Capital Development Board

Building a Better Illinois

BRIDGING DOCUMENTS

CDB PROJECT#: 630-442-057
CDB BUILDING#: IDOT442-0003
CONSTRUCT MATERIALS LAB
FOR THE ILLINOIS DEPARTMENT OF TRANSPORTATION
SPRINGFIELD (SANGAMON COUNTY), ILLINOIS
CONTRACT: NEW CONSTRUCTION

State of Illinois

CAPITAL DEVELOPMENT BOARD

USING AGENCY:
ILLINOIS DEPARTMENT OF TRANSPORTATION

Illinois Department of Transportation

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tkb ARCHITECTURE & DESIGN

DATE: May 9, 2023 – FINAL REPORT

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Tilton, Kelly + Bell would like to recognize the efforts of all who have contributed to developing the bridging documents. Many thanks for your valuable input, patience, and insight.

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**Provided as separate electronic files for informational purposes only and relied upon at the proposer's or design/builder's own risk. The inclusion of reference documents does not warrant or represent that the information contained herein is complete or accurate or that such information is in conformity with the project requirements. Design/builder shall have no right to additional compensation or time extension based on any incompleteness or inaccuracy in the reference documents. See RFP.

1. Geotechnical Investigation**
2. Existing Site Survey**
3. Existing Hanley Campus Duct Bank Plans**
4. Existing Lab Equipment Surveys**
5. Lab Equipment Cut Sheets**

PART V – Preliminary Documents***

***Provided as separate electronic files for CDB/IDOT information and included with or excluded from the bridging documents at CDB's discretion. The inclusion of preliminary documents does not warrant or represent that the information contained herein is complete or accurate or that such information is in conformity with the project requirements. Design/builder shall have no right to additional compensation or time extension based on any incompleteness or inaccuracy in the preliminary documents. See RFP.

1. Conceptual Drawings***
2. Preliminary LEED Scorecard & Preliminary Energy Model***

PLANNING & DESIGN CRITERIA

PART I

126 East Ash Street – Existing D6 & CBM Lab Facilities

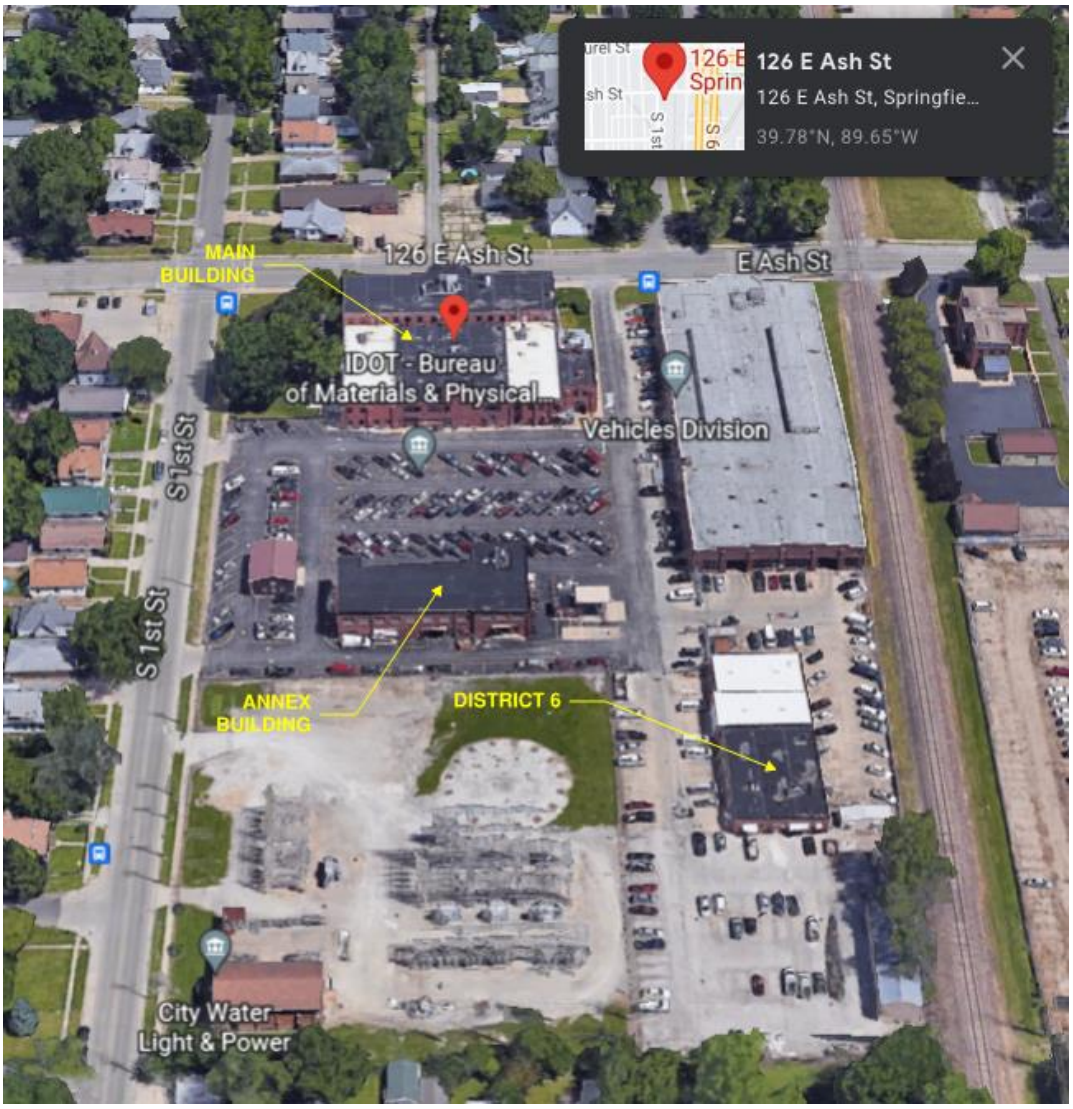
I–1 Executive Summary & Project Overview

Introduction

The Capitol Development Board (CDB) and Illinois Department of Transportation (IDOT) seek to construct a new materials lab building on the Harry Hanley campus located at 2300 South Dirksen Parkway in Springfield, Illinois. The new building will replace and consolidate existing lab and administration facilities occupied by IDOT District 6, Central Bureau of Materials, Bureau of Programming and Bureau of Research departments located at 126 East Ash Street. Unification of IDOT departments at a central location to optimize operating processes, facilities and efficiencies is the core mission of the project.

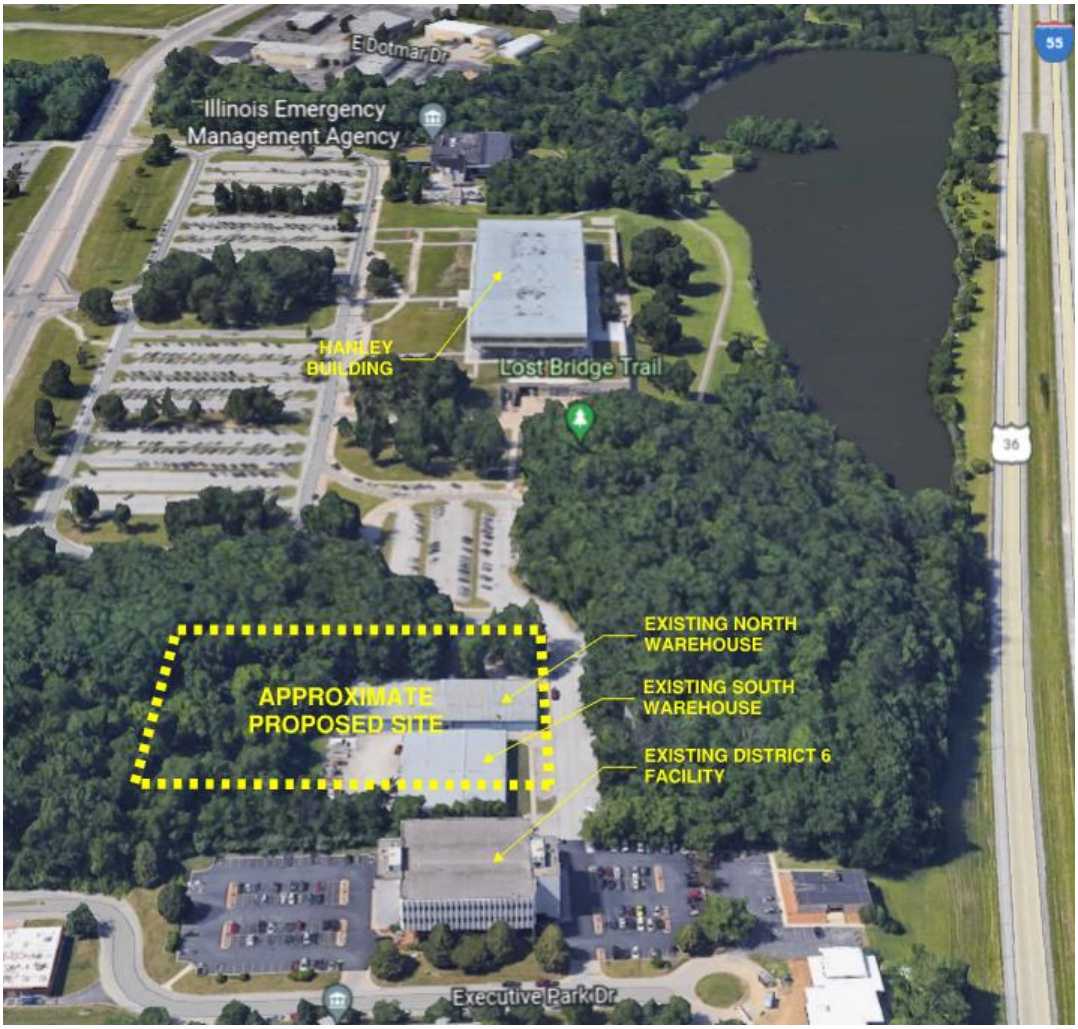
Project Background

In April 2022, the Capital Development Board engaged Tilton, Kelly + Bell to provide bridging documents for the construction and relocation of a consolidated laboratory and office building for the Illinois Department of Transportation on the campus, known as the Hanley Complex where the agency's headquarters facility presently exists. This project is one of several concurrent projects now underway to consolidate agency activities and provide greater utilization of the IDOT campus.
A preliminary study commissioned by the CDB determined the feasibility of constructing a new laboratory and office building to accommodate Materials Testing on the headquarters campus. Prepared by the architectural firm Bailey Edward Design, Inc., the study developed a preliminary space requirements program and conceptual layout. The focus of our current study is to ratify and further develop the space requirements program and conceptual layouts into a package of project requirements to be submitted as a bid document to prospective design-build teams.



Existing Conditions

The materials laboratory and office facilities are presently housed in multiple masonry buildings on a site at 126 East Ash Street in Springfield. The facility includes the Bureau of Materials, Bureau of Research, Traffic Instrumentation Lab, District 6 labs and offices. Ad hoc growth within the existing buildings has accommodated program expansion but created space utilization and organization compromising workflow, lab safety and further expansion. Additional constraints include inadequate storage facilities. The space limitations of the existing building and confined limits of the present site preclude the development of a well-organized laboratory facility at the site.



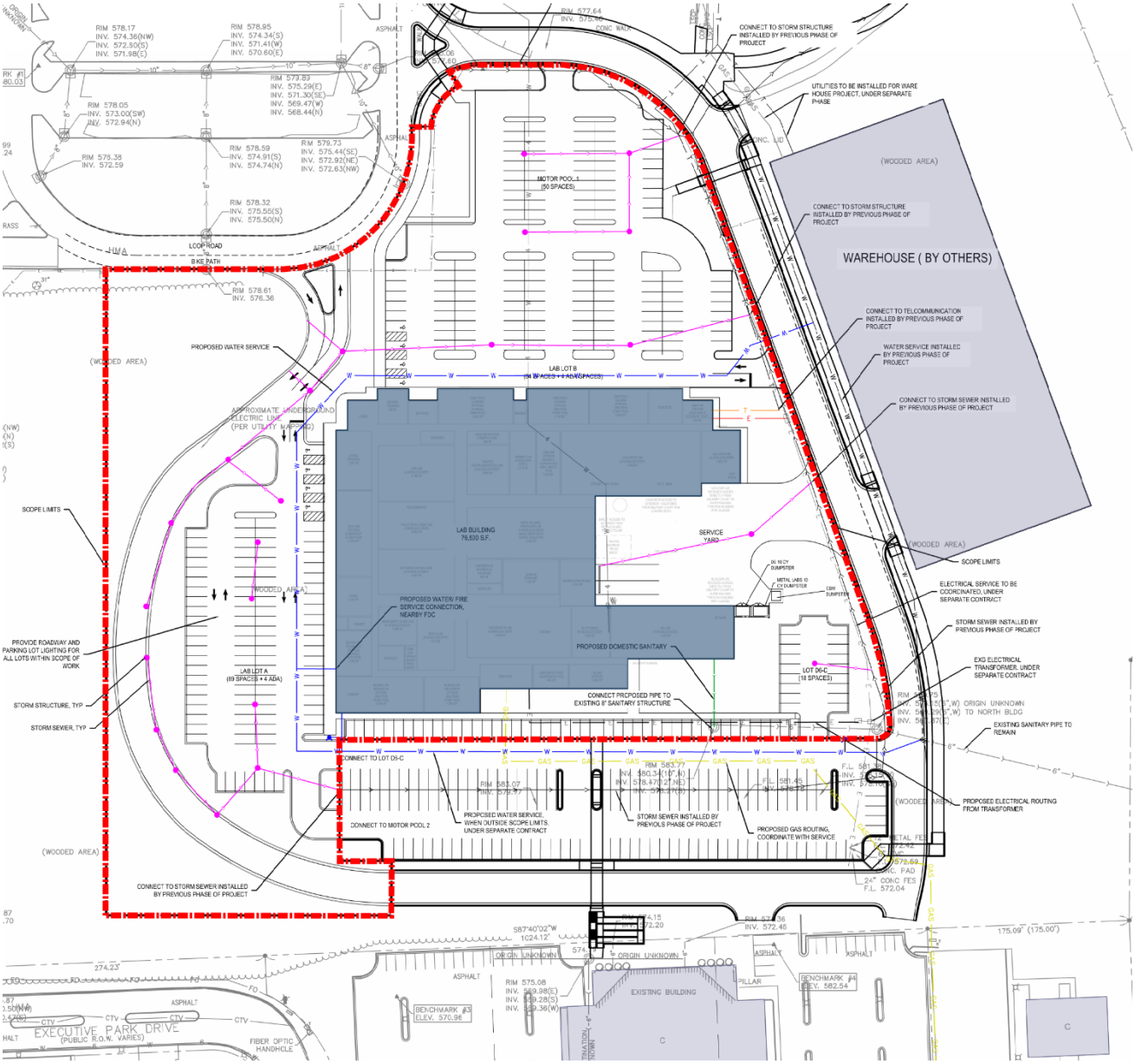
Proposed Site

The Hanley Complex: The existing Hanley site is dominated by IDOT's striking, mid-century modern headquarters. The south end of the complex, proposed for the new research lab, has steep elevation changes with a ravine in the northwest corner and a severe drop at the south edge of the site. A single road roughly bisects the site, provides access to two existing warehouse buildings in the middle of the site, and exits the property to the south. This road will be relocated to the east as part of a separate contract and connected to a new road that will wrap the project site to the west, creating a loop to access the new laboratory building and parking.

