SOLDIER'S HOME IN CHELSEA

QUIGLEY HOSPITAL BUILDING FEASIBILITY STUDY

MAY 2013

PAYETTE

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

BACKGROUND

The Soldier's Home in Chelsea (Chelsea), located on top of Power House Hill, is a multi-tiered healthcare facility serving eligible veterans in the Commonwealth of Massachusetts. Chelsea currently provides 157 long term care beds in the Lawrence Quigley Memorial Hospital, and 355 domiciliary beds, and support services throughout various buildings on its 23.7 acres campus. The site and buildings are listed on the National Register of Historic Places.

Quigley Hospital (Quigley), built in 1949 with later additions, is the largest building on the campus totaling 216,600 GSF within a 7-story plus basement building envelope. In January 2012, a Veterans Administration (VA) Boston Healthcare System inspection cited that Quigley's existing residential configuration of 16-20 bed wards did not meet Code of Federal Regulation Title 38 Housing Home which mandates no more than four residents per room. In addition, the VA cited Quigley's inability to provide "adequate nursing care, comfort and privacy of patients". Payette, who recently completed the Study of the Soldier's Home in Holyoke (Holyoke), was contracted to complete a feasibility study to assess Quigley and propose corrective options to meet current VA guidelines. In order to meet a compressed schedule, the study for Quigley was not intended to be a comprehensive certifiable study, but rather a feasibility study to investigate potential options for planning purposes. Applicable information from the Holyoke study was resourced to expedite the process.

Payette investigated re-purposing the existing building for LTC within Title 38 compliance, and also evaluated what was necessary to adopt the Community Living Center (CLC) model, as was planned for Holyoke. The CLC model advocates for smaller units, with increased living spaces and private bedrooms and baths. A comparison of the CLC square footage requirements to the LTC requirements indicates a doubling of program areas. In order to be eligible for the VA State Home Construction reimbursement (65% federal grant program), all units within the existing facility and any new units must be designed to align with t the CLC model recently adopted by the VA.

GOALS AND CHALLENGES

The challenges for this project were identified at the initial meeting with Chelsea representatives. It was clearly conveyed to the planning team that Chelsea desired continuing Long Term Care (LTC) model with combination of 4 bed wards, doubles, and singles. Under this model, Chelsea would receive per diem reimbursement from VA (CFR Title 38), however, it will not be eligible for 65% reimbursement of construction cost under the VA Grant, as it would not provide for the CLC model.

EXECUTIVE SUMMARY (CONT'D)

Another major challenge is to address the conditions the existing Quigley infrastructure. A site assessment of the existing conditions identified the following challenges:

- difficult and costly to achieve regulatory standard of care thru renovation alone
- difficult and costly to abate the entire facility of hazardous materials
- a renovated facility would meet the goals of maintaining the 178 bed count, A major addition would be necessary.
- complex construction phasing plan requiring temporary relocation of current programs and relocation of some residents off-site to another facility.

OPTIONS SUMMARY

Three options were developed for the existing Quigley Hospital site, and a fourth option (Option 3B) was developed for the northern site (the property between Summit and Crest Avenues) which would require demolition of several underutilized historic buildings. Options include renovation and/or new construction, and all but Option 1 adopt the new CLC model. Option 1 was developed to determine what renovations would be required to address the VA citation within the LTC requirements. This is the most expensive option as federal reimbursement would not be provided, eliminates 68 beds, and does not provide for CLCs. Options 2, 3 and 3A provides CLCs and maximizes federal reimbursement.

EXECUTIVE SUMMARY (CONT'D)

COST ESTIMATE SUMMARY

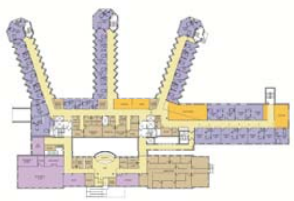
OPTION 1

- Renovate Quigley (Title 38)
- 110 Beds

ESTIMATED COST

$52M (CC) x 1.35 (ECC) = $70M TPC

Net State Cost with no VA funding = $70M TPC



OPTION 2

- Renovate Quigley as CLC(72 beds)
- New CLC Addition (84 beds)
- 156 Beds

$58.8M (CC) x 1.35 (ECC) = $79.5M TPC

$45M (CC) x 1.35 (ECC) = $59.5M TPC

Demolition Cost = $1M

Total = $140M TPC

Net State Cost with VA funding = $49M TPC

OPTION 3A

- New CLC Building: Quigley Site
- 168 Beds

$82.5M (CC) x 1.35 (ECC) = $111.5M TPC

Demolition = 1.5M

Total = 113M TPC

Net State Cost with VA funding = $39.5M TPC

OPTION 3B

- New CLC Building: North Site
- 168 Beds

$84M (CC) x 1.35 (ECC) = $113M TPC

Demolition = $1.5M

Total = $113M TPC

Net State Cost with VA funding = $39.5M TPC

** assumes 65% VA federal reimbursement

OUTSTANDING ISSUES AND NEXT STEPS

VETERANS NEEDS ASSESSMENT

Veterans Affairs and EOHHS is conducting a Needs Assessment to determine future demographic data and service needs for veterans in Massachusetts over the next 10 to 20 years. The findings of this effort will help to determine long term needs and capital program at this facility and at Holyoke Soldiers Home to serve the Commonwealth's veterans community's needs.

NEEDS IN THE CONTEXT OF THE EOHHS FACILITES MASTER PLAN

An analysis of both Soldiers Homes' mission, goals, and capital needs will need to be assessed within the framework of the Secretariat's strategic master planning efforts. EOHHS's Veterans strategic goals are:

- ensure that access to all Veterans benefits and services is available throughout the Commonwealth
- end Veterans homelessness/increase access to transitional and permanent housing options
- maximize opportunities toward self-sufficiency through employment, education, and/or job training
- ensure both Soldiers' Homes are meeting the evolving needs of Veterans

CERTIFIABLE BUILDING STUDY

Once the needs at Chelsea are determined, a certifiable building study will need to be initiated to document the needs, proposed program, existing conditions, alternatives, and preferred option at this location with detailed cost estimates and an implementation plan.

EXISTING CONDITIONS

EXISTING CONDITIONS

SITE PLAN

N

SCALE: NTS

EXISTING CONDITIONS

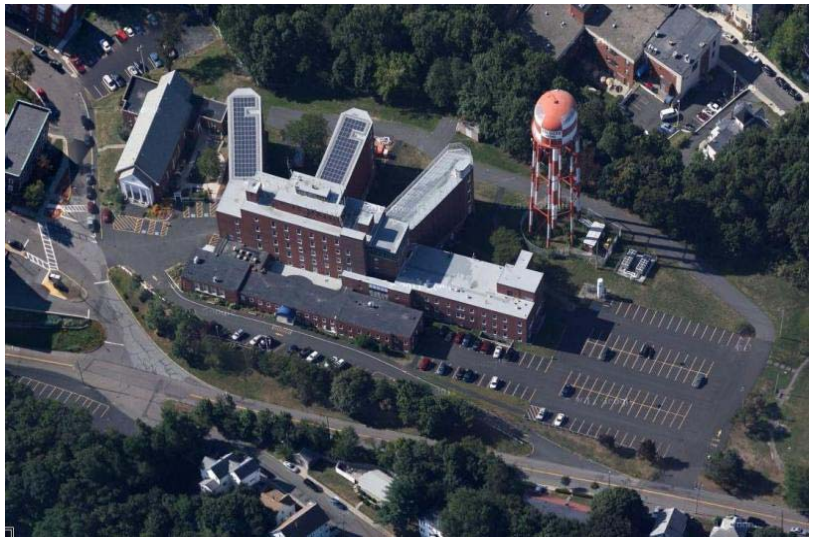
ENLARGED SITE PLAN: Quigley Hospital

N

SCALE: NTS

EXISTING CONDITIONS

SITE ASSESSMENT



Aerial view, from south

Aerial view, from north

SUMMARY

Existing 23.7 acre site is constrained and does not adequately accommodate current needs. The additional building area required for CLC model further stretches the sites' constraints

- Difficult way finding to front door
- Lack of sufficient visitors parking
- Lack of strong identity: entrance, landscape and sense of campus
- Front entry not accessible
- Lack of exterior amenity spaces for residents
- Lack of separation for service route
- Development on adjacent park not feasible

PROGRAM COMPLIANCE, CODES

PROGRAM COMPARISON

Nursing Home LTC (Title 38) vs. CLC Standard

Program Comparison

Community Living Center vs. Nursing Home 26 Beds

Nursing Home 26 Beds	# OF UNITS	NSF/ UNITS	TOTAL NSF	Community Living 2 Houses (13 Beds) 26 Beds	# OF UNITS	NSF/ UNITS	TOTAL NSF
RESIDENTIAL UNIT				**RESIDENTIAL UNIT**			
Single Rooms	16	150	2,400	Single Rooms	25	175	4,375
shared toilet rooms	8	80	640	Toilet Rooms	25	80	2,000
Double Rooms	5	245	1,225	Bariatric room	1	320	320
Toilet Rooms	5	80	400	Toilet Room	1	100	100
SUPPORT				**SUPPORT**			
				Vestibule	2	50	100
Day Room	26	9	234	Living Room	2	380	760
Dining	26	10	260	Dining Room	2	390	780
				Pantry	2	90	90
Nourishment	1	100	100	Kitchen	2	175	350
Public Toilet Room	2	50	100	Public Toilet Room	2	50	100
				Quiet Room	2	120	240
Clean Utility Room	1	120	120	Clean Utility Room	2	20	40
Soiled Utiity Room	1	70	70	Soiled Cart	2	20	40
Linen Storage	1	40	40	Linen Storage	2	20	40
Euipment Storage	1	150	150	Equipment Storage	2	100	200
Nurse Station	3	100	300	Nurse Station	2	50	100
Staff Lockers/Break Room	1	150	150	Staff Lockers/Break Room	1	150	150
Work room	1	200	200				0
Medication Room	1	100	100	Medical Supplies	2	100	200
Housekeeping Room	1	60	60	Housekeeping Room	2	50	100
Resident Laundry	1	120	120	Resident Laundry	2	100	200
Staff Toilet	2	50	100	Staff Toilet	2	50	100
Stretcher Wheelchair Storage	1	100	100	Stretcher Wheelchair Storage	2	100	200
				NEIGHBORHOOD SUPPORT			
				Multipurpose	1	400	415
				Nurse Station	1	250	250
				Housekeeping	1	50	50
				Clean Utility	1	120	120
				Soiled Utility	1	100	100
				Storage wheelchair/stretcher	1	60	60
ADMIN. SUPPORT				**ADMIN. SUPPORT**			
office- coordinator	1	120	120	office- coordinator	1	120	120
office-supervisor	1	120	120	office-supervisor	1	120	120
conference room	1	240	240	conference room	1	240	240
TOTAL NSF			7,349	TOTAL NSF			12,060
net to gross factor		1.55		net to gross factor		1.55	
TOTAL DGSF			11,391	TOTAL DGSF			18,693
DELTA			**7,303**	**1.65**			

- LTC space criteria
  - Title 38 Nursing Home and Mass DPH requirements
  - Double rooms and single rooms with shared toilet rooms permitted
  - Shared resident support areas within building.
- CLC space requirements are 65% larger LTC
  - 2 households with neighborhood support on each floor
  - All single rooms with private toilets
  - 7,300 additional square feet for each 26-bed unit

COMPLIANCE: DEFICIENCIES CITATIONS

CFR 38 PART 51

	CFR 38 Part 51 Criteria	Current Configuration
• Resident rooms	• 4 resident maximum	• 16 - 20 residents/room
• Minimum NSF/resident	• 115 NSF	• 70 NSF
• Single resident room	• 150 NSF	• 113 average
• 1 large double room for spinal cord	• 305 NSF	• No large double room
		• No visual privacy
• Full visual privacy	• Required	• No closets, bedside table only
• Individual closet space	• Required	

Interior view, patient ward

Interior view, patient ward

Interior view, communial space

COMPLIANCE: DIFICIENCIES CITATIONS

CRF 38 PART 51

	CFR 38 Part 51 Criteria	Current Configuration
• Toilet and bath	• Toilet and bath facility requires private or direct access from room	• 1 toilet for 11 residents average Over half of residents have 129 feet or more to travel to toilet 2 unisex bath/shower, 2 accessible toilets; 2 bathing stalls per floor
•		
• Outside ventilation	• Required (windows and/or mechanical)	• No outside ventilation
• Corridor handrails	• Required	• Handrails sporadically provided

Interior view, patient bathroom stalls

Interior view, patient bathroom stall

Interior view, patient vanity area

COMPLIANCE: DIFICIENCIES CITATIONS

Department of Public Health

	DPH Criteria	Current Configuration
• Resident rooms	• Max. 4 to a room	• 16-20 residents/room
• Toilets	• 1 toilet per 4 beds with direct access from bedroom	• 1 toilet per 11 beds
• Defined activity and dining areas	• Dining 10 SF/bed Activity 8 SF/bed	• Activity and dining dispersed & not well defined
• Nurses station with visual access of patient	• centrally located; 100 ft to farthest bed	• No visual access
• Nourishment kitchen	• Required	• Kitchen does not meet standards
• Staff lounge/dining	• Required hospital cafeteria or Staff Lounge on the floor	• not in suite
• Exam room or special care	• Required	• Exam Room not provided

BUILDING CODE

Applicable Codes are outlined in the table below:

Code Type	Applicable Code (Model Code Basis)
Building	780 CMR: Massachusetts State Building Code, 8th Edition (2009 International Building Code) (2009 International Existing Building Code)
Fire Prevention	527 CMR: Massachusetts Fire Prevention Regulations M.G.L. Chapter 148 Section 26G – Sprinkler Protection
Accessibility	521 CMR: Massachusetts Architectural Access Board Regulations 2004 Americans with Disabilities Act Architectural Guidelines
Electrical	527 CMR 12.00: Massachusetts Electrical Code (2011 National Electrical Code)
Elevators	524 CMR: Massachusetts Elevator Code (2004 ASME A17.1)
Mechanical	2009 International Mechanical Code (IMC)
Plumbing	248 CMR: Massachusetts Plumbing Code
Energy Conservation	2009 International Energy Conservation Code
Joint Commission	NFPA 101, 2000 Edition

Based on a Type 1B Construction Type for the new addition and the existing building, the required fire-resistance assembly ratings are outlined in the table below.

Building Element	Fire Resistance Rating (Hrs)
Structural Frame	2
Exterior Bearing Walls	2
Interior Bearing Walls	2
Exterior Non-Bearing Walls	0
Interior Non-Bearing Walls	0
Floor Construction	2
Roof Construction	1

SUSTAINABILITY STRATEGIES

As a State-owned facility, renovations and additions to the Soldiers' Home are required to comply with the State of Massachusetts Executive Order 484, Leading by Example – Clean Energy and Efficient Buildings (included in the Appendix). The main targets identified in the Executive Order are summarized as follows:

- Reduce greenhouse gas emissions by 25% by 2012, 40% by 2020 and 80% by 2050, based on a 2002 baseline and not adjusted for expansions.
- Reduce overall energy consumption by 20% by 2012 and 35% by 2020, based on a 2004 base line.
- Procure 15% annual electricity consumption from renewable sources by 2012 and 35% by 2020. Purchase of renewable energy certificates is allowed.
- Utilize bio heat products with a minimum blend of 3% bio based materials for all heating applications that use #2 fuel starting in the winter of 2007-2008, and 10% bio heat blend by 2012.
- All new construction and major renovations (projects over 20,000 square feet) must meet the Mass LEED Plus green building standard established by the Massachusetts Sustainable Design Roundtable.
- Reduce potable water use, as compared to 2006, by 10% by 2012 and 15% by 2020.

The Mass LEED plus certification equates to the USGBC LEED silver rating but requires specific points that must be obtained. This requirement would also fulfill the VA minimum criteria for LEED certification as prescribed in the VA Sustainable Design and Energy Reduction Manual.

BUILDING ASSESSMENT

KEY FACTS

Aerial view, from the south

Existing site, aerial view

QUIGLEY HOSPITAL

- Built in 1949
- 167,070 BGSF
- 6 ½ floors + basement:
- 178 beds
- 16 – 20 beds per ward
- Fully Sprinkled
- Current Programs
    - Resident Wards
    - Single Rooms
    - Resident Day Rooms
    - Administration
    - Physical Therapy
    - Kitchen/Patient Dining
    - Chapels
    - Medical Clinic
    - Clinical Lab
    - Recreation
    - Resident Support
    - Pharmacy
    - Mechanical

Interior view, patient floor corridor

Interior view, former operating rooms used for storage

Interior view, linen storage

SUMMARY

- Multiple non-regulatory compliance issues (Title 38, CLC, ADA/MAAB, UFAS, DPH, FGI, NFPA 101 and Mass Building Code)
- Egress staircase not code compliant
- Saw tooth configuration creates unusable space, difficult to repurpose
- Low floor to floor heights constrain integration of new MEP services, or structural upgrades
- Limiting structural system because of non-compliance with current siesmic code requirements
- Outdated building infrastructure
- inefficient distribution of stair, elevator and mechanical shafts; food service areas
- Inefficient building envelope does not meet energy codes, e.g. IECC 2009, 2011
- Asbestos abatement required
- Poor utilization of spaces (former imaging, lab areas, Annex)
- Inefficient location of central pharmacy on upper floor

UNIT ASSESSMENT

Interior view, Physical/Occupational Therapy

Interior view, patient ward

Interior view, patient ward

SUMMARY

- Open wards with 16 – 20 beds per ward
- Lack of visual privacy
- Long travel distance to bathrooms
- Insufficient number of toilets
- Toilets shared between males and females
- Lack of storage and privacy at beds
- Inadequate support space: equipment & clean linen stored along corridors, poor fit-out of nourishment room
- No designated dining space on the floor
- Lack of staff space

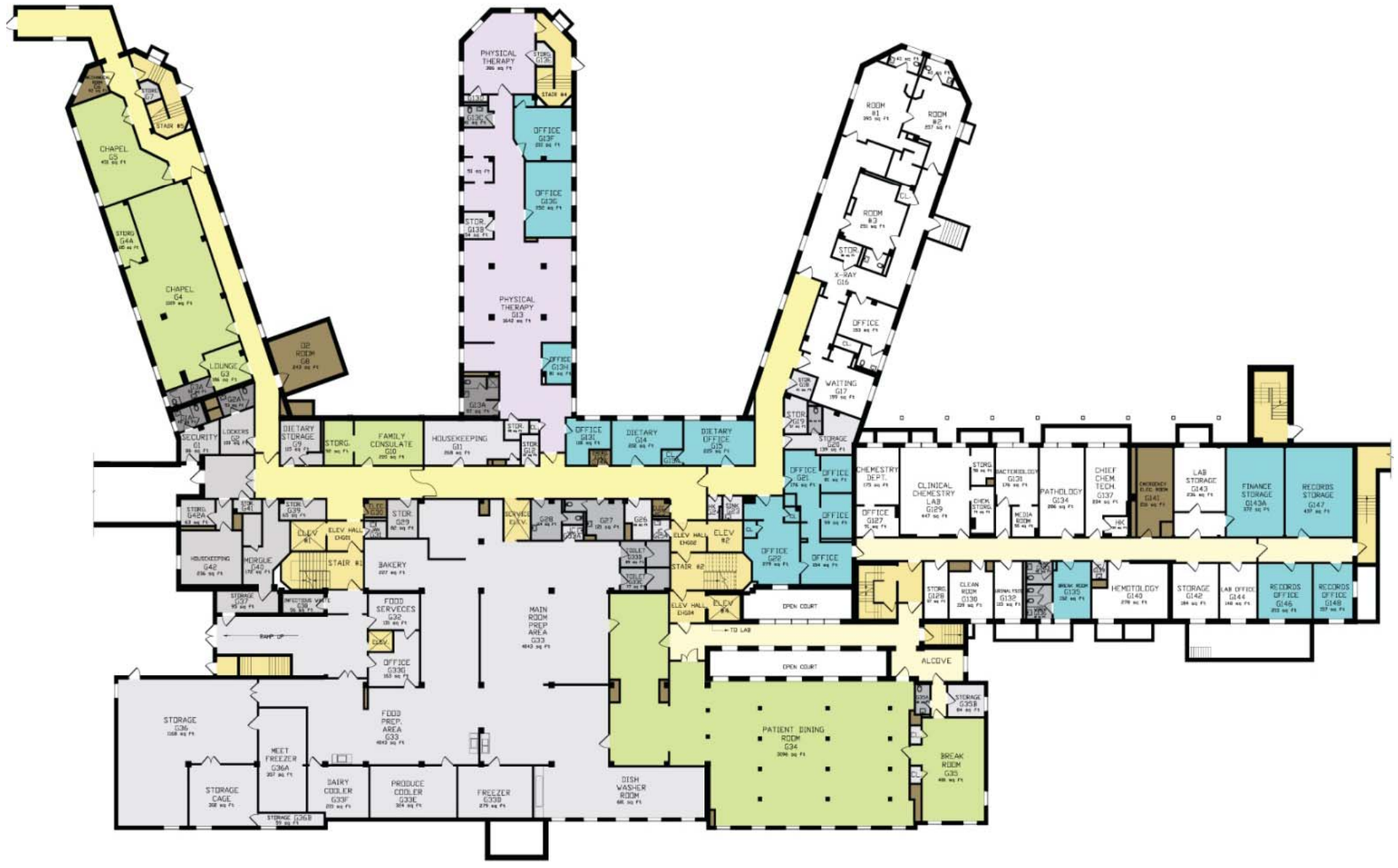
FLOOR BY FLOOR ASSESSMENT

LEVEL G

Interior view, materials storage

Interior view, circulation corridor

Interior view, worship space



- Space available for repurpose with closure of imaging and lab
- Reorganize food service to achieve more efficient layout
- Consolidate Multi denominational worship spaces into a singular non-denominational space.

