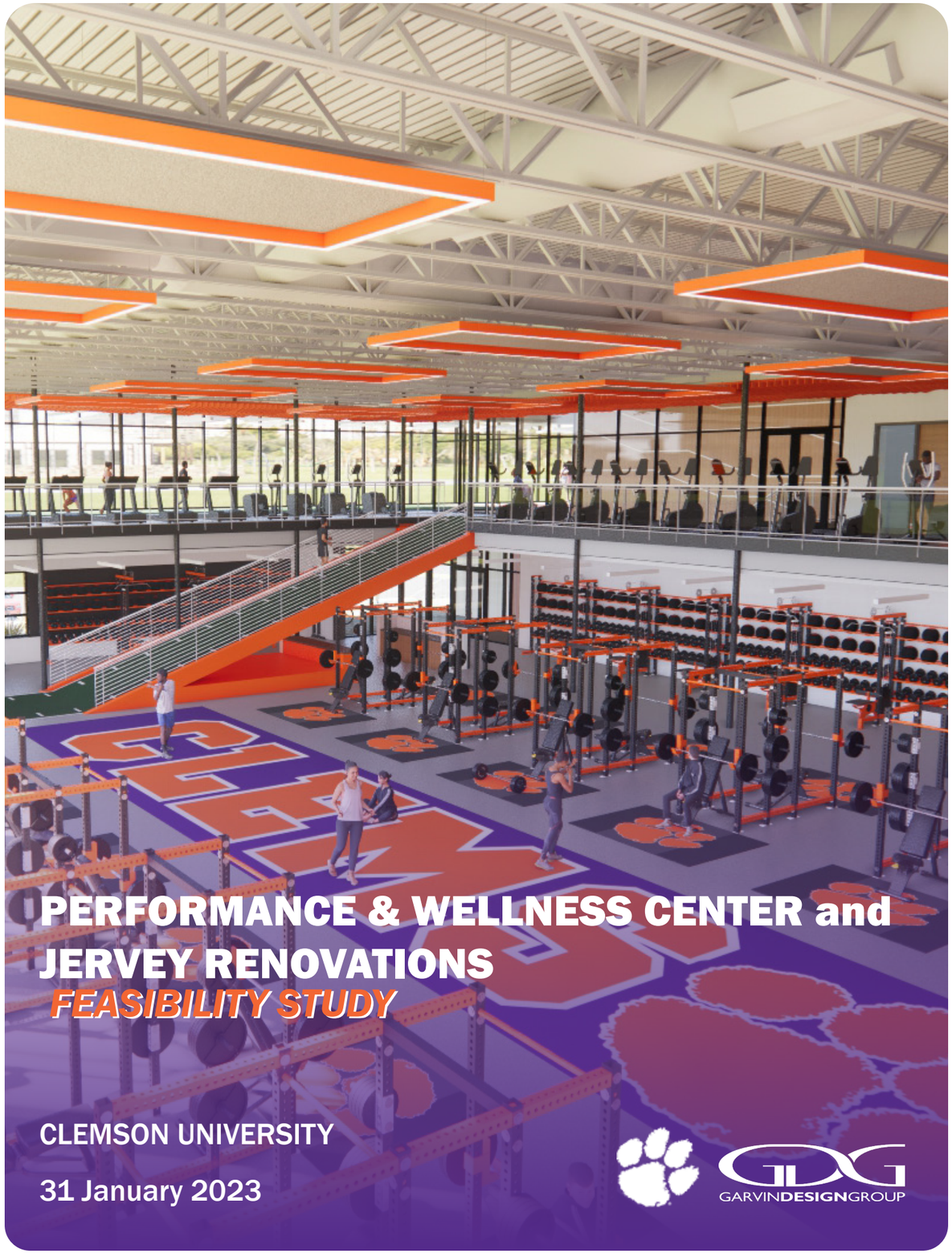

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EXECUTIVE SUMMARY

UNIVERSITY OF MICHIGAN FOOTBALL WEIGHT ROOM WITH TURF RAMP

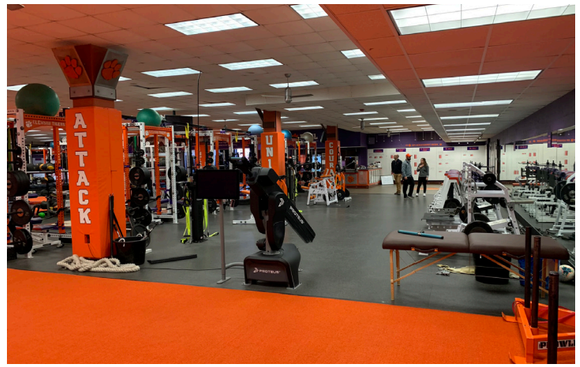
UNIVERSITY OF LOUISVILLE VOLLEYBALL ARENA WITH BASELINE GALLERY/SEATING AREA

INTRODUCTION

The goal of this feasibilty study is to explore the creation of a new home for both existing and new athletics programs that will equip Clemson University Athletics to continue to deliver exceptional experiences and facilities for their student athletes.

Mulitple athletics support programs that are currently housed in Jervey Athletic Center, and Jervey Gym desparately need upgrades if the Univeristy is to remain competitive in these varied sports. The strength & conditioning program is one of the the best in the country and typically would be a showcase stop on the recruiting tour. However, its current facility in the basement of Jervey Gym with low ceilings and limited natural light does not provide the experience commenserate with the high level of expected performance and staff.

Similarliy, the volleyball program plays their competition matches in a facility with a ceiling that is lower than NCAA minimum requirements and well below industry standard recommendations. Jervey Gym is currently grandfathered in, but improvements must be made to provide the level of competition venue desired for success.



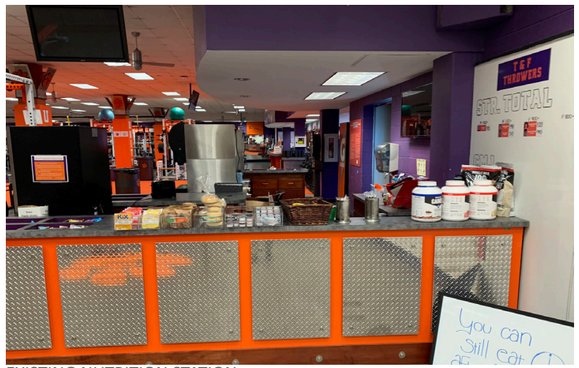
EXISTING WEIGHT ROOM

EXISTING VOLLEYBALL LOCKER ROOM

EXISTING RECOVERY POOLS

APPROACH

EXISTING SPORTS MED



EXISTING NUTRITION STATION

EXISTING JERVEY GYM INTERIOR

A new 50,000 sf facility will be constructed in the existing sloped greenspace directly to the south of Jervey Gym. Together with another smaller addition to the north and selective renovations to Jervey Gym and the lower level of Jervey Athletic Center, Clemson Athletics will be able to boast facilities that reflect the expectations and excellence within.

This new, state-of-the-art facility will provide a home for the Clemson Athletics Strength & Conditioning program, Nutrition Program, and the Sports Medicine & Recovery Program. A foodservice/bistro will provide athletes and coaches meals with a focus on health and nutrition to fuel performance, all while providing panoramic views of the athletic precinct. A new lobby and concourse connector addition will give a fresh look to Jervey Gym and create a prominent identity for the volleball program, in addition to providing an elevated VIP club and baseline viewing area.

Portions of the ground floor of Jervey Athletic Center, will be renovated for the volleyball program, including a new locker room, team lounge and salon. To improve the volleyball competition arena and meet NCAA height and clearance requirements, the Jervey Gym roof will be removed and raised creating a completely refreshed look to this storied venue.

Multiple programs will still reside in the lower level of Jervey Athletic Center, and a new addition between Jervey and Jervey Gym will provide a new accessible entry and connect the volleyball court level with the ground floor of Jervey. The additional enclosed space will allow for the creation of a “hype tunnel” giving the volleyball team direct access to the court from their new locker room.

The new building will be fully-sprinklered and will be built to all current applicable codes. In addition, the renovation of Jervey Gym and raising of the roof is intended to bring the entire facility up to current code standards, with the full replacement of HVAC and electrical systems as well as the addition of fire sprinklers. Since the current Gym is unsprinklered as well as the majority of Jervey Athletic Center, a fire wall is proposed at the north wall of the existing Gym building to separate the two structures. A full code assessment of both new and renovated construction will be required at the onset of design and construction documents.

