1. METROTECH CORPORATE CAMPUS

1.1 Technical Specifications & Construction Methodology

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Prepared For: Global Synergy Partners

Prepared By: Summit Construction Group

2. SITEWORK & CIVIL ENGINEERING SPECIFICATIONS

2.2 Earthwork & Grading

2.2.1 Excavation & Fill Specifications

Cut/Fill Operations

Excavation Depth	Maximum 15' below existing grade
Fill Material	Select granular fill, ASTM D2940
Compaction Requirements	95% Standard Proctor Density per ASTM D698
Slope Stabilization	3:1 maximum slope ratio with erosion control matting
De-watering	Wellpoint system with filtration to NPDES standards

2.2.2 Subdrainage System

Component	Material Specification	Size/Dimensions	Installation Method	Standard
Perforated Drain Pipe	HDPE SDR 35, Corrugated	6" Diameter	Minimum 0.5% slope to storm sewer	ASTM F667
Drainage Aggregate	Washed gravel, 3/4" clean stone	12" bed depth	Wrapped with geotextile fabric	ASTM D448
Filter Fabric	Non-woven geotextile	6 oz/sq yd	Overlap seams 18" minimum	ASTM D4751

2.3 Utility Trenches & Conduits

Underground Electrical Conduit Schedule

Conduit Use	Conduit Type	Size	Depth Below Grade	Bedding Material	Warning Tape
Primary Electrical	PVC Schedule 40	4" Conduit (Qty: 3)	36" minimum	1/2" pea gravel	Red "Danger Electrical"
Telecommunications	PVC Schedule 40	2" Conduit (Qty: 6)	24" minimum	Sand bedding	Orange "Communication"
Fiber Optics	Innerduct HDPE	1.25" Microduct	30" minimum	Sand bedding	Orange "Fiber Optic"

3. STRUCTURAL SYSTEMS SPECIFICATIONS

3.4 Foundation System

3.4.3 Concrete Mix Designs

Application	Mix Design	Compressive Strength	Slump	Admixtures	Testing Frequency
Foundation Walls	4000 psi @ 28 days	5,000 psi design	4" ± 1"	Water reducer, Type D	1 set/50 yd³
Structural Slab	3500 psi @ 28 days	4,000 psi design	4" ± 1"	Fibers: 1.5 lb/yd³	1 set/100 yd³
Elevated Decks	5000 psi @ 28 days	6,000 psi design	7" ± 1"	High-range water reducer	1 set/40 yd³

3.4.4 Reinforcing Steel Schedule

Location	Bar Size	Grade	Spacing	Lap Splice Length	Standard
Foundation Mat	#8 (Bottom), #6 (Top)	Grade 60	12" O.C. Each Way	45 diameters	ASTM A615
Columns	#10 Vertical, #4 Ties	Grade 60	12" O.C. Ties	Class B tension splice	ASTM A615
Elevated Slabs	#5 Bottom, #4 Top	Grade 60	12" O.C. Each Way	40 diameters	ASTM A615

3.5 Structural Steel

Steel Member Schedule

Member Type	Section Size	Grade	Connection Type	Fireproofing	Finish
Columns	W14x211	A992	Bolted: A325 1"Ø	Spray-applied, 2hr rating	Shop prime only
Beams	W24x94	A992	Shear tab connections	Spray-applied, 2hr rating	Shop prime only
Joists	24K10	A36	Welded to ledger angles	Intumescent coating	Shop prime only

4. MECHANICAL SYSTEMS SPECIFICATIONS

4.6 HVAC System Components

4.6.5 VRF System Detailed Specifications

Component	Manufacturer/Model	Capacity	Electrical Characteristics	Refrigerant	Sound Rating
Outdoor Unit	Daikin VRV IV-S Heat Recovery RXYQ24P8W1B	24 HP (67.2 kBtu/h)	460V/3Ph/60Hz, MCA 98.7A, MOCP 125A	R-32 (GWP 677)	68 dB(A) @ 1m
Indoor Ceiling Cassette	Daikin FDQ-B Series FDQ100BXVJU	4-way blow, 36 MBH cooling	208-230V/1Ph, 3.2A FLA	R-32	NC 35
Branch Controller	Daikin REFNET Joint BRC7D62	7 Ports, 2-3/8" main connection	N/A	R-32	N/A

4.6.6 Refrigerant Piping Details

Copper Pipe Specifications

Pipe Type	Material	Size Range	Wall Thickness	Joint Method	Cleaning Procedure
Main Gas Line	ACR Copper, Type L	2-1/8" to 3-1/8" OD	0.083" min wall	15% Silver Phosphorous Brazing	Nitrogen purge during brazing
Main Liquid Line	ACR Copper, Type L	3/4" to 1-5/8" OD	0.065" min wall	15% Silver Phosphorous Brazing	Nitrogen purge during brazing
Branch Connections	ACR Copper, Type L	1/2" to 1-1/8" OD	0.035" min wall	Mechanical flare joints	De-burring after cutting

4.6.7 Ductwork Specifications

Duct Type	Material	Gauge/Thickness	Insulation	Sealing Class	Hanger Spacing
Main Supply/Return	Galvanized Steel	22 ga (0.0336")	2" fiberglass, R-8	Class A (UL 181)	10' maximum
Branch Ducts	Galvanized Steel	24 ga (0.0276")	1" fiberglass, R-4.2	Class B (UL 181)	8' maximum
Flex Duct	Insulated Flex	Mylar reinforced	R-6 integral	Pressure independent	4' maximum