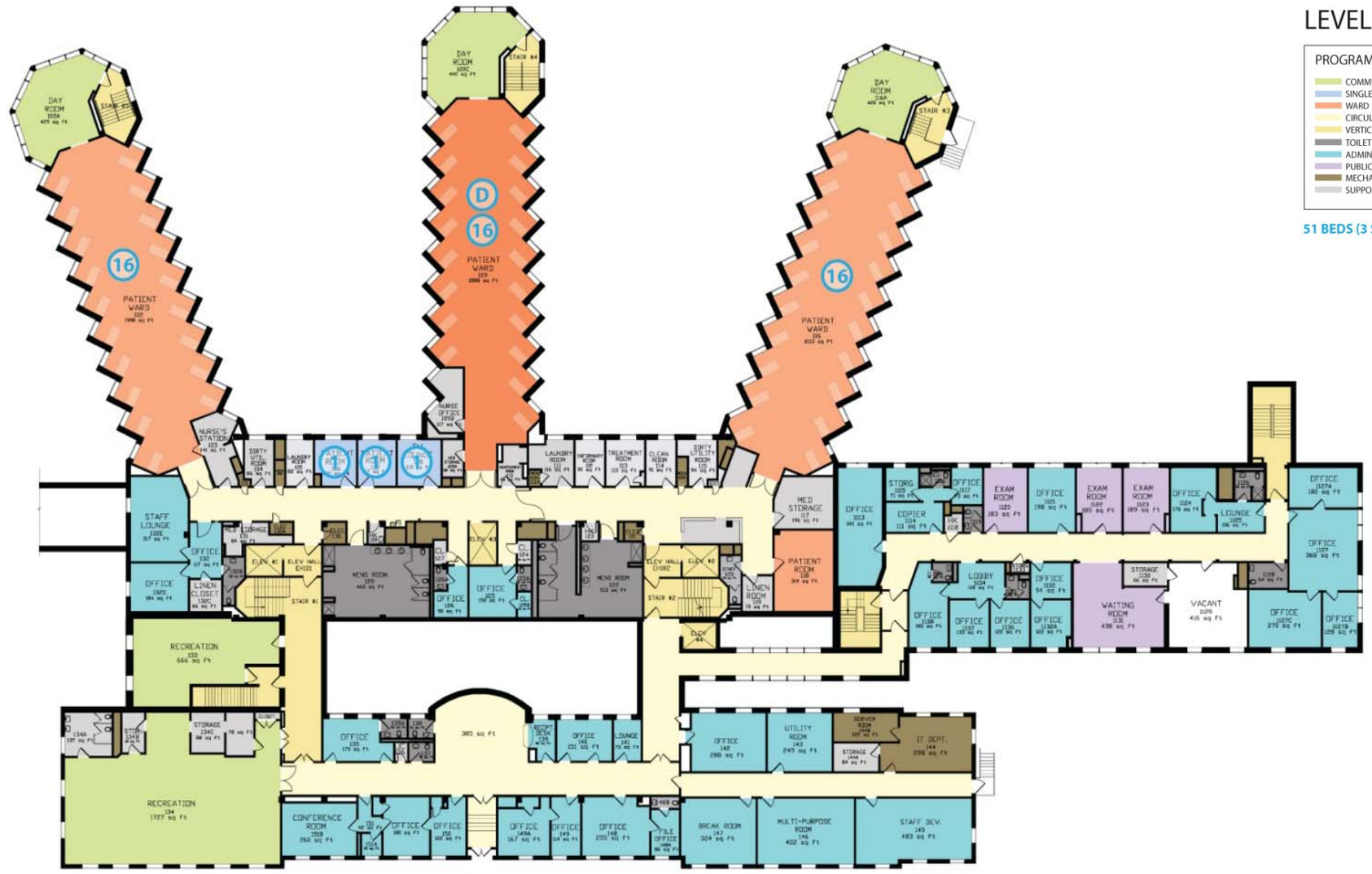
FLOOR BY FLOOR ASSESSMENT

LEVEL 1

Interior view, nurses station

Interior view, dayroom

Interior view, existing door finish

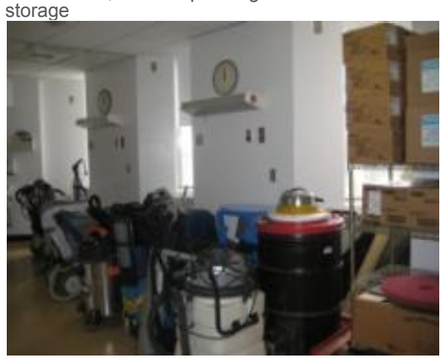


- Narrow building width: 20 feet wide at patient wards
- saw tooth configuration creates unusable space
- limiting structural system
- inefficient distribution of core elements
- Finishes in need of upgrade

FLOOR BY FLOOR ASSESSMENT

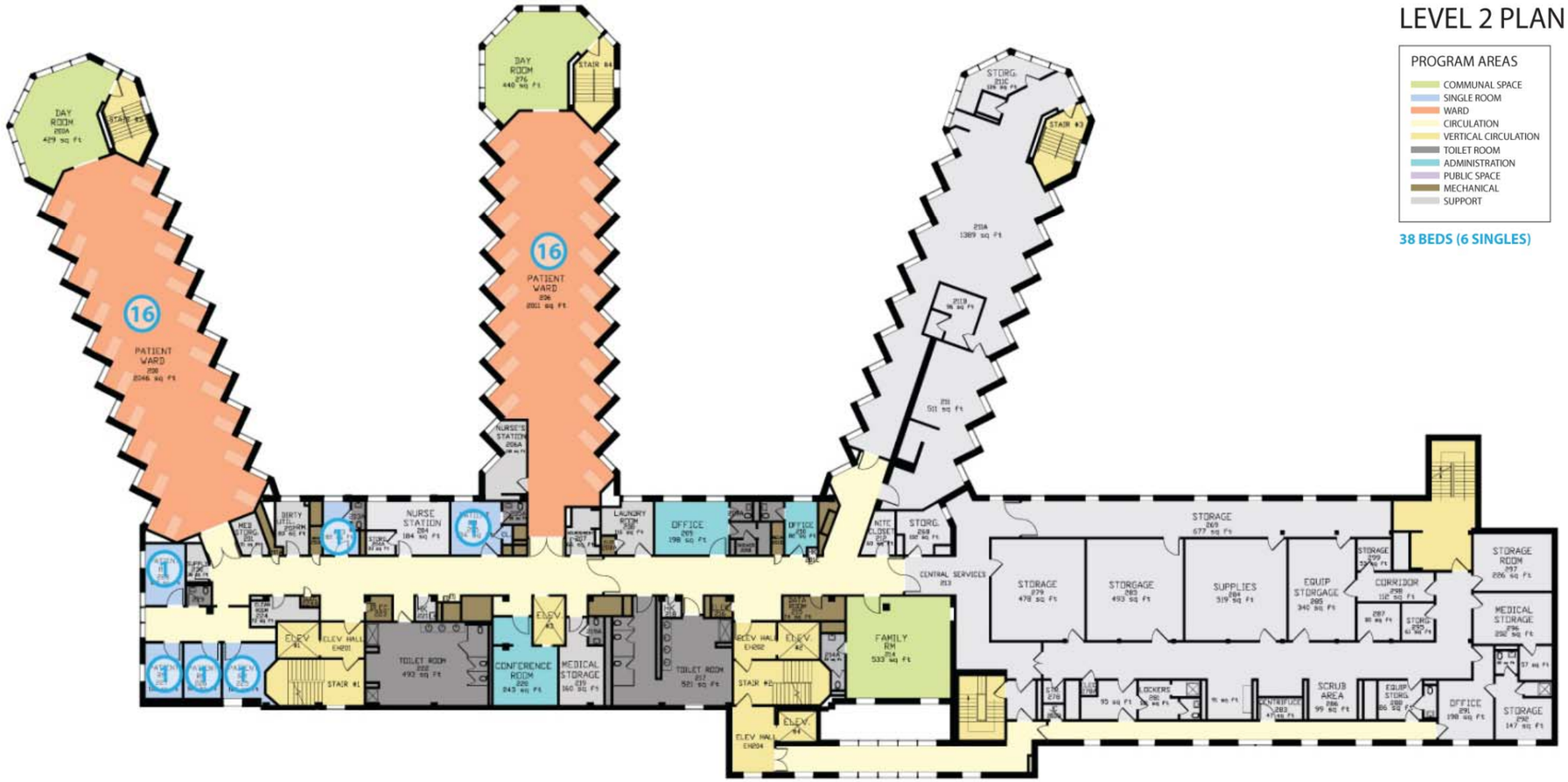
LEVEL 2

Interior view, former operating rooms used for storage



Interior view, former patient recovery used for environmental services

Interior view, former patient recovery used for linen storage



- Existing Post Anesthesia Care Unit wing and Operating Room suite poorly utilized as Central Services and Clean Linen area

FLOOR BY FLOOR ASSESSMENT

LEVEL 3

Interior view, pharmacy

Interior view, equipment storage

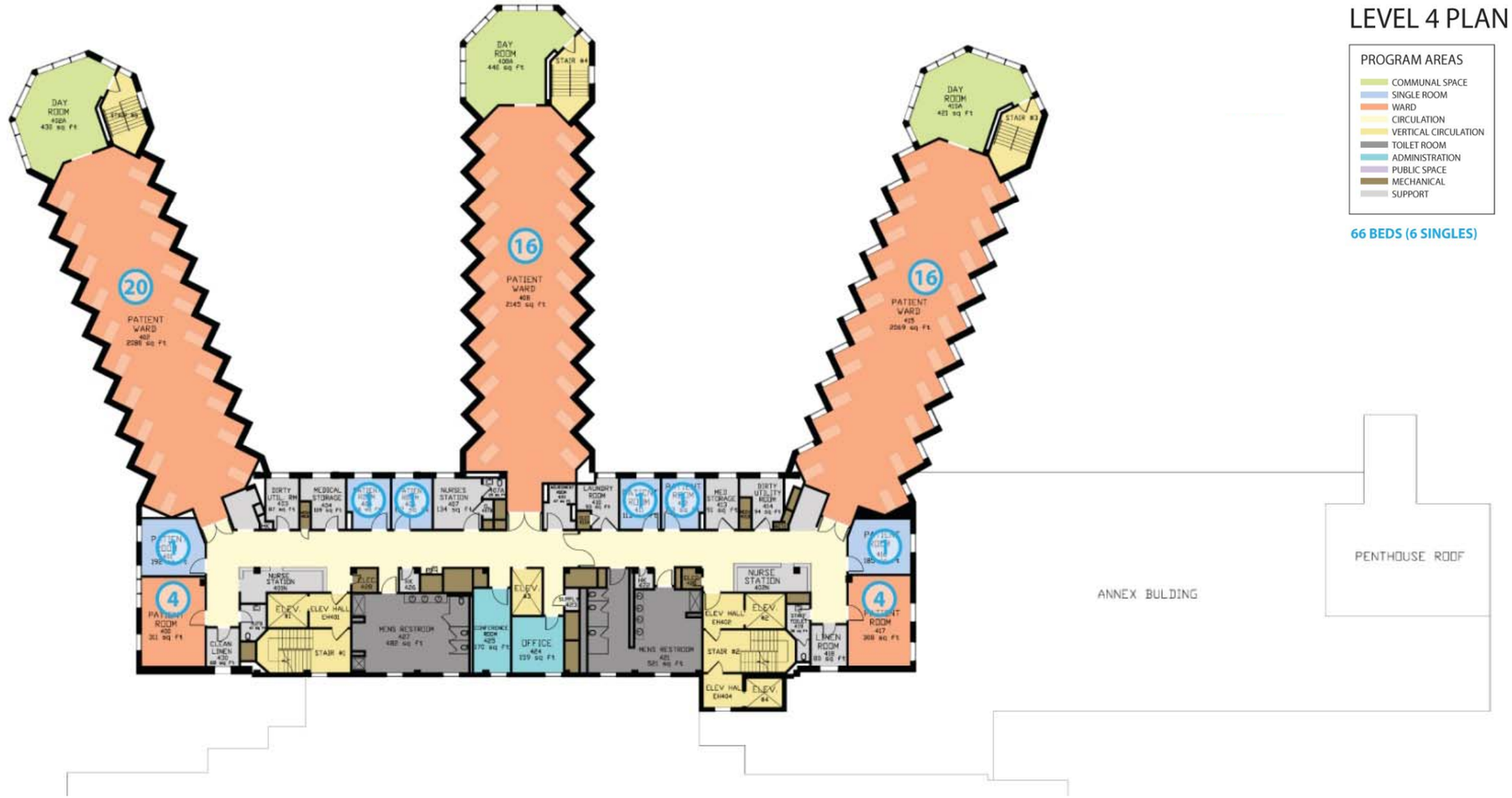
- Inadequate support space: equipment and clean linen stored along corridors, poor fit-out of nourishment room
- Lack of storage and privacy at beds
- Lack of staff space
- Inadequate distribution of beds per toilets: 5 beds per toilet
- Centralized bathrooms not appropriate for residential model

FLOOR BY FLOOR ASSESSMENT

LEVEL 4

Interior view, patient floor corridor

Interior view, Procedure Room



- Egress staircase not code compliant
- No designated dining space on the floor
- Lack of staff support work space for supervision

FLOOR BY FLOOR ASSESSMENT

LEVEL 5 & PENTHOUSE

LEVEL 5

- Inefficient location of central pharmacy
- Space rented to third party for programs that could be reclaimed
- Not code compliant for egress

PENTHOUSE

SYSTEMS ASSESSMENT

Fire Protection: GOOD CONDITION

- The fire pump was installed in 2004. It is in good condition and has sufficient capacity to serve the fire protection distribution for the current facility.
- The building is fully sprinklered.

Plumbing: MAJOR UPGRADES RECOMMENDED

- 2011 Study recommends replacing all fixtures, water supply risers, valves and return piping to mains. Domestic hot water for the annex needs to be replaced. Patient medical gas systems are in good overall condition and adequate to serve the current facility.

Chiller: GOOD CONDITION

- The 300-ton air-cooled chiller plant was installed in 2004 and appears to be in good condition and has sufficient capacity for the existing distribution. Additional capacity may be required if a replacement building or addition is pursued.

Cental Boiler Plant: DECENTALIZED BOILERS RECOMMENDED

- Quigley and on the campus receive steam from the Central Plant. Three hi-pressure steam boilers installed in 1997 are in good condition and have sufficient capacity to serve the facility. Steam, condensate, condensate pumps and fuel oil distribution are in need of repair. 2011 Study recommends providing decentralized boilers for all buildings.

SYSTEMS ASSESSMENT (CONT'D)

Air Handling Systems: GOOD CONDITION

- The majority of the air handling systems had been updated in 2004 and appear to be in good condition. The unit ventila tors that serve the patient floors do not utilize relief or exhaust, this needs to be addressed.
- Ceiling mounted 4 pipe fan coil unit and fin tube radiation is in good condition.

Electrical Service: ADEQUATE CAPACITY

- The 4160V primary service utilizes C&W oil switches that have been re-called by the manufacturer and should be re placed. Quigley transformer vault houses (2) 500KVA 3-phase transformers that provide 208Y/120V power on the secondary and (1) 100KVA 1-phase transformer that provides 120/240V power on the secondary. A new 500KVA 480Y/277-volt substation was added to serve the new chiller plant within the last 7 years.

Emergency Power: REPLACEMENT/UPGRADES ONGOING

- The existing indoor generators at the Headquarters Building and Quigley Buildings will be replaced with exterior units with self contained skid mounted tanks. The upgrade also includes new transfer switches and distribution panels. The work is ongoing and should be completed within the next two years.

SYSTEMS ASSESSMENT (CONT'D)

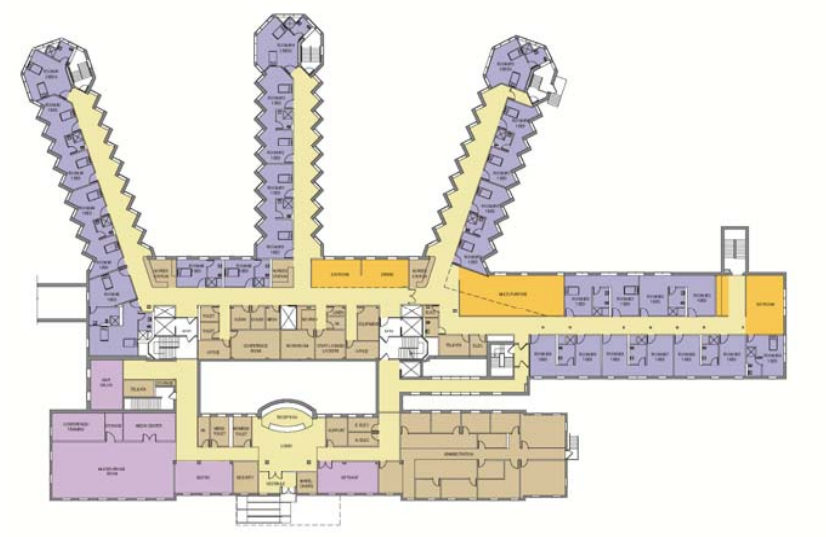
- Challenging and difficult to repurpose & renovate
- Asbestos abatement throughout the buildings
- Inefficient building envelope
- Outdated building infrastructure systems
- Low floor to floor height: 11'
- Multiple non regulatory compliance
  - CFR Title 38 S1.200
  - Uniform Federal Accessibility Standards (UFAS), ADA, MAAB
  - DPH , FGI, NFPA 101 and Massachusetts Building Code
- Annex building not well utilized

OPTION STUDIES

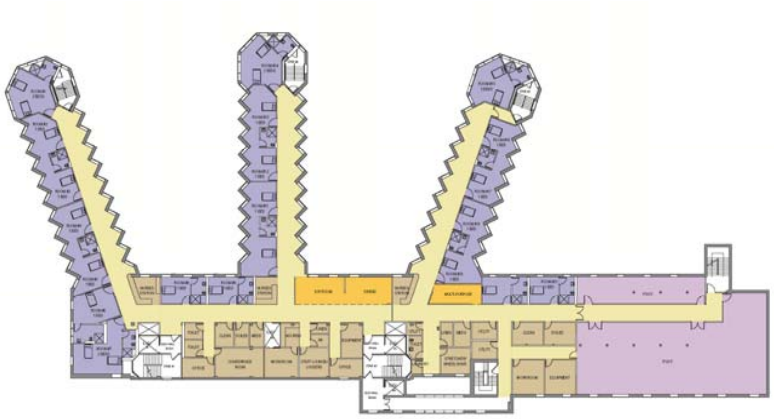
OPTION STUDIES

OPTION 1: RENOVATE QUIGLEY FOR A LTC FACILITY

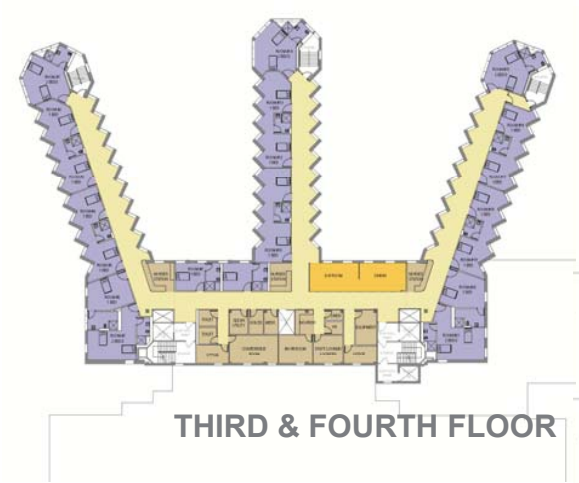
OPTION 1: RENOVATE QUIGLEY FOR A LTC FACILITY



FIRST FLOOR



SECOND FLOOR



THIRD & FOURTH FLOOR

Key Features

- Maintains Long Term Care
- 110 Beds
- 18 beds/unit
- Double & single bed rooms
- Private & semi-private baths
- Meets Title 38 Standards

Advantages

- Addresses VA Citation
- Maintains Title 38 per diem reimbursement
- Replaces multi-bed wards
- Locates PT/OT on unit
- Provides appropriate support functions on unit