GARY CONDRON FAMILY DINING HALL, UNIVERSITY OF FLORIDA

GATORADE FUELING STATION, UNIVERSITY OF NORTH CAROLINA

PROGRAM

Clemson Jervey Expansion

	Space	EXISTING AREAS	NEW ATHLETE PERFORMANCE CENTER #	Area	Total	
New Build Scope						
Sports Med - 2nd Floor	Offices		6	95	570	
	MD Offices		2	120	240	
	Exam Room		2	130	260	
	Procedure Room		1	160	160	
	Medical Files		1	150	150	
	PT Zone		1	2600	2600	
	Treatment			*included in PT zone*		
	Taping			*included in PT zone*		
	Storage		2	150	300	
	Family Restroom		1	65	65	
	Check-In + Waiting		1	150	150	
	Hydrotherapy Pools		1	1,600	1600	LOCATE ON 1ST FLOOR WITH RECOVERY
	Pool equip. room / Vault access		1	150	150	
	Conference Room		1	330	330	
	TOTAL NET SF				6575	
	Grossing Factor - department				1.25	
	TOTAL GROSS SF	**6500**			**8218.75**	
Recovery - 1st Floor	Float Room		1	170	170	
	Hydromassage		1	275	275	
	Cryo		1	95	95	
	Mechanical for Cryo & Float		1	120	120	
	Pods		1	450	450	
	Recovery		1	1800	1800	
	Stretch Tables			*included in Recovery*		
	Massage Chairs			*included in Recovery*		
	Infrared Beds			*included in Recovery*		
	Family Restroom		1	65	65	
	Check-In + Waiting		1	200	200	
	TOTAL NET SF				3175	
	Grossing Factor - department				1.25	
	TOTAL GROSS SF	**800**			**3968.75**	
Strength	Weight Room		1	6000	6000	
	Turf Zone (1)		1	1300	1300	
	Turf Zone (40-yard dash)		1	3450	3450	
	Turf Ramp		1	500	500	
	Office		5	100	200	*
	Head Office		1	200	200	
	Bullpen		1	350	0	*
	Cardio Machines		1	1400	1400	
	Internal Stair to Mezz		1	200	200	
	Storage (enlosed)		1	350	0	*
	Storage (open)		1	350	350	
	TOTAL NET SF				13600	
	Grossing Factor				1.2	
	TOTAL GROSS SF	**12500**			**16320**	
Nutrition	Nutrition Storage		1	280	0	*
	Prep Zone		1	175	0	*
	Fuel Bar		1	250	250	
	Office		3	110	330	
	Dexa		1	144		
	Bod Pod		1	100		
	TOTAL NET SF				580	
	Grossing Factor - department				1.25	
	TOTAL GROSS SF	**900**			**725**	*
Volleyball	Gallery/Lobby/Concourse		1	2000	2000	
	VIP Area (Aces Club)		1	900	900	
	Concessions	150	1	200	200	
	Locker Room Suite	1250	1	3600		
	Team Entry/Hype Tunnel		1	400		
	Gym Renovations					
	TOTAL NET SF				3100	
	Grossing Factor - department				1.25	
	TOTAL GROSS SF	**1400**			**3875**	

Clemson Jervey Expansion

	Space	EXISTING AREAS	NEW ATHLETE PERFORMANCE CENTER #	Area	Total	
New Build Scope						
Volleyball	Gallery/Lobby/Concourse		1	2000	2000	
	VIP Area (Aces Club)		1	900	900	
	Concessions	150	1	200	200	
	Locker Room Suite	1250	1	3600		
	Team Entry/Hype Tunnel		1	400		
	Gym Renovations					
	TOTAL NET SF				3100	
	Grossing Factor - department				1.25	
	TOTAL GROSS SF	**1400**			**3875**	
Bistro/NIL	NIL		0	5300	0	
	Kitchen		1	2500	2500	
	Seated Dining		1	3500	3500	
	Exec. Chef Office		1	120	120	
	Roof Terrace		1	1600		
	TOTAL NET SF				6120	
	Grossing Factor - department				1.25	
	TOTAL GROSS SF	**0**			**7650**	
Common Areas	Wellness Room		1	100	100	
	Restrooms		3	600	1800	
	Janitor		2	50	100	
	Jervey-to-Gym Connector		1	560	560	
	MEP support		1	2600	2600	
	TOTAL NET SF				5160	
	Grossing Factor - department				1.25	
	TOTAL GROSS SF				**6450**	
	TOTAL				**47208**	
	Grossing Factor - building				1.06	
	GRAND TOTAL				**50040**	
Renovation Scope						
Volleyball	Locker Room Suite		1	4000	4000	
	Team Entry/Hype Tunnel		1	400	400	
	Raise Roof of Gym		1			
	Officials Locker Room		0	400	0	
	Jervey Basement Renovations		1	700	700	
	Jervey Breezeway Renovations		0	700	0	
	TOTAL NET SF				5100	
	Grossing Factor				1	
	TOTAL GROSS SF	**0**			**5100**	
	Storage/Receiving	3000	1	2700	2700	
	Equipment	3000	1	4400	4400	
	Ice Room	300	1	250	250	
	Strength Office		3	100	300	
	Strength Storage		1	350	350	
	Strength Bullpen		1	350	350	
	Nutrition Storage		1	275	275	
	Nutrution Prep Zone		1	180	180	
	Laundry/Mech	700	1	2500	2500	
	Small Locker Room + RRs	0	1	600	600	
	TOTAL NET SF				11905	
	Grossing Factor				1.17	
	TOTAL GROSS SF	**7000**			**13928.85**	**
	GRAND TOTAL				**19029**	

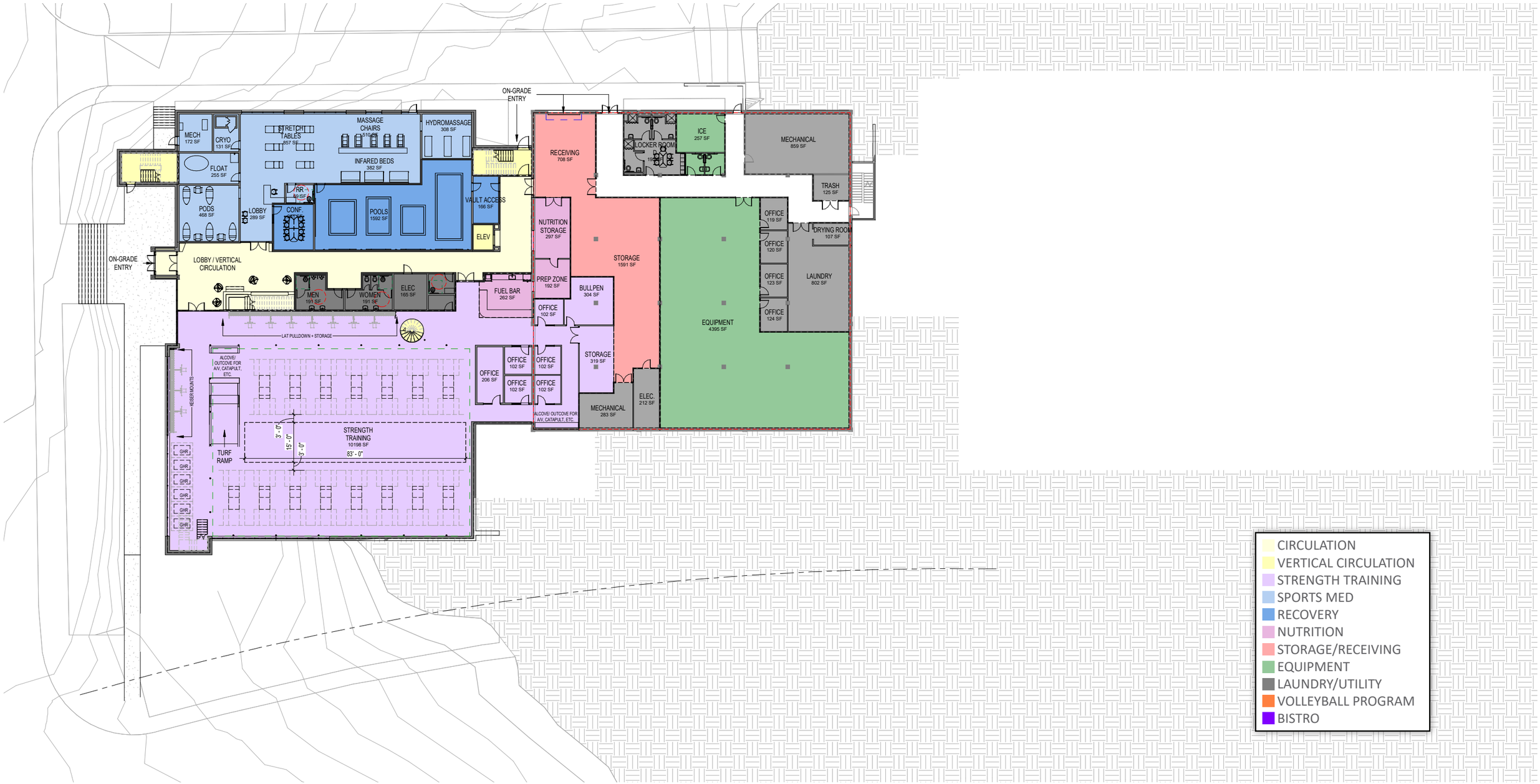
** this program element was moved to the renovation area in the basement of Jervey Gym*