The existing southern storage warehouse has been demolished, a new warehouse building located northeast of the lab building, and new District 6 south parking lot will be constructed under separate contracts. Heavily wooded areas of the site have

been cleared to make room for construction of the new warehouse, District 6 parking, and east leg of the new access road. Additional tree clearing may be required to facilitate construction of the new lab building, sitework, and west leg of the new access road. Using Agency preference is for a new single-story lab building.

The northern existing storage warehouse will be demolished, the western spur of the new ring road and new parking for the lab building, Hanley Motor Pool, and District 6 constructed as part of the laboratory project scope.



(North – Up) Conceptual Site Diagram – Not to Scale

Utilities

Considerable coordination has taken place during the bridging document phase related to existing and new utilities to facilitate provisions for the new warehouse and lab and to choreograph utility installations through various contracts. Following is a general overview of lab building utility coordination efforts to date:

1. Existing Utilities – With the exception of the existing sanitary sewer line south of the proposed new lab building, and portions of the existing duct bank extending to the Hanley building, all existing utilities will either be removed to avoid conflict with new construction or abandoned in-place where acceptable. The initial assumptions are the lab can connect to the existing sanitary sewer service and portions of the existing duct bank may be reused where possible. This work is part of the lab building scope.
2. Water/Fire – Under separate phase & contract, a new water/fire line will be extended to the west end of the new District 6 north parking lot for future connection to the lab. A second water/fire line will be stubbed under the new east access road for connection of water/fire loop around the lab building. The Lab building contractor will be responsible for connections to stub-outs, building water/fire service, and loop around lab the building.
3. Electrical – Under separate phase & contract, electrical will be extended from the east side of Dirksen Parkway up around the north edge of the proposed lab site and down along the west side of the new east access road to new transformers located at the southeast corner of the proposed lab building site. Power connection by lab contractor for lab building power service will connect to the new transformer at the southeast side of the proposed site.
4. IT/COMM – Under separate contract, IT/COMM will be extended from the south end of the Hanley building south under the new east access road and capped for future connection by the lab contractor. Extension from this location is part of the lab building scope.
5. Storm Sewer – New stormwater conveyance from the lab site will tie into stormwater infrastructure provided under separate phase and contract along the new east access road.
6. Natural Gas – Gas service for the new lab will extend from a new meter to be provided by the utility company located near the cul-de-sac on the north side of Executive Park Drive. Extension of gas service by the lab building contractor from the new meter location is part of the lab building scope and may require boring under existing site conditions to accomplish extension to the lab site.

Conceptual Drawings

Conceptual Drawings, as separate Preliminary Documents, illustrate indicative design information derived from the program documents and are included with or excluded from the bridging document package at the CDB's discretion. If included, proposers are not bound to Preliminary Documents which are not considered contract documents. Preliminary Documents are provided for informational purposes only and relied upon at the proposer's own risk. Conceptual Drawings do not warrant or represent that the information contained therein is complete or accurate or that such information is in conformity with the requirements of the project. Design-Builder shall have no right to additional compensation or time extension based on any incompleteness or inaccuracy in the Preliminary Documents.

Betterments & Deviations

The Request for Proposals (RFP), developed by the Illinois Capitol Development Board describes procedures for design/builders to propose betterments and deviations for the project. Proposers are free to develop and include betterments and deviations according to the process described in the RFP.

Design-Build Deliverable Milestones

Submittals required at 30%, 70%, and 100% document phases. CDB and design-builder will negotiate which scopes will be more developed than others for each submittal. (For example: civil and structural need to be at 100% with the overall 30% package, so the civil/structural scope can be released first. But civil/structural does not need to be a separate submittal.)

Submittal documents will also be required at 30% and 70% for coordination with the Illinois State Historic Preservation Officer (SHPO). See II-3 Landscape Architecture basis of design.

Construction Time Lapse Documentation

Contractor to provide time-lapse video documentation of project construction progress via live construction cameras throughout the entire duration of construction including the following:

1. 24-hour video documentation.
2. Multiple wide-angle, high-definition camera locations to capture entire site and building scope.
3. Aerial drone footage at regular intervals during construction.
4. Accessible database/interface for monitoring progress.
5. Video and photo record file formats.

I–2 Program Summary

Process

Program verification & development was conducted by representatives of Tilton, Kelly + Bell and HERA Laboratory Planners. This process included multiple walk-throughs of existing facilities, administration of questionnaires and individual meetings with each lab group and Bureau. In these meetings, laboratory process, workflow and preferred spatial adjacencies were explored in detail, resulting in the adjacency and conceptual diagrams that accompany this report. The facility processes large volumes of bulky samples including concrete, aggregate, cement, asphalt, metals and miscellaneous products. Special emphasis was paid to the receipt of materials, and the storage and subsequent delivery of these materials to the individual labs.

Detailed inventories of existing lab equipment were conducted by HERA as part of phase 2, with the results attached as appendices to the bridging documents.

Similar discussions and on-site observations were conducted for administrative, training, and research library components of the facility. All are summarized in the space requirements program.

The new lab facility is expected to position IDOT to continue its mission well into the future with flexibility to adjust to seasonal operational demands, new procedural and equipment requirements, and provide a more efficient and effective environment in which to conduct their work.

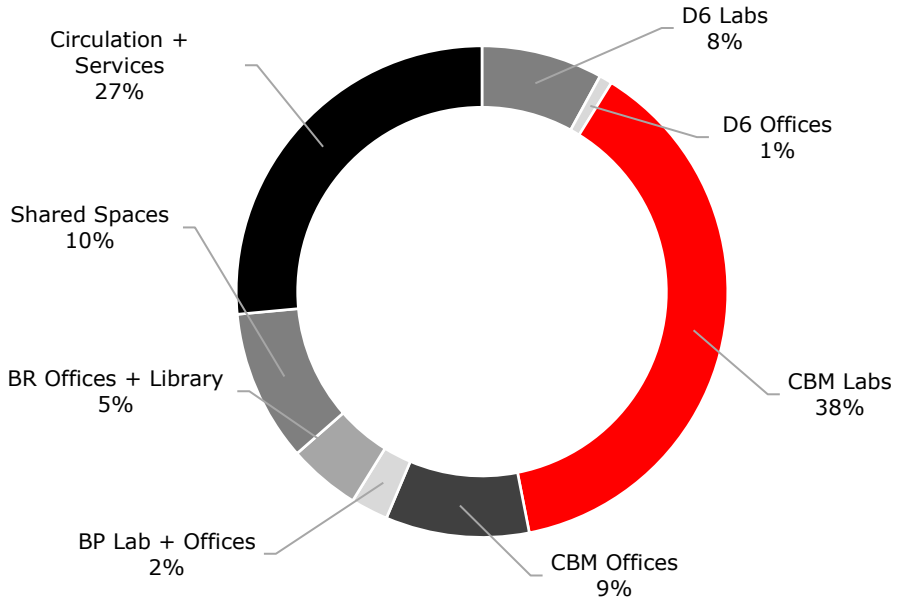
To accomplish this, the key purposes of the Program include:

- Establish the governing ideology and salient spatial requirements for the facility.
- Communicate the qualitative and quantitative aspects of the project.
- Identify the parameters and requirements to be achieved during the design process.
- Identify sustainability goals.
- Support the content of the bridging documents.

Program Summary

Programmatic needs are tracked by each department's required space types and activities to identify and organize necessary spatial and functional relationships. Below is a program summary by space types grouped under District 6 (D6), Central Bureau of Materials (CBM), Bureau of Programming (BP), Bureau of Research (BR), Shared Spaces (including training rooms, receiving/loading/shipping, storage, filing, & workrooms), and Building Circulation + Services.

Detailed Program Area Tables for each group and detailed Room Data Sheets are attached as appendices to the bridging documents.



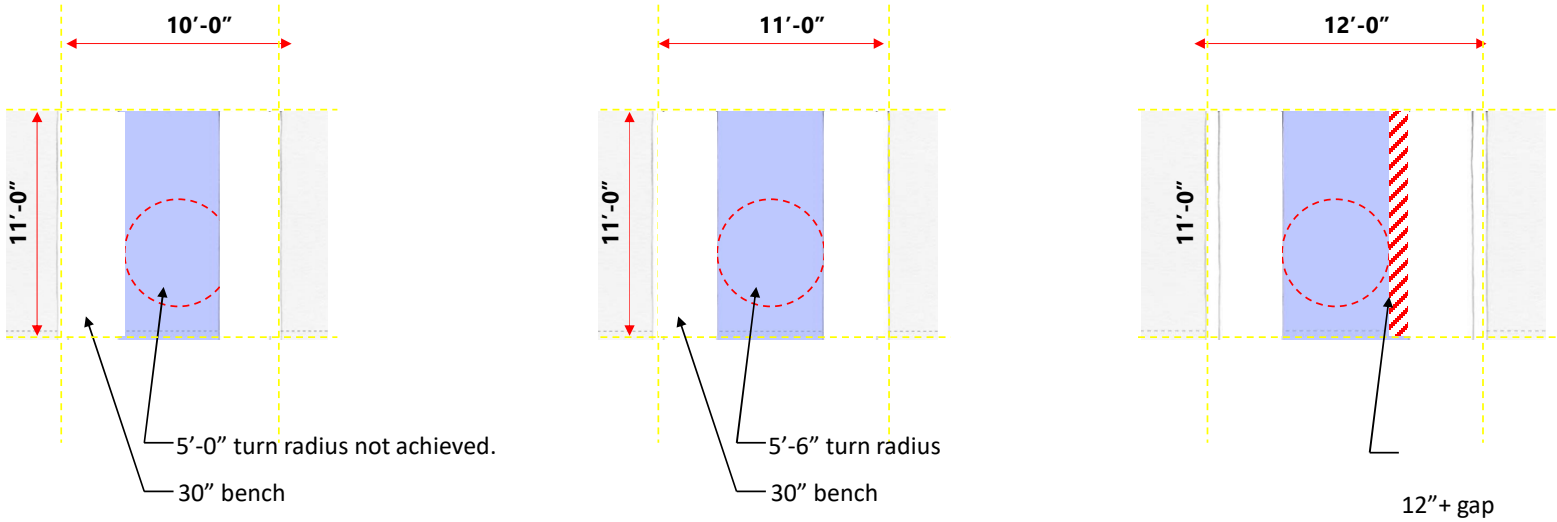
Program Summary	
Space Types	**Bridging Docs. SF**
D6 Lab	6,111
D6 Offices	651
CBM Labs	29,162
CBM Offices	7,230
BP Traffic Instrumentation Lab & Offices	1,885
BR Offices & Library	3,632
Shared Spaces (Reference Program Area Table)	7,633
Circulation & Services (Reference Program Area Table)	20,269
Total	**76,573**

I–3 Adjacency Diagrams

A. Example Lab Modularity Diagrams
B. Adjacency Diagrams

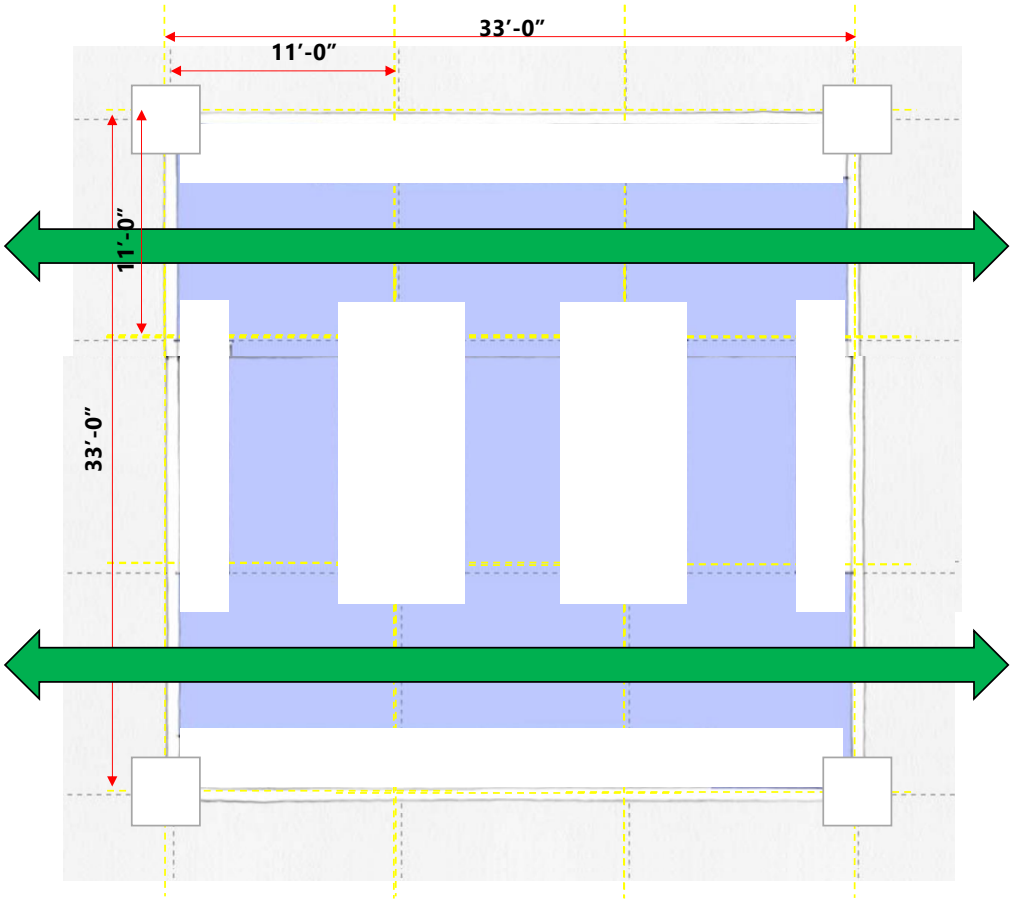
Why an 11’-0” Grid?