Disadvantages

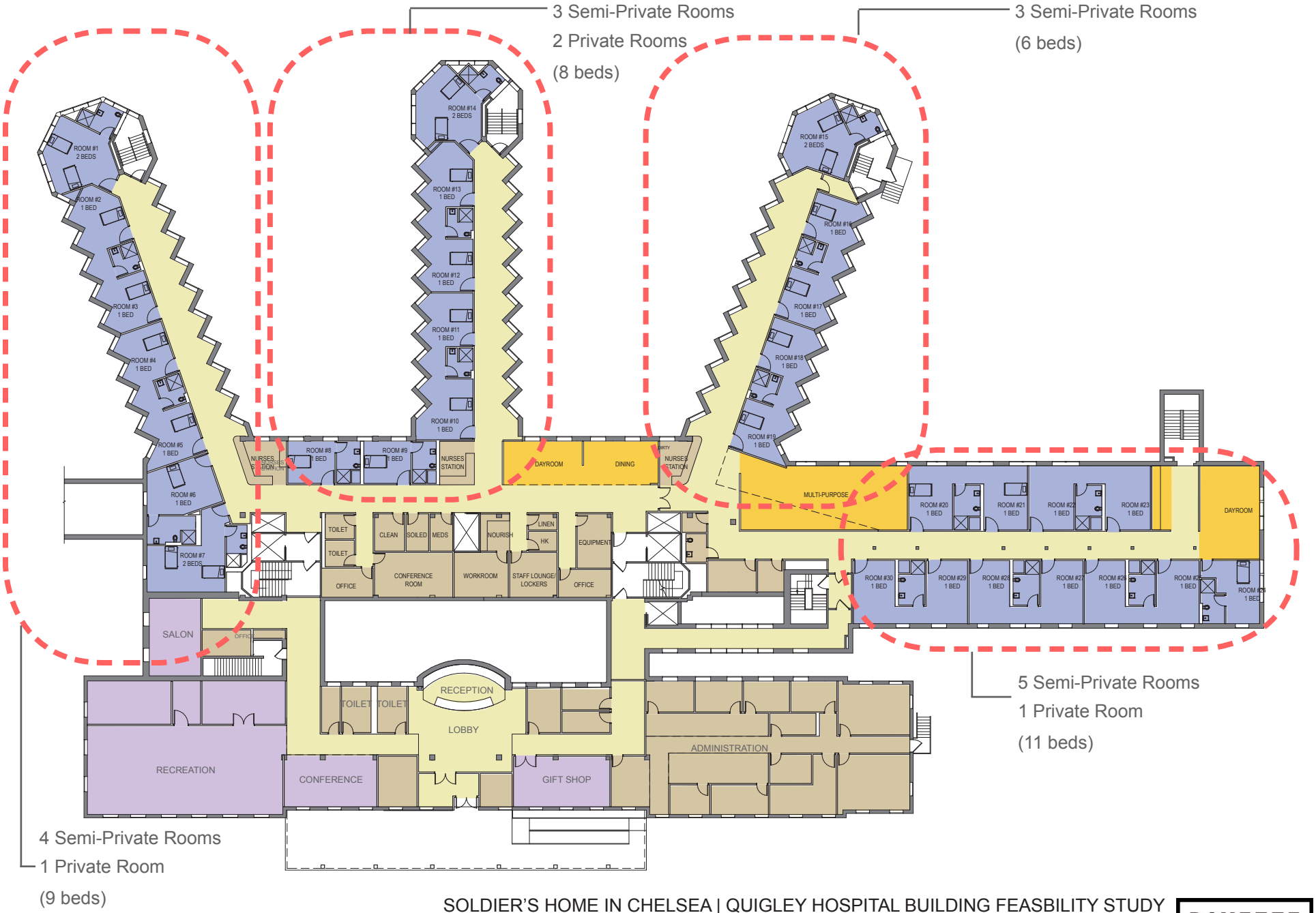
- Not eligible for 65% VA construction grant
- Loss of 68 beds
- Does not meet CLC standards
- Multiple phasing requires temporary relocation of programs off site

Estimated Costs

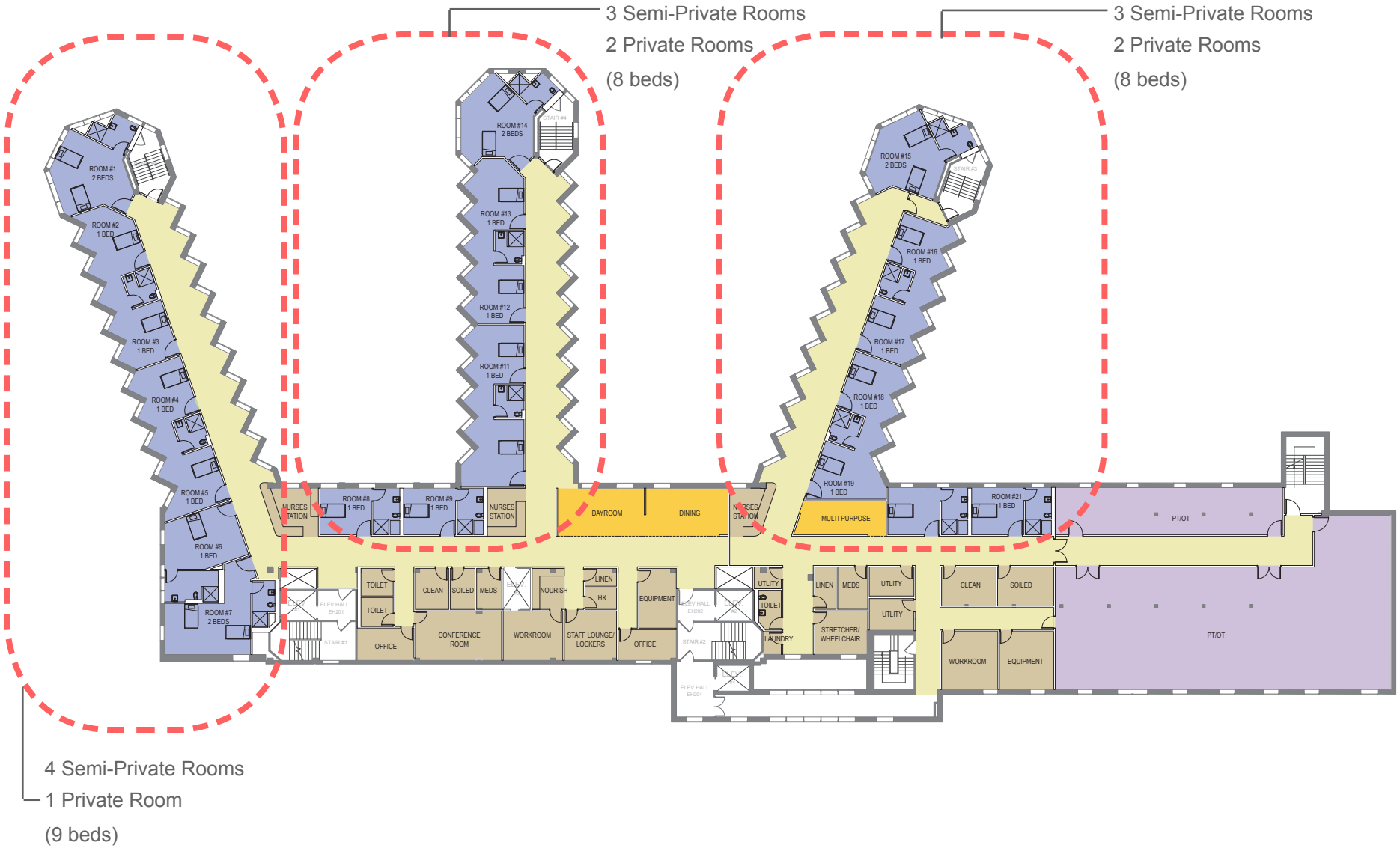
$52M ECC

$70M TPC

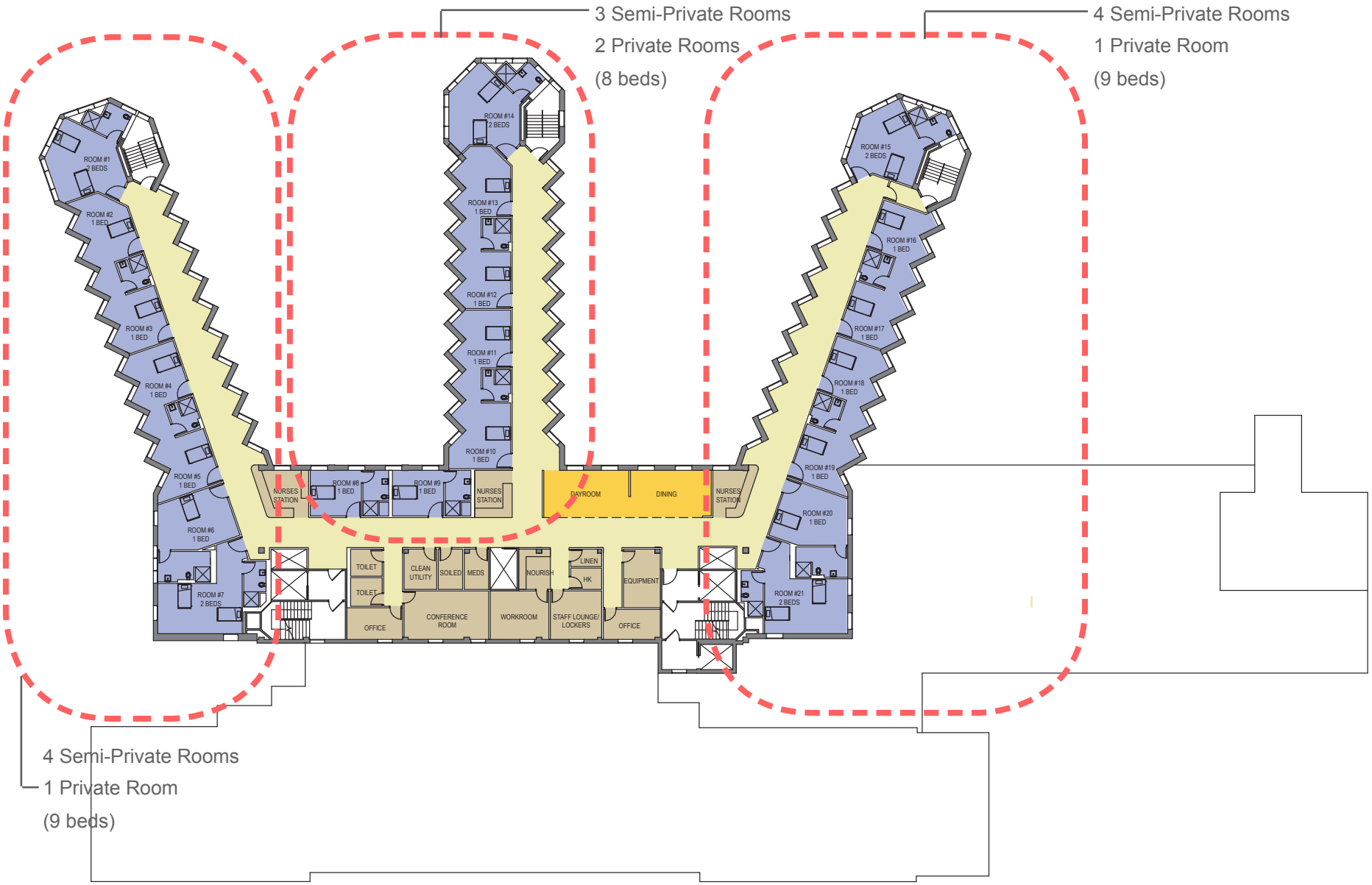
OPTION 1: TO RENOVATE QUIGLEY - FIRST FLOOR



OPTION 1: TO RENOVATE QUIGLEY - SECOND FLOOR



OPTION 1: TO RENOVATE QUIGLEY - FOURTH FLOOR



OPTION 1: TO RENOVATE QUIGLEY

SPACE PROGRAM - LONG TERM CARE

Nursing Home - Long Term Care - Quigley Renovation

	# OF UNITS	NSF	TOTAL NSF
RESIDENTIAL UNIT			
Single Rooms	16	150	2,400
shared toilet rooms	8	80	640
Double Rooms	5	245	1,225
Toilet Rooms	5	80	400
SUPPORT			
Day Room	26	9	234
Dining	26	10	260
Nourishment	1	100	100
Public Toilet Room	2	50	100
Clean Utility Room	1	120	120
Soiled Utiity Room	1	70	70
Linen Storage	1	40	40
Euipment Storage	1	150	150
Nurse Station	3	100	300
Staff Lockers/Break Room	1	150	150
Work room	1	200	200
Medication Room	1	100	100
Housekeeping Room	1	60	60
Resident Laundry	1	120	120
Staff Toilet	2	50	100
Stretcher Wheelchair Storage	1	100	100

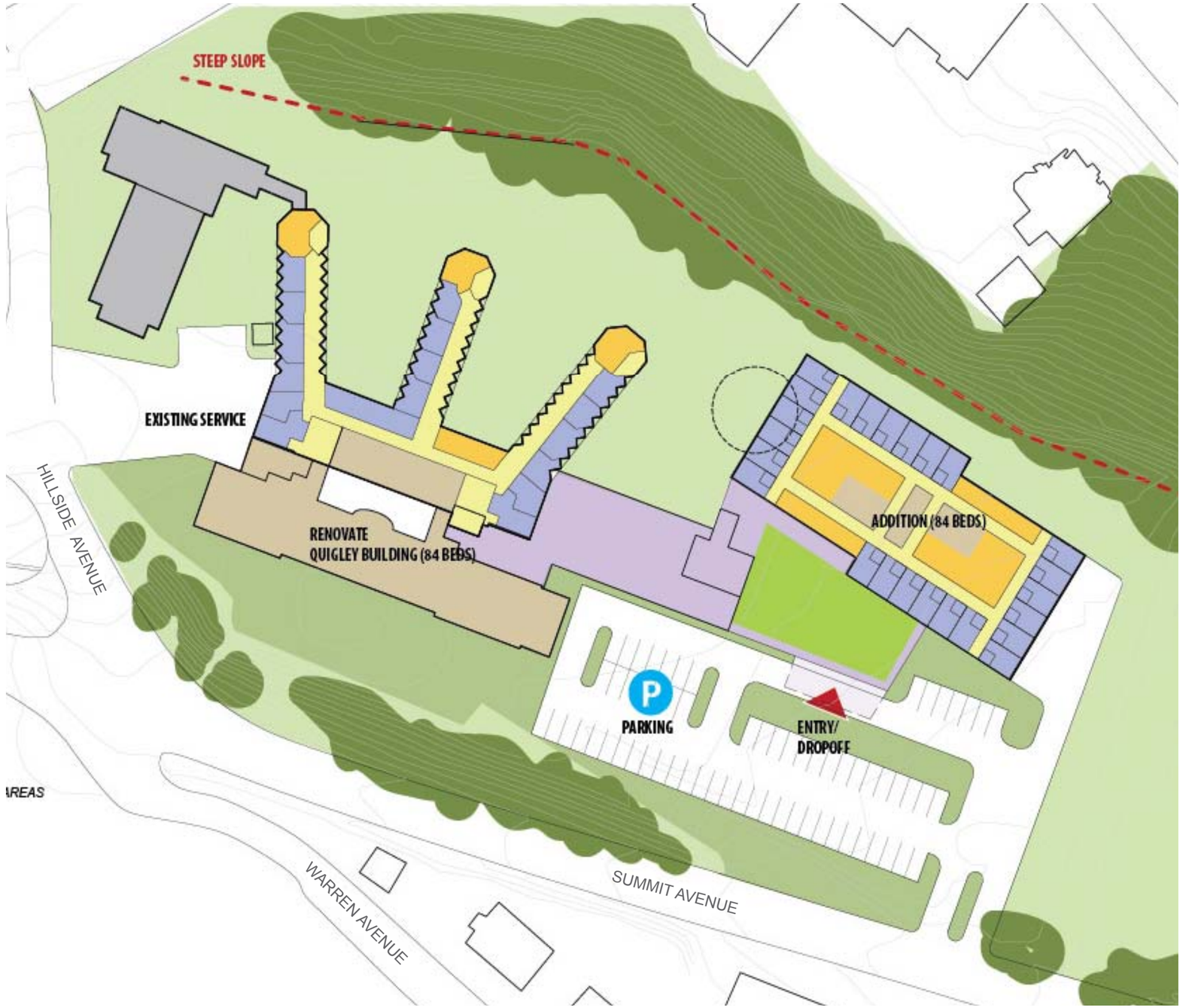
	# OF UNITS	NSF	TOTAL NSF
ADMIN. SUPPORT			
office- coordinator	1	120	120
office-supervisor	1	120	120
conference room	1	240	240
Total NSF			**6,869**
net to gross factor		1.55	
TOTAL DGSF			**10,647**

OPTION 2: RENOVATE QUIGLEY AS CLC AND BUILD NEW CLC ADDITION

N

SCALE: NTS

OPTION 2: RENOVATE QUIGLEY AS CLC AND BUILD NEW CLC ADDITION



Key Features

- Community Living Center model
- 156 Beds total
- Single bedrooms
- Private baths

  Quigley CLC Renovation
  72 Beds (16 beds/unit)
  New CLC Addition
  84 Beds (12 beds/unit)
  110,000 SF (4 floors + bsmt)

Advantages

- Addresses VA citation
- Maintains Quigley
- Efficient phasing
- Maintains per diem rate
- New ADA compliant entrance
- Eligible for 65% VA Grant

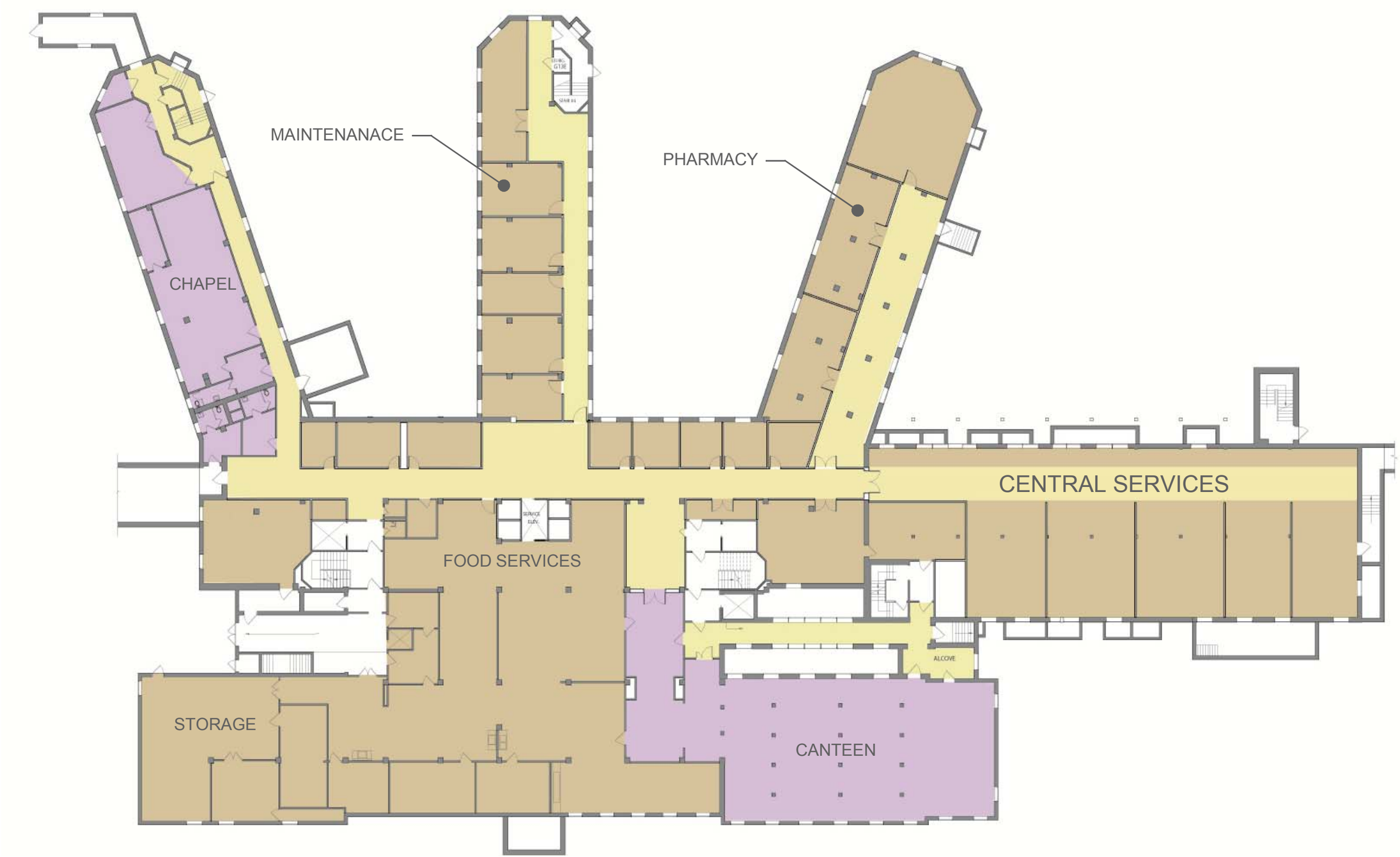
Disadvantages

- Loss of 22 beds
- Creates disparity between room configurations and sizes
- Not ideal CLC model in Quigley
- Loss of 40 parking spaces