*** this includes program elements that were originally included in the new construction program*

CONCEPT DESIGN

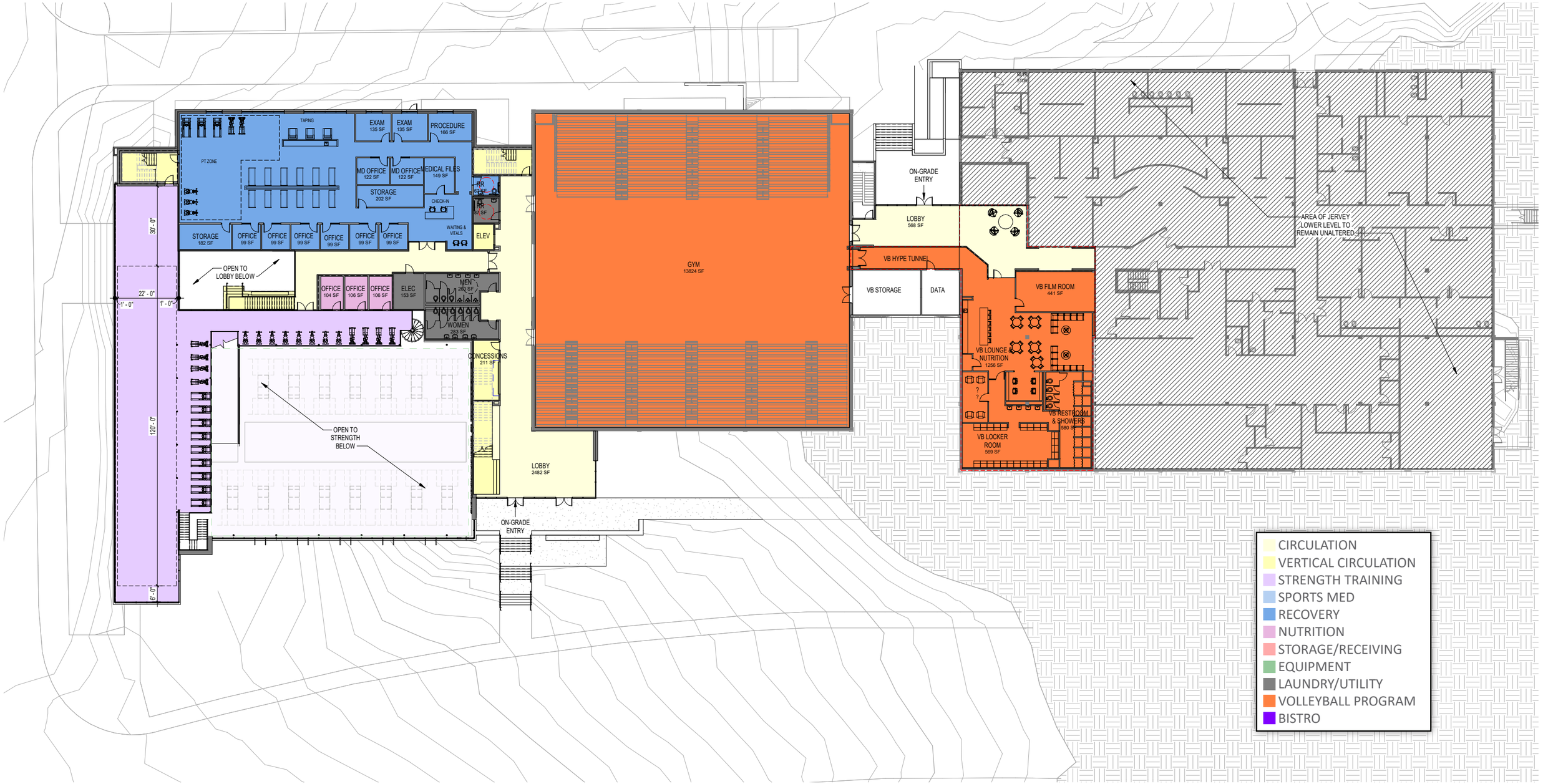
PLAN DIAGRAMS

Ground Floor



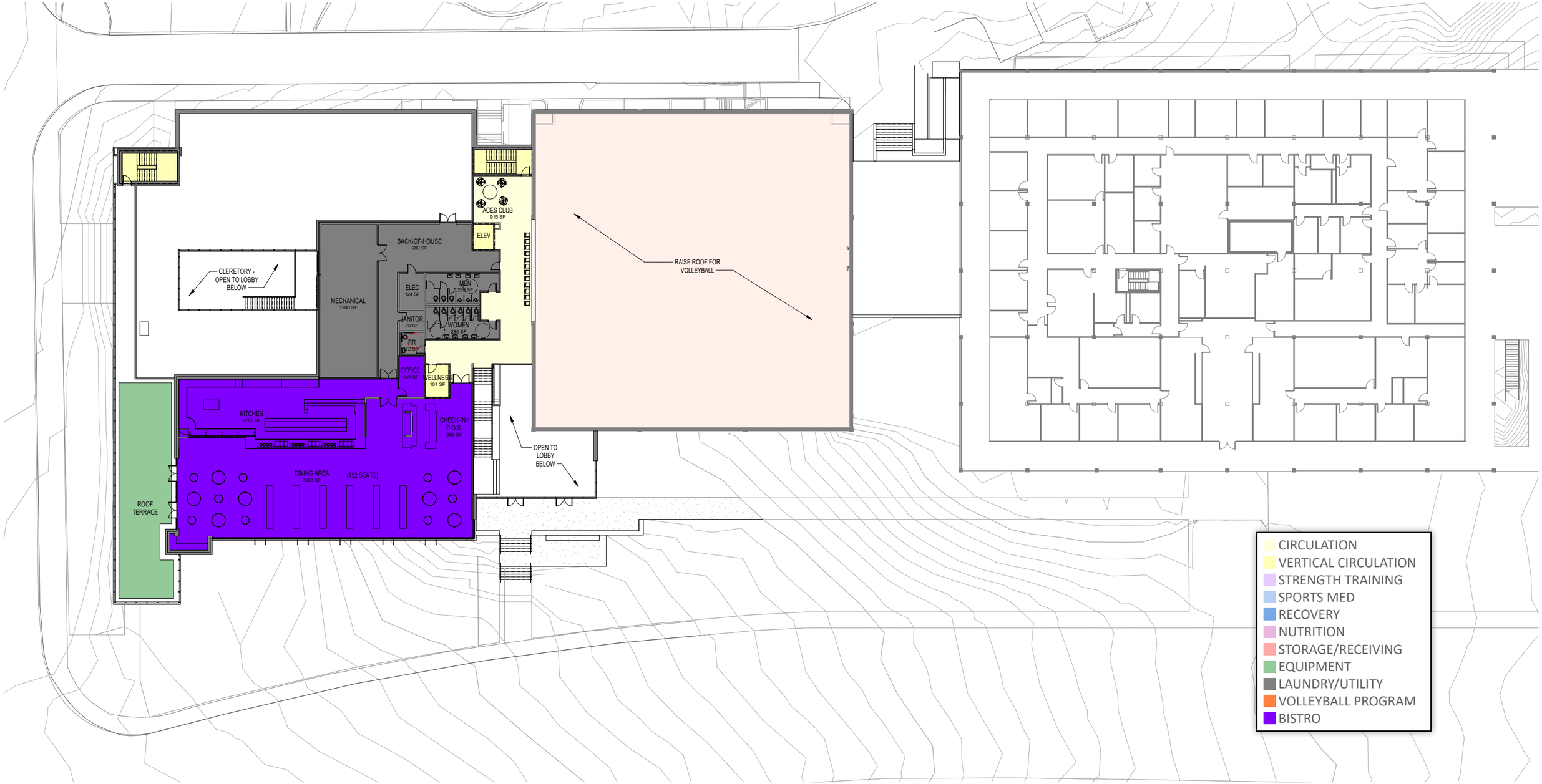
PLAN DIAGRAMS

Second Floor



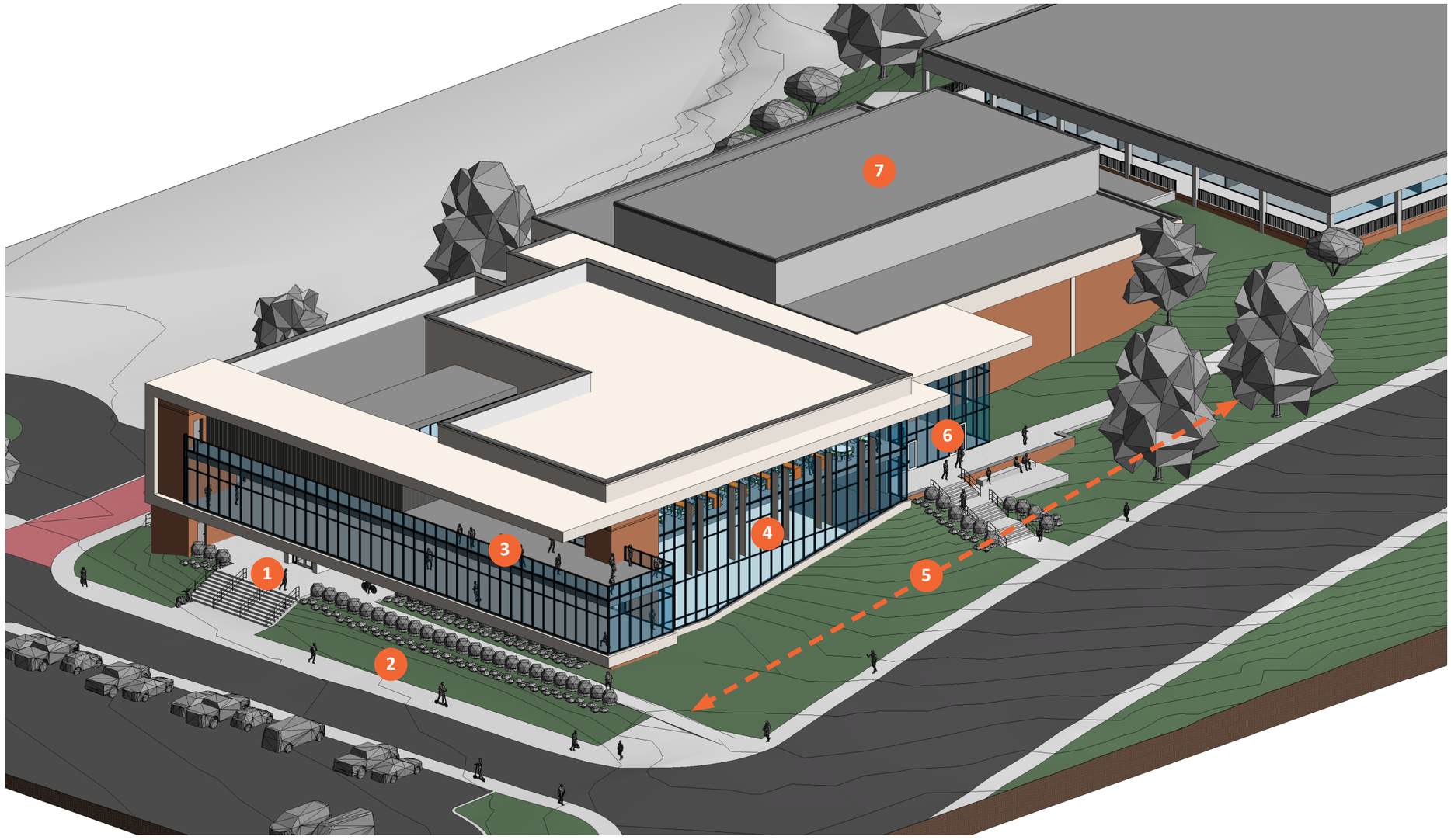
PLAN DIAGRAMS

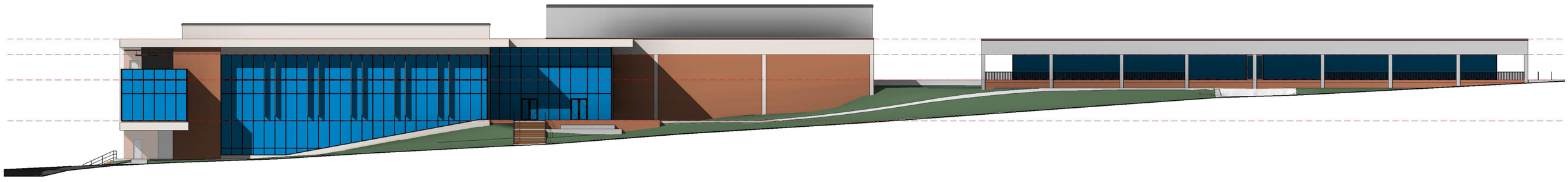
Third Floor



SITE MASSING

1. PRIMARY STUDENT ATHLETE ENTRY
2. LANDSCAPE/HARDSCAPE TO ENHANCE LOT 4 ENTRY AND TIGERWALK
3. OUTDOOR TERRACE OFF BISTRO WITH VIEWS OF ATHLETIC PRECINCT
4. GENEROUS GLAZING ON EAST ELEVATION FOR DAYLIGHTING AND VIEWS INTO STRENGTH TRAINING
5. SUBSTANTIAL BUFFER BETWEEN STREET TO MAINTAIN SIGNIFICANT AREA FOR GAME-DAY PARKING
6. NEW LOBBY + ENTRY PLAZA TO PROVIDE NEW FRONT DOOR TO JERVEY GYM AND CREATE IDENTITY FOR VOLLEYBALL
7. RAISED JERVEY GYM ROOF TO MEET NCAA MINIMUM REQUIREMENTS





SITE MASSING

1. NEW CONNECTOR ADDITION TO PROVIDE ON-GRADE ACCESS TO JERVEY GYM COURT LEVEL AND JERVEY GROUND LEVEL
2. ON-GRADE ENTRANCE AND ROLL-UP DOOR INTO RECEIVING AREA AT JERVEY GYM BASEMENT LEVEL
3. ON-GRADE ENTRY TO RECOVERY
4. CLERESTORY WINDOWS INTO STUDENT ATHLETE ENTRY LOBBY

CONCEPT IMAGES

View from south-east

CONCEPT IMAGES

View from east

CONCEPT IMAGES

View from north-east

CONCEPT IMAGES

Weight room interior

CONCEPT IMAGES

Weight room interior

CONCEPT IMAGES

Weight room interior

CONCEPT IMAGES

Lobby interior

CONCEPT IMAGES

Lobby interior

CONCEPT IMAGES

Lobby interior

APPENDIX

DESIGN AND SYSTEMS NARRATIVES

Civil Narrative

Land Planning Associates, Inc.

The proposed Athlete Performance Center will require extensive civil work including utility reroutes, grading and site improvements.
The proposed building addition and renovation to the Frank Johnstone Jervey Athletic Center will require demolition of the existing sidewalk and stairs to the south of Jervey Gym. In order to install the basement associated with the building significant excavation will occur in the area north of the P-4 parking lot, east of Athletic Service Drive and west of Perimeter Road. The existing chilled water running parallel to Perimeter Road will have to be re-routed to provide space for the proposed building. Additionally, new chilled water service lines will be brought to the proposed building. The existing gas line parallel to P-04 will likely need to be relocated to allow for excavation for the building basement. Additionally, the sanitary sewer and electrical will need to be re-routed.
The proposed building will have new water and sanitary sewer connections to tie to the water/sewer lines near Athletic Service Drive. The best location for the new electrical service within the new facility is anticipated to be the southwest corner of the building, near the mechanical room stairs. New electrical duct banks will need to be run from an existing electrical manhole to be selected, to a new manhole located in the entrance to Athletic Service Drive. Storm drainage from the new facility will tie to the existing storm drainage in P-04 parking lot which drains to the moat.

Structural Narrative

Mabry Engineering Associates, Inc.
840 Shull Street, Suite 100
West Columbia, South Carolina 29169-6756
803-926-0000