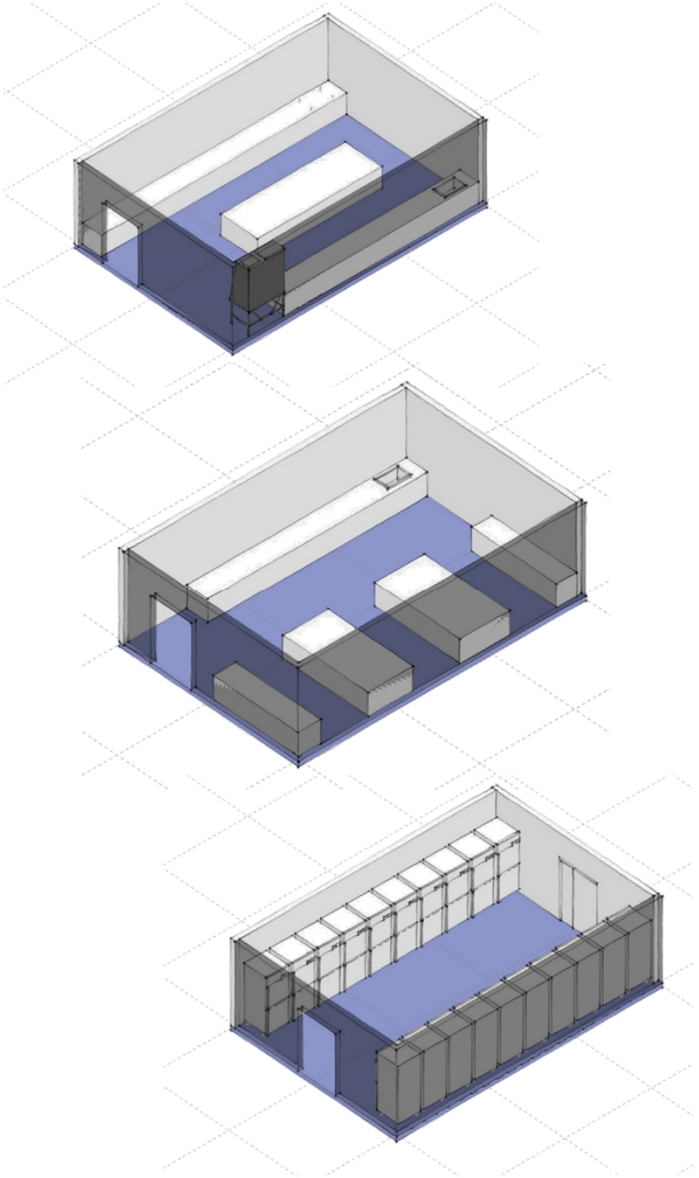
- Ideal module sizes can range depending on function, but we recommend an 11’-0” module because it allows for 30” wide wall benches, 5’-0” island benches, and sufficient aisle space for staff working back-to-back.
- In a small lab with walls on both ends, the aisle space is 5’-6”, while in an open plan it is 6’-0”
- Larger modules would just add wasted floor space
- Smaller Modules would impede wheelchairs, cart traffic, and back-to-back work
- Modules can be used to create labs of multiple size ranging from a single module to 100’s of modules
- Working within modules mitigates any wasted spaces and odd shaped rooms.
- Module size works in conjunction with the column grid to avoid the intrusion of columns in the labs.



HERA laboratory planners

Lab Grid (11′ x 11′)





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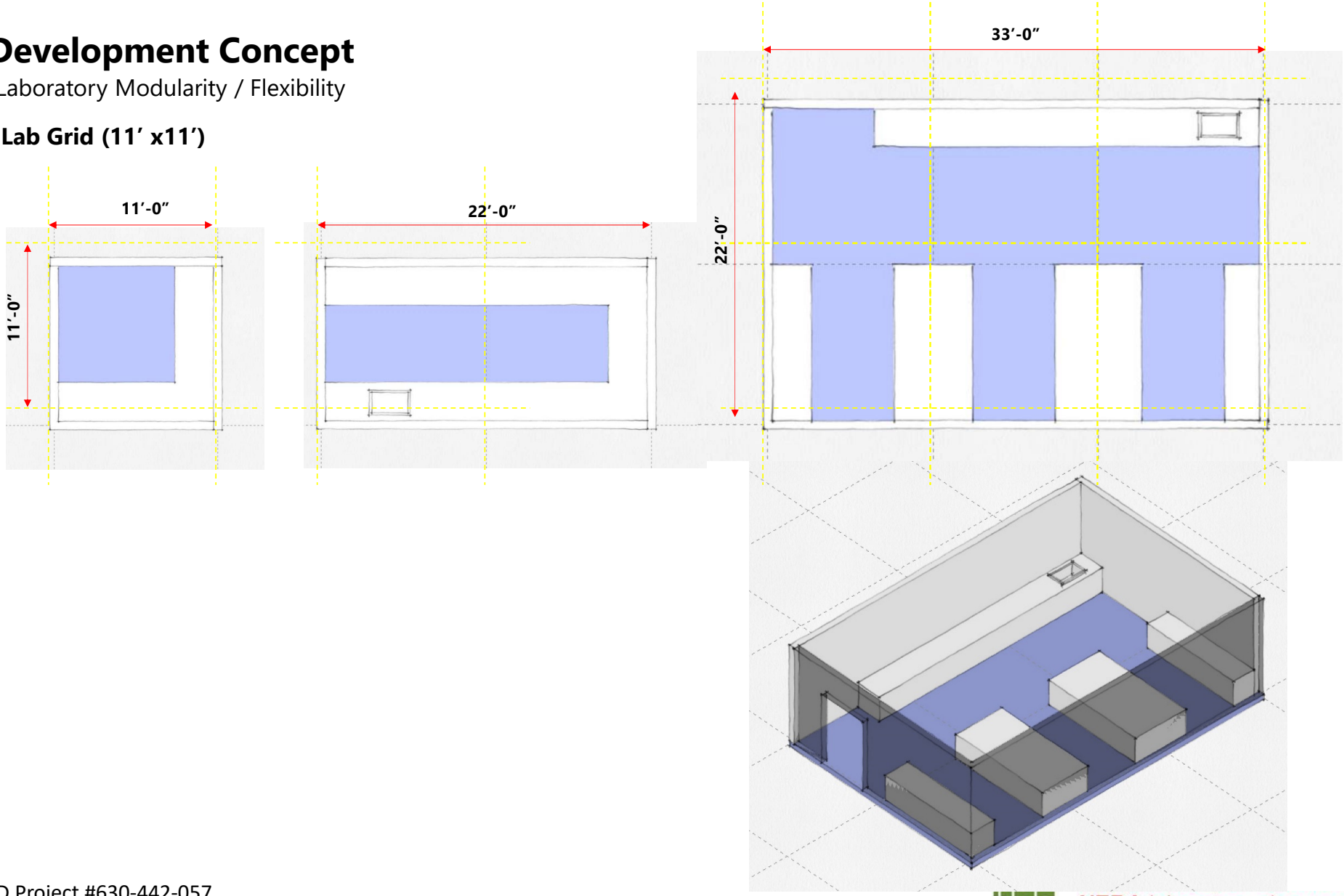
HERA laboratory planners

Development Concept

Laboratory Modularity / Flexibility

Lab Grid (11’ x11’)



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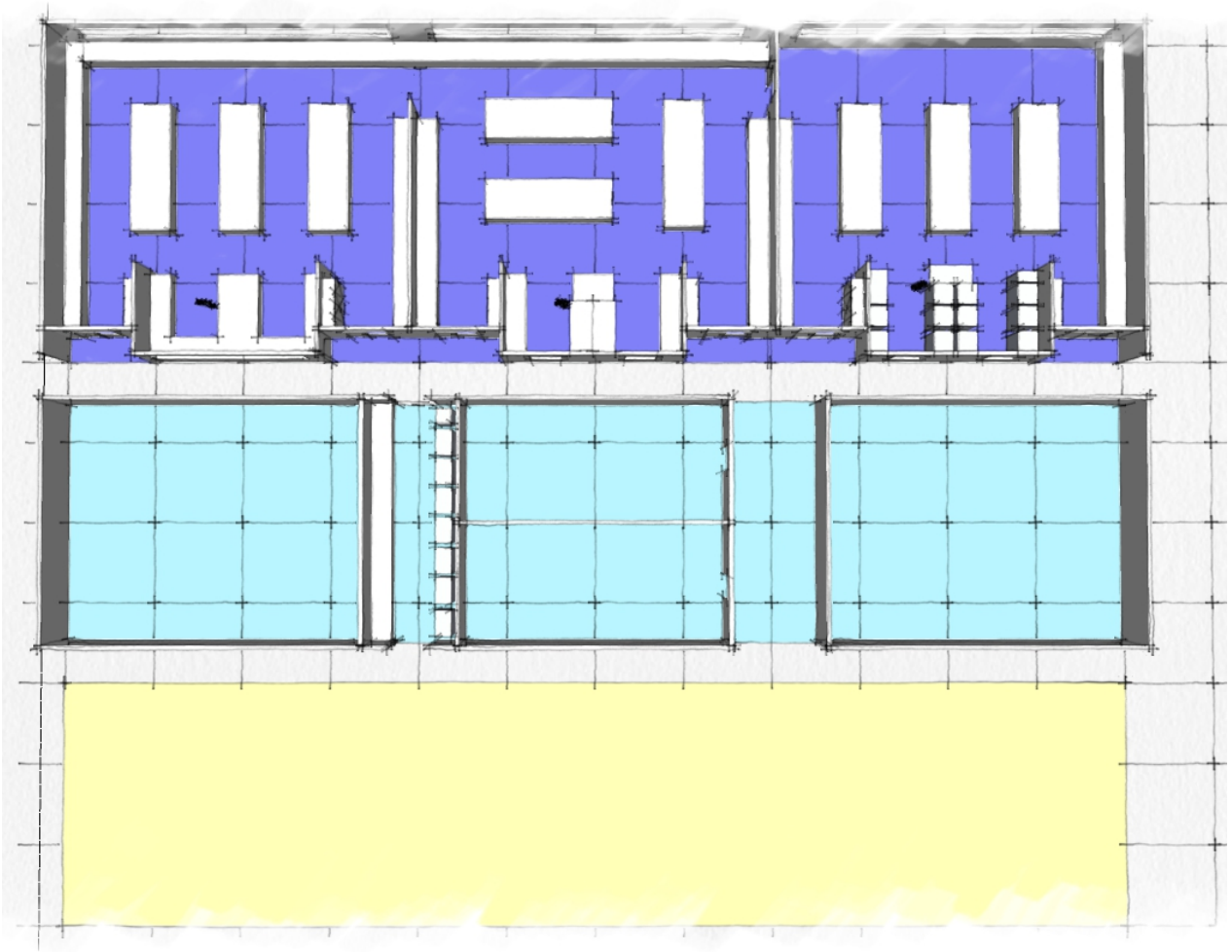
Development Concept