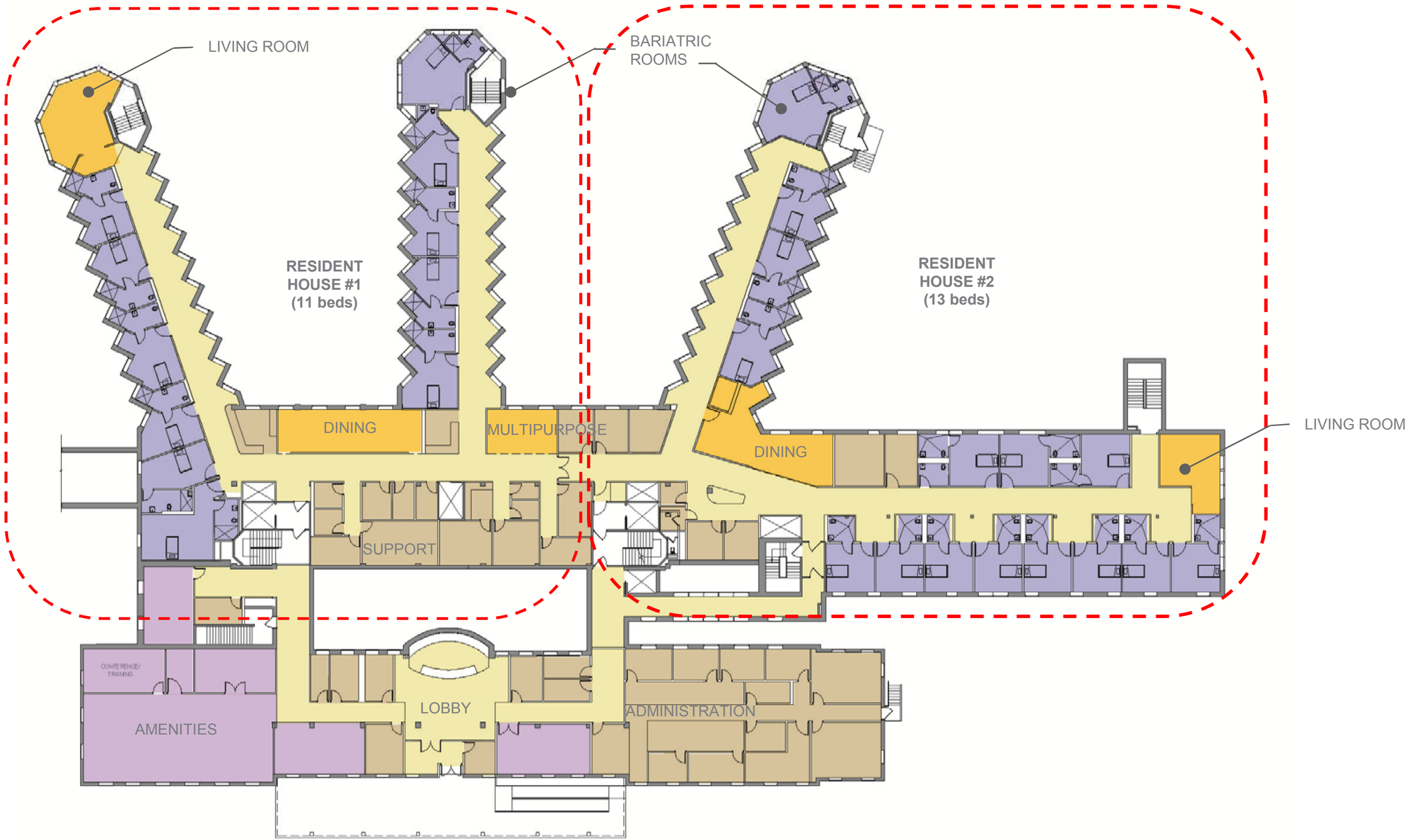
Estimated Costs

$104M ECC
$140M TPC
$49M net state costs

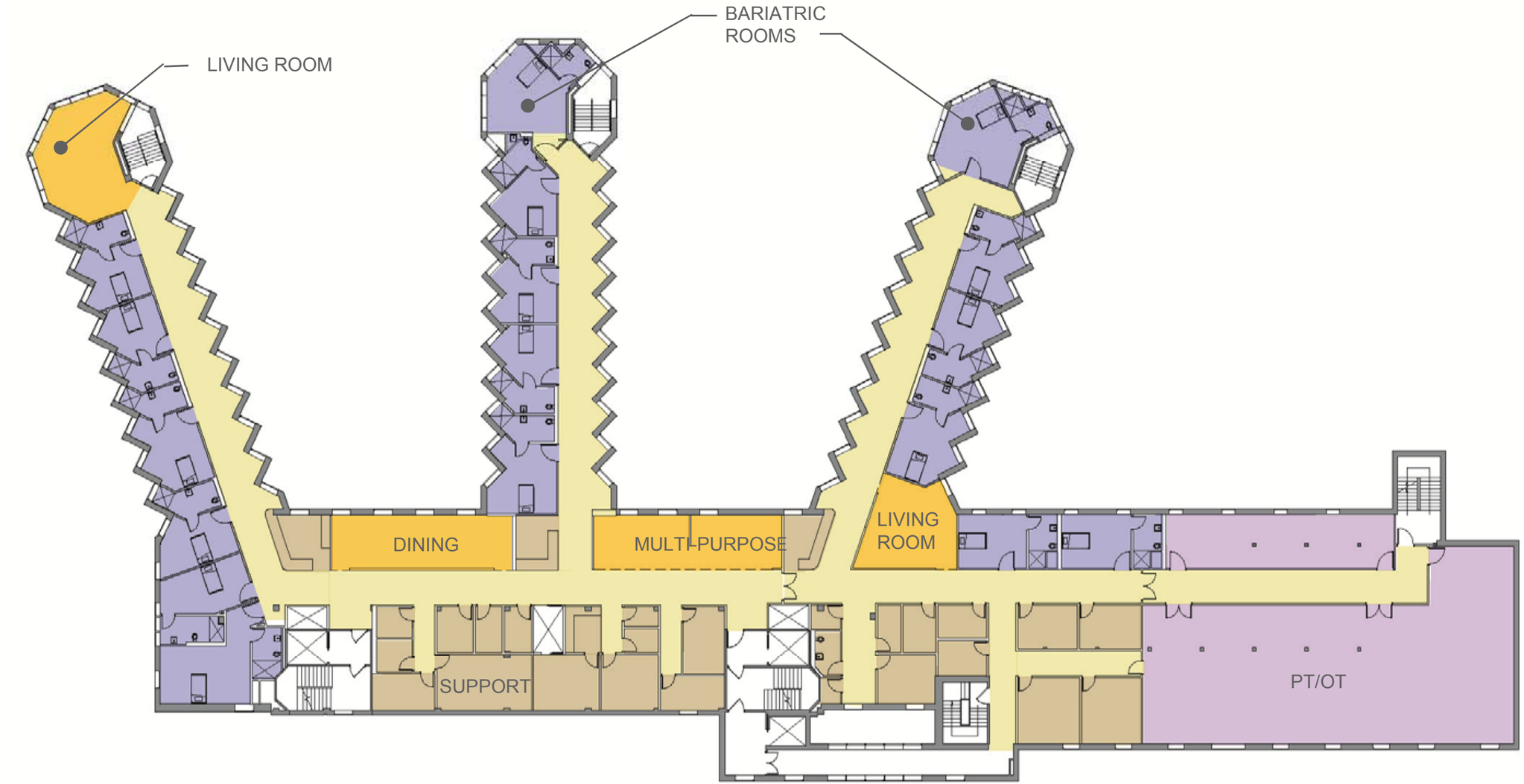
OPTION 2: RENOVATE QUIGLEY - GROUND FLOOR



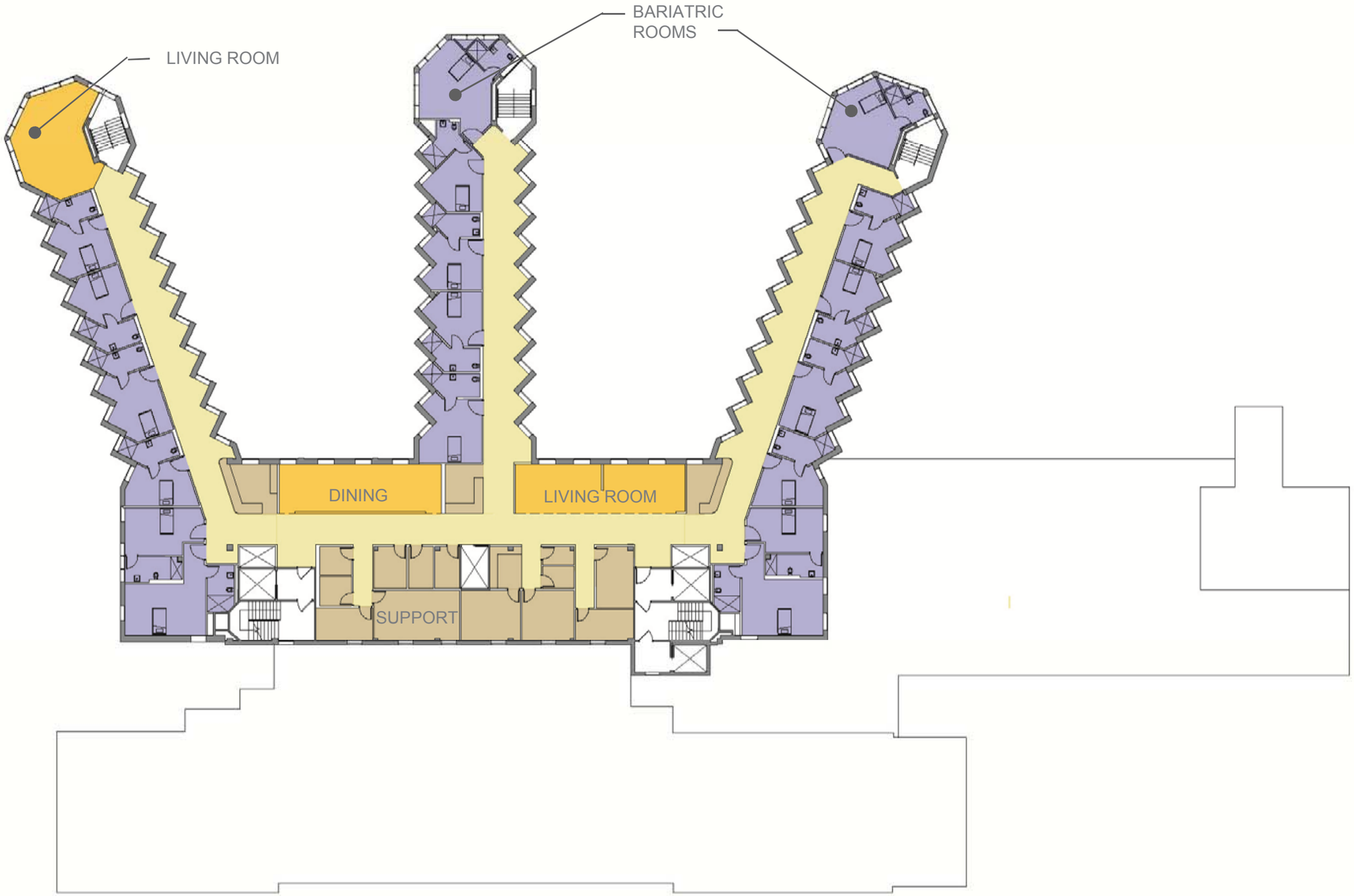
OPTION 2: RENOVATE QUIGLEY - 1ST FLOOR (24 BEDS)



OPTION 2: RENOVATE QUIGLEY - 2ND FLOOR (16 BEDS)



OPTION 2: RENOVATE QUIGLEY - 3RD AND 4TH FLOORS (16 BEDS/UNIT



OPTION 3A: NEW CLC CONSTRUCTION: QUIGLEY SITE

OPTION 3A: NEW CLC CONSTRUCTION: QUIGLEY SITE

N

SCALE: NTS

Key Features

- All new construction
- 160 Beds
- Single bedrooms
- Private baths
- 210,000 SF(4 floors + bsmt)
- Phase 1: 84 beds,
- Phase 2: 84 Beds

Advantages

- CLC model with identical single bed rooms with private baths
- Efficient layout
- Efficient phasing plan
- New campus identity
- Set back from adjacent residential neighborhood
- Eligible for 65% VA Grant

Disadvantages

- Demolition of Quigley Hospital
- Temporary relocation of some resi dents during phase 2

Estimated Costs

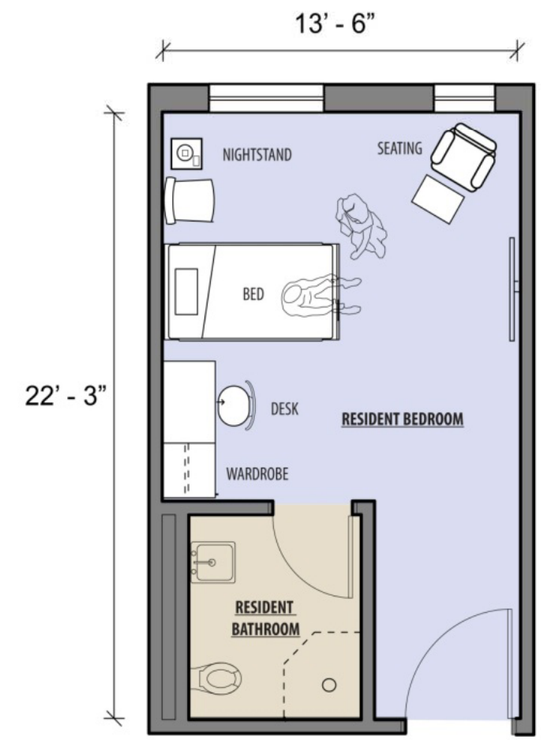
- $113M ECC
- $39.5M TPC (Net State Cost)

TYPICAL CLC FLOOR PLAN

TYPICAL PLAN

PROGRAM AREAS

- COMMUNAL SPACE
- SINGLE ROOM
- CIRCULATION
- VERTICAL CIRCULATION
- TOILET ROOM
- ADMINISTRATION
- PUBLIC SPACE
- MECHANICAL
- SUPPORT



Typical New Single Room

Community Living 1 Neighborhood (2 Houses, 12 Beds/House)

RESIDENTIAL UNIT			
PROGRAM	# OF UNITS	NSF	TOTAL NSF
Single Rooms	11	230	2,530
Toilet Rooms	11	70	770
Bariatric room	1	320	320
Toilet Room	1	100	100
SUPPORT			
Vestibule	1	50	50
Living Room	1	360	360
Dining Room	1	360	360
Pantry	1	80	90
Kitchen	1	150	150
Public Toilet Room	1	50	50
Quiet Room	1	120	120
Soiled Cart	1	20	20
Linen Storage	1	20	20
Equipment Storage	1	100	100
Nurse Station	1	50	50
Medical Supplies	1	100	100
Housekeeping Room	1	50	50
Resident Laundry	1	100	100
Staff Toilet	1	50	50
Stretcher Wheelchair Storage	1	100	100
Subtotal 1 Residential House NSF			**5,490**
net to gross factor		1.55	
Subtotal 1 Residential House DGSF			**8,510**
Total DGSF Residential House x 2			**17,019**

NEIGHBORHOOD SUPPORT			
PROGRAM	# OF UNITS	NSF	TOTAL NSF
Multipurpose	1	400	400
Nurse Station	1	250	250
Exam Room	1	120	120
Housekeeping	1	50	50
Clean Utility	1	120	120
Soiled Utility	1	100	100
Storage wheelchair/stretcher	1	60	60
Staff Lockers/Break Room	1	150	150
office- coordinator	1	100	100
office-supervisor	1	100	100
conference room	1	240	240
Subtotal			440
Total Neighborhood Support			**2,130**
net to gross factor		1.55	
Subtotal Neighborhood Support DGSF			**3,302**
Total DGSF Neighborhood			**20,321**
Total DGSF 7 Neighborhoods			**142,244**

Building Amenities & Support			
Lobby			**1,677**
Public Areas			**8,000**
Clinical Support			**3,186**
Administration			**2,400**
Food Service			**4,030**
Building Support			**9,650**
Total Amenities & Support DGSF			**28,943**
Total DGSF			**171,187**
DGSF to BGSF gross factor		**1.2**	
Total			**205,424**
Penthouse Allowance			**5,000**
Total BGSF			**210,424**

OPTION 3B: NEW CLC CONSTRUCTION: NORTH SITE

N

SCALE: NTS

OPTION 3B: NEW CLC CONSTRUCTION: NORTH SITE

Key Features

- All new construction
- CLC model
- 168 Beds
- Single bedrooms
- Private baths
- 210,000 SF (4 floors + bsmt)
- Quigley retained for reuse

Advantages

- No disruption to residents or operations
- 'Thin Building' configuration provides significant natural light
- New efficient layout

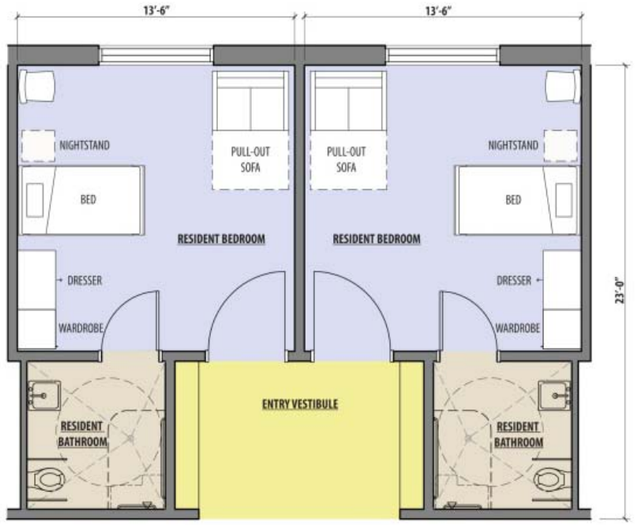
Disadvantages

- Demolish Laundry, Sargents, Williams, Commandant's House. MHC coordination required
- Narrow site presents service and access challenges
- Limited parking
- Close proximity to residential neighborhood.
- Narrow floor plate limits options for residential unit layout

Estimated Costs

$84M ECC
$113 TPC
$39.5M net state costs

OPTION 3B: NEW CLC CONSTRUCTION: NORTH SITE (TYPICAL FLOOR)



Typical Private CLC Bedroom

COST ESTIMATE SUMMARY

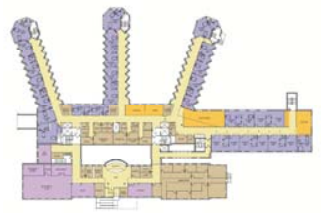
COST ESTIMATE SUMMARY

OPTION 1

- Renovate Quigley (Title 38)
- 110 Beds

ESTIMATED COST

$52M (CC) x 1.35 (ECC)	= $70M TPC
Net State Cost with no VA funding	= $70M TPC



OPTION 2

- Renovate Quigley as CLC(72 beds)
- New CLC Addition (84 beds)
- 156 Beds

$58.8M (CC) x 1.35 (ECC)	= $79.5M TPC
$45M (CC) x 1.35 (ECC)	= $59.5M TPC
Demolition Cost	= $1M
Total	= $140M TPC
Net State Cost with VA funding	= $49M TPC

OPTION 3A

- New CLC Building: Quigley Site
- 168 Beds

$82.5M (CC) x 1.35 (ECC)	= $111.5M TPC
Demolition	= 1.5M
Total	= 113M TPC
Net State Cost with VA funding	= $39.5M TPC

OPTION 3B

- New CLC Building: North Site
- 168 Beds

$84M (CC) x 1.35 (ECC)	= $113M TPC
Demolition	= $1.5M
Total	= $113M TPC
Net State Cost with VA funding	= $39.5M TPC

NIC: Temporary or permanent relocation costs

APPENDIX

System Descriptions (RDK Engineers) Appendix A

- Quigley Hospital Renovations
- Replacement Building - Quigely Hospital Site
- Replacement Building - North Site

Detailed Cost Estimate - Feasibility Study to Renovate Quigely Hospital (VJ Associates) Appendix B

PAYETTE

Appendix A

RDK ENGINEERS

RDK understands how engineering affects people

Mechanical

Electrical

Plumbing

Fire Protection

Technology Design

Commissioning

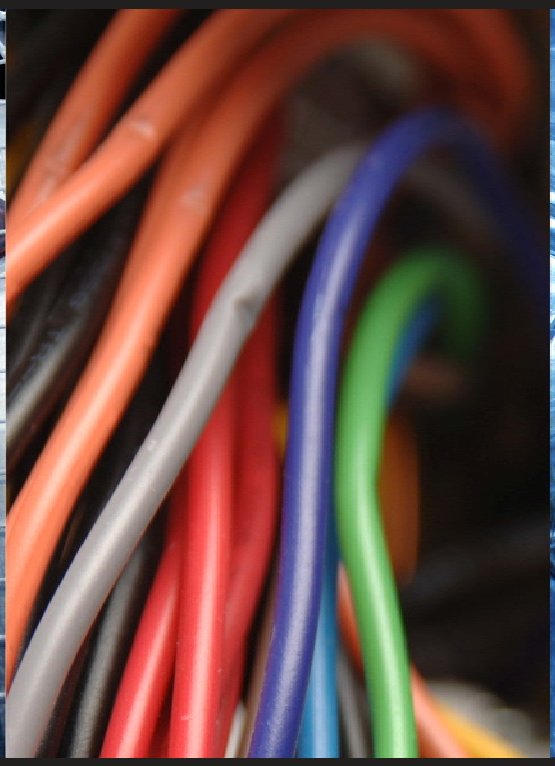
Code Consulting

Energy Conservation

Chelsea Soldiers Home – Quigley Hospital Renovation Study / System Description

Submitted to: **Payette Associates**
December 13, 2012

Submitted by: RDK ENGINEERS



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PART 1 - QUIGLEY SYSTEM DESCRIPTION / OUTLINE SPECIFICATIONS

1.00 PROJECT OVERVIEW

A. This project consists of a complete renovation of the existing Quigley Hospital and Annex Long Term Care facility located in Chelsea Massachusetts.

1.01 EXISTING CONDITIONS/DEMOLITION

A. *Fire Protection (Existing):*

The fire protection system is connected to 8" underground main that enters the basement of the Quigley Building. The service is fed by a diesel fire pump located in a prefabricated building on the south side of the campus. The pump is rated for 1,500 gpm at a 100-psig boost. Sprinkler piping is distributed to the Quigley and Annex Buildings. These Buildings are fully sprinkled and served via combined standpipe and wet sprinkler systems. The fire pump was installed in 2004 and has sufficient capacity to serve the distribution.

B. *Fire Protection (Demolition):*

Maintain fire pump and stand-pipe system, demolish branch piping and heads for proposed architectural layout.

C. *Plumbing (Existing):*

Domestic cold water is fed by a 6" underground service fed from the campus loop. The service enters the Quigley Building in the basement mechanical room. Domestic water is distributed to the building via duplex booster pumps based on Syncro Flow; model SG-10 185 gpm at 45 psig boost.