The Athlete Performance Center would consist of additions and renovations to Jervey Hall and Jervey Gym with a new ground up structure adjoining the gym. The majority of Jervey Hall would remain unaltered from a structural standpoint. However, the renovations to the Jervey Gym would require obtaining addition height for competition volleyball. Various options would be considered for the gym, to include raising the existing roof. One addition would provide connectivity from the programmed Volleyball Locker room to the renovated gym. This space would include an entry Lobby and Hype Tunnel. The ground up addition would be multiple levels to include athletic spaces, dining, and offices. Mabry Engineering Associates Inc. will provide structural engineering concepts for the foundations, floor framing, and roof framing systems. A complete set of the original construction documents was made available to understand the existing construction techniques and framing systems utilized for the Jervey complex. Following is a brief description of the foundation systems and framing systems anticipated for the complex.

ADDITIONS:

Foundations and Floor Slabs on Grade:

The anticipated foundation system for the two additions would consist of conventional, continuous wall footings poured approximately 2’-0” below finished floor/grade elevation. The footings would need to get larger at the building columns as required to account for the concentrated loading of the columns, but they would be poured monolithically with the wall footings. Isolated, interior columns would be used throughout the multi-story addition adjoining

the gym; however, the addition connecting Jervey Hall and Gym may be a clear span approach. Load bearing concrete masonry walls may be utilized in areas requiring more durability such as the elevators, restrooms, and stairwells. Non-load bearing exterior wall footings have been anticipated as 2'-6" wide and 1'-0" deep. Bearing wall footings would be approximately 4'-0" wide with a 1'-6" depth. Column footings would vary depending on the overall tributary areas being supported and the number of levels being supported; but column footings in the maximum of 9'-0" (2'-0" deep) square range are likely. These footings would have typical mild steel reinforcing. The topography on the site and the location of the planned multi-story addition would result in the need for building foundation walls at the east elevation and portions of both the north and south elevation as the interior elevations transition from the ground level (651') to the lowest level (643'). And foundation walls are likely needed for most of the Lobby addition between the Jervey Hall and Gym. Concrete retaining/foundation walls would be utilized at these soil retaining conditions. For estimating purposes these walls should be considered as 12" thick until additional information has been obtained for site soil characteristics provided in the ongoing geotechnical investigation. The grading plan and site development will be coordinated to make sure any topographic issues have been accounted for in the foundation design. Concrete masonry unit walls would be utilized at least to the floor slab elevation in the non-retaining locations and could possibly be used elsewhere as noted above. The concrete masonry unit walls would be doweled to the footings and would have vertical reinforcing at 32" on center for the foundation walls and at 16" on center for elevator shafts and stairwells.