LAB

SUPPORT

OFFICE



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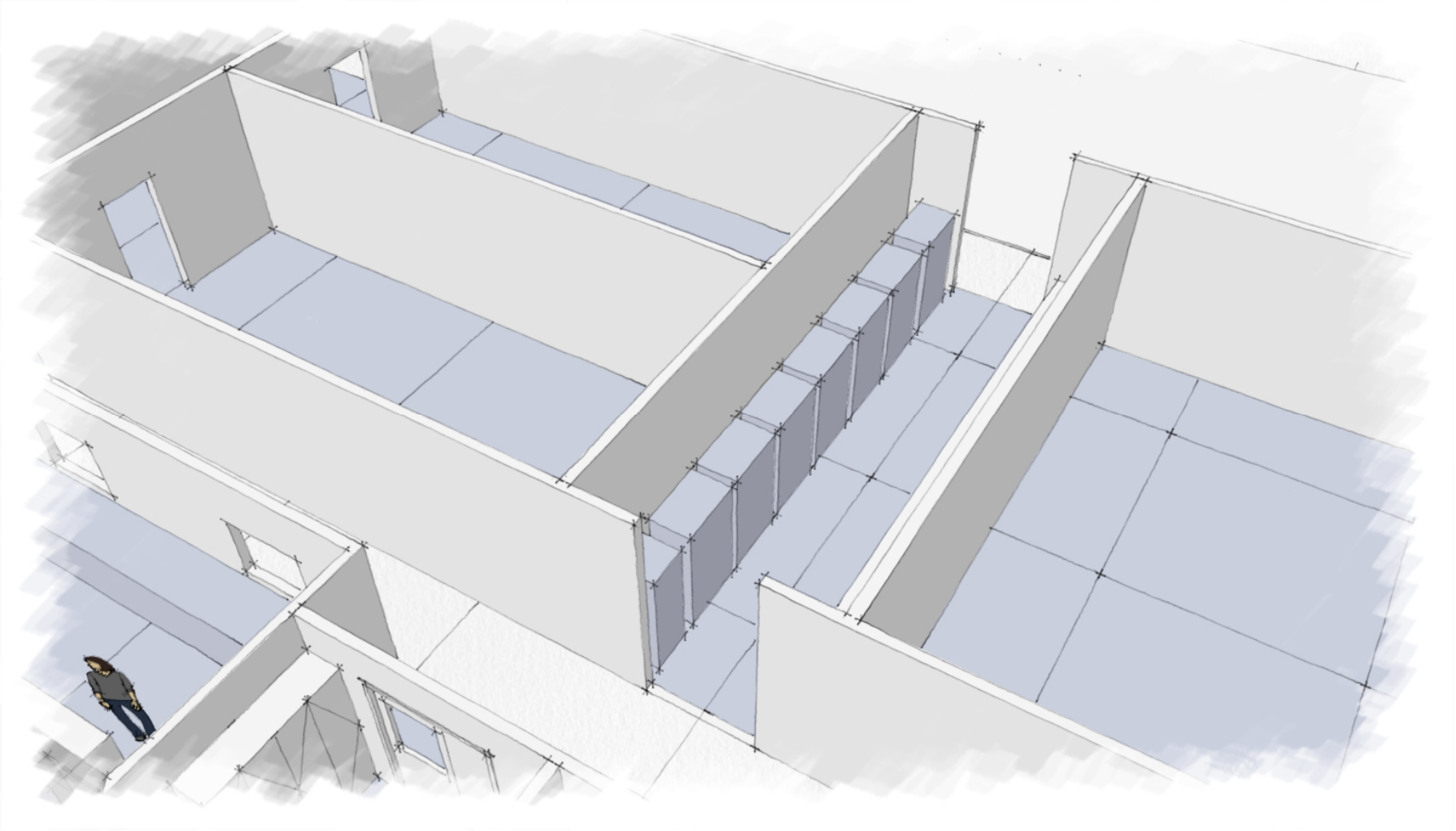
Equipment Corridor



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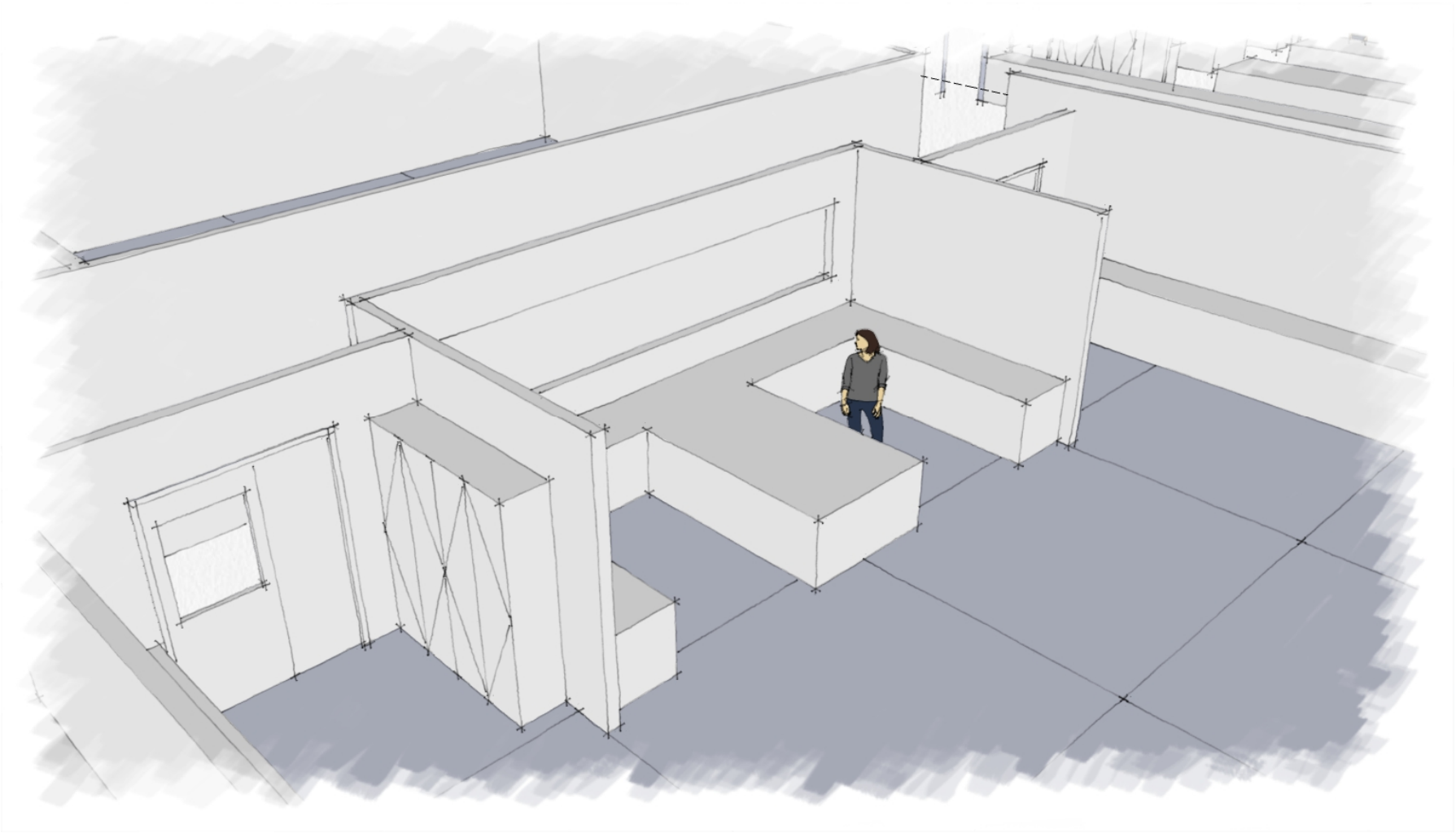
Tech Station



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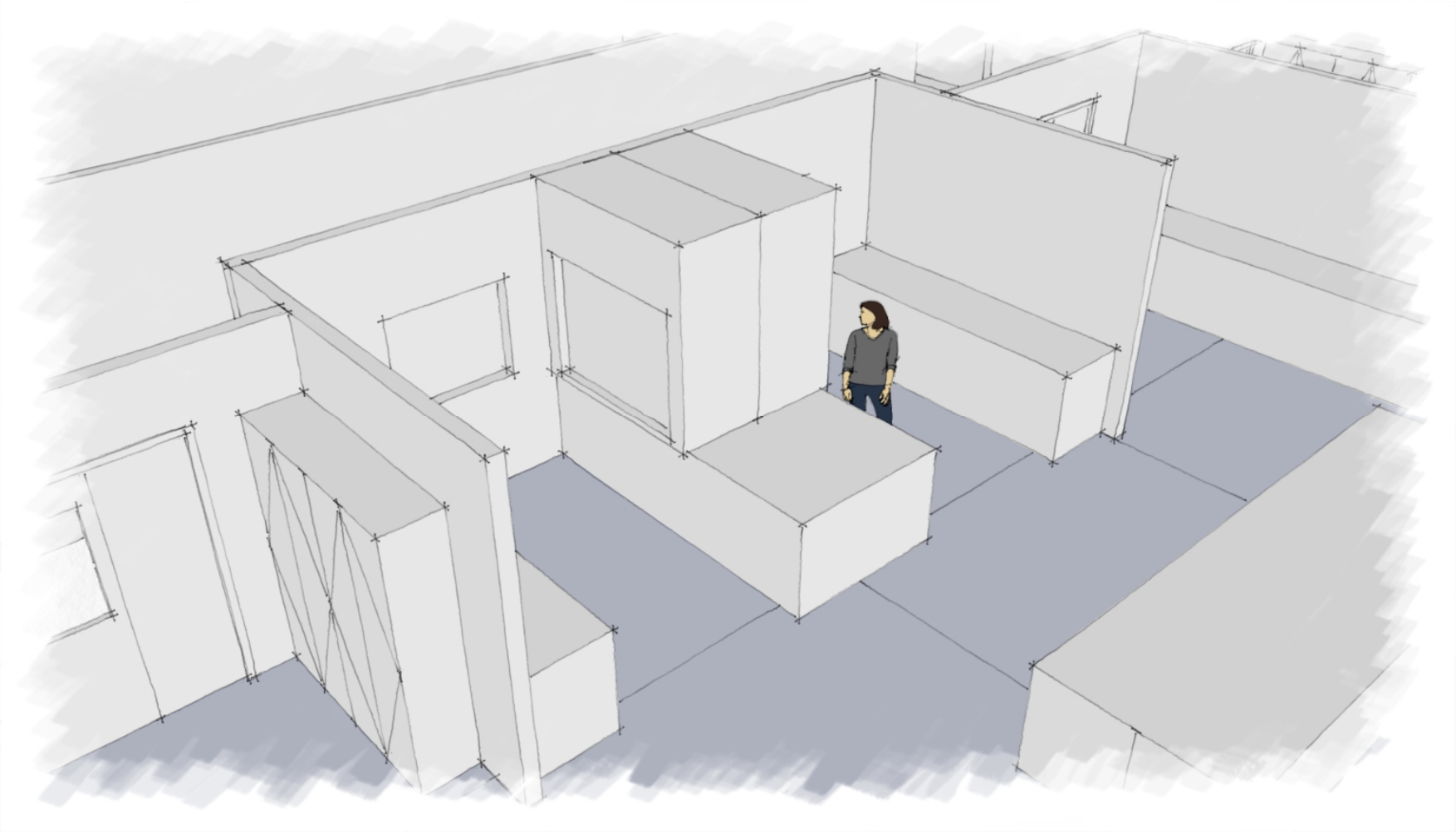
Fume Hood/ BSC Alcove



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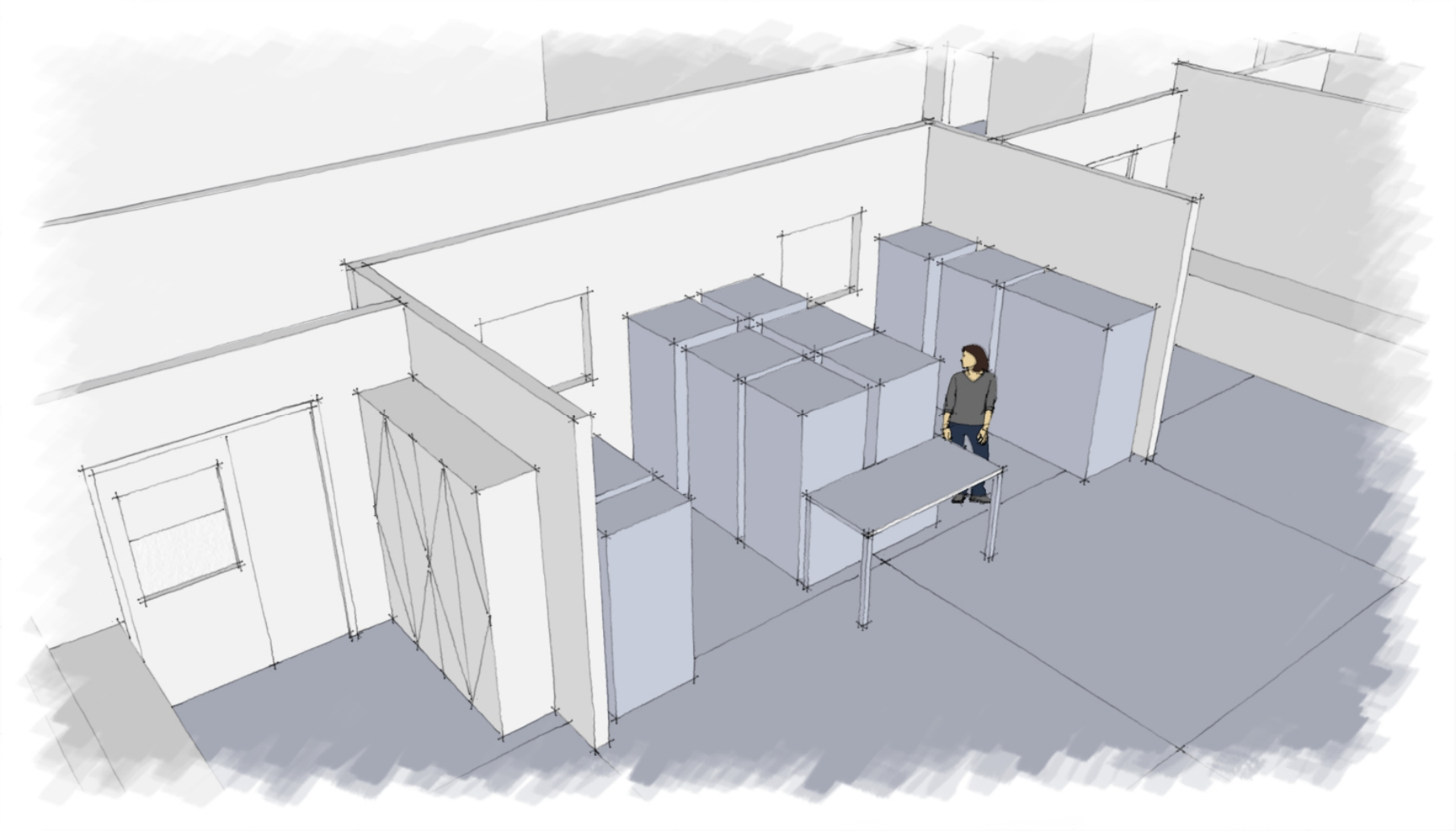
HERA laboratory planners