Domestic hot water is served by steam to hot water heaters located in the basement of the Quigley and Annex Buildings. The Quigley Building is served by (2) ACE Series storage units. The Annex Building is served by (2) Patterson Kelley steam heaters. Steam is provided by the Power Plant boiler system.

Patient oxygen is supplied via a pad mounted vertical liquid oxygen tank located in back of Annex Building. Oxygen is distributed through main distribution piping in the Annex and Quigley Building basement.

Patient vacuum is served by duplex vacuum pump set installed in 2004. The pump is rated for 15.2 scfm at 19"hg. Patient medical air is served via duplex compressors rated at 20.9 scfm at 50 psig. The equipment is located in the basement of the Annex Building.

D. *Plumbing (Demolition):*

Maintain domestic water service, booster pumps and Quigley hot water heaters. Demolish Patterson Kelley hot water heaters located in basement of the Annex Building.

E. *Chiller Plant (Existing):*

The Chiller Plant is located at grade on the south side of the campus behind the Annex Building. There are two (2) air-cooled chillers, each sized at 150 ton. Chillers utilize refrigeration type R-134a and there is no plan to phase out for this type of refrigeration currently. Chilled water is distributed to Quigley Hospital by dedicated pumps via underground piping to the utility tunnel located in the Annex Building basement. The

chiller plant was installed in 2004 and appears to be in good condition and has sufficient capacity for the existing distribution.

F. *Chiller Plant (Demolition):*

Maintain air-cooled chiller and pumps currently located in the Annex Building basement.

G. *Boiler Plant (Existing):*

Boilers systems are located in Power Plant (North Site) mechanical room. The plant consists of (3) hi-pressure steam boilers, associated condensate pumps and de-aerator. The boilers are Cleaver Brooks model CBLE(dual fuel) fire tube hi-pressure steam boilers (installed in 1993), (1) boiler is rated at 400 hp and (2) at 700 hp; total of 1,700 hp. Steam is distributed to the campus via piping located within the tunnel. Heating, steam is converted to hot water by steam to liquid heat exchangers located in each building. The boilers were installed in 1997. The piping system and boiler controllers have been updated recently. The boilers are appeared to be in good condition and have sufficient capacity for the existing distribution. During the cold design day condition, in general, one (1) 700 hp boiler can satisfy campus heating requirements.

H. *Boiler Plant (Demolition):*

No demolition required in the Power Plant for the proposed renovation.

I. *Air Handling Systems (Existing):*

The Quigley and Annex Buildings are conditioned and ventilated by a variety of equipment. Air handling units primarily located in the basement and Penthouse serve the floors of the Annex and Quigley Buildings. Ceiling mounted four-pipe fan coil units provide cooling and heating for interior zones. Perimeter heating is done by two-pipe fan coil units and finned tube radiation. Outside ventilation air is provided by ceiling mounted unit ventilators located in the corridors ceilings. Outside ventilation air is distributed to ceiling mounted unit ventilators units to provide required outside air to each space. The existing ventilation system has been updated and appeared to be in good condition; however, there is no relief or exhaust air on the patient wards.

J. *Air Handling Systems (Demolition):*

Demolish patient ward unit ventilators, fan coils, and perimeter heating units. Retract piping into ceiling cavity and prepare for new connection. Maintain ground floor common area's HVAC systems fed by basement air handlers.

K. *Automatic Temperature Controls:*

The HVAC system is controlled by Delta controls DDC system. The DDC system is controls the major HVAC equipment and majority of terminal equipment including fan coil units and perimeter heating radiators. The DDC system front end is located in the Power Plant. The existing DDC system appears to be in good condition and has sufficient control capability to provide proper control of the existing HVAC system.

L. *Electrical Service (Existing)*

The existing electrical service to the campus is via 4160V primary service from the utility. The service from the utility enters the east side of the campus at the Headquarters Building. The substation at the Headquarters Building serves many of the buildings on that side of the campus including the boiler plant. The 4160V feeders are installed in the service tunnel from the Headquarters Building to the Quigley Building. There are C&W oil switches installed in the existing transformer room for the Quigley Building. These

switches have been re-called by the manufacturer and should be replaced as soon as possible. One set has already been replaced with new. In the original Quigley transformer vault there are (2) 500KVA 3-phase transformers that provide 208Y/120V power on the secondary and (1) 100KVA 1-phase transformer that provides 120/240V power on the secondary. A new 500KVA 480Y/277-volt substation was added to serve the new chiller plant within the last 7 years. A study provided "ERS" stated the peak demand for the site to be 874KW in July of 2010.

M. *Electrical Service (Demolition)*

The existing service shall remain with no demolition.

N. *Electrical Distribution (Existing)*

The existing electrical distribution within the Quigley Building consists of a mix of original panelboards and new. The existing panelboards are as manufactured by WM Wurdack Electric and are past there useful life. The existing panelboards on the patient floors are located in dedicated electrical closets or behind locked doors that have no patient access. In general the new panels are as manufactured by Cutler-Hammer.

O. *Electrical Distribution (Demolition)*

The demolition will be limited to the replacement of the existing normal power panelboards.

P. *Emergency Power (Existing)*

The site is currently in the process of upgrading the emergency systems for all areas except the Boiler Plant. The existing indoor generators at the Headquarters Building and Quigley Buildings will be replaced with exterior units with self contained skid mounted tanks. The upgrade also includes new transfer switches and distribution panels. The work is on going and should be completed within the next two years. The new 300kW generator for the Quigley Building is currently located adjacent to the Annex Building. The emergency power within Quigley has two branches the life safety branch and standby branch. The life safety branch serves the emergency lighting and fire alarm system within the building. The standby branch serves the mechanical systems within the building. The life safety panels are stacked and enclosed in a 2-hour rated closet. The local fire alarm panels may also be installed within these closets. The mechanical standby panels are usually located in staff only rooms with no patient access and are stacked up the building.

Q. *Emergency Power (Demolition*)

At the completion of the current project the system should be able to support the proposed renovation in a code compliant manor.

R. *Fire Alarm System (Existing)*

The existing EST fire alarm system was upgraded with the HVAC upgrade within the past 10 years. Initiation devices are addressable and all devices appear to be labeled with the system address. Visual annunciation devices are xenon strobes and are ADA compliant. Fire alarm risers are located within the 2-hour rated emergency closets within Quigley.

S. *Fire Alarm System (Demolition)*

There will be only limited demolition of devices that are in the areas to be renovated.

T. *Photovoltaic (Existing)*

There is an existing photovoltaic system on the roof of the existing patient wings. The system inverters are located in the penthouse of the Quigley Building.

U. *Photovoltaic (Demolition)*

No demolition of this system should be required.

1.02 PHASING

A. The project will be constructed in distinct phases. Refer to the overall schedule for additional detail.

1.03 CODE ISSUES:

A. A fail open (normally closed smoke damper will be provided for the elevator shaft vents). This damper will open on loss of power, rise in temperature to 90°F, or a signal from the fire alarm system.

1.04 SYSTEM DESCRIPTIONS AND OPTIONS

QUIGLEY HOSPITAL & ANNEX BUIDING RENOVATION:

A. Fire Protection:

1. The entire building will be fully sprinkled, served by existing combined standpipes. The current structures (Quigley and Annex Buildings) are served by a fire pump system housed in a prefabricated structure. For this renovation, it is proposed to maintain the current infrastructure including fire pump an standpipe systems.

2. Sprinkler floor service shall be provided by existing combined riser-standpipes systems. Sprinkler service shall be routed from floor zone stations with a water flow alarm, isolation valve, check valve to the renovated areas.

3. Sprinkler mains shall be located where possible, in main lower lever heated corridors and thus feed the combined system at the egress stair enclosures where floor feeder zone stations are set up.

4. A temporary standpipe system with 2-½" fire hose valves on each floor shall be provided and maintained during construction. A temporary standpipe shall be provided with a separate pumper connection.

5. The above fire protection proposal is based on basic building code and NFPA requirements. Any additional demands made by Insurance Underwriters will be considered an addition to the base contract.

B. Plumbing Systems:

1. Maintain domestic water service and booster pumps (located in basement) fed from the existing campus loop.

2. Provide a complete domestic water distribution system including supply to fixtures, hose bibs, wall hydrants, kitchen equipment, process *equipment*, trap primers and HVAC make-up.

3. Provide a tempered water supply to all emergency equipment including emergency showers, eyewashes, and eye/face washes. A tempered water return line complete with recirculation pump shall be included.

4. Re-route sanitary waste and vent system serving all plumbing fixtures, kitchen equipment, and floor drains.

5. Replace the current duplex sewage ejectors located in the Quigley and Annex Building basement. Provide new in similar location. The ejector shall serve the basement plumbing fixtures and floor drains and discharge to the gravity waste line at the ceiling of the basement floor. Sizing shall be in accordance of State Plumbing Code. Pumps shall be submersible with cast iron casings and bronze impellers. Pump discharge shall be Type L copper with soldered joints.

6. Provide new interior floor mounted grease interceptor to serve the kitchen. Pot sinks, scullery sinks, floor drains and floor sinks shall be piped through the grease interceptor. The interceptor shall be constructed of steel with an acid resistant coating and have an automatic draw-off. The grease interceptor shall be complete with draw-off valve, line shut-off valve and flow control fitting.

7. Provide a new exterior grease interceptor to serve kitchen waste. The interceptor shall be of concrete or fiberglass construction and sized in accordance with the Massachusetts State Plumbing Code, and the Massachusetts State Environmental Code Title 5. A chamber vent shall be provided and piped back into the building.

8. Re-route, as required, the internal rainwater leaders to accommodate the new architectural layout.

9. Existing natural gas will be extended for cooking equipment.

10. Domestic hot water will be generated by the existing water heaters located in the Quigley basement mechanical room.

11. Insulation will be provided on all hot and cold water piping, tempered water, horizontal roof drainage, roof drain bodies and all piping at handicapped accessible fixtures.

12. Insulation shall be four pound density fiberglass with factory applied white fire retardant, reinforced vapor barrier jacket. Insulation shall be 1 inch thick and continuous through sleeves.

13. Maintain patient vacuum, medical air and oxygen systems. Re-route piping systems as required to meet the new layout requirements. Provide new patient vacuum, oxygen and medical air outlets at proposed headwalls.

C. <u>HVAC Systems:</u>

1. Boiler Plant:

   a. Maintain high pressure steam service from boiler plant. Replace PRV stations in the Quigley and Annex Buildings.

   b. Maintain steam to liquid heat exchangers and pumps in Quigley and Annex Buildings. Provide additional heat exchanger in each building for redundancy purposes. Quigley building shall be based on 5,000 mbh output and Annex Building 1,400 mbh output.

2. Chiller Plant:

   a. Maintain two (2) air-cooled chillers and pumps. Provide one (1) new 100-ton air-cooled chiller and supply/return pumps. New chiller shall be headed with existing chiller piping infrastructure and located adjacent to the existing chillers.

   b. Provide alternate to replace air-cooled chillers and pumps with two (2) new 250-ton centrifugal water cooled chillers, pumps and two (2) cooling towers. Chillers shall be installed in a pre-fabricated building located on the south side of the building Provide three (3) primary and three (3) secondary pumps. Chillers shall be located within a pre-fabricated building located on the south side of the building. Pumps will be installed adjancent to the equipment located in the Annex Building. Provide new 4" CHWS/R express riser up to new roof mounted air handlers.

3. Building HVAC Air Handling Systems

   a. Provide new HVAC systems to serve the patient areas of the building to include a combination of hot water perimeter heating via radiant panels or fin-tube radiation (option) and cooling / warm-up / ventilation via variable air volume (VAV) air handling systems. Fin-tube radiation or radiant panels shall have control valves and be controlled by the associated VAV box.

   b. Provide two (2) central VAV air handling units (AHU). Each AHU will be sized for 25,000 cfm sized for a minimum 25% outdoor air and maximum 475 fpm coil velocity. The AHUs will be located on the roof. Supply and return risers will be routed from the roof through the building floors. Each AHU shall have an intake louver, outdoor airflow monitoring station, mixing section (with air economizer dampers), 30% efficient pleated filters, hot water heating coil, chilled water cooling coil, and supply fan section. Relief air for each AHU (during air economizer operation) will be by a relief fan and back draft damper. Provide a variable frequency drive (with harmonic filters) for each fan motor with remote differential pressure for supply fan speed control and return airflow monitoring stations for relief fan speed control. Air handling units supply air shall be ducted with 4" pressure class insulated galvanized duct sealed to leakage class 6, and distributed to the VAV terminal units. The supply air ductwork shall be leakage tested per SMACNA. Air handling units return/relief air shall be ducted with 2" pressure class galvanized duct sealed to leakage class 12.

   c. Each perimeter and top floor interior VAV terminal units will have hot water heating coil, wall-mounted temperature sensor, be sized according to the zone (average of 1.2 cfm/sf), and will be ducted with 2" pressure class insulated galvanized duct sealed to leakage class 12, and distributed to ceiling diffusers with individual duct mounted volume dampers. All systems will be equipped with direct digital controls. Conference rooms and workrooms will have series fan powered terminal units with reheat coils and CO_2 sensors. Provide one (1) VAV, with reheat, per patient room.

   d. Toilet exhaust will be provided by 2" pressure class galvanized duct sealed to leakage class 12 ductwork from each toilet room and janitor's closet (with individual volume dampers) to two 3,000 cfm roof mounted toilet exhaust fans.

e. Replace existing Penthouse kitchen exhaust systems with new exhaust fans to serve the kitchen exhaust hood (8,000 cfm) and the dishwasher exhaust (3,000 cfm). The grease hood shall have minimum 16 gauge welded grease black steel ductwork (stainless steel where exposed). The duct shall be covered with 2-layers of fire rated insulation between the kitchen and the fan. The dishwasher shall have soldered 16 gauge aluminum or welded 16 gauge stainless steel ductwork. The fans shall operate via local switches with interlocks to the make-up air terminal units.

f. Elevator: Provide dedicated cooling for all elevator machine rooms. Utilize fan coil (if year-round chilled water is available) or split system DX unit and controls. For heating, provide electric baseboard or unit heater. Maintain minimum 2' clear of all elevator equipment. All duct penetrations shall have fire dampers. Provide elevator shaft vent with normally closed (fail open) damper. Damper shall open on fire alarm signal or power failure.

4. Miscellaneous Exhaust Systems

a. Provide exhaust systems for the following systems:

1) Loading Dock – Carbon monoxide and diesel fume exhaust system

2) Trash Room

3) Maintenance Workshop

4) Men's / Women's Locker Rooms – Stainless Steel Ductwork and Dedicated Fan

5) Mechanical Room Ventilation

6) Electric Room Ventilation

7) Clothes Dryer Exhaust: Clothes dryers shall be ducted to common risers. If duct passes through any fire rated partitions, it shall either be wrapped with 2 layers of fire-rated insulation or shall use an oversized riser with 22" sub-ducts from each dryer. No more than (6) dryers shall be connected to any one riser. Exhaust fans shall be 100% speed controllable. Fans shall operate via a duct pressure sensor mounted in the riser duct. The pressure sensor shall be set to keep a slight negative pressure (.05") in the riser duct.

5. Automatic Temperature Controls

a. Add to the current DDC controls system srving the building. The new system will be interfaced with the current DDC front end located in the Power Plant Building.

b. Provide all DDC field panels and interlocking wiring to integrate all system components. All panels will be stand-alone and fully programmable.

c. Provide adjustable high / low alarms for all sensors.

d. Fully checkout the system and verify that all points and sequences operate per design requirements.

D. Electrical Systems:

1. Provide a new 175A/3P circuit from the 480Y/277-volt substation in the basement to a new 225A 480Y/277-volt 30 pole panelboard in the penthouse to serve the new AHU's required for the patient floors.

2. Replace the (4) existing 208Y/120V 225-ampere main lug only normal power panels on each patient floor with new. Re-connect existing circuits to remain as well as proving new breakers to support the new layout.

3. Provide a minimum of 6 hospital grade duplex outlets in each patient room.

4. A 20-ampere 120-volt circuit shall serve no more than 6 duplex receptacles on normal power.

5. Provide general-purpose hospital grade convenience outlets in the corridor 50% which shall be connected to the life safety branch.

6. Provide GFCI hospital grade receptacles at each of the bathrooms and any other location within 6' of a sink.

7. Lighting shall be provided in accordance with the architectural reflected ceiling plans.

8. Provide wall mounted or ceiling mounted occupancy sensors in storage areas or offices.

9. Provide branch circuits to mechanical equipment. Provide VSD's for all pumps and air handling equipment.

10. Provide a remote fire alarm annunciator at each nurse's station.

11. Provide smoke detectors in the corridors, sleeping rooms, electrical closets and all locked storage closets.

12. Alarm notification shall be via speaker/strobe and all strobes shall be synchronized.

13. Provide a new nurse call system (Rauland 4000) for the patient floors. Each patient bed shall have a nurse call button and pillow speaker for the ability to control the bed lighting.

14. Update the existing overhead paging system.

15. Update the existing security system.

-END-

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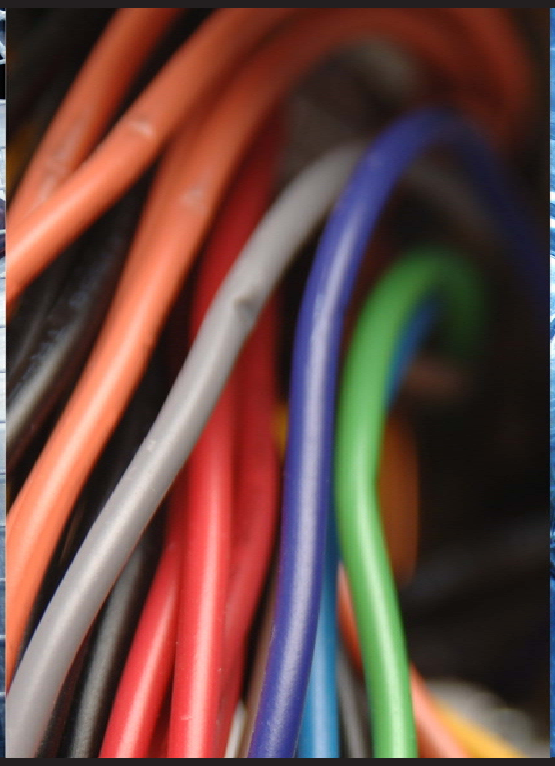
Energy Conservation

Chelsea Soldiers Home – Quigley Hospital Site Study / System Description

Submitted to: **Payette Associates**
December 11, 2012

Submitted by: RDK ENGINEERS



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PART 1 - BAR / L /Z BUILDING SYSTEM DESCRIPTION / OUTLINE SPECIFICATIONS

1.00 PROJECT OVERVIEW

A. This project consists of three options, which include demolition of existing structures and the construction of a 90,500 square foot Long Term Care facility located in Chelsea Massachusetts. The three options are as follows:

1. *BAR-Building Option:* Demolish Annex and Quigley Hospital and construct a new 90,500 square foot Long Term Care Facility on the same site.

2. *L-Building Option:* Demolish the Annex Building, partially demolish Quigley Hospital and construct a new 90,500 square foot Long Term Care Facility on the same site.

3. *Z-Building Option:* Demolish the Annex Building, partial demolition of the Quigley Hospital and construct a new 90,500 square foot Long Term Care Facility.

1.01 EXISTING CONDITIONS/DEMOLITION

A. *Fire Protection (Existing):*

The fire protection system is connected to 8" underground main that enters the basement of the Quigley Building. The service is fed by a diesel fire pump located in a prefabricated building on the south side of the campus. The pump is rated for 1,500 gpm at a 100-psig boost. Sprinkler piping is distributed to the Quigley and Annex Buildings. These Buildings are fully sprinkled and served via combined standpipe and wet sprinkler systems. The fire pump was installed in 2004 and has sufficient capacity to serve the distribution.

B. *Fire Protection (Demolition):*

Due to the site location for Option BAR and L, the fire pump and pre-fabricated structure will be required to be relocated and reconfigured to back-feed the Quigley Hospital and new building.

C. *Plumbing (Existing):*

Domestic cold water is fed by a 6" underground service fed from the campus loop. The service enters the Quigley Building in the basement mechanical room. Domestic water is distributed to the building via duplex booster pumps based on Syncro Flow; model SG-10 185 gpm at 45 psig boost.

Domestic hot water is served by steam to hot water heaters located in the basement of the Quigley and Annex Buildings. The Quigley Building is served by (2) ACE Series storage units. The Annex Building is served by (2) Patterson Kelley steam heaters. Steam is provided by the Power Plant boiler system.

Patient oxygen is supplied via a pad mounted vertical liquid oxygen tank located in back of Annex Building. Oxygen is distributed through main distribution piping in the Annex and Quigley Building basement.

Patient vacuum is served by duplex vacuum pump set installed in 2004. The pump is rated for 15.2 scfm at 19"hg. Patient medical air is served via duplex compressors rated at 20.9 scfm at 50 psig. The equipment is located in the basement of the Annex Building.

D. *Plumbing (Demolition):*

Demolish plumbing systems serving the Annex Building; including hot water heaters, vacuum and medical air compressors. Temporally relocate patient medical air compressors and vacuum pumps to the Quigley basement and reconnect to the piping systems.

Relocate bulk oxygen storage tank systems to serve the Quigley Building; provide temporary O2 back feed to the hospital via emergency O2 connection.

E. *Chiller Plant (Existing):*

The Chiller Plant Building is located at grade on the south side of the campus behind the Annex Building. There are two (2) air-cooled chillers, each sized at 150 ton. Chillers utilize refrigeration type R-134a and there is no plan to phase out for this type of refrigeration currently. Chilled water is distributed to Quigley Hospital by dedicated pumps via underground piping to the utility tunnel located in the Annex Building basement. The chiller plant was installed in 2004 and appears to be in good condition and has sufficient capacity for the existing distribution.