A 4" concrete slab would be all that is needed in the interior of the additions. Welded wire fabric would be used in the light duty slab. All concrete for slabs on grade and foundation walls should be anticipated as 4,000 psi compressive strength at 28-days, whereas foundation concrete would be 3,000 psi. Fly ash content should be limited to 25% or less. A geotechnical report would need to be provided for the site to define the soil characteristics, site preparation recommendations, and site seismic parameters. A bearing capacity would also be needed. There have been several restrooms and functional spaces planned with floor drains. These slabs would need to slope at a minimum to these floor drains. As the design of floor finishes becomes finalized; these slab areas would be revisited to determine the need for any slab depressions.

There would be numerous recessed pools in the treatment area programmed on the ground level. These pools would all require concrete bases and walls that will likely be reinforced concrete to the finished floor elevation. The mat footing for the pools would likely be 1'-0" thick and the concrete side walls of the pools would be 10" thick. The size, configuration, and depth of the pools would be defined by the basis of design equipment and programming; with 8'-0" deep being a maximum requirement. The mat footings and walls would be reinforced with #5's at 12" on center, each way and in each face. Slab recesses of 2" to 3" would be common requirements at the specialty flooring areas, such as the Weight Room.

The elevator pit base and walls will likely be reinforced concrete to the finished floor elevation. The mat footing for the elevator would likely be 1'-6" thick and the concrete side walls of the elevator pit would be 8" thick. The size, configuration, and depth of the pit would be defined by the basis of design elevator selected; with 4'-0" deep being a common requirement. Also, there would be the need for a 2'-0"x2'-0"x4'-0' deep sump pit in the base of the elevator.

Structural Narrative cont.

A combination of steel wide flange (W-Section), round, and square structural steel columns would be utilized. The anticipated sizes would be W10x60, 10" XS Pipe, and HSS10x10x3/8.

Floor Structure:

Structural steel beams would be used to support a composite floor deck and concrete slab system. A 6" total depth slab, which includes the depth of the floor deck, would be sufficient to support the loading required for the spatial functions defined in the program. The deck would likely be 3" depending on the spacing of the floor framing. A series of interior columns would be placed on each side of the primary lobby/circulation spaces and around the perimeter of the overlooking second floor to the weight room below. Matching columns would be placed on the north and south exterior. Cantilevered floors with both interior and exterior spaces have been programmed on the west elevation. Additional columns should be anticipated along the exterior wall of the west elevation to create the ability to cantilever these floors.

The use of lightweight concrete for the elevated slabs on metal deck could reduce the weight of the building for foundation design, but normal weight concrete may provide a more economical solution. Also, a floor rating may be required. The approved UL D916 assembly would be recommended as the primary option to account for the required rated separation. The assembly would require 3 ¼" of lightweight concrete above the 3" metal deck (total 6 ¼") or 4 ½" of normal weight concrete above the 3" metal deck (total 7 ½"). The decking and slab system would carry the rating. However, the structural steel beams and girders would need to be spray fireproofed to the appropriate thickness to achieve the rating. The type of concrete and depth of floor deck/slab would be defined during the next phase of design, based on the overall best answer for the structure/project and final rating requirements. Welded wire fabric and reinforcing bars will be used in the composite concrete for strength. The structural steel beams will have steel studs (3/4"x5") welded to the top flanges at approximately 12" on center prior to the placement of the floor concrete. The composite floor system would be used for all elevated floors. All concrete for slabs on metal deck should be anticipated as 3,500 psi compressive strength at 28-days, with a superplasticizer for workability. Fly ash content should be limited to 25% or less.

Roof Structure:

The roof framing systems will consist of standard steel joists and metal deck. A 1 ½" metal (22 gage) roof deck would be used as the roof diaphragm and support for the roof finishes. The location of the elevator within the floor plan could result in the need to extend the shaft above the roof line. The height above the roof, the necessary spaces for controls, hoisting mechanism, and guide rail requirements would be coordinated with the basis of design elevator.

Structural Lateral Resisting System:

The lateral resisting system will utilize reinforced concrete masonry shearwalls, structural steel "X" bracing, and moment resisting frames. The stair towers and elevator shafts provide opportunities to either use reinforced masonry shearwalls or place "X" bracing in areas that would not affect the floor plans, as long as the lateral forces can be collected and taken to the stair towers and elevator shafts. Secondary moment resisting frames

would likely be needed where the design utilizes large extents of glazing or where the floor plans are open. The number of braces and their locations would need to be planned for during the space layout to determine their feasibility.

Miscellaneous steel framing will need to be considered for support of any mechanical equipment and for bracing of exterior wall openings.

Code Issues and Special Design Considerations:

The 2021 International Building Code design values anticipated for the project would consist of:

- Basic Wind Speed: 115 mph
- Building Risk Category: III
- Wind Exposure: B
- Spectral Response Ss 37.6%
- Spectral Response S1 10.2%
- Seismic Design Category C

The code indicates the exact location of the wind speed lines is established by local authorities and the values noted above would need to be verified with the local authorities. Similarly, the seismic values would be verified with site characteristics defined by the geotechnical evaluation.

JERVEY HALL RENOVATIONS:

The majority of the renovations associated with Jervey Hall would be associated with the interior, non-load bearing spaces and utilities. Noted above are the requirements anticipated for the Lobby addition. For connectivity with this addition, the majority of the exterior wall of the west elevation would be removed at the lobby and hype tunnel of the addition. Concrete beams, slabs, and columns that extend to this exterior wall would remain, with new lintels being placed to create the openings.

JERVEY GYM RENOVATIONS:

The majority of the renovations associated with Jervey Gym would be associated with the height needed for competition volleyball. The current clearance from the court to the existing ceiling prohibits the facility from being utilized under the current clearance requirement regulations. The completion of the flooring and spectator seating during the facility's last renovation would dictate the need to preserve and protect these features. The existing roof framing consists of steel joists that support a metal deck, insulation concrete topping, and the roofing system. In order to add height above the court the existing roof would need to be raised. While the final height of the roof framing has yet to be established, the construction approach would be similar regardless of this final height.

Structural Narrative cont.

As noted above, the desire to protect the existing bleachers and court has led to a concept of building a new roof system over top of the existing roof. One option to accomplish this design would be to construct extensions of the load bearing system on top of the existing structure. Reinforced concrete beams had been constructed in the original building to support the steel joists that clear span the space. By building the walls above the existing concrete beam and leaving the roofing in place the need for bracing and shoring of the existing structure would be minimized if not negated. Long span steel joists would be used, similar to the existing roof structure. There would not be the need for an insulating concrete topping on the proposed 1 ½" metal (22 gage) roof deck. Eliminating this dead weight affords the opportunity to construct more wall onto the existing system.

An additional design option would be to extend the new roof system past the existing building envelope. With additions programmed on each end of the gym, any vertical columns or supports could be incorporated into the floor plan. Regardless of the final decision on approach, the roof and side walls could be constructed to maintain water tightness with demolition of the existing roofing system and insulating concrete being performed under cover. The selective demolition approach would take addition time and would cost more than wholesale demolition but the advantages are evident.

The initial design concepts show that only the portion of the existing roof over the court would be raised. However, the approaches denoted above are sectional in concept. The amount of roof to be raised could be a portion of the existing area or the approach could be taken to raise the entire roof system.

Long span joists in the 64" to 72" deep range would be expected at a maximum spacing of 6'-0" on center. The 64" deep joists would be expected if the decision to extend new wall supports above the existing walls becomes the preferred approach. The 72" deep joists would be necessary should the desire to extend the new roof out over a portion of the Gym addition be selected.