5. PLUMBING SYSTEMS SPECIFICATIONS

5.7 Water Distribution System

5.7.8 Domestic Water Piping

System	Pipe Material	Size Range	Pressure Rating	Joint Method	Hanger Type
Water Main (Riser)	Type L Copper (ASTM B88)	3" to 4"	300 PSI @ 100°F	Brazed (Sil-Fos 15)	3-bolt Clevis hangers
Branch Lines	Uponor PEX-A (ASTM F876)	3/4" to 1-1/2"	160 PSI @ 73°F	ProPEX expansion fittings	Plastic J-hooks
Fixture Supplies	Uponor PEX-A (ASTM F876)	1/2"	160 PSI @ 73°F	ProPEX expansion fittings	Plastic J-hooks

5.7.9 Plumbing Fixture Detailed Schedule

Fixture Type	Manufacturer/Model	Rough-in Dimensions	Supply/ Waste Sizes	Trim/Finish	Accessories
Wall-hung Water Closet	TOTO Nexus EW576SB#01	20-1/2" AFF, 4-1/2" rough-in	1/2" supply, 4" waste	Cotton White, ADA compliant	Sloan EFX-850 flushometer
Lavatory Faucet	Chicago Faucet 872-315BKSQ	8" center set	1/2" IPS supplies	Matte Black, lever handles	Pop-up drain assembly
Lab Faucet	Speakman EDF-80 Gooseneck	8" center set	1/2" IPS supplies	Chrome plated brass	Wrist blades, vacuum breaker

5.7.10 Sanitary Drainage System

Component	Material	Size Range	Slope Requirements	Joint Method	Cleanout Type
Soil/Waste Stacks	No-Hub Cast Iron	4" to 6"	1/4" per foot minimum	No-hub couplings	4" screw-type cleanout

Component	Material	Size Range	Slope Requirements	Joint Method	Cleanout Type
Branch Drains	Schedule 40 PVC	2" to 3"	1/4" per foot minimum	Solvent cement	4" screw-type cleanout
Fixture Traps	PVC P-trap	1-1/4" to 2"	N/A	Slip-joint compression	Integral cleanout

6. ELECTRICAL SYSTEMS SPECIFICATIONS

6.8 Power Distribution

6.8.11 Panelboard Schedule

Panel Designation	Type/Manufacturer	Voltage/Phases	Main Breaker	Branch Circuits	Enclosure Type
MBP-1 (Main)	Square D I-Line NQOD	277/480V, 3Ph, 4W	1200A, LSIG	(42) 20-100A poles	NEMA 1, Surface Mount
PP-2 (Power)	Square D I-Line NQOB	277/480V, 3Ph, 4W	400A, LSIG	(42) 20-60A poles	NEMA 1, Flush Mount
LP-3 (Lighting)	Square D NF Panelboard	277/480V, 3Ph, 4W	225A, Main Lug Only	(42) 20A, 1-pole	NEMA 1, Surface Mount

6.8.12 Conduit & Raceway Specifications

Location/Use	Conduit Type	Size Range	Support Spacing	Bending Radius	Box Types
Above Ceiling	EMT (Electrical Metallic Tubing)	1/2" to 4"	10' maximum	6x conduit diameter	4" square, 1-1/2" deep
Concrete Slab	PVC Schedule 40	3/4" to 2"	Continuous in concrete	Factory elbows only	Galvanized concrete boxes
Exposed Areas	Galvanized RMC	1/2" to 2"	8' maximum	6x conduit diameter	Cast device boxes

6.8.13 Lighting Fixture Schedule

Fixture Type	Manufacturer/Model	Light Source	Wattage	Mounting	Controls Integration
2x4 LED Troffer	Lithonia RT5 2X4 40K 80CRI	Integrated LED	40W	Lay-in T-bar	DALI dimming, 0-10V

Fixture Type	Manufacturer/Model	Light Source	Wattage	Mounting	Controls Integration
LED Downlight	Cooper ECDR4 40K 80CRI	Integrated LED	15W	Recessed 4" aperture	DALI dimming, 0-10V
Emergency Lighting	Dual-Lite EBRD Series	LED, battery backup	20W normal/8W emergency	Surface/wall mount	Self-testing per NFPA 101

7. TESTING & COMMISSIONING PROTOCOLS

7.9 Mechanical System Testing

7.9.14 HVAC Commissioning Sequence

VRF System Startup Procedure

Pressure Testing	625 PSIG nitrogen, 24-hour hold, < 1% drop acceptable
Vacuum Dehydration	Triple evacuation to 250 microns maximum
Refrigerant Charge	Weighed-in per manufacturer's calculation
Electrical Verification	Phase rotation, voltage balance within 2%
Control Calibration	Temperature sensors ±0.5°F, pressure ±2%

7.9.15 Duct System Testing

Leakage Testing	Class A: 2% maximum leakage at 2" w.g.
Air Balance	NEBB standards: ±10% of design airflow
Sound Testing	NC 35 in offices, NC 40 in mechanical rooms
VAV Box Calibration	Flow measurement ±5% of setpoint

7.10 Plumbing System Testing

Pressure & Flow Testing

Water Supply Test	150 PSI for 2 hours, < 5 PSI drop acceptable
Drainage Test	10' head for 15 minutes, no visible leakage
Fixture Flow Rates	Verify 1.2 GPM faucets, 1.28 GPF toilets
Backflow Prevention	Annual test certification, reduced pressure zone

7.11 Electrical System Testing

Electrical Verification

Insulation Resistance	100 MΩ minimum, 1000V megger test
Ground Continuity	< 1.0 ohm resistance to ground
Circuit Verification	Point-to-point verification of all circuits
Lighting Control	DALI address verification, scene programming