F. *Chiller Plant (Demolition):*

For Option 2/L: Temporarily relocate the air-cooled chiller plant and re-distribute piping to Quigley Hospital. Relocate chiller pumps currently located in the Annex Building basement to the Quigley Building basement and reconnect to the piping infrastructure.

G. *Boiler Plant (Existing):*

Boilers systems are located in Power Plant (North Site) mechanical room. The plant consists of (3) hi-pressure steam boilers, associated condensate pumps and de-aerator. The boilers are Cleaver Brooks model CBLE(dual fuel) fire tube hi-pressure steam boilers (installed in 1993), (1) boiler is rated at 400 hp and (2) at 700 hp; total of 1,700 hp. Steam is distributed to the campus via piping located within the tunnel. Heating, steam is converted to hot water by steam to liquid heat exchangers located in each building. The boilers were installed in 1997. The piping system and boiler controllers have been updated recently. The boilers are appeared to be in good condition and have sufficient capacity for the existing distribution. During the cold design day condition, in general, one (1) 700 hp boiler can satisfy campus heating requirements.

H. *Boiler Plant (Demolition):*

Demolish heat exchanger and pumps serving the Annex Building. No demolition required in the Power Plant under the proposed options.

I. *Air Handling Systems (Existing):*

The Quigley and Annex Buildings are conditioned and ventilated by a variety of equipment. Systems air handling units primarily located in the basement and Penthouse serve the floors of the Annex and Quigley Buildings. Ceiling mounted four-pipe fan coil units provide cooling and heating for interior zones. Perimeter heating is done by two-pipe fan coil units and finned tube radiation. Outside ventilation air is provided by ceiling mounted unit ventilators located in the corridors ceilings. Outside ventilation air is distributed to ceiling mounted unit ventilators units to provide required outside air to each space. The existing ventilation system has been updated and appeared to be in good condition; however, there is no relief or exhaust air on the patient wards.

J. *Air Handling Systems (Demolition):*

Option BAR: Demolish air handlers, associated fan coil units and unit ventilators serving the Quigley and Annex Buildings.

Option L/Z: Demolish all HVAC systems serving the proposed areas slated for demolition.

K. *Automatic Temperature Controls:*

The HVAC system is controlled by Delta controls DDC system. The DDC system is controls the major HVAC equipment and majority of terminal equipment including fan coil units and perimeter heating radiators. The DDC system front end is located in the Power Plant. The existing DDC system appears to be in good condition and has sufficient control capability to provide proper control of the existing HVAC system.

L. *Electrical Service (Existing)*

The existing electrical service to the campus is via 4160V primary service from the utility. The service from the utility enters the east side of the campus at the Headquarters Building. The substation at the Headquarters Building serves many of the buildings on that side of the campus including the boiler plant. The 4160V feeders are installed in the service tunnel from the Headquarters Building to the Quigley Building. There are C&W oil switches installed in the existing transformer room for the Quigley Building. These switches have been re-called by the manufacturer and should be replaced as soon as possible. One set has already been replaced with new. In the original Quigley transformer vault there are (2) 500KVA 3-phase transformers that provide 208Y/120V power on the secondary and (1) 100KVA 1-phase transformer that provides 120/240V power on the secondary. A new 500KVA 480Y/277-volt substation was added to serve the new chiller plant within the last 7 years. A study provided “ERS” stated the peak demand for the site to be 874KW in July of 2010.

M. *Electrical Service (Demolition)*

Bar Building Option: Existing primary service and substations would need to be removed in its entirety back to the east side of the campus. The Chapel will need to be reserved from the new building.

L and Z Building Options: Existing primary service and substations for the Annex and existing chiller plant would need to be removed.

N. *Electrical Distribution (Existing)*

The existing electrical distribution within the Quigley Building consists of a mix of original panelboards and new. The existing panelboards are as manufactured by WM Wurdack Electric and are past there useful life. The existing panelboards on the patient floors are located in dedicated electrical closets or behind locked doors that have no patient access. In general the new panels are as manufactured by Cutler-Hammer.

O. *Electrical Distribution (Demolition)*

Bar Building Option: All existing distribution would be removed within the Annex and Quigley Buildings. Panelboards less than 15 years old should be turned over to the owner. The Chapel will need to be served from the new building

L and Z Building Options: Existing distribution within the Annex should be removed along with the existing feeders to the air cooled chillers from Quigley. Panelboards less than 15 years old should be turned over to the owner.

P. *Emergency Power (Existing)*

The site is currently in the process of upgrading the emergency systems for all areas except the Boiler Plant. The existing indoor generators at the Headquarters Building and Quigley Buildings will be replaced with exterior units with self contained skid mounted tanks. The upgrade also includes new transfer switches and distribution panels. The work is on going and should be completed within the next two years. The new 300kW generator for the Quigley Building is currently located adjacent to the Annex Building. The emergency power within Quigley has two branches the life safety branch and standby branch. The life safety branch serves the emergency lighting and fire alarm system within the building. The standby branch serves the mechanical systems within the building. The life safety panels are stacked and enclosed in a 2-hour rated closet. The local fire alarm panels may also be installed within these closets. The mechanical standby panels are usually located in staff only rooms with no patient access and are stacked up the building.

Q. *Emergency Power (Demolition*)

Bar Building Option: All existing emergency distribution equipment would be removed within the Annex and Quigley Buildings. All equipment should be turned over to the owner. Provide emergency battery units for the Chapel in lieu of emergency power.

L and Z Building Options: The existing exterior generator will need to be relocated to conform to the new site plan. Any existing emergency distribution within the Annex will be removed.

R. *Fire Alarm System (Existing)*

The existing EST fire alarm system was upgraded with the HVAC upgrade within the past 10 years. Initiation devices are addressable and all devices appear to be labeled with the system address. Visual annunciation devices are xenon strobes and are ADA compliant. Fire alarm risers are located within the 2-hour rated emergency closets within Quigley.

S. *Fire Alarm System (Demolition)*

Bar Building Option: All existing fire alarm equipment shall be removed within the Annex and Quigley Buildings. All equipment should be turned over to the owner. Provide a small independent system for the Chapel.

L and Z Building Options: Remove the devices and equipment within the demolition area and re-test the system upon completion.

T. *Photovoltaic (Existing)*

There is an existing photovoltaic system on the roof of the existing patient wings. The system inverters are located in the penthouse of the Quigley Building.

U. *Photovoltaic (Demolition)*

Bar Building Option: Should be removed and re-located if possible to the new buildings.

L and Z Building Options: Should be removed from the one wing being demolished.

1.02 PHASING

A. The project will be constructed in distinct phases. Refer to the overall schedule for additional detail.

1.03 CODE ISSUES

A. A fail open (normally closed smoke damper will be provided for the elevator shaft vents. This damper will open on loss of power, rise in temperature to 90°F, or a signal from the fire alarm system.

1.04 SYSTEM DESCRIPTIONS AND OPTIONS

BAR / L/ Z Building Options:

A. Fire Protection:

1. The new building will be fully sprinkled, provided with combined standpipes and wet sprinkler system. The current structures (Quigley and Annex Buildings) are served by a fire pump system housed in a *prefabricated* structure. For this project, it is proposed to relocate existing pre-fabricated fire pump enclosure to serve the new structure. Fire service from the relocated fire pump will be extended back to the Quigley Building with the exception of Option BAR.

2. For the new building, wet alarm valves serve the automatic sprinkler and standpipe systems for the common, residential, office, living areas and storage areas of the building. In addition, the basement and penthouse mechanical spaces are designed on wet pipe systems.

3. Sprinkler floor service provided by combined riser-standpipes systems. Provide shutoff valves at the base of standpipe equipment. Each *sprinkler* service routed from floor zone stations with a water flow alarm, isolation valve, check valve, and an inspector's test for zone control. Each standpipe shall have 2-½" fire department valves at each floor level.

4. Sprinkler mains shall be located where possible, in main lower lever heated corridors and thus feed the combined system at the egress stair enclosures where floor feeder zone stations are set up.

5. A temporary standpipe system with 2-½" fire hose valves on each floor shall be provided and maintained during construction. A temporary standpipe shall be provided with a separate pumper connection.

6. Top of the riser: provide pressure gauges, two [2-½"] fire department *connections* with chain and cap for high rise buildings, provide one 4" roof manifold with a 4" control valve in the highest stair.

7. The above fire protection proposal is based on basic building code and NFPA *requirements*. Any additional demands made by Insurance Underwriters will be considered an addition to the base contract.

B. Plumbing Systems:

1. A new 6” domestic water service beginning at a point 10’ – 0” outside the foundation wall will be brought into the building. The service will be fed from an existing campus loop. Connection to the main will be by site Utilities. The service will enter the mechanical room, be metered and *distributed* throughout the building. A reduced pressure backflow preventer will be provided on the incoming service as required. The domestic water service below ground shall be cement lined ductile iron Class 52 with mechanical joints and retainer glands.

2. Provide a complete domestic water distribution system including supply to fixtures, hose bibs, wall hydrants, kitchen equipment, process *equipment*, trap primers and HVAC make-up.

3. Provide a tempered water supply to all emergency equipment including emergency showers, eyewashes, and eye/face washes. A tempered water return line complete with recirculation pump shall be included.

4. An approved reduced pressure backflow preventer shall be provided on the make-up water supply to the HVAC equipment. The backflow preventer shall be installed in accordance with the Massachusetts Department of Environmental Protection and be complete with shut-off valves and strainer.

5. A complete sanitary waste and vent system serving all plumbing fixtures, kitchen equipment, and floor drains will be provided. A 6 inch sanitary *sewer* will exit the building by gravity and will extend to a point 10’ – 0” outside the foundation wall. Continuation of the sanitary sewer will be by site utilities.

6. A duplex sewage ejector complete with fiberglass basin, float controls and control panel shall be provided at the basement level. The ejector shall serve the basement plumbing fixtures and floor drains and *discharge* to the gravity waste line at the ceiling of the basement floor. Sizing shall be in accordance of State Plumbing Code. Pumps shall be submersible with cast iron casings and bronze impellers. Pump discharge shall be Type L copper with soldered joints.

7. An interior floor mounted grease interceptor shall be provided to serve the kitchen. Pot sinks, scullery sinks, floor drains and floor sinks shall be piped through the grease interceptor. The interceptor shall be constructed of steel with an acid resistant coating and have an automatic draw-off. The grease interceptor shall be complete with draw-off valve, line shut-off valve and flow control fitting.

8. An exterior grease interceptor shall be located on the west side of the building. The interceptor shall be fed from a dedicated kitchen waste line and shall discharge to the sanitary sewer on site. The interceptor shall be of *concrete* or fiberglass construction and sized in accordance with the Massachusetts State Plumbing Code, and the Massachusetts State Environmental Code Title 5. A chamber vent shall be provided and piped back into the building.

9. The roof(s) will be drained by means of roof drains and internal rainwater leaders. The leaders will collect below the basement slab and discharge by gravity on the North side of the building to a point 10’ – 0” outside the foundation wall. Continuation of the roof drainage will be by site utilities.

10. Furnish and install under slab/foundation drains as noted on the *structural* plans. Provide cleanouts and backwater valves as necessary. Pipe shall be PVC perforated pipe, ASTM-2729 with bell and spigot joints. Provide nonwoven filter fabric as a drainage medium.

11. Natural gas will be provided for heating, cooking, generating domestic hot water and process equipment. Gas will be low pressure, will be fed from an existing distribution system in the street and will be brought to the building by the Gas Company.

12. Domestic hot water will be generated by a two tank type gas fired or electric water heater located in the basement mechanical room. The hot water storage tank shall be constructed of a heavy gauge steel jacket with foam insulation and a glass lining. The system shall be complete with a recirculation pump and mixing valve. The recirculation pump shall be an all bronze pump complete with immersion aqua stat, check valve, isolation valves and thermometer. Provide balancing valves on the hot water return lines. Distribution temperature of the hot water shall be 120ºF.

13. Insulation will be provided on all hot and cold water piping, tempered water, horizontal roof drainage, roof drain bodies and all piping at *handicapped* accessible fixtures.

14. Insulation shall be four pound density fiberglass with factory applied *white* fire retardant, reinforced vapor barrier jacket. Insulation shall be 1 inch thick and continuous through sleeves.

15. Provide a prepackaged two pump water pressure booster system. The system shall be capable of automatically providing a constant system pressure of 40 psig while supplying a flow rate of 0 to 150 GPM.

C. HVAC Systems:

1. Boiler Plant:

a. Provide complete hot water heating system including, but not limited to: boilers, combustion air, flue system, fuel piping, pumps, DDC controls, air separator, expansion tank, valving, piping, insulation, fittings, expansion provisions, drains vents, chemical treatment and make-up water. All motors shall be premium efficiency.

b. The plant will be located in the new building's basement mechanical room.

c. Boilers shall be condensing type set to supply 140^0F hot water with 120^0F return water temperature. Provide three gas-fired 2,000 MBH output boilers. Each boiler is sized at 40% of the peak load providing 80% redundancy in the event of a boiler or primary pump failure. Provide for temperature reset down to 90^0F supply, based on outdoor air temperature.

d. Provide one dedicated primary hot water pump for each boiler and three secondary hot water pumps. A maximum of two secondary pumps will be running at any one time, (1) pump as a standby, to provide redundancy in the event of a pump failure. Provide a variable frequency drive (with harmonic filters) for each secondary pump motor with remote differential pressure speed control. Provide bypass for minimum pump flow.

e. Hot water pipe distribution is as follows: 6" hot water mains with two 4" branches to serve each half of the building. Total hot water flow will be approximately 485 gpm.

2. Chiller Plant:

a. Provide complete water cooled chilled water cooling system including, but not limited to: chillers, cooling towers, refrigerant detection and purge system, pumps, DDC controls, air separator, expansion tank, valving, piping, insulation, fittings, drains vents, expansion provisions, chemical treatment and make-up water. All motors shall be premium efficiency.

b. The central plant will be located in the new building's basement mechanical room.

c. Each chiller shall be electric centrifugal type with integral VFD (with harmonic filters) set to supply 44^0F chilled water with a 12^0F temperature rise. Provide two 200-ton electric driven chillers. Each chiller is sized at 50% of the peak load providing 50% redundancy in the event of a chiller failure. Provide an option to increase to (2) 400-ton chillers to back-feed the Quigley Building under Options L/Z.

d. Provide three primary chilled water pumps each sized for the flow of a chiller. A maximum of two pumps will be running at any one time, (1) pump as a standby, to provide redundancy in the event of a pump failure. Provide a variable frequency drive (with harmonic filters) for each secondary pump motor with remote differential pressure speed control. Provide flow sensor for each chiller with bypass for minimum chiller flow.

e. Chilled water pipe distribution is as follows: 8" chilled water mains with two 8" branches to serve each half of the building. Total chilled water flow rate will be approximately 880 gpms (400 tons).

f. Condenser water will be produced by (2) 250 ton cooling towers located on the roof set to supply 85^0F condenser water with a flow rate of 2.5 gpm/ton. Towers will be headered together with equalization lines and drains. Towers will each have a VFD for speed control and basin heaters for freeze protection. Provide a minimum temperature bypass valve.

g. Provide three condenser water pumps each sized for the flow of a chiller. A maximum of two pumps will be running at any one time, (1) pump as a standby, to provide redundancy in the event of a pump failure.

h. Condenser water pipe distribution is as follows: 10" condenser water mains to the towers with 8" branches to serve each chiller and tower. Total condenser water flow rate will be approximately 1,250 gpm (500 tons).

i. Provide water treatment system, with blow down valve, conductivity sensor, make-up water flow meter, and coupon rack. Provide a make up water connection from the city water supply with back flow preventer.

j. All outdoor condenser water piping will be heat traced and insulated serving the cooling towers for freeze protection.

k. Provide a 150 ton "free cooling" plate in frame type heat exchanger. This will allow production of chilled water without using the chillers when the outdoor temperatures are cool enough. Pipe a chiller bypass through the "free cooling" heat exchanger. Provide two pumps, each with a flow of 360 gpm. One pump is for the condenser water and one for the chilled water. No spare will be provided as the chillers can back-up the system.

Provide a second tower bypass valve and automatic tower isolation valves (both supply and return) for each tower cell.

3. Building HVAC Air Handling Systems

a. The typical HVAC systems serving the main areas of the building will be a combination of hot water perimeter heating via radiant panels or fin-tube radiation (option) and cooling / warm-up / ventilation via variable air volume (VAV) air handling systems. Fin-tube radiation or radiant panels shall have control valves and be controlled by the associated VAV box.

b. Provide (3) three distributed central VAV air handling units (AHU). Each AHU will be sized for 50,000 cfm sized for a minimum 25% outdoor air and maximum 475 fpm coil velocity. Each AHU shall have an intake louver, outdoor airflow monitoring station, mixing section (with air economizer dampers), 30% efficient pleated filters, hot water heating coil, chilled water cooling coil, and supply fan section. Relief air for each AHU (during air economizer operation) will be by a relief fan and back draft damper. Provide a variable frequency drive (with harmonic filters) for each fan motor with remote differential pressure for supply fan speed control and return airflow monitoring stations for relief fan speed control. Air handling units supply air shall be ducted with 4" pressure class insulated galvanized duct sealed to leakage class 6, and distributed to the VAV terminal units. The supply air ductwork shall be leakage tested per SMACNA. Air handling units return/relief air shall be ducted with 2" pressure class galvanized duct sealed to leakage class 12.

c. Each perimeter and top floor interior VAV terminal units will have hot water heating coil, wall-mounted temperature sensor, be sized according to the zone (average of 1.2 cfm/sf), and will be ducted with 2" pressure class insulated galvanized duct sealed to leakage class 12, and distributed to ceiling diffusers with individual duct mounted volume dampers. All systems will be equipped with direct digital controls. Conference rooms and workrooms will have series fan powered terminal units with reheat coils and CO_2 sensors.

d. Toilet exhaust will be provided by 2" pressure class galvanized duct sealed to leakage class 12 ductwork from each toilet room and janitor's closet (with individual volume dampers) to two 3,000 cfm roof mounted toilet exhaust fans.

e. Provide separate roof mounted exhaust fans to serve the kitchen exhaust hood (8,000 cfm) and the dishwasher exhaust (3,000 cfm). The grease hood shall have minimum 16 gauge welded grease black steel ductwork (stainless steel where exposed). The duct shall be covered with 2-layers of fire rated insulation between the kitchen and the fan. The dishwasher shall have soldered 16 gauge aluminum or welded 16 gauge stainless steel ductwork. The fans shall operate via local switches with interlocks to the make-up air terminal units.

f. Elevator: Provide dedicated cooling for all elevator machine rooms. Utilize fan coil (if year-round chilled water is available) or split system DX unit and controls. For heating, provide electric baseboard or unit heater. Maintain minimum 2' clear of all elevator equipment. All duct penetrations shall have fire dampers. Provide elevator shaft vent with normally closed (fail open) damper. Damper shall open on fire alarm signal or power failure.

4. Miscellaneous Exhaust Systems

a. Provide exhaust systems for the following systems:

1) Loading Dock – Carbon monoxide and diesel fume exhaust system

2) Trash Room

3) Maintenance Workshop

4) Men's / Women's Locker Rooms – Stainless Steel Ductwork and Dedicated Fan

5) Mechanical Room Ventilation

6) Electric Room Ventilation

7) Clothes Dryer Exhaust: Clothes dryers shall be ducted to common risers. If duct passes through any fire rated partitions, it shall either be wrapped with 2 layers of fire-rated insulation or shall use an oversized riser with 22" sub-ducts from each dryer. No more than (6) dryers shall be connected to any one riser. Exhaust fans shall be 100% speed controllable. Fans shall operate via a duct pressure sensor mounted in the riser duct. The pressure sensor shall be set to keep a slight negative pressure (.05") in the riser duct.

5. Automatic Temperature Controls

a. Provide a new DDC controls system for the new building. System will include a complete operating station, web-server, programming and graphics. The new system will be interfaced with the current DDC front end located in the Power Plant Building.

b. Provide all DDC field panels and interlocking wiring to integrate all system components. All panels will be stand-alone and fully programmable.

c. Provide adjustable high / low alarms for all sensors.

d. Fully checkout the system and verify that all points and sequences operate per design requirements.

D. <u>Electrical Systems:</u>

1. New 13.8kV or 4160V service from the utility. New exterior primary switchgear.

2. New 1500kVA substation transformer to a 2000-ampere 480Y/277-volt service switchboard basement level. Main breaker shall be 100% rated insulated case with an adjustable trip unit with ground fault protection and customer metering. Distribution breakers shall be electronic trip breakers with ground fault protection. The ground fault settings shall be selectively coordinated between the main and distribution breakers. All bus shall be copper and shall be braced for 65,000 Amperes symmetrical.

3. For each wing provide (2) 150kVA 480-208Y/120 volt transformers and associated 600-ampere 208Y/120-volt 3 phase 4 wire 42 pole distribution panleboard to lighting and receptacle panelboards in the building. One shall be

located in the basement and the other in the penthouse each shall serve a minimum of 3 floors.

4. For each wing provide (5) 225 ampere 208Y/120-volt 3 phase 4 wire 60 pole main lug only panelboard to power receptacles and lighting on each of the five floors.

5. In each penthouse provide (1) 100 ampere 208Y/120-volt 3 phase 4 wire 42 pole main lug only panelboard to power receptacles, lighting and minor mechanical loads in the penthouse.

6. In the phase 1 penthouse provide (1) 1000 ampere 480Y/277-volt 3 phase 4 wire 60 pole main lug only panelboard to serve mechanical loads in the penthouse.