Mabry Engineering Associates, Inc.
Albert A. Stevens, PE

MECHANICAL ENGINEERING NARRATIVE

CONTENTS

MECHANICAL SPECIFICATION SECTIONS:

Section 210010 – General Provisions – Fire Protection
Section 210500 – Fire Protection

Section 220010 – General Provisions – Plumbing
Section 220500 – Plumbing
Section 220700 – Plumbing Insulation

Section 220010 – General Provisions – HVAC
Section 230500 – Air Conditioning, Heating, and Ventilation
Section 230548 – Vibration Isolation and Seismic Restraint
Section 230700 – HVAC Insulation
Section 230900 – Facilities Management System

FIRE PROTECTION SYSTEMS:

A. The entire new facility along with the reconfigured gym will be protected with an automatic wet pipe sprinkler system in accordance with the requirements of NFPA 13 – 2016 Edition “Standard for the Installation of Sprinkler Systems”, the 2021 International Fire Code, the 2021 International Building Code, and the State Fire Marshal Regulations - Latest Edition. A fire wall will be added to the north side of the gym and the small area of the renovated locker room for the volleyball team will remain unprotected by a fire sprinkler system. Per data from 2004, the fire hydrant flow test resulted in the following information near the project site: Static Pressure – 135 psi; Residual Pressure – 105 psi; Flow – 1660 gpm. This is very good flow data and therefore, a booster fire pump is not anticipated. Due to the size of the building, multiple zones will be needed for the building. All piping 4”and larger shall be Schedule 10 black steel rolled-grooved or flanged and all piping 3” and smaller shall be schedule 40 black steel piping with threaded fittings. All sprinkler piping will be braced per NFPA requirements including seismic bracing. Sprinklers throughout the building will be with a chrome finish except in areas without ceilings which shall be brass upright sprinklers. Most sprinklers will be recessed pendent type with chrome finish while sprinklers in the public areas may have concealed pendent sprinklers of a color finish of one of the manufacturer’s standard colors. Areas with ceiling clouds (non-continuous ceilings) will require protection above and below. Upright sprinklers in the competition gym and training areas that could involve airborne objects should be complete with wire cages to protect the sprinkler from damage and accidental discharge. The entire building shall be considered light hazard occupancy except in the following areas:

Mechanical/Equipment Rooms:	Ordinary Hazard (Group I)
Storage Rooms:	Ordinary Hazard (Group I)

PLUMBING SYSTEMS:

A. General:

The plumbing system will cover all materials, fixtures and workmanship complete to provide all items as will be shown on the plumbing and architectural drawings. The plumbing system will be designed in accordance with the requirements of the 2021 International Plumbing Code, the 2021 International Building Code, and all local and state codes. Plumbing systems shall be designed to meet the requirements of the Americans with Disabilities Act (ADA) and will be designed with water conservation in mind to reduce utility costs. All plumbing will be accomplished to connect to the fixtures as indicated on the current architectural drawings. The following narrative describes the systems more completely.

B. Existing Systems:

The small section to the north of the current volleyball gym that is being renovated to serve as volleyball team locker rooms shall connect to existing waste and supply systems in that area of the building.

C. Supply Piping:

All new above grade domestic water piping will be type L copper piping and all new below grade piping will be type K copper. Piping is anticipated to be run primarily above the ceilings. This will allow access to the piping for repair or maintenance at future dates. Where possible this may result in piping being routed up to the floor above and down the fixtures below in order to save on some piping in multiple story areas. All domestic water piping shall be insulated with 1" thick fiberglass insulation. There will be sufficient quantity of shut off ball valves to provide proper zoning of supply systems. The new building will likely require a 4” domestic water service that shall be new to serve only this new facility. The system shall be complete with parallel reduced pressure backflow preventers and a water meter connected to the campus METASYS system.

New gas piping as required for equipment and/or water heating purposes shall be Schedule 40 black steel with malleable iron fittings.

D. Waste Piping:

New waste lines located below floor slab will be schedule 40 PVC plastic pipe and fittings with solvent cement joints. New waste lines located above the floor slab shall be standard weight cast iron with heavy duty bands. Waste lines will connect to new sewer lines indicated on the civil plans and will likely be 6” in size. All waste systems will be served with ample quantities of floor cleanouts. Waste piping will be routed towards the west direction. Renovations to the existing building will result in some slab cutting for connections to the existing system and shall be expected. Any existing sanitary waste lines that are being connected to in the new volleyball locker room area shall be completely augured to assure positive flow.

E. Vent Piping:

All new vent piping will be standard weight hubless cast iron with heavy-duty clamps. The minimum vent size will be 2" with a 3” main stack at the new group restrooms at the new addition to the Jervey Gym.

Mechanical Narrative cont.

F. Storm Drainage Piping:

The new roof structure of the gym will result in a new system for that area as well as all new building additions. Piping for new storm drainage system shall match the waste piping indicated earlier for sanitary sewer for both below grade and above grade piping. All new horizontal storm drainage piping shall be insulated with 1” fiberglass insulation. All storm drainage piping will exit toward the west or the south where it will connect to the civil system.

G. Fixtures:

All fixtures, floor drains, etc. will be as shown on the architectural and plumbing drawings. Floor drains in mechanical rooms shall be heavy duty with 12” round tops. All floor drains will be complete with trap guards to prevent sewer odors from entering the building. Most fixtures will be cast iron, vitreous china, or 18 gauge stainless steel with cast brass faucets. Water closets will be wall hung with chair carrier, and all flush valves on water closets will utilize battery operated sensor valves. Urinals will be wall hung with chair carrier and the flush valves on these urinals will also utilize battery operated sensor valves. Lavatories will be undercounter mounted with cast brass faucets. Wall hung lavatories will be cast iron with cast brass faucets. All lavatories shall be equipped with ASSE 1070 approved mixing valves. Showers will be solid surface surrounds provided under the architectural scope with the shower valve, linear drain, and shower head being provided and installed under the plumbing scope. Electric water coolers shall be dual height with sensor operated bottle fillers. All custodial/mechanical areas and laundry areas to be equipped with emergency eyewash, or emergency safety shower/eyewash respectively. All fixtures will be low consumption for water efficiency in order to reduce on utility costs and aid in achieving two green globes.

Main water heaters serving the new building addition will be gas fired, approximately 300,000 btuh input, with a storage tank similar to Aerco, or equal. The heater shall produce 140 degree water and the building shall be served by a master mixing valve with bypass. The heater shall be complete with a storage tank (approximately 120 gallons) and shall be complete with an expansion tank. Due to the gas input rating, the room where the water heater is located shall be equipped with an automatic gas shutdown system and the room shall be rated. The water heater will utilize a hot water recirculating pump similar to Bell & Gossett to maintain water temperature. Wall hydrants (loose-key, freezeless) shall be located around the perimeter of the building at approximately 100’ intervals around the perimeter of the building.

HVAC SYSTEMS:

A. Design Criteria:

All HVAC systems will be designed in accordance with the 2021 International Mechanical Code, ASHRAE 90.1-2007, and the State Fire Marshal Regulations, Latest Edition.

Outdoor Design Conditions
Summer 94 FDB, 77 FWB
Winter 21 FDB

Indoor Design Conditions
Summer 75 FDB, 50%-60% RH
Winter 72 FDB

B. Scope of Work

Renovate Jervey Gym, Renovation of Volleyball Locker Room in existing Jervey, and New 50,000 SF Addition.

Existing central mechanical room in Jervey will remain in service.

In the Gym new air handling systems will be indoor units located in mechanical rooms.

A new central mechanical room with chilled water pumps will be provided in the Addition. New chilled water utilities will be routed to the building from the central energy loop.

New Addition will utilize roof top air handling units.

New Addition will require relocation of approximately 200’ of existing underground chilled water utility pipe in the central energy loop.

C. System Description

The Mechanical systems will utilize chilled water from the campus central energy facility and electric heat. The cooling system will be a two pipe chilled water system utilizing variable water flow. The main chilled water pumps will be controlled by variable frequency drives.

The air handling units will be variable air flow (VAV), with medium pressure oval ductwork, to single duct variable air volume terminal units. Terminal units will utilize electric heating.

The energy recovery units will include fans for exhaust and fresh air and an energy recovery wheel for total energy recovery.

The Data Rooms will have ductless cooling systems installed to provide cooling when the main systems are not in operation.

D. Equipment

1. Air Handling Units:

The air handling units will be chilled water variable air volume (VAV) modular air handlers with electric heaters for fresh air pre-heat. The units will be VAV systems utilizing plenum fan arrays and variable frequency drives. The units will be complete with high capacity cooling coils, double wall construction, and stainless steel drain pans.

Mechanical Narrative cont.

Rooftop air handlers will include weatherproof construction, extended piping cabinet cabinets for control valves and seismic roof curbs.

2. Variable Air Volume Terminal Units:

VAV terminal units will be single duct units with electric heating coils to provide primary heat. VAV terminal units provide individual temperature control to each thermal control zone.

3. Energy Recovery Units:

A energy recovery units will be provided for the locker room areas. The ERV units will have direct drive fans and an energy recovery wheel for total energy recovery.

4. Chilled Water System:

Two new secondary chilled water pumps will be installed in the new main mechanical room. These pumps will include a variable frequency drive for variable flow operation. Pump speed will be controlled by a differential pressure sensor at the most remote air handling unit.

5. Ductless Air Conditioner (Data/IT):

The ductless air conditioner will be a variable speed compressor ductless split system with the condensing units installed on grade.

E. Exhaust Systems:

Restroom exhaust duct will be galvanized metal. Exhaust air will be ducted to roof top exhaust fans.

Locker room exhaust will be ducted to a central energy recovery unit.