Equipment Alcove



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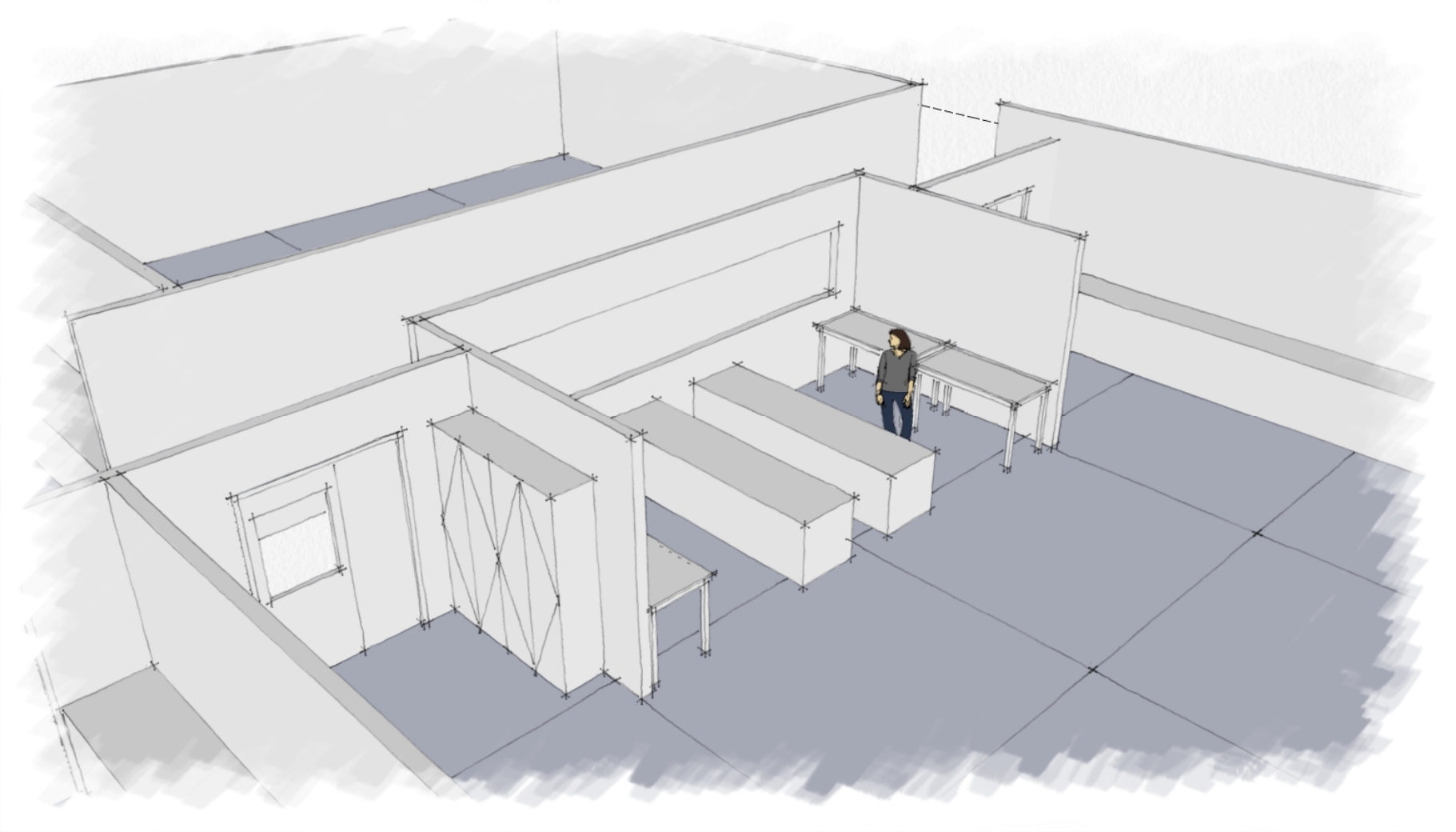
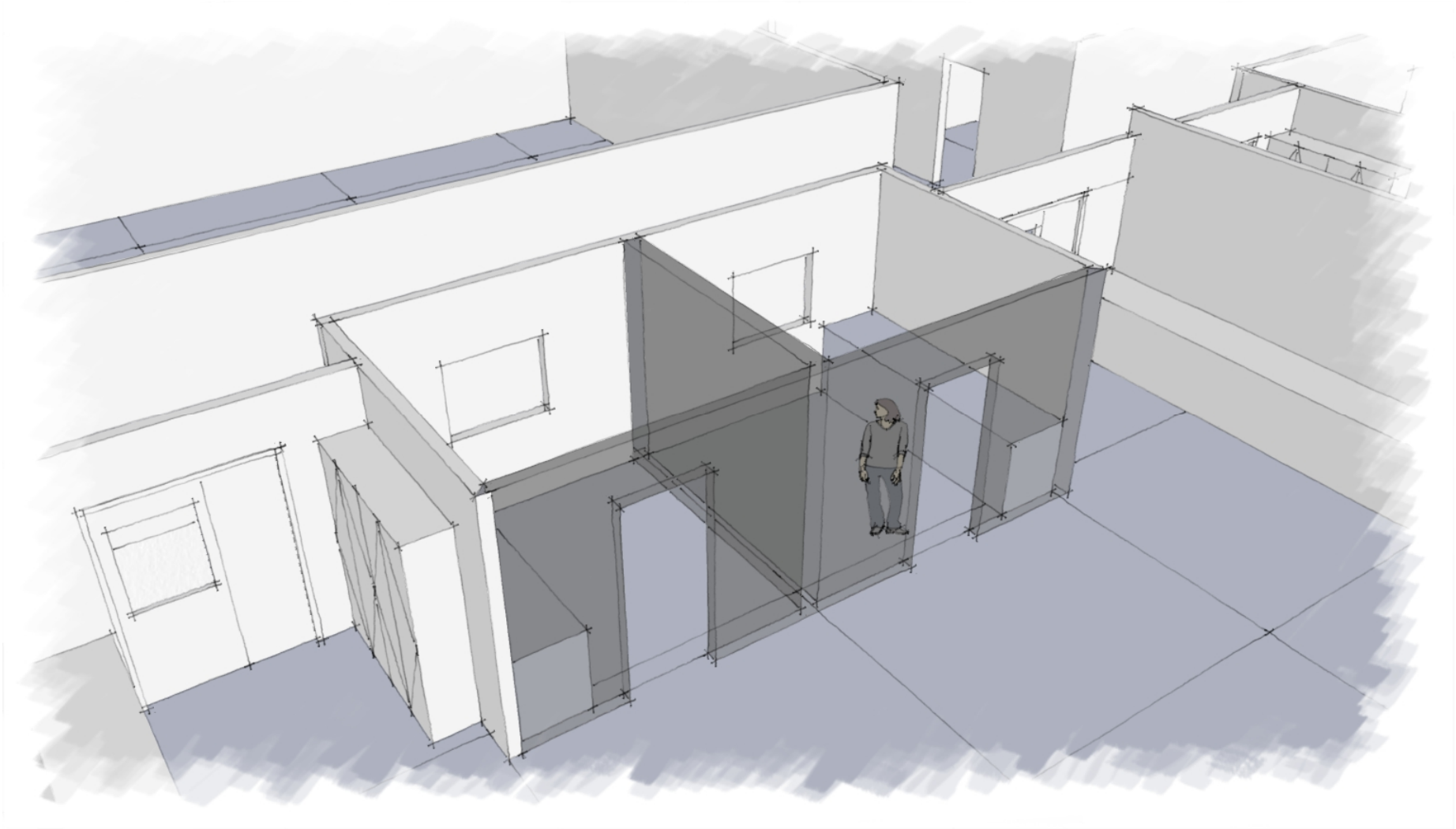
HERA laboratory planners

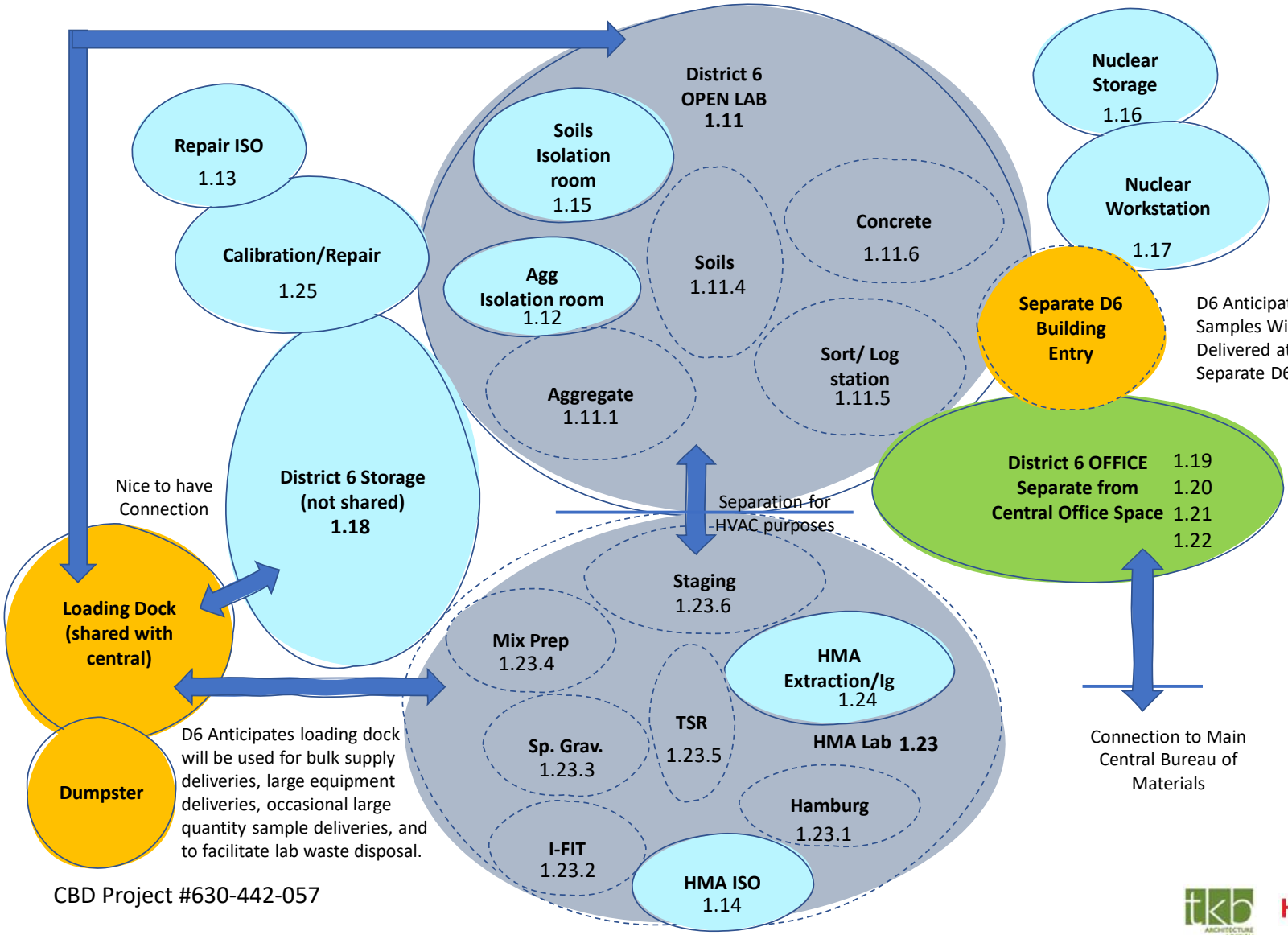
Instrument Alcove



Dedicated Zones



FLOW DIAGRAMS – District 6 – 1.0



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LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB
- BULLET POINT indicate Activities within the space.
- One Way Connection
- Two ways Connection
- Sample Flow
- Equipment