7. Provide (1) 225 ampere 480Y/277-volt 3 phase 4 wire 42 pole main lug only panelboard to serve mechanical loads in the basement .

8. New 500kw/600kVA diesel generator located on the site with 96 hours of fuel capacity for life safety, critical and legally required emergency power.

9. Transfer switches shall be 4 pole ASCO 7000 or equal.

10. Provide (1) 200-ampere 480Y/277-volt by-pass isolation transfer switch for life safety loads.

11. Provide (1) 400-ampere 480Y/277-volt by-pass isolation transfer switch for critical branch loads

12. Provide (1) 1000-ampere 480Y/277-volt transfer switch for legally required and equipment loads.

13. Provide (1) 225 ampere 480Y/277-volt 3 phase 4 wire 42 pole main lug only panelboard to serve life safety step down transformers.

14. Provide (2) 45kVA 480-208Y/120-volt transformer and associated 150-ampere 208Y/120-volt main circuit breaker 42-pole panelboards for the life safety branch in each wing of the building.

15. Provide (1) 400 ampere 480Y/277-volt 3 phase 4 wire 42 pole main lug only panelboard to serve critical branch step down transformers.

16. Provide (2) 112.5kVA 480-208Y/120-volt transformer and associated 400-ampere 208Y/120-volt main circuit breaker 42-pole panelboards (one in each wing) for the critical branch. Main circuit breaker shall have an electronic trip unit.

17. Provide (10) 100-ampere 208Y/120-volt main lug only 42-pole panelboards for critical receptacles and lighting on each patient floor.

18. Provide (1) 1000 ampere 480Y/277-volt 3 phase 4 wire 60 pole main lug only panelboard to serve legally required mechanical loads, elevator and any other legally required standby or equipment branch loads.

19. Provide a minimum of 6 hospital grade duplex outlets in each patient room 2 of which shall be connected to the critical branch panelboard.

20. A 20-ampere 120-volt circuit shall serve no more than 8 duplex receptacles on normal power and 4 duplex receptacles on the critical branch.

21. Provide general-purpose hospital grade convenience outlets in the corridor 50% which shall be connected to the critical branch.

22. Provide GFCI hospital grade receptacles at each of the bathrooms and any other location within 6' of a sink.

23. Lighting shall be provided in accordance with the architectural reflected ceiling plans.

24. Provide wall mounted or ceiling mounted occupancy sensors in storage areas or offices.

25. Provide branch circuits to mechanical equipment. Provide VSD's for all pumps and air handling equipment.

26. Provide a stand alone addressable fire alarm system for the new building. The new building shall be self contained but shall report to the existing main fire alarm panel that will need to be relocated prior to the start of construction.

27. Provide manual pull stations at each entrance/exit, stairwells and at each nurses station.

28. Provide a remote fire alarm annunciator at each nurse's station.

29. Provide smoke detectors in the corridors, sleeping rooms, electrical closets and all locked storage closets.

30. Alarm notification shall be via speaker/strobe and all strobes shall be synchronized.

31. Provide a lightning protection system for the building.

32. Provide a nurse call system (Rauland 4000) for the patient floors. Each patient bed shall have a nurse call button and pillow speaker for will also control the bed lighting and television.

33. Provide for an overhead paging system. The system shall be stand alone but also be connected to the existing system that will need to be relocated prior to the start of construction.

34. Provide a security system for monitoring all floors.

-END-

RDK ENGINEERS

RDK understands how engineering affects people

Mechanical

Electrical

Plumbing

Fire Protection

Technology Design

Commissioning

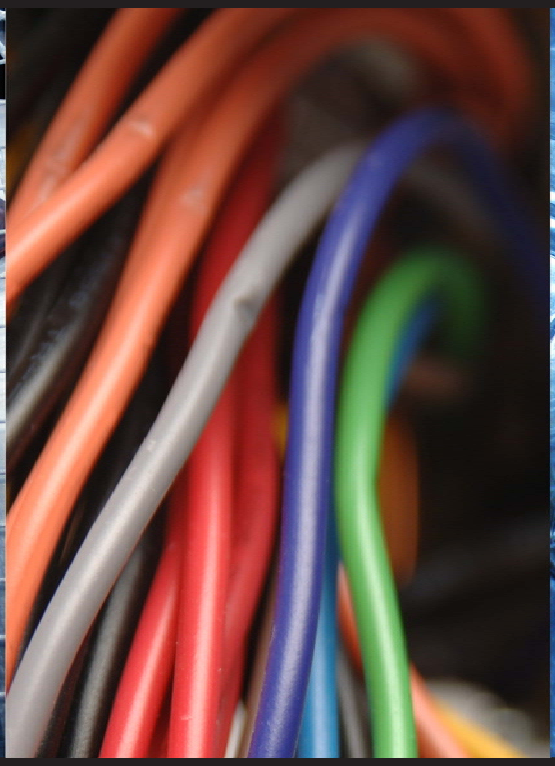
Code Consulting

Energy Conservation

Chelsea Soldiers Home – North Building Site Study / System Description

Submitted to: **Payette Associates**
December 11, 2012

Submitted by: RDK ENGINEERS



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PART 1 - BAR / L /Z BUILDING SYSTEM DESCRIPTION / OUTLINE SPECIFICATIONS

1.00 PROJECT OVERVIEW

A. This project includes demolition of existing North Site structures, boiler plant and the construction of a 104,500 square foot Long Term Care facility located in Chelsea Massachusetts.

1.01 EXISTING CONDITIONS/DEMOLITION

A. *Fire Protection (Existing)*:

The fire protection system is fed by (2) peerless diesel fire pumps located in a prefabricated building on the south side of the campus. The pumps are rated for 1,500 gpm at a 52-psig boost. Sprinkler piping is distributed to the North Site Buildings via campus loop. These buildings are fully sprinkled and served via combined standpipe and wet sprinkler systems. The fire pump was installed in 2004 and has sufficient capacity to serve the distribution.

B. *Fire Protection (Demolition):*

Remove all fire protection systems within the scope of the building structures that are being demolished. Retract service main to 10'-0" beyond foundation wall.

C. *Plumbing (Existing):*

Domestic cold water is fed by the underground campus loop fed from (3) booster pumps located in a prefabricated building on the south building site. Domestic water is distributed to the buildings via the campus loop.

Domestic hot water is served by steam to hot water heaters located in the basement of the buildings.

D. *Plumbing (Demolition):*

Demolish plumbing systems serving the Buildings shall be removed. Retract domestic cold water service main to 10'-0" beyond foundation wall.

The prefabricated pump system will remain and shall be utilized to serve the new structure.

E. *Chiller Plant (Existing):*

The chiller plant located on the roof of the Sullivan Building is non operable.

F. *Chiller Plant (Demolition):*

Remove associated chiller, pumps and controls as part of the building demolition.

G. *Boiler Plant (Existing)*:

Boilers systems are located in Power Plant mechanical room. The plant consists of (3) hi-pressure steam boilers, associated condensate pumps and de-aerator. The boilers are Cleaver Brooks (dual fuel) fire tube hi-pressure steam boilers (installed in 1993), (1) is rated at 400 hp each and (2) at 700 hp; total of 1,700 hp. Steam is distributed to the campus via piping located within the tunnel. Building heating is provided at the perimeter via steam radiators.

H. *Boiler Plant (Demolition):*

Power plant should remain on line to serve the Quigley Hospital and Annex Building. Divorce North Building structures from boiler plant.

I. *Automatic Temperature Controls:*

The HVAC system is controlled by Delta controls DDC system. The DDC system is controls the major HVAC equipment and majority of terminal equipment including fan coil units and perimeter heating radiators. The DDC system front end is located in the Power Plant. The existing DDC system appears to be in good condition and has sufficient control capability to provide proper control of the existing HVAC system.

J. *Electrical Service (Existing)*

The existing electrical service to the campus is via 4160V primary service from the utility. The service from the utility enters the east side of the campus at the Headquarters Building. The substation at the Headquarters Building serves many of the buildings on that side of the campus including the boiler plant.

K. *Electrical Service (Demolition)*

Remove the existing 208Y/120-volt services from the north side of Cresent Avenue including the Boiler Plant.

L. *Electrical Distribution (Existing)*

The existing electrical distribution within the Boiler Plant is limited to a 600-ampere distribution panel and a 400-ampere panel.

M. *Electrical Distribution (Demolition)*

All existing distribution would be removed within the Boiler Plant and adjacent buildings.

N. *Emergency Power (Existing)*

The Boiler Plant contains a 125kW diesel generator that backs up the entire electrical service for the Boiler Plant. There are 2-275 gallon fuel oil storage tanks to supply fuel for the generator.

O. *Emergency Power (Demolition*)

All existing emergency distribution equipment including the generator shall be removed.

P. *Fire Alarm System (Existing)*

The existing EST fire alarm system was upgraded with the HVAC upgrade within the past 10 years. Initiation devices are addressable and all devices appear to be labeled with the system address. Visual annunciation devices are xenon strobes and are ADA compliant.

Q. *Fire Alarm System (Demolition)*

All existing fire alarm equipment shall be removed within the Boiler Plant and adjacent buildings.

1.02 PHASING

A. The project will be constructed in distinct phases. Refer to the overall schedule for additional detail.

1.03 CODE ISSUES

A. A fail open (normally closed) smoke damper will be provided for the elevator shaft vents. This damper will open on loss of power, rise in temperature to 90°F, or a signal from the fire alarm system.

1.04 SYSTEM DESCRIPTIONS AND OPTIONS

North Building Options:

A. Fire Protection:

1. The new building will be fully sprinkled; provided with combined standpipes and wet sprinkler system. The building will be service via the campus loop fed by the fire pump system housed in a prefabricated structure.

2. Wet alarm valves serve the automatic sprinkler and standpipe systems for the common, residential, office, living areas and storage areas of the building. In addition, the basement and penthouse mechanical spaces are designed on wet pipe systems.

3. Sprinkler floor service provided by combined riser-standpipes systems. Provide shutoff valves at the base of standpipe equipment. Each sprinkler service routed from floor zone stations with a water flow alarm, isolation valve, check valve, and an inspector's test for zone control. Each standpipe shall have 2-½" fire department valves at each floor level.

4. Sprinkler mains shall be located where possible, in main lower lever heated corridors and thus feed the combined system at the egress stair enclosures where floor feeder zone stations are set up.

5. A temporary standpipe system with 2-½" fire hose valves on each floor shall be provided and maintained during construction. A temporary standpipe shall be provided with a separate pumper connection.

6. Top of the riser: provide pressure gauges, two [2-½"] fire department connections with chain and cap for high rise buildings, provide one 4" roof manifold with a 4" control valve in the highest stair.

7. The above fire protection proposal is based on basic building code and NFPA requirements. Any additional demands made by Insurance Underwriters will be considered an addition to the base contract.

B. Plumbing Systems:

1. A new 6" domestic water service beginning at a point 10' – 0" outside the foundation wall will be brought into the building. The service will be fed from an existing campus loop. Connection to the main will be by site Utilities. The service will enter the mechanical room, be metered and distributed throughout the building. A reduced pressure backflow preventer will be provided on the incoming service as required. The domestic water service below ground shall be cement lined ductile iron Class 52 with mechanical joints and retainer glands.

2. Provide a complete domestic water distribution system including supply to fixtures, hose bibbs, wall hydrants, kitchen equipment, process equipment, trap primers and HVAC make-up.

3. Provide a tempered water supply to all emergency equipment including emergency showers, eyewashes, and eye/face washes. A tempered water return line complete with recirculation pump shall be included.

4. An approved reduced pressure backflow preventer shall be provided on the make-up water supply to the HVAC equipment. The backflow preventer shall be installed in accordance with the Massachusetts Department of Environmental Protection and be complete with shut-off valves and strainer.

5. A complete sanitary waste and vent system serving all plumbing fixtures, kitchen equipment, and floor drains will be provided. A 6 inch sanitary sewer will exit the building by gravity and will extend to a point 10' – 0" outside the foundation wall. Continuation of the sanitary sewer will be by site utilities.

6. A duplex sewage ejector complete with fiberglass basin, float controls and control panel shall be provided at the basement level. The ejector shall serve the basement plumbing fixtures and floor drains and discharge to the gravity waste line at the ceiling of the basement floor. Sizing shall be in accordance of State Plumbing Code. Pumps shall be submersible with cast iron casings and bronze impellers. Pump discharge shall be Type L copper with soldered joints.

7. The roof(s) will be drained by means of roof drains and internal rainwater leaders. The leaders will collect below the basement slab and discharge by gravity on the North side of the building to a point 10' – 0" outside the foundation wall. Continuation of the roof drainage will be by site utilities.

8. Furnish and install underslab/foundation drains as noted on the structural plans. Provide cleanouts, and backwater valves as necessary. Pipe shall be PVC perforated pipe, ASTM-2729 with bell and spigot joints. Provide nonwoven filter fabric as a drainage medium.

9. Natural gas will be provided for heating, generating domestic hot water and process equipment. Gas will be low pressure, will be fed from an existing distribution system in the street and will be brought to the building by the Gas Company.

10. Natural gas piping up to 2 ½ inches shall be Schedule 40 black steel with malleable iron threaded fittings. Piping 3 inches and larger shall be Schedule 40 black steel with welded joints.

11. Domestic hot water will be generated by (2) tank type <u>gas fired or electric</u> water heater located in the basement mechanical room. The hot water storage tank shall be constructed of a heavy gauge steel jacket with foam insulation and a glass lining. The system shall be complete with a recirculation pump and mixing valve. The recirculation pump shall be an all bronze pump complete with immersion aquastat, check valve, isolation valves and thermometer. Provide balancing valves on the hot water return lines. Distribution temperature of the hot water shall be 120ºF.

12. Insulation will be provided on all hot and cold water piping, tempered water, horizontal roof drainage, roof drain bodies and all piping at handicapped accessible fixtures.

13. Insulation shall be four pound density fiberglass with factory applied white fire retardant, reinforced vapor barrier jacket. Insulation shall be 1 inch thick and continuous through sleeves.

C. HVAC Systems:

1. Boiler Plant:

a. Provide complete hot water heating system including, but not limited to: boilers, combustion air, flue system, fuel piping, pumps, DDC controls, air separator, expansion tank, valving, piping, insulation, fittings, expansion provisions, drains vents, chemical treatment and make-up water. All motors shall be premium efficiency

b. The central plant will be located in the centrally located basement mechanical room.

c. Boilers shall be condensing type set to supply 140^0F hot water with 120^0F return water temperature. Provide three gas-fired 2,000 MBH output boilers. Each boiler is sized at 40% of the peak load providing 80% redundancy in the event of a boiler or primary pump failure. Provide for temperature reset down to 90^0F supply, based on outdoor air temperature.

d. Provide one dedicated primary hot water pump for each boiler and three secondary hot water pumps. A maximum of two secondary pumps will be running at any one time, (1) pump as a standby, to provide redundancy in the event of a pump failure. Provide a variable frequency drive (with harmonic filters) for each secondary pump motor with remote differential pressure speed control. Provide bypass for minimum pump flow.

e. Hot water pipe distribution is as follows: 6” hot water mains with two 4” branches to serve each half of the building. Total hot water flow will be approximately 485 gpm.

2. Chiller Plant Option

a. Provide complete water cooled chilled water cooling system including, but not limited to: chillers, cooling towers, refrigerant detection and purge system, pumps, DDC controls, air separator, expansion tank, valving, piping, insulation, fittings, drains vents, expansion provisions, chemical treatment and make-up water. All motors shall be premium efficiency.

b. The central plant will be located in the centrally located basement mechanical room.

c. Each chiller shall be electric centrifugal type with integral VFD (with harmonic filters) set to supply 440F chilled water with a 120F temperature rise. Provide two 250-ton chillers. Each chiller is sized at 50% of the peak load providing 50% redundancy in the event of a chiller failure.

d. Provide three primary chilled water pumps each sized for the flow of a chiller. A maximum of two pumps will be running at any one time, (1) pump as a standby, to provide redundancy in the event of a pump failure. Provide a variable frequency drive (with harmonic filters) for each secondary pump motor with remote differential pressure speed control. Provide flow sensor for each chiller with bypass for minimum chiller flow.

e. Chilled water pipe distribution is as follows: 8” chilled water mains with two 8” branches to serve each half of the building. Total chilled water flow rate will be approximately 800 gpm (345 tons).

f. Condenser water will be produced by (2) 250 ton cooling towers located on the roof set to supply 850F condenser water with a flow rate of 2.5 gpm/ton. Towers will be headered together with equalization lines and drains. Towers will each have a VFD for speed control and basin heaters for freeze protection. Provide a minimum temperature bypass valve.

g. Provide three condenser water pumps each sized for the flow of a chiller. A maximum of two pumps will be running at any one time, (1) pump as a standby, to provide redundancy in the event of a pump failure.

h. Condenser water pipe distribution is as follows: 10” condenser water mains to the towers with 8” branches to serve each chiller and tower. Total condenser water flow rate will be approximately 1,250 gpm (500 tons).

i. Provide water treatment system, with blow down valve, conductivity sensor, make-up water flow meter, and coupon rack. Provide a make up water connection from the city water supply with back flow preventer.

j. All outdoor condenser water piping will be heat traced and insulated serving the cooling towers for freeze protection.

k. Provide a 150 ton “free cooling” plate in frame type heat exchanger. This will allow production of chilled water without using the chillers when the outdoor temperatures are cool enough. Pipe a chiller bypass through the “free cooling” heat exchanger. Provide two pumps, each with a flow of 360 gpm. One pump is for the condenser water and one for the chilled water. No spare will be provided as the chillers can back-up the system. Provide a second tower bypass valve and automatic tower isolation valves (both supply and return) for each tower cell.

l. Provide three 360 gpm chilled/hot water pumps each with an 8-inch supply/return header and dedicated to the twelve water to water heat pumps. A maximum of two pumps will be running at any one time, (1) pump as a standby, to provide redundancy in the event of a pump failure. Provide a variable frequency drive (with harmonic filters) for each pump motor with remote differential pressure speed control. Provide flow meter for each water-to-water heat pump with bypass for minimum flow.

m. Provide high-density polyethylene piping from the wells to the water-to-water heat pumps. Provide schedule 40 steel pipe from heat pumps out to systems.

n. Provide three 1200 gpm GS pumps to provide the balance of 1000-ton central plant cooling capacity. Each pump shall be sized for ½ capacity with (1) pump as standby.

3. Building HVAC Air Handling Systems

a. The typical HVAC systems serving the main areas of the building will be a combination of hot water perimeter heating via radiant panels or fin-tube radiation (option) and cooling / warm-up / ventilation via variable air

volume (VAV) air handling systems. Fin-tube radiation shall have control valves and be controlled by the associated VAV box.

b. Provide (3) three distributed central VAV air handling units (AHU). Each AHU will be sized for 50,000 cfm sized for a minimum 25% outdoor air and maximum 475 fpm coil velocity. Each AHU shall have an intake louver, outdoor airflow monitoring station, mixing section (with air economizer dampers), 30% efficient pleated filters, hot water heating coil, chilled water cooling coil, and supply fan section. Relief air for each AHU (during air economizer operation) will be by a relief fan and back draft damper. Provide a variable frequency drive (with harmonic filters) for each fan motor with remote differential pressure for supply fan speed control and return airflow monitoring stations for relief fan speed control. Air handling units supply air shall be ducted with 4" pressure class insulated galvanized duct sealed to leakage class 6, and distributed to the VAV terminal units. The supply air ductwork shall be leakage tested per SMACNA. Air handling units return/relief air shall be ducted with 2" pressure class galvanized duct sealed to leakage class 12.

c. Each perimeter and top floor interior VAV terminal units will have hot water heating coil, wall-mounted temperature sensor, be sized according to the zone (average of 1.2 cfm/sf), and will be ducted with 2" pressure class insulated galvanized duct sealed to leakage class 12, and distributed to ceiling diffusers with individual duct mounted volume dampers. All systems will be equipped with direct digital controls. Conference rooms and workrooms will have series fan powered terminal units with reheat coils and CO2 sensors.

d. Toilet exhaust will be provided by 2" pressure class galvanized duct sealed to leakage class 12 ductwork from each toilet room and janitor's closet (with individual volume dampers) to two 3,000 cfm roof mounted toilet exhaust fans.

e. Elevator: Provide dedicated cooling for all elevator machine rooms. Utilize fan coil (if year-round chilled water is available) or split system DX unit and controls. For heating, provide electric baseboard or unit heater. Maintain minimum 2' clear of all elevator equipment. All duct penetrations shall have fire dampers. Provide elevator shaft vent with normally closed (fail open) damper. Damper shall open on fire alarm signal or power failure.

4. Miscellaneous Exhaust Systems

a. Provide exhaust systems for the following systems:

1) Loading Dock – Carbon monoxide and diesel fume exhaust system

2) Trash Room

3) Maintenance Workshop

4) Men's / Women's Locker Rooms – Stainless Steel Ductwork and Dedicated Fan

5) Mechanical Room Ventilation

6) Electric Room Ventilation

7) Clothes Dryer Exhaust: Clothes dryers shall be ducted to common risers. If duct passes through any fire rated partitions, it shall either be wrapped with 2 layers of fire-rated insulation or shall use an oversized riser with 22" sub-ducts from each dryer. No more than (6) dryers shall be connected to any one riser. Exhaust fans shall be 100% speed controllable. Fans shall operate via a duct pressure sensor mounted in the riser duct. The pressure sensor shall be set to keep a slight negative pressure (.05") in the riser duct.