F. Air Distribution Systems:

Ductwork will be galvanized sheet metal per SMACNA guidelines. The supply will be ducted from the air handlers to the VAV boxes with medium pressure rated sheet metal oval duct. The supply will be ducted from the VAV boxes to the diffusers with low pressure rectangular sheet metal duct and round sheet metal run outs with flexible duct not to exceed 5’ in length. Return air will be plenum return above the lay-in ceiling.

Gymnasium ductwork will be fabric duct with an internal frame for support.

Air distribution will be selected as appropriate for the spaces served from a durability, noise and air delivery standpoint.

G. Piping:

Chilled water piping larger than 2” will be schedule 40 black steel with welded fittings. Steel pipe will be welded or may utilize Victaulic couplings and accessories.

Chiller water piping 2” and smaller will be Type L hard drawn copper. Copper pipe will utilize Pro-Press mechanical couplings.

Condensate drain piping will be Type L hard drawn copper.

Underground chilled water piping will be equal to Perma-Pipe Ricwil pre-insulated piping with fiberglass jacket.

H. Insulation:

Indoor duct insulation will be fiberglass duct wrap with an all service jacket. Seams will be sealed with glass fabric tape, staples and mastic. Insulation exposed in equipment rooms will be fiberglass board with an all service jacket. Seams will be sealed with glass fabric tape, staples and mastic.

Indoor piping insulation will be fiberglass with an all service jacket. Piping in equipment rooms will be covered by canvas jacketing. Equipment room piping will be painted to the University standard colors.

Exterior piping will be foamglass covered by corrugated aluminum jacketing.

Refrigerant tubing and condensate drains will be insulated with 3/4” wall Armaflex and the outdoor pipe insulation will be covered with a corrugated aluminum jacket.

I. Control System:

The building will be controlled by a Johnson Controls DDC system, capable of individual programming and scheduling. The web server will be remotely accessed via Clemson University LAN connected to the internet. The interface will include a graphical representation of the building with point and click controls. The DDC system shall consist of an operator interface, building controllers, unit controllers, valves, dampers, operators, sensors, switches, etc. as required to provide a complete and fully functional system.

Control systems will include variable speed operation for all air handling systems. All hydronic systems will be variable speed to modulate as cooling and heating loads increase.

Fresh air ventilation will be controlled by time of day scheduling and CO2 demand controlled ventilation.

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JERVEY BUILDING RENOVATION STUDY

CLEMSON, SC

ELECTRICAL DESIGN NARRATIVE

February 8, 2023

PROPOSED ELECTRICAL RENOVATIONS/NEW CONSTRUCTION

GENERAL – FOR ALL BUILDINGS

I. DESIGN CODES AND STANDARD

A. The design of the electrical system shall confirm to the following codes and their local amendments:

1. International Building Code (2021)
2. International Energy Conservation Code (2009)
3. International Fire Code (2021)
4. NFPA 70 – National Electrical Code (2020)
5. National Electrical Safety Code, ANSI-C2 (2017)
6. ICC A117.1
7. ASCE 7

B. The design of the electrical systems shall conform to the follow standards:

1. NFPA 72 (2016) – National Fire Alarm and Signaling Code
2. NFPA 1221 (2016) – Standard for the Installation, Maintenance, and Use of Emergency Services Communication Systems.

II. BASIC ELECTRICAL MATERIALS

A. Electrical Distribution: Existing Jervey electrical service and the majority of the distribution shall remain in place. A new electrical service shall be provided to support the addition to Jervey, and the Jervey Gym electrical loads shall be removed from the existing service and the new electrical service shall be extended to support the Jervey Gym.

B. Service Entrance, Feeder, and branch circuit conduits installed below grade shall be Galvanized Rigid Conduit (GRC) with bitumastic coating or Intermediate Grade Metallic Conduit (IMC) with bitumastic coating.

C. Feeders and branch circuits installed in mechanical rooms below 7’-0” above finished floor on building exterior shall be GRC or IMC.

D. Interior feeders and branch circuits in locations not described above shall be installed in Electrical

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Metallic Tubing (EMT) except for the following applications:

E. Flexible conduit shall be used for final connections to light fixtures in drop ceilings. The maximum length of flexible conduit or cable shall be 6-feet.

F. Flexible conduit shall be used for final connections to vibrating equipment such as motors, air compressors, transformers, etc. The maximum length of flexible conduit shall be 6-feet.

G. ENT (Electrical non-metallic tubing) is not allowed.

H. All conduits shall be minimum of ¾".

I. All building wiring shall be copper insulated conductors (THWN/THHN-2 or XHHW-2) with 90-degree C minimum temperature rating for both dry and wet applications.

J. Nonmetallic-Sheathed Cable (Romex) is not allowed.

K. MC cabling is not allowed.

L. Branch circuits for lighting and receptacles shall be #12 minimum copper (#10 for runs longer than 100') conductors with equipment ground conductors included.

M. All devices shall be commercial specification grade and rated for 20-amps. Receptacles within 6 feet of a sink and all receptacles in kitchens shall have ground fault interrupting (GFI) protection.

N. All exterior receptacles shall be weather resistant (WR) rated with metallic "while-in-use" weatherproof covers.

O. Distribution panelboards shall be 3-phase, 4-wire with copper buses.

P. Electrical equipment manufacturers shall be one of the following: Square D, General Electric, Eaton, or Siemens.

Q. Provide UL listed lightning protection system to support all new and existing buildings with connected roofs. Existing systems shall be removed and new systems shall be installed to support existing roofs.

III. ELECTRICAL SERVICE AND DISTRIBUTION

A. Jervey is currently fed through a medium voltage 3-way switch on exterior of building on perimeter road side to a unit substation in existing mechanical room. Substation consists of a fused medium voltage switch, a 500KVA transformer, and a 480-volt, 600-amp switchboard and motor control center. The medium voltage switch and transformer appear to have been replaced, but the switchboard is original to the building.

B. There is also an existing emergency generator in the old chiller yard that currently feeds emergency power into McFadden. Emergency panel in McFadden then feeds emergency power back into Jervey. Generator appears to be undersized. A new 80kw generator shall be provided to support emergency loads in Jervey, McFadden, and building addition. Install must be coordinated to ensure that emergency power is maintained in McFadden and existing Jervey facility to remain while occupied.

C. New service shall consist of a new exterior medium voltage transformer furnished and installed by owner. Contractor shall provide two 5" conduits with 15kv primary conductors to transformer location. There are two options for providing new MV service: Extend duct bank from existing manhole between baseball and softball fields to a new manhole at the entrance to Athletic Service Drive or from existing manhole south of parking lot to new manhole at entrance to Athletic Service Drive. Contractor shall provide concrete pad and secondary from transformer to 480-volt, 1600-amp switchboard in main electrical room. New service shall support Jervey addition and Jervey Gym. See below for more information on switchboard.

D. All electrical distribution equipment serving Jervey and McFadden buildings shall remain as is.

E. Existing panels and transformers feeding Jervey shall remain as is except for panels associated with Jervey Gym loads. Those panels shall be removed during demolition of Jervey.

F. Provide a 480/277-volt, 3-phase, 4-wire, 1600-amp switchboard "MSB" in ground floor main electrical room of Jervey addition. Main circuit breaker shall be LSIG type with arc-reduction accessory switch. Switchboard shall include integral SPD and Schneider Electric power meter tied to campus network.

G. A main building meter (Schneider Electric PM5563RD) shall be provided at the main panel and a sub-meter bank (Schneider Electric MMU-24 enclosure with iEM3000 meters or equal) with sub-meters and single ethernet connection shall be provided to monitor lighting, equipment, receptacle loads, and DAS equipment. Meters shall be connected to the University monitoring system (JCI Metasys).

H. Disconnect Jervey Gym distribution from existing 600A, 480V switchboard in basement mechanical room and refeed from MSB in new building. "MSB" shall feed the following equipment to support Jervey Gym:

1. Provide a 480/277-volt, 3-phase, 4-wire 400-amp main lugs only panel 'GPM0' in Gym basement mechanical room to feed mechanical loads for gym building.
2. Provide a 480/277-volt, 3-phase, 4-wire 100-amp Main lugs only panel 'GPL0' in Gym basement mechanical room to feed lighting loads for gym building.
3. Provide a 75KVA transformer 'TG0' and provide a 208/120-volt, 3-phase, 4-wire 225-amp panel 'GPR0' in Gym basement mechanical room to feed general receptacle loads and any misc. equipment loads throughout gym building. 'GPR0' shall be fed through transformer 'TG0'.

I. 'MSB' shall feed the following Building Addition Distribution Equipment:

a. Provide a 480/277-volt, 3-phase, 4-wire 400-amp main lugs only panel 'MP1' to support ground floor mechanical.

b. Provide a 480/277-volt, 3-phase, 4-wire 100-amp main lugs only panel 'LP1' to support ground floor lighting.

c. Provide a 112.5KVA transformer 'T1' in ground floor electrical room to feed:

i. Provide a 208/120-volt, 3-phase, 4-wire 400-amp distribution panel 'DP1' to feed:

1. Provide a 208/120-volt, 3-phase, 4-wire 150-amp panel 'RP1' in ground floor electrical room to support receptacle loads on ground floor.
2. Provide a 208/120-volt, 3-phase, 4-wire 100-amp panel 'TP1' in ground floor telcom room.

