET / CT**	**91 days**	**Fri 3/27/20**	**Fri 7/31/20**
49		PET / CT Average Lead Time	70 days	Thu 3/26/20	Thu 7/2/20
50		PET / CT Systems Delivery	1 day	Thu 7/2/20	Fri 7/3/20
51		PET / CT Mechanical Installation	5 days	Fri 7/3/20	Fri 7/10/20
52		PET / CT Callibration and testing	10 days	Fri 7/10/20	Fri 7/24/20
53		PET / CT Applications	5 days	Fri 7/24/20	Fri 7/31/20
54		End Date	0 days	Fri 7/31/20	Fri 7/31/20
55					
56		**PHILLIPS MRI**	**117 days**	**Thu 2/20/20**	**Fri 7/31/20**
57		MRI Average lead time	85 days	Thu 2/20/20	Wed 6/17/20
58		MRI Magnet Delivery	1 day	Thu 6/18/20	Thu 6/18/20
59		MRI Electronics Delivery	1 day	Fri 6/19/20	Fri 6/19/20
60		MRI Mechanical Installation	5 days	Mon 6/22/20	Fri 6/26/20
61		MRI Callibration & Testing	15 days	Mon 6/29/20	Fri 7/17/20
62		MRI Applications Training	10 days	Mon 7/20/20	Fri 7/31/20
63		**PHILLIPS PET / CT**	**132 days**	**Thu 1/30/20**	**Fri 7/31/20**
64		PET / CT Average Lead Time	70 days	Fri 3/27/20	Thu 7/2/20
65		PET / CT Systems Delivery	1 day	Thu 7/2/20	Fri 7/3/20
66		PET / CT Mechanical Installation	5 days	Fri 7/3/20	Fri 7/10/20
67		PET / CT Callibration and testing	10 days	Fri 7/10/20	Fri 7/24/20
68		PET / CT Applications	5 days	Fri 7/24/20	Fri 7/31/20
69		End Date	0 days	Fri 7/31/20	Fri 7/31/20
70					
71		**Siemens MRI**	**132 days**	**Thu 1/30/20**	**Fri 7/31/20**
72		MRI Average lead time	100 days	Thu 1/30/20	Wed 6/17/20
73		MRI Magnet Delivery	1 day	Thu 6/18/20	Thu 6/18/20
74		MRI Electronics Delivery	1 day	Fri 6/19/20	Fri 6/19/20
75		MRI Mechanical Installation	15 days	Mon 6/8/20	Fri 6/26/20
76		MRI Callibration & Testing	5 days	Mon 7/13/20	Fri 7/17/20
77		MRI Applications Training	0 days	Fri 7/31/20	Fri 7/31/20
78		**Siemens PET / CT**	**121 days**	**Fri 2/14/20**	**Fri 7/31/20**
79		PET / CT Average Lead Time	100 days	Fri 2/14/20	Thu 7/2/20
80		PET / CT Systems Delivery	1 day	Thu 7/2/20	Fri 7/3/20
81		PET / CT Mechanical Installation	1 day	Fri 7/3/20	Mon 7/6/20
82		PET / CT Callibration and testing	15 days	Mon 7/6/20	Fri 7/24/20
83		PET / CT Applications	5 days	Fri 7/24/20	Fri 7/31/20
84		End Date	0 days	Fri 7/31/20	Fri 7/31/20



UNT HSC Project Critical Path Items:
1. Equipment Manufacturer Selection
2. Construction Phasing
3. Project Contracts for Architectural Team and Contractor

Schedule to be confirmed with Equipment Manufacturer once UNT HSC makes determination and give direction

Project: UNT HSC Workplan dra
Date: Fri 9/13/19

Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Progress, Manual Progress

Page 1

7. Manufacture's Specifications (cut sheets and field test findings)

Please see the manufacturers complete set of information in the Section 7.
Below is information each manufacture provided.

a. GE
https://www.dropbox.com/sh/56uuqfre95f2lr2/AAAhURBbfzmSYgQkK1dLMqlra?dl=0

i. Imaging Equipment Timelines
SIGNA Premier 3T MRI:

- Average 17-week lead time
- Dust- free environment and chiller in place
- 1 day Magnet delivery (approx 1 week prior to Electronics delivery)
  - o Wall or roof hatch removed and replaced before and after magnet delivery
  - o Chilled water and quench vent pipe connected to magnet
- 1 day Electronics delivery
- 5 days Mechanical installation
- 15 days Calibration & testing
- 10 days Applications Training

Discovery MI PET/CT:

- Average 14 week lead time
- 1 day System delivery (dust- free environment)
- 5 days Mechanical installation
- 10 days Calibration & testing
- 5 days Applications

Available in the Appendices
b. GEHC SIGNA Premier 3T MR PIM
c. GEHC SIGNA Premier 3T Typical Drawings
d. GEHC Discovery MI PET – CT PIM
e. GEHC Discovery MI Typical Drawings
f. Test Results

b. Phillips
https://www.dropbox.com/sh/o0vtbhysc7njlz6/AABrU1SOUiZ3PyOCAUYNUdWta?dl=0

See manufacturers complete set of information in the appendixes.
a. Ingenia Elition 3T
b. Vereos
c. Testing Results

c. Siemens
https://www.dropbox.com/sh/bnqjy8a90dimsjp/AAAUJpddxETYbFVgOXvIMQ6na?dl=0

See manufacturers complete set of information in the appendixes.
a. 17064 – Magnetom VIDA – XQ Gradients
b. 18070 – Biograph Vision

c. Testing

Notes from 3 September 2019 e-mail

"Siemens has concluded that they cannot test existing conditions of UNTHSC's proposed space (including vibration, AC, and DC testing) due to interference from the existing MR on site, as these tests will require UNTHSC's tenant, Envision, to ramp down their existing MR magnet.

In absence of such testing, and in an effort to provide a timely feasibility study to leadership at UNTHSC, the Siemens team is confident there will be no insurmountable issues with using their system in the proposed facility as delineated in previously shared drawings."