5. Automatic Temperature Controls

a. Provide a new DDC controls system for the new building. System will include a complete operating station, web-server, programming and graphics. The new system will be interfaced with the current DDC front end located in the Power Plant Building.

b. Provide all DDC field panels and interlocking wiring to integrate all system components. All panels will be stand-alone and fully programmable.

c. Provide adjustable high / low alarms for all sensors.

d. Fully checkout the system and verify that all points and sequences operate per design requirements.

D. <u>Electrical</u>

1. Extend the existing 4160-volt service to a new 1500kVA substation transformer and associated 2000-ampere 480Y/277-volt service switchboard in the basement level. Main breaker shall be 100% rated insulated case with an adjustable trip unit with ground fault protection and customer metering. Distribution breakers shall be electronic trip breakers with ground fault protection. The ground fault settings shall be selectively coordinated between the main and distribution breakers. All bus shall be copper and shall be braced for 65,000 Amperes symmetrical.

2. For each wing provide (2) 150kVA 480-208Y/120 volt transformers and associated 600-ampere 208Y/120-volt 3 phase 4 wire 42 pole distribution panleboard to lighting and receptacle panelboards in the building. One shall be located in the basement and the other in the penthouse each shall serve a minimum of 3 floors.

3. Provide (4) 30kVA 480-208Y/120-volt transformer and associated 100-ampere 208Y/120-volt main circuit breaker 42-pole panelboards on each of the 4 resident floors of the building for a total of 16 locations to power receptacles and lighting.

4. In each penthouse provide (1) 60 ampere 208Y/120-volt 3 phase 4 wire 30 pole main lug only panelboard to power receptacles, lighting and minor mechanical loads in the penthouse.

5. In the basement provide (1) 1000 ampere 480Y/277-volt 3 phase 4 wire 60 pole main lug only panelboard to serve mechanical loads in that area.

6. New 500kw/600kVA diesel generator located on the site with 96 hours of fuel capacity for life safety, critical and legally required emergency power.

7. Transfer switches shall be 4 pole ASCO 7000 or equal.

8. Provide (1) 200-ampere 480Y/277-volt by-pass isolation transfer switch for life safety loads.

9. Provide (1) 400-ampere 480Y/277-volt by-pass isolation transfer switch for critical branch loads

10. Provide (1) 1000-ampere 480Y/277-volt transfer switch for legally required and equipment loads.

11. Provide (1) 225 ampere 480Y/277-volt 3 phase 4 wire 42 pole main lug only panelboard to serve life safety step down transformers.

12. Provide (2) 45kVA 480-208Y/120-volt transformer and associated 150-ampere 208Y/120-volt main circuit breaker 42-pole panelboards for the life safety branch in each wing of the building.

13. Provide (1) 400 ampere 480Y/277-volt 3 phase 4 wire 42 pole main lug only panelboard to serve critical branch step down transformers.

14. Provide (2) 112.5kVA 480-208Y/120-volt transformer and associated 400-ampere 208Y/120-volt main circuit breaker 42-pole panelboards (one in each wing) for the critical branch. Main circuit breaker shall have an electronic trip unit.

15. Provide (8) 100-ampere 208Y/120-volt main lug only 42-pole panelboards for critical receptacles and lighting on each patient floor and each wing.

16. Provide (1) 1000 ampere 480Y/277-volt 3 phase 4 wire 60 pole main lug only panelboard to serve legally required mechanical loads, elevator and any other legally required standby or equipment branch loads.

17. Provide a minimum of 6 hospital grade duplex outlets in each patient room 2 of which shall be connected to the critical branch panelboard.

18. A 20-ampere 120-volt circuit shall serve no more than 8 duplex receptacles on normal power and 4 duplex receptacles on the critical branch.

19. Provide general-purpose hospital grade convenience outlets in the corridor 50% which shall be connected to the critical branch.

20. Provide GFCI hospital grade receptacles at each of the bathrooms and any other location within 6’ of a sink.

21. Lighting shall be provided in accordance with the architectural reflected ceiling plans.

22. Provide wall mounted or ceiling mounted occupancy sensors in storage areas or offices.

23. Provide branch circuits to mechanical equipment. Provide VSD’s for all pumps and air handling equipment.

24. Provide a stand-alone addressable fire alarm system for the new building. The new building shall be self contained but shall report to the existing main fire alarm panel that will need to be relocated prior to the start of construction.

25. Provide manual pull stations at each entrance/exit, stairwells and at each nurses station.

26. Provide a remote fire alarm annunciator at each nurse’s station.

27. Provide smoke detectors in the corridors, sleeping rooms, electrical closets and all locked storage closets.

28. Alarm notification shall be via speaker/strobe and all strobes shall be synchronized.

29. Provide a lightning protection system for the building.

30. Provide a nurse call system (Rauland 4000) for the patient floors. Each patient bed shall have a nurse call button and pillow speaker for will also control the bed lighting and television.

31. Provide for an overhead paging system. The system shall be stand alone but also be connected to the existing system that will need to be relocated prior to the start of construction.

32. Provide a security system for monitoring all floors.

-END-

SOLDIERS' HOME IN CHELSEA
Chelsea, MA

Quigley Hospital Feasibility Study

December 17, 2012

DRAFT

Architect : Payette

60 Dedham Avenue, Needham, Massachusetts

Demember 17, 2012

ASSOCIATES
A CONSTRUCTION CONSULTING FIRM
100 DUFFY AVENUE, HICKSVILLE NY 11801
TEL (516) 932-1010

SOLDIERS' HOME IN CHELSEA
Chelsea, MA

Quigley Hospital Feasibility Study
ESTIMATE QUALIFICATIONS

1 Pricing is based on the review of Schematic Submittal drawings provided by Payette dated 11/08/2012
2 All work shall occur during normal hours between 7 AM and 3 PM
3 Off hour work is excluded.
4 Prevailing wage labor rates are included.
5 A/E fees are excluded.
6 The estimate includes hazardous material handling, disposal and abatement as an allowance of $1,000,000
7 General Requirements & General Conditions is included at: 15.00%
8 Contractor's Overhead & Profit is included at: 5.00%
9 Design contingency is included at: 15.00%
10 Phasing and Temporary Work included at: 5.00%
11 Escalation contingency is excluded. (Pricing is base on current rates 4Q 2012)
12 Construction contingency is excluded

Demember 17, 2012

SOLDIERS' HOME IN CHELSEA
Chelsea, MA
Quigley Hospital Feasibility Study

Architect : Payette

Total Project Estimate

Renovation

	Total Program Area	GFA	Raw Rate/SF (excl all markups)	Est. Cost	Grand Total	% of ECC	One line specification or comments
		167,070	*206.76*				
A	Substructure	167,070	0.58	97,254	97,254	0.23%	
B	Shell	167,070	31.74	5,303,256	5,303,256	12.41%	
C	Interiors	167,070	53.10	8,871,140	8,871,140	20.77%	
D	Services (not included below)						
D10	Conveying	167,070	0.45	75,000	75,000	0.18%	
D20	Plumbing	167,070	25.00	4,176,750	4,176,750	9.78%	
D30	HVAC	167,070	35.00	5,847,450	5,847,450	13.69%	
D40	Fire Protection	167,070	6.00	1,002,420	1,002,420	2.35%	
D50	Electrical	167,070	28.00	4,677,960	4,677,960	10.95%	
E	Fittings and Fixed Equipment	167,070	11.43	1,910,350	1,910,350	4.47%	
F	Special Construction & Demolition	167,070	15.45	2,581,245	2,581,245	6.04%	
G	Building Site Work (included below)						
G10	Site Preparation			1,500,000	1,500,000	3.51%	
G20	Site Improvements			Incl above	-	0.00%	
G30	Mechanical Utilities			Incl above	-	0.00%	
G40	Electrical Utilities			Incl above	-	0.00%	
G90	Other Site Construction			Incl above	-	0.00%	
	Building Total			**36,042,826**	**36,042,826**		
Z							
	General Requirements, General Conditions, Insurance, Bond & Permit			5,406,424	5,406,424	15.00%	
	CM Fee			828,985	828,985	2.00%	
	GMP Contingency			1,268,347	1,268,347	3.00%	
	Subtotal ECC Before Contingencies			**42,717,596**	**42,717,596**	2224%	*(% GC's, Gen Reqmt., Contr's OH&P)*
	Contingencies						
	Design Contingency			6,407,639	6,407,639	15.00%	
	Construction Contingency				-		Excluded
	Phasing and Temporary Work			2,456,262	2,456,262	5.00%	
	Escalation Contingency			-	-		Excluded
	Total ECC with Contingencies			**$51,581,497.67**	**$51,581,498**		
	Total Rate/SF with Contingencies		*$308.74*				

Demember 17, 2012

SOLDIERS' HOME IN CHELSEA
Chelsea, MA
Quigley Hospital Feasibility Study

Architect : Payette

Renovation

SUMMARY

	Total Program Area		GFA	Raw Rate/SF (excl all markups)	Elements Subtotal	Est. Cost	% of ECC	Notes
			167,070					
A	**Substructure**			**$0.58**		**$97,254**	**0.23%**	
A10	Foundations				**$97,254**			
	A1010	Standard Foundations			25,200			
	A1020	Special Foundations			0			NIC
	A1030	Slab on Grade			72,054			
A20	Basement Construction				**$0**			NIC
	A2010	Basement Excavation			0			NIC
	A2020	Basement Walls			0			NIC
								NIC
B	**Shell**			**$31.74**		**$5,303,256**	**12.41%**	
B10	Superstructure				**$1,085,955**			
	B1010	Floor Construction			1,002,420			
	B1020	Roof Construction			83,535			
B20	Exterior Enclosure				**$4,133,766**			
	B2010	Exterior Walls			2,944,043			
	B2020	Exterior Windows			1,022,654			
	B2030	Exterior Doors			167,070			
B30	Roofing				**$83,535**			
	B3010	Roof Coverings			83,535			
	B3020	Roof Openings			0			NIC
C	**Interiors**			**$53.10**		**$8,871,140**	**20.77%**	
C10	Interior Construction				**$3,508,470**			
	C1010	Partitions			2,004,840			
	C1020	Interior Doors			835,350			
	C1030	Fittings			668,280			
C20	Stairs				**$183,500**			
	C2010	Stair Construction			170,000			
	C2020	Stair Finishes			13,500			
C30	Interior Finishes				**$5,179,170**			
	C3010	Wall Finishes			1,503,630			
	C3020	Floor Finishes			2,004,840			
	C3030	Ceiling Finishes			1,670,700			
D	**Services**							
D10	Conveying			$0.45	**$75,000**	**$75,000**	0.18%	
	D1010	Elevators and Lifts			75,000			
	D1020	Escalators and Moving Walks			0			NIC
	D1090	Other Conveying Systems			0			NIC
								NIC
D20	Plumbing			$25.00	**$4,176,750**	**$4,176,750**	9.78%	
	D2010	Plumbing Fixtures			4,176,750			
	D2020	Domestic Water Distribution			0			NIC
	D2030	Sanitary Waste			0			NIC
	D2040	Rain Water Drainage			0			NIC
	D2090	Other Plumbing Services			0			NIC
D30	HVAC			$35.00	**$5,847,450**	**$5,847,450**	13.69%	
	D3010	Energy Supply			5,847,450			
	D3020	Heat Generating Systems			0			NIC
	D3030	Cooling Generating Systems			0			NIC
	D3040	Distribution Systems			0			NIC
	D3050	Terminal and Package Units			0			NIC
	D3060	Controls and Instrumentation			0			NIC
	D3070	Systems Testing and Balancing			0			NIC
	D3090	Other HVAC Systems and Equipment			0			NIC
D40	Fire Protection			$6.00	**$1,002,420**	**$1,002,420**	2.35%	
	D4010	Sprinklers			1,002,420			
	D4020	Standpipes			0			NIC
	D4030	Fire Protection Specialties			0			NIC
	D4090	Other Fire Protection Systems			0			NIC

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SUMMARY

	Total Program Area		GFA	Raw Rate/SF (excl all markups)	Elements Subtotal	Est. Cost	% of ECC	Notes
			167,070					
D50	Electrical			$28.00	**$4,677,960**	**$4,677,960**	10.95%	
	D5010	Electrical Service and Distribution			4,677,960			
	D5020	Lighting and Branch Wiring			0			NIC
	D5030	Communications and Security			0			NIC
	D5090	Other Electrical Systems			0			NIC
								NIC
E	**Equipment and Furnishings**			**$11.43**		**$1,910,350**	**4.47%**	**NIC**
E10	Equipment				**$1,075,000**			
	E1010	Commercial Equipment			1,050,000			
	E1020	Institutional Equipment			0			NIC
	E1030	Vehicular Equipment			25,000			
	E1090	Other Equipment			0			NIC
E20	Furnishings				**$835,350**			
	E2010	Fixed Furnishings			835,350			
	E2020	Movable Furnishings			0			NIC
								NIC
F	**Special Construction & Demolition**			**$15.45**		**$2,581,245**	**6.04%**	**NIC**
F10	Special Construction				**$0**			NIC
	F1010	Special Structures			0			NIC
	F1020	Integrated Construction			0			NIC
	F1030	Vehicular Equipment			0			NIC
	F1040	Special Facilities			0			NIC
	F1050	Special Controls and Instrumentation			0			NIC
F20	Selective Building Demolition				**$2,581,245**			
	F2010	Building Elements Demolition			1,077,615			
	F2020	Hazardous Components Abatement			1,503,630			
G	**Site work**					**$1,500,000**		
		Site - Allowance			1,500,000			
	Building Total					**$36,042,826**		
Z	General Requirements, General Conditions, Insurance, Bond, & Permit					5,406,424	15.00%	
	CM Fee					828,985	2.00%	
	GMP Contingency					1,268,347	3.00%	
	Subtotal ECC Before Contingencies					**$42,717,596**		
	Contingencies							
	Design Contingency					6,407,639	15.00%	
	Construction Contingency							Excluded
	Phasing and Temporary Work					2,456,262	5.00%	
	Escalation Contingency					-		Excluded
	Total ECC with contingencies					**$51,581,498**		
	Total Rate/SF with contingencies				*$ 308.74*			

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Code	Description	Quantity	Unit	Rate	Assembly Cost
A	SUBSTRUCTURE				
A10	FOUNDATIONS				
A1010	**Standard Foundations**				**$ 25,200**
	Footing for new ramp	112	LF	$ 225.00	25,200
A1020	**Special Foundations**				**$ -**
	No items in this section				
A1030	**Slab on Grade**				**$ 72,054**
	Allowance to repair concrete floor for new plumbing	18,418	GFA	$ 3.00	55,254
	New Ramp	112	LF	$ 150.00	16,800
A20	BASEMENT CONSTRUCTION				
A2010	**Basement Excavation**				**$ -**
	No items in this section				
A2020	**Basement Walls**				**$ -**
	No items in this section				
B	SHELL				
B10	SUPERSTRUCTURE				
B1010	**Floor Construction**				**$ 1,002,420**
	Allowance for repair to existing floor	167,070	GFA	$ 1.00	167,070
	Allowance seismic upgrades	167,070	GFA	$ 5.00	835,350
B1020	**Roof Construction**				**$ 83,535**
	Allowance for repair to existing roof	167,070	GFA	$ 0.50	83,535
B20	ENCLOSURE				
B2010	**Exterior Walls**				**$ 2,944,043**
	Repair to existing exterior wall (70% of total exterior wall) allowance	35,091	SF	$ 50.00	1,754,553
	New exterior canopy	1	LS	$ 20,000.00	20,000
	Interior skin				
	Interior face of exterior wall (drywall, Insulation, air barrier)	167,070	GFA	$ 7.00	1,169,490
B2020	**Exterior Windows**				**$ 1,022,654**
	Replace existing windows (30% of total exterior wall) allowance	15,039	SF	$ 68.00	1,022,654
B2030	**Exterior Doors**				**$ 167,070**
	Doors				
	Doors, complete with frame & hardware	167,070	GFA	$ 1.00	167,070
B30	ROOFING				
B3010	**Roof Coverings**				**$ 83,535**
	Allowance for repair to existing roof coverings	167,070	GFA	$ 0.50	83,535
B3020	**Roof Openings**				**$ -**
	No items in this section				
C	INTERIORS				
C10	INTERIOR CONSTRUCTION				
C1010	**Partitions**				**$ 2,004,840**
	Interior partitions, drywall				
	Typical	167,070	GFA	$ 12.00	2,004,840

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Code	Description	Quantity	Unit	Rate	Assembly Cost
C1020	**Interior Doors**				**$ 835,350**
	Doors				
	Doors, complete with frame & hardware	167,070	GFA	$ 5.00	835,350
C1030	**Fittings**				**$ 668,280**
	Allowance (Toilet partitions, countertop, mirror, accessories)	167,070	GFA	$ 4.00	668,280
C20	STAIRS				
C2010	**Stair Construction**				**$ 170,000**
	Allowance for stair modification to existing railing & hand railing	10	FLT	$ 3,500.00	35,000
	New stairs	9	FLT	$ 15,000.00	135,000
C2020	**Stair Finishes**				**$ 13,500**
	New stairs finishes	9	FLT	$ 1,500.00	13,500
C30	INTERIOR FINISHES				
C3010	**Wall Finishes**				**$ 1,503,630**
	Wall Finishes	167,070	GFA	$ 9.00	1,503,630
C3020	**Floor Finishes**				**$ 2,004,840**
	Floor Finishes	167,070	GFA	$ 12.00	2,004,840
C3030	**Ceiling Finishes**				**$ 1,670,700**
	Ceiling Finishes	167,070	GFA	$ 10.00	1,670,700
D	SERVICES				
D10	CONVEYING				
D1010	**Elevators and Lifts**				**$ 75,000**
	Allowance to upgrade existing elevators (2)	1	LS	$ 75,000.00	75,000
D1020	**Escalators and Moving Walks**				**$ -**
	No items in this section				
D1090	**Other Conveying Systems**				**$ -**
	No items in this section				
D20	**PLUMBING**				
D2010	**Plumbing Fixtures**				**$ 4,176,750**
	Allowance for Plumbing installations complete	167,070	GFA	$ 25.00	4,176,750
D2020	**Domestic Water Distribution**				**$ -**
	In Above				
D2030	**Sanitary Waste**				**$ -**
	In Above				
D2040	**Rain Water Drainage**				**$ -**
	In Above				
D2090	**Other Plumbing Systems**				**$ -**
	In Above				
D30	HVAC				
D3010	**Energy Supply**				**$ 5,847,450**
	Allowance for HVAC installations complete	167,070	GFA	$ 35.00	5,847,450
D3020	**Heat Generating Systems**				**$ -**
	In Above				

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Code	Description	Quantity	Unit	Rate	Assembly Cost
D3030	**Cooling Generating Systems**				**$ -**
	In Above				
D3040	**Distribution Systems**				**$ -**
	In Above				
D3050	**Terminal and Package Units**				**$ -**
	In Above				
D3060	**Controls and Instrumentation**				**$ -**
	In Above				
D3070	**Systems Testing and Balancing**				**$ -**
	In Above				
D3090	**Other HVAC Systems and Equipment**				**$ -**
	No items in this section				
D40	FIRE PROTECTION				
D4010	**Sprinklers**				**$ 1,002,420**
	Allowance for Fire Protection installations complete	167,070	GFA	$ 6.00	1,002,420
D4020	**Standpipes**				**$ -**
	In Above				
D4030	**Fire Protection Specialties**				**$ -**
	In Above				
D4090	**Other Fire Protection Systems**				**$ -**
	In Above				
D50	ELECTRICAL				
D5010	**Electrical Service and Distribution**				**$ 4,677,960**
	Allowance for Electrical System installations complete	167,070	GFA	$ 25.00	4,176,750
	Allowance for low voltage complete	167,070	GFA	$ 3.00	501,210
D5020	**Lighting and Branch Wiring**				**$ -**
	In Above				
D5030	**Communications and Security**				**$ -**
	In Above				
D5090	**Other Electrical Systems**				**$ -**
	In Above				
E	EQUIPMENT & FURNISHINGS				
E10	EQUIPMENT				
E1010	**Commercial Equipment**				**$ 1,050,000**
	Kitchen equipment (appliance, cabinets.. Etc.)	1	LS	$ 50,000.00	50,000
	Commercial Kitchen Equipment	1	LS	$ 1,000,000.00	1,000,000
E1020	**Institutional Equipment**				**$ -**
	No items in this section				
E1030	**Vehicular Equipment**				**$ 25,000**
	Allowance for loading dock	1	LS	$ 25,000.00	25,000

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Code	Description	Quantity	Unit	Rate	Assembly Cost
E1090	**Other Equipment**				**$ -**
	No items in this section				
E20	FURNISHINGS				
E2010	**Fixed Furnishings**				**$ 835,350**
	Allowance for fixed furnishings	167,070	GFA	$ 5.00	835,350
E2020	**Movable Furnishings**				**$ -**
	No items in this section				
F	SPECIAL CONSTRUCTION & DEMOLITION				
F10	SPECIAL CONSTRUCTION				
F1010	**Special Structures**				**$ -**
	No items in this section				
F1020	**Integrated Construction**				**$ -**
	No items in this section				
F1030	**Vehicular Equipment**				**$ -**
	No items in this section				
F1040	**Special Facilities**				**$ -**
	No items in this section				
F1050	**Special Controls and Instrumentation**				**$ -**
	No items in this section				
F20	SELECTIVE BUILDING DEMOLITION				
F2010	**Building Elements Demolition**				**$ 1,077,615**
	Demo existing interior construction	167,070	GFA	$ 4.00	668,280
	Demo existing windows	15,039	GFA	$ 5.00	75,195
	Demo existing MEP	167,070	GFA	$ 2.00	334,140
F2020	**Hazard Components Abatement**				**$ 1,503,630**
	Allowance- Abatement	167,070	GFA	$ 9.00	1,503,630