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3. Provide a 208/120-volt, 3-phase, 4-wire 150-amp panel 'RP2' in 1st floor electrical room to support 2nd floor receptacle loads.

d. Provide a 75KVA transformer 'TL1' in ground floor gym mechanical room to feed:
   i. Provide a 208/120-volt, 3-phase, 4-wire 225-amp panel MCB panel 'LP1' in laundry room in Gym basement.

e. Provide a 112.5KVA transformer 'TQ1' in ground floor electrical room to feed:
   i. Provide a 208/120-volt, 3-phase, 4-wire 400-amp panel 'RPQ1' to support equipment loads on ground floor.

f. Provide a 480/277-volt, 3-phase, 4-wire 225-amp panel 'MP2' to support 2nd floor mechanical.

g. Provide a 480/277-volt, 3-phase, 4-wire 100-amp panel 'LP2' to support 2nd floor lighting.

h. Provide a 112.5KVA transformer 'T2' in 2nd floor electrical room to feed:
   i. Provide a 208/120-volt, 3-phase, 4-wire 225-amp panel 'RPQ2' to feed equipment loads on 1st floor.
   ii. Provide a 208/120-volt, 3-phase, 4-wire 100-amp panel 'TP2' in 1st floor telcom room.

i. Provide a 480/277-volt 3-phase, 4-wire 600-amp panel 'MP3' to support rooftop and 3rd floor mechanical.

j. Provide a 480/277-volt 3-phase, 4-wire 100-amp panel 'LP3' to support 3rd floor lighting.

k. Provide a 480/277-volt, 3-phase, 4-wire 225-amp panel 'KQ' to support kitchen equipment.

l. Provide a 112.5KVA transformer in 3rd floor electrical room to feed:
   i. Provide a 208/120-volt, 3-phase, 4-wire 400-amp panel 'RPK' in kitchen. Panel 'RPK' shall feed the following:
      1. Large kitchen appliances / equipment.
      2. Provide a 208/120-volt, 3-phase, 4-wire, 150-amp main shunt-trip type circuit breaker panel for feeding equipment under hood(s).
      3. Provide a 208/120-volt, 3-phase, 4-wire, 150-amp main lugs only type panel for feeding small appliance and general kitchen loads.

IV. EMERGENCY POWER:

A. Provide a pad mounted, diesel 80kW generator with sub-base fuel tank and weatherproof, sound attenuating enclosure. Generator shall have a 150-amp circuit breaker to feed exterior emergency transition equipment to allow for load bank connections and portable generator connection. Generator distribution panel shall include: a 60-amp, 2 pole breaker to support existing emergency distribution system in McFadden, a 50-amp, 3 pole breaker to support future emergency distribution

Electrical Narrative cont.

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systems in Jervey, and a 50-amp, 3 pole breaker to support new building.

B. New building emergency distribution system shall consist of a 70-amp, 3-pole automatic transfer switch and a 480-volt, 3-phase, 4-wire fused panelboard to support emergency loads in new building.

C. Existing Jervey emergency distribution is currently fed from McFadden's emergency distribution system and shall remain in place at this time.

D. Emergency Loads:
   1. Exit signage and means of egress lighting
   2. Elevator cab power
   3. Emergency voice/alarm communications systems
   4. Fire alarm systems
   5. Emergency responder radio systems

E. All emergency system and legally required standby system panelboards shall be protected with surge protection devices.

F. Provide surge protection devices at all elevator equipment disconnects.

V. LIGHTING

A. All lighting shall be LED with 3500K color temperature and minimum 80 CRI. Fixtures shall have 5-year warranty. Drivers shall be dimmable down to 10%.

B. Lighting in public spaces shall be architectural grade fixtures. Back of house spaces shall utilize economical grade fixtures.

C. Office spaces: Architectural 2x2 or 2x4 LED grid mount fixtures.

D. Conference rooms: Architectural LED linear fixtures and recessed LED downlights.

E. Lounge & Nutrition Spaces: High performance recessed LED linear fixtures and decorative pendants over seating areas.

F. Recovery Spaces: Architectural 2x2 LED grid mount fixtures in open areas and LED recessed downlights in specialty rooms.

G. Locker/Restrooms: 2x2 recessed LED grid mount fixtures, wet listed non-conductive trim LED downlights, and LED vanity fixtures.

H. Lobby: Provide decorative high performance LED fixtures.

I. Sports Med: Architectural 2x2 and 2x4 LED grid mount fixtures

J. Strength Training: Provide surface mounted high performance LED strip fixtures.

K. Storage/MEP: Provide 4' LED surface mounted strip fixtures.

L. Gymnasium: Provide high-performance sports LED high-bay fixtures. Lighting shall be perimeter type with indirect lighting to reduce glare.

M. Dining: Provide architectural 2x2 and 2x4 LED grid mount fixtures.

N. Kitchen: Provide sealed and gasketed 2x2 and 2x4 LED troffers.

O. VB Hype Tunnel: Provide recessed RGB architectural Linear fixtures.

P. Roof Terrace: Provide LED wet listed architectural surface mount cylinders, and decorative wet listed pendant rings.

Q. Aces Club: Provide architectural LED recessed downlights.

R. Existing HID site lighting shall be replaced with campus standard LED pedestrian lighting with 7-pin photocell and receptacle. Provide a handhole at base of each pole with barrier to separate line-voltage and low-voltage conductors.

S. Existing parking lot lighting and fountain power is fed from Jervey underground to the south lot. Circuits shall be maintained during construction and refed from new electrical service prior to completion.

T. Provide code required automatic lighting controls as required to support the building spaces. Assume all lighting shall have dimming controls.

VI. FIRE ALARM SYSTEMS

A. Existing fire alarm control panel in Jervey building was fairly recently upgraded, but system is not currently based on voice notification. Existing panel shall be upgraded with voice capabilities. McFadden appears to have separate fire alarm control panel and shall remain as is.

B. All notification devices throughout existing Jervey facility shall be replaced with speaker devices.

C. All existing smoke detectors that are over 10-years old shall be replaced. Smoke detectors less than 10-years old may be re-used / relocated.

D. Notification: Provide ceiling mount ADA-compliant combination speaker/strobes for all locations.

E. Wet-listed devices shall be provided in shower areas and on exterior terrace. Provide manufacturer's back-box flushed mounted in ceiling / walls. Do not surface mount backboxes.

F. Provide connections to Gymnasium Audio system to allow for fire alarm voice system to override Audio system and make emergency announcements through this Audio system.

G. Provide connections to Strength Training Audio system to allow for fire alarm voice system to shutdown audio system so that emergency communications through fire alarm system speakers can be clearly understood.

H. Smoke Detectors:

1. Provide system smoke detectors at fire alarm control panel, in public corridors, and in storage rooms.
2. Provide elevator recall system smoke detectors in elevator lobbies, and elevator equipment rooms. Provide heat detection with shunt trip in machine rooms and top of elevator shaft.
3. Provide duct mounted smoke detectors at all mechanical systems over 2000 CFM that support multiple rooms. 15,000 CFM mechanical systems shall require detectors in both supply and return ducts.

I. Provide fire alarm system monitoring and control relays for elevators, sprinkler system, door holders, access control systems, and mechanical systems.

J. Commissioning: Provide 4-hours of owner training for owner's staff and maintenance personnel.

VII. COMMUNICATION SYSTEMS

A. Existing fiber communications into Jervey shall remain in place and be utilized as the MDF to support Jervey, Gym, and Addition. Provide dedicated pathways from MDF to IDFs in Addition.

B. Communications systems shall be provided per CCIT design guidelines and standards.

C. Standards require CAT6e cabling in minimum of 1-1/4"conduit to 5" square by 2-7/8" deep backboxes for all data ports. Provide data outlets throughout facility as required to support

D. Provide data connections to elevator system controller, and emergency call station system per CCIT specifications.

E. Security surveillance cameras – Provide data outlet as defined above to nearest IDF. All exterior doors and interior corridors shall have cameras.

F. Access Controlled doors – Provide power supply and infrastructure conduit/boxes for building entry doors and doors separating departments / suites. Coordinate access control system requirements with owner. Access control system equipment shall be located on backboards in electrical rooms.

G. Emergency Call Stations –Provide emergency call stations at elevator landings per CCIT specifications.

H. Emergency Radio Communication Enhancement System (ERCES) – Provide, if required, Bi-Directional Amplifier (BDA) system, transmitting antennas, and interconnecting cable.

I. Provide allowance for volleyball arena sound system and video board integration.

J. Provide allowance for sound system in strength and conditioning.

END OF ELECTRICAL NARRATIVE

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