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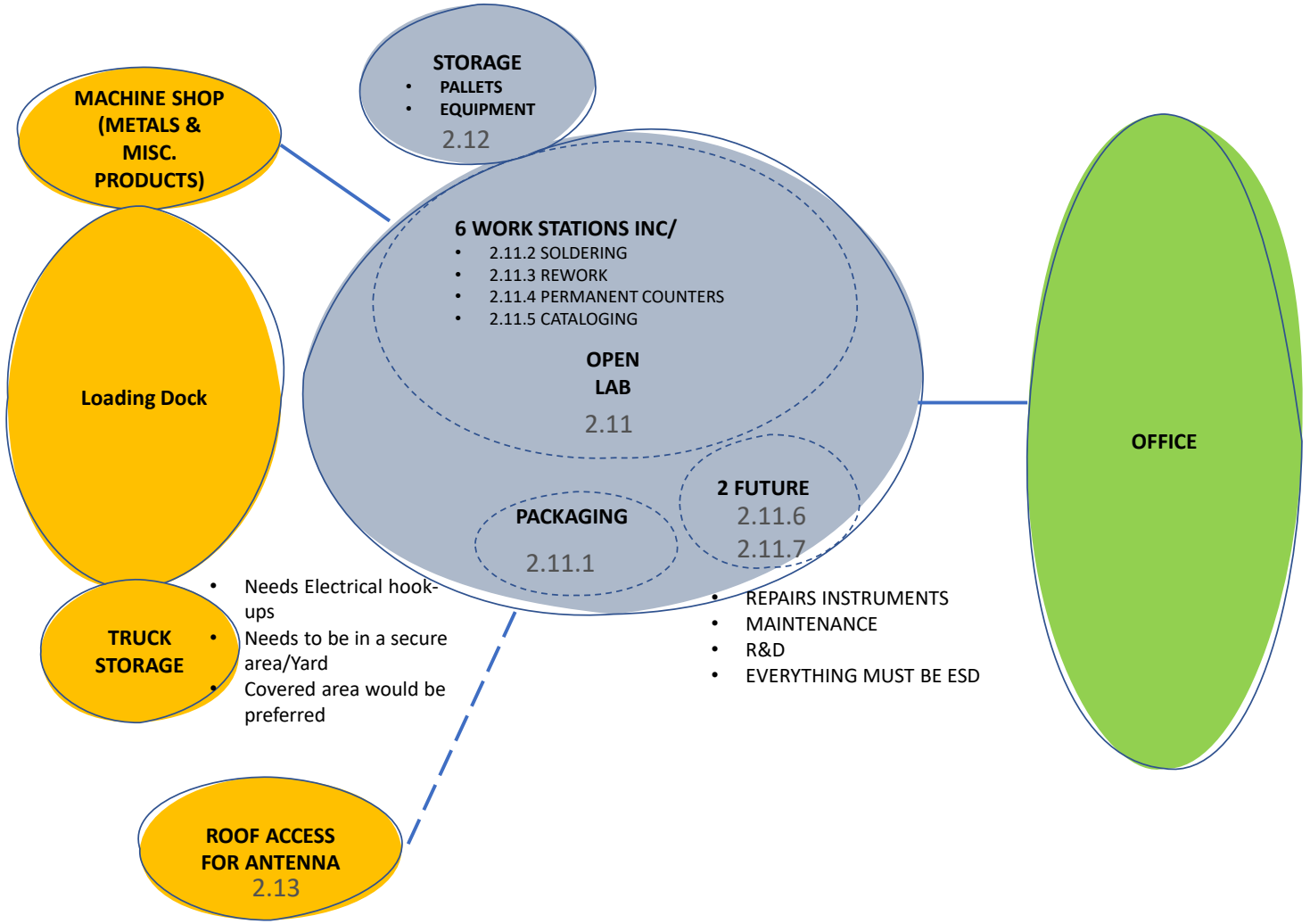
FLOW DIAGRAMS – Traffic Instrumentation– 2.1



LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB
- BULLET POINT indicate Activities within the space.
- One Way Connection
- Two ways Connection
- Sample Flow
- Equipment

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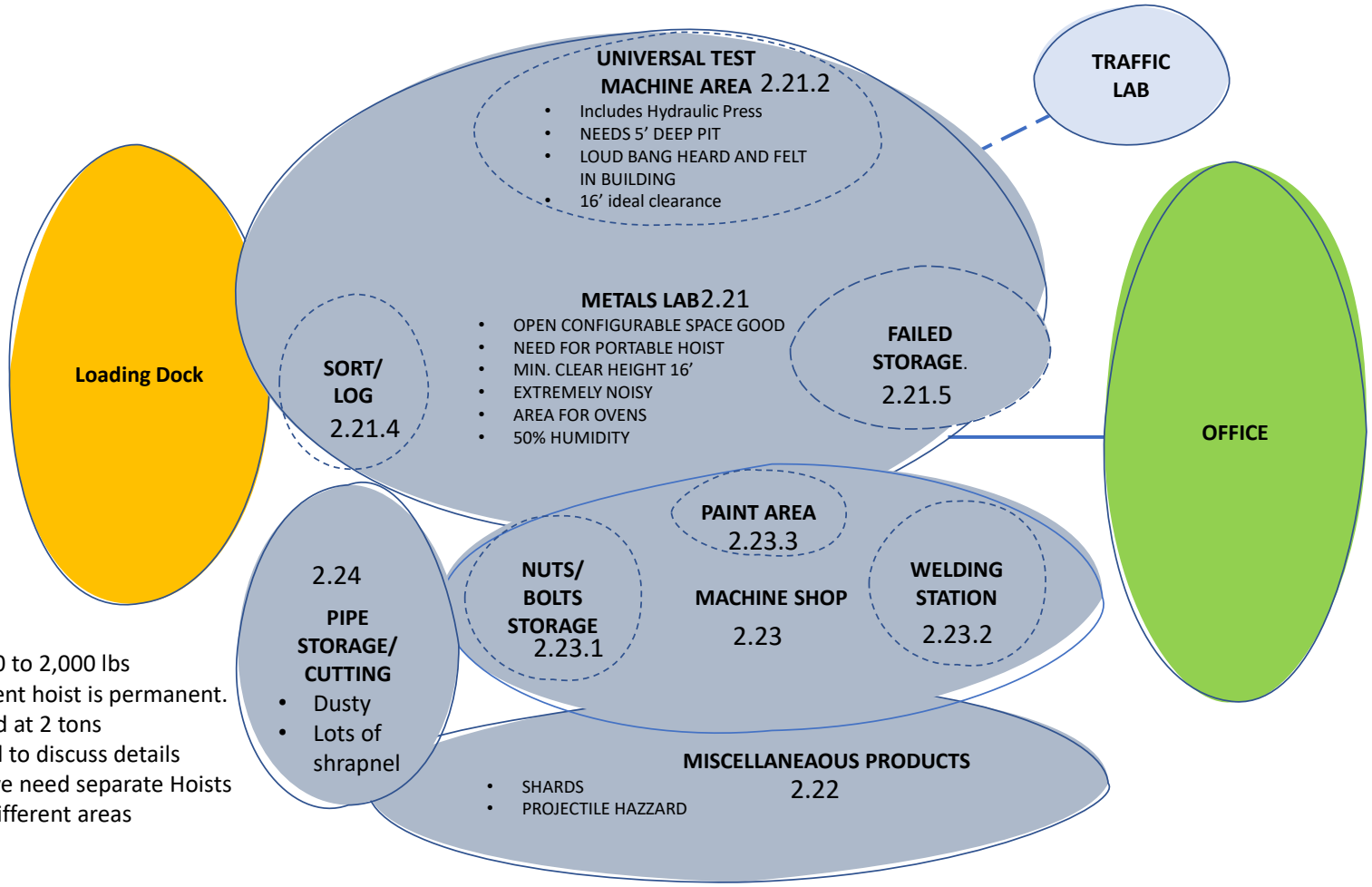
FLOW DIAGRAMS – Metals & Miscellaneous Products Lab - 2.2



HOIST:
- 1,500 to 2,000 lbs
- Current hoist is permanent. Rated at 2 tons
- Need to discuss details
- Do we need separate Hoists for different areas

LEGEND

ISOLATED ISO LAB

SUPPORT SPACE

OFFICE

MAIN LAB

AREA WITHIN LAB

- BULLET POINT indicate Activities within the space.

One Way Connection

Two ways Connection

Sample Flow

Equipment

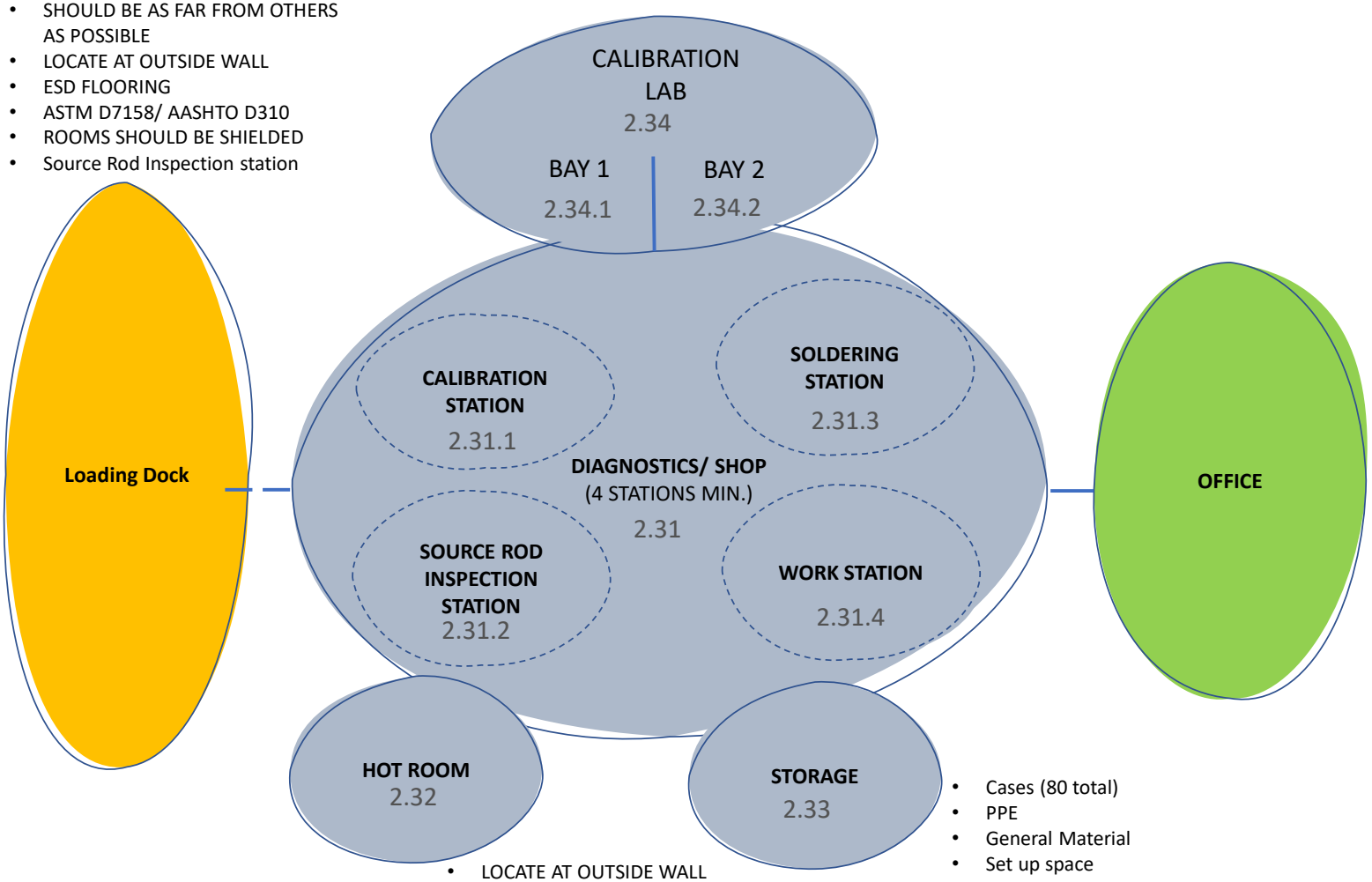
CBD Project #630-442-057

tkb ARCHITECTURE & DESIGN HERA laboratory planners

FLOW DIAGRAMS – Nuclear – 2.3

- SHOULD BE AS FAR FROM OTHERS AS POSSIBLE
- LOCATE AT OUTSIDE WALL
- ESD FLOORING
- ASTM D7158/ AASHTO D310
- ROOMS SHOULD BE SHIELDED
- Source Rod Inspection station

- Synergies with Soils



- Cases (80 total)
- PPE
- General Material
- Set up space

- LOCATE AT OUTSIDE WALL
- Away from public zones
- 30' from unauthorized personnel

LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB

- BULLET POINT indicate Activities within the space.

One Way Connection

Two ways Connection

Sample Flow

Equipment

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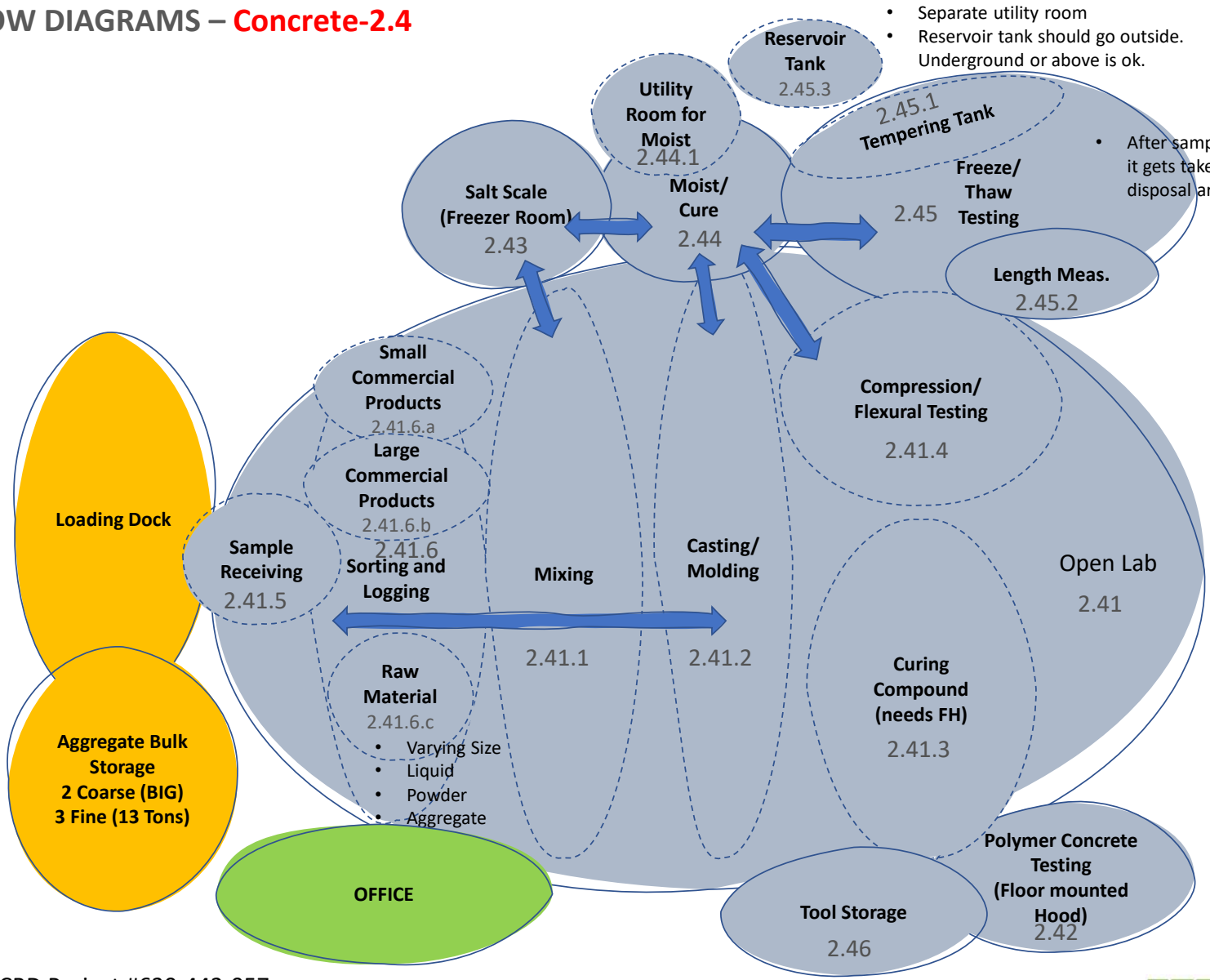
tkb ARCHITECTURE & DESIGN HERA laboratory planners

FLOW DIAGRAMS – Concrete-2.4



- Separate utility room
- Reservoir tank should go outside. Underground or above is ok.

- After sample is done, it gets taken to disposal area

LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB

- BULLET POINT indicate Activities within the space.

One Way Connection

Two ways Connection

Sample Flow

Equipment

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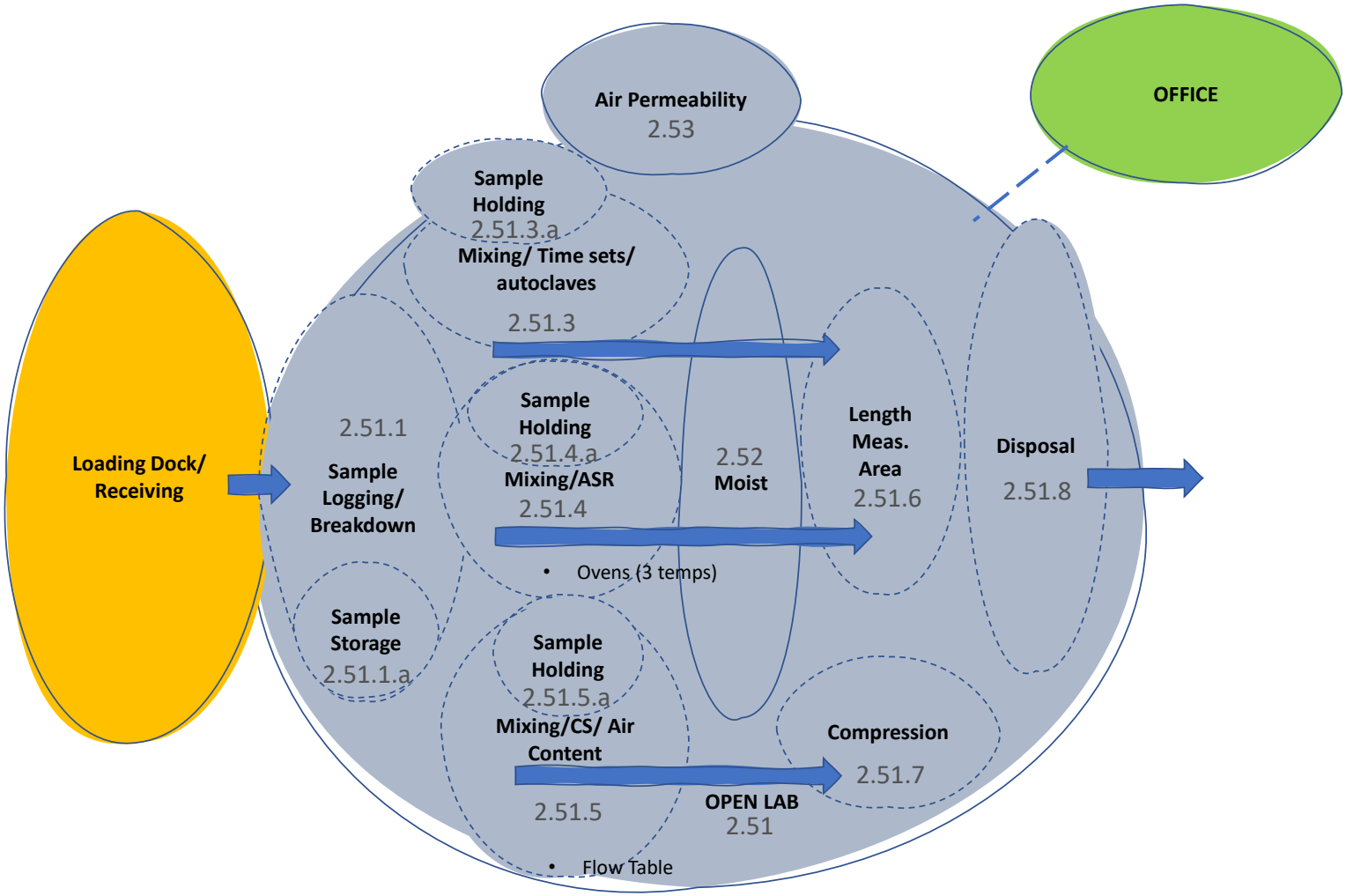
FLOW DIAGRAMS – Cement-2.5



- MOIST= Cabinet or access to Moist Room
- Each station to have workspaces and sample holding

LEGEND

ISOLATED ISO LAB

SUPPORT SPACE

OFFICE

MAIN LAB

AREA WITHIN LAB

- BULLET POINT indicate Activities within the space.

One Way Connection

Two ways Connection

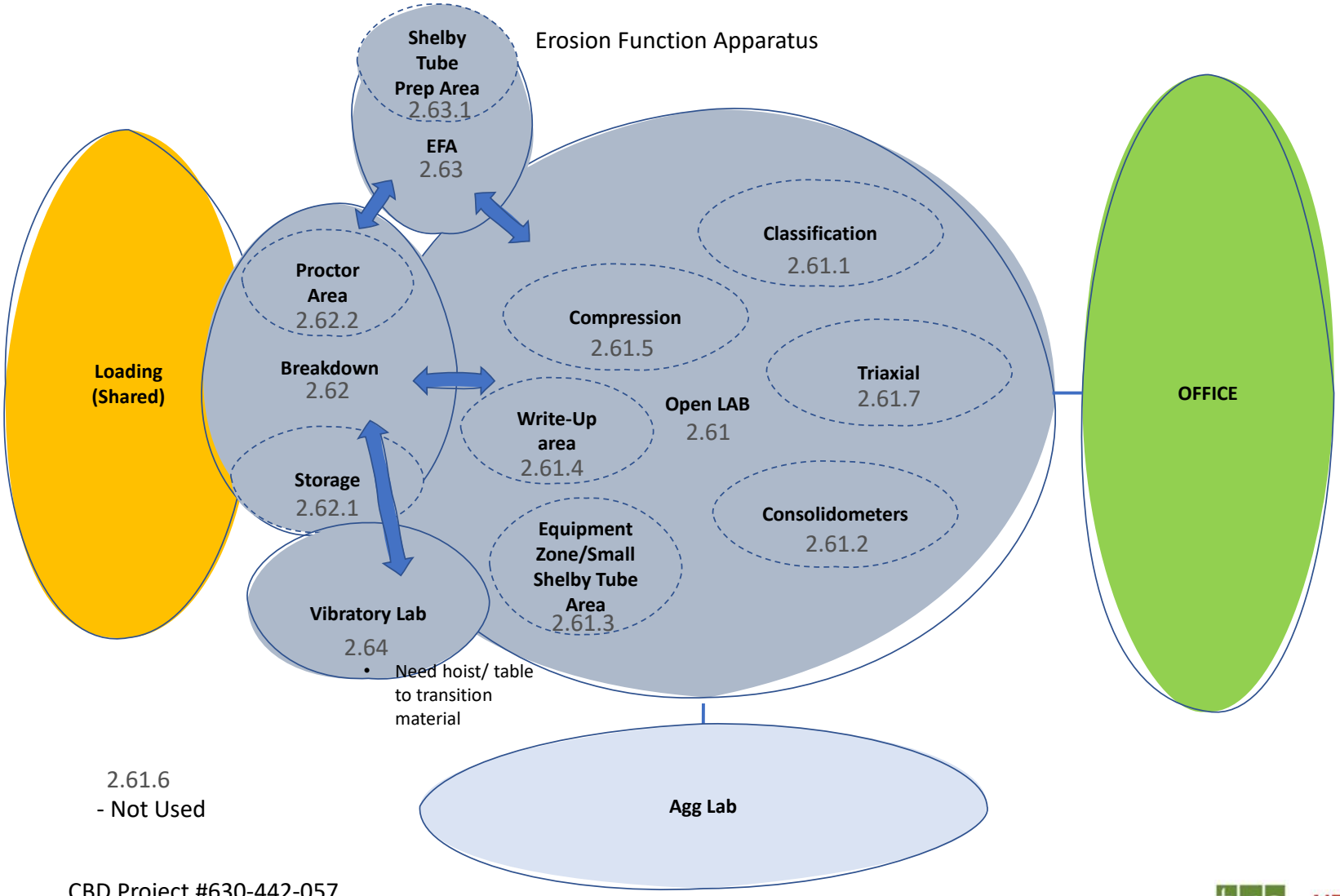
Sample Flow

Equipment

CBD Project #630-442-057

tkb ARCHITECTURE & DESIGN HERA laboratory planners

FLOW DIAGRAMS – SOILS - 2.6x



LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB

- BULLET POINT indicate Activities within the space.

One Way Connection

Two ways Connection

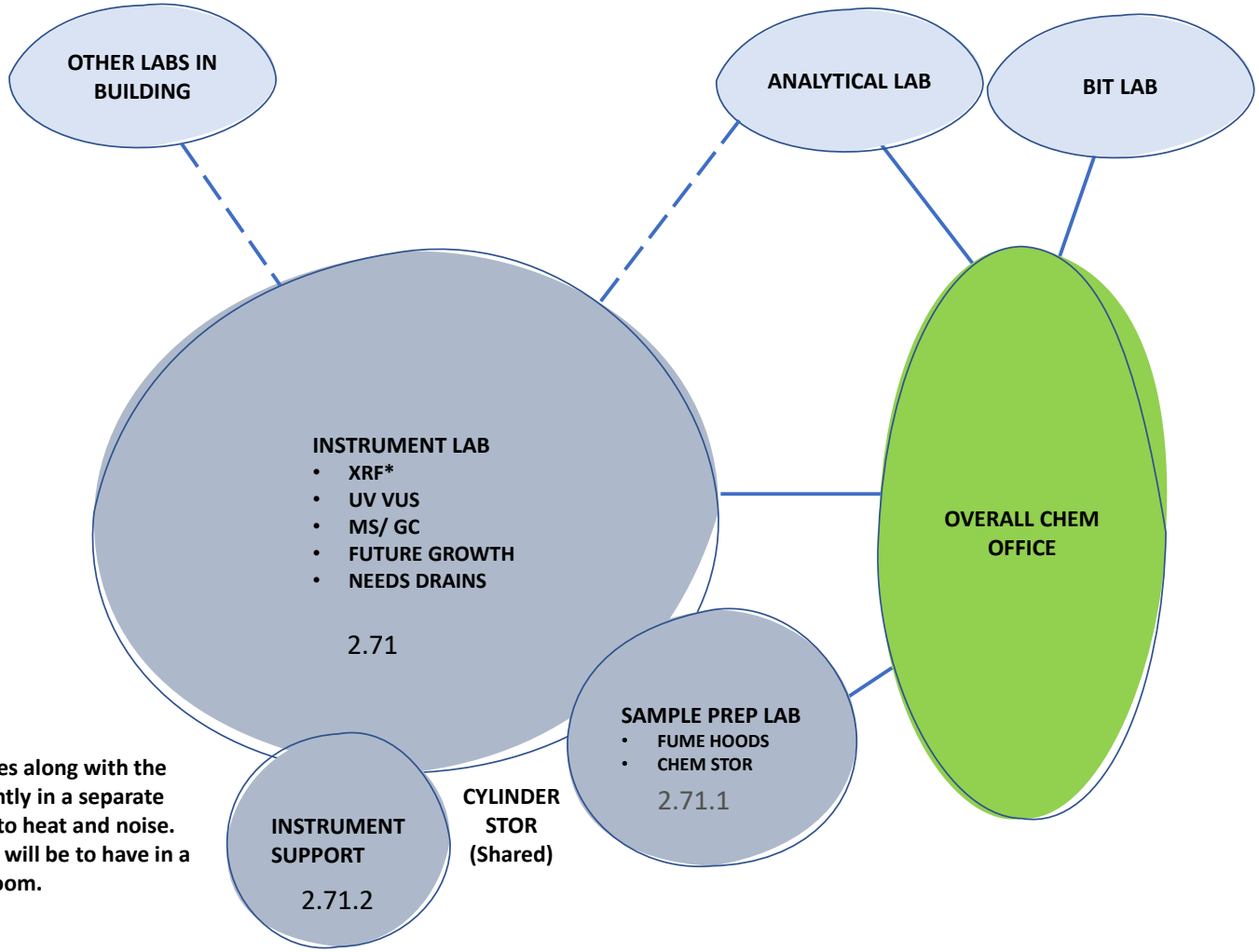
Sample Flow

Equipment

CBD Project #630-442-057

HERA laboratory planners

FLOW DIAGRAMS – CHEMISTRY – INSTRUMENT LAB.-2.71x



***Chiller goes along with the XRF. Currently in a separate room dUE to heat and noise. Preference will be to have in a separate room.**

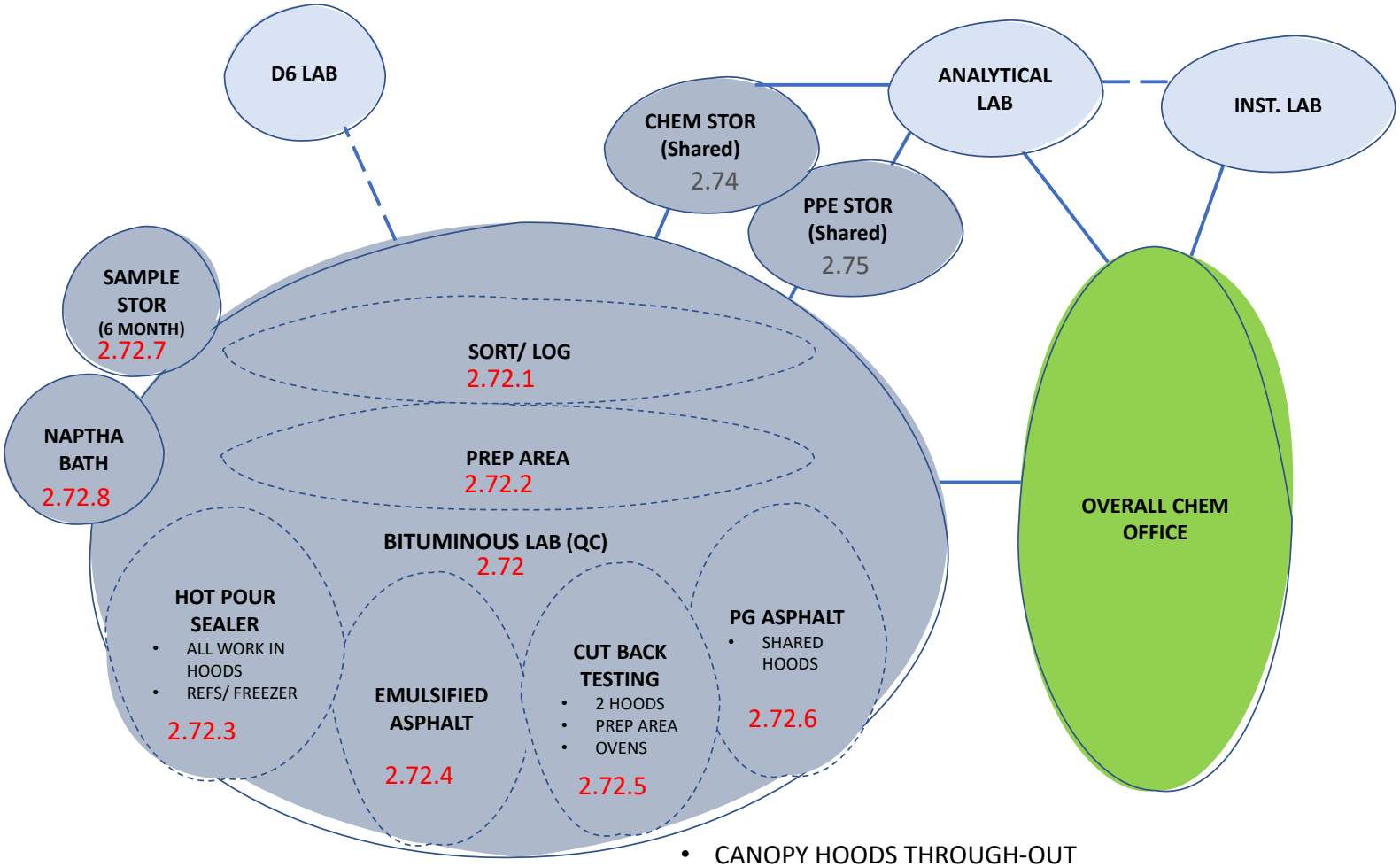
LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB
- BULLET POINT indicate Activities within the space.
- One Way Connection
- Two ways Connection
- Sample Flow
- Equipment

CBD Project #630-442-057

HERA laboratory planners

FLOW DIAGRAMS – CHEMISTRY – BITUMINOUS LAB-2.72x



- CANOPY HOODS THROUGH-OUT
- SAMPLES COLLECTED AT SITE AND BROUGHT TO LAB

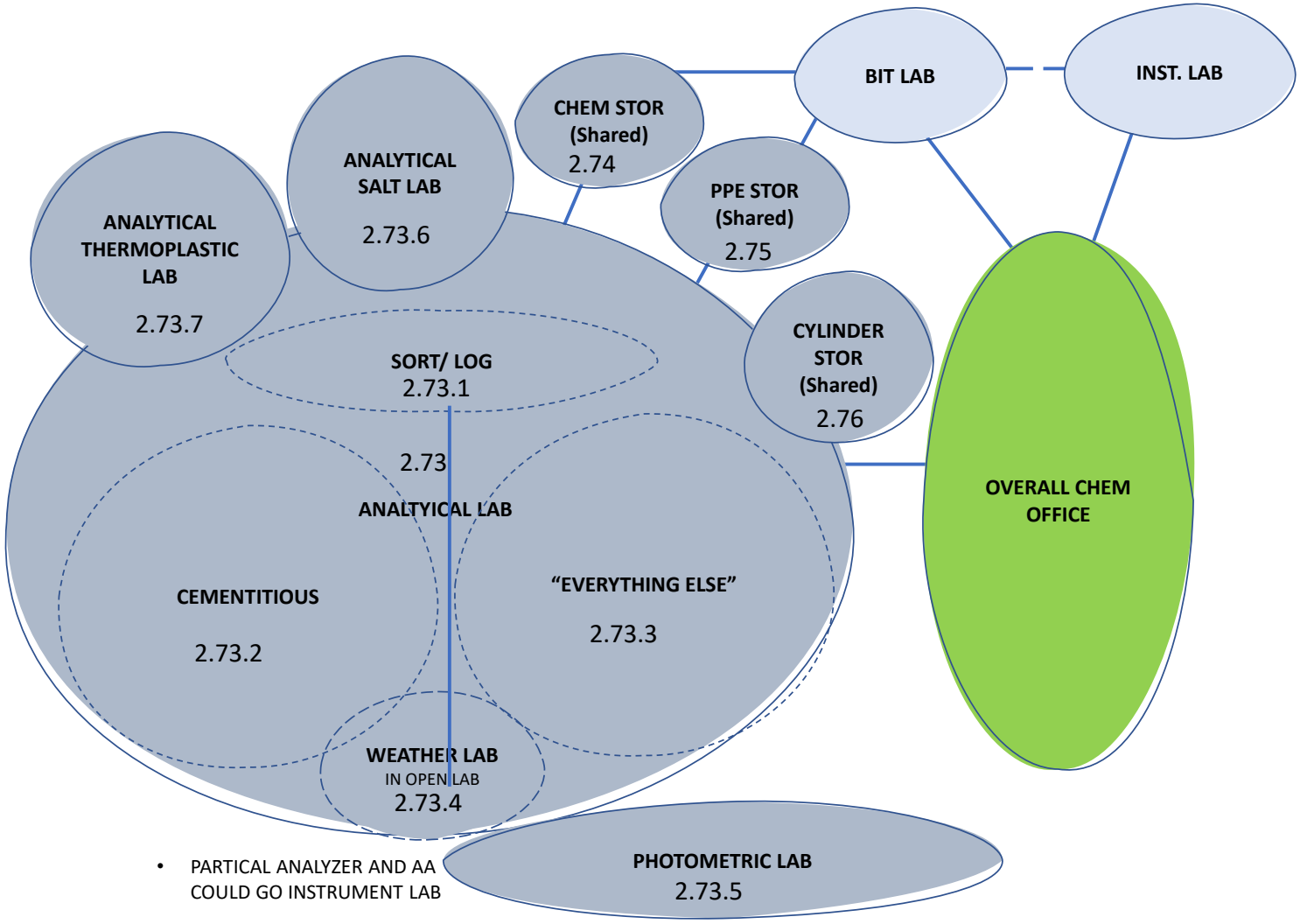
LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB
- BULLET POINT indicate Activities within the space.
- One Way Connection
- Two ways Connection
- Sample Flow
- Equipment

CBD Project #630-442-057

tkb ARCHITECTURE & DESIGN HERA laboratory planners

FLOW DIAGRAMS – CHEMISTRY– ANALYTICAL-2.73x



- PARTICAL ANALYZER AND AA COULD GO INSTRUMENT LAB

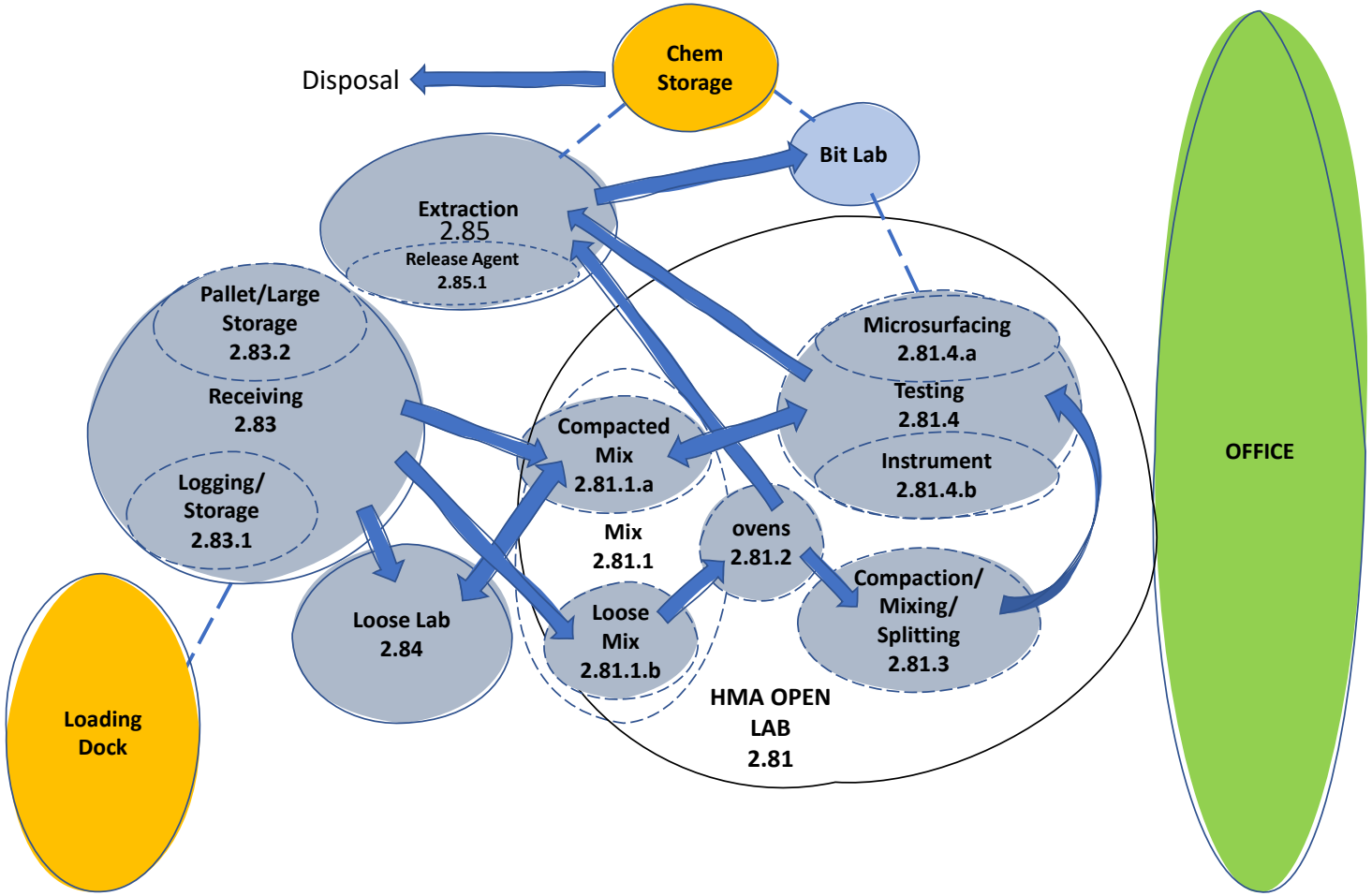
LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB
- BULLET POINT indicate Activities within the space.
- One Way Connection
- Two ways Connection
- Sample Flow
- Equipment

CBD Project #630-442-057

HERA laboratory planners

FLOW DIAGRAMS – HOT MIX ASPHALT (HMA) - 2.8



LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB

- BULLET POINT indicate Activities within the space.

One Way Connection

Two ways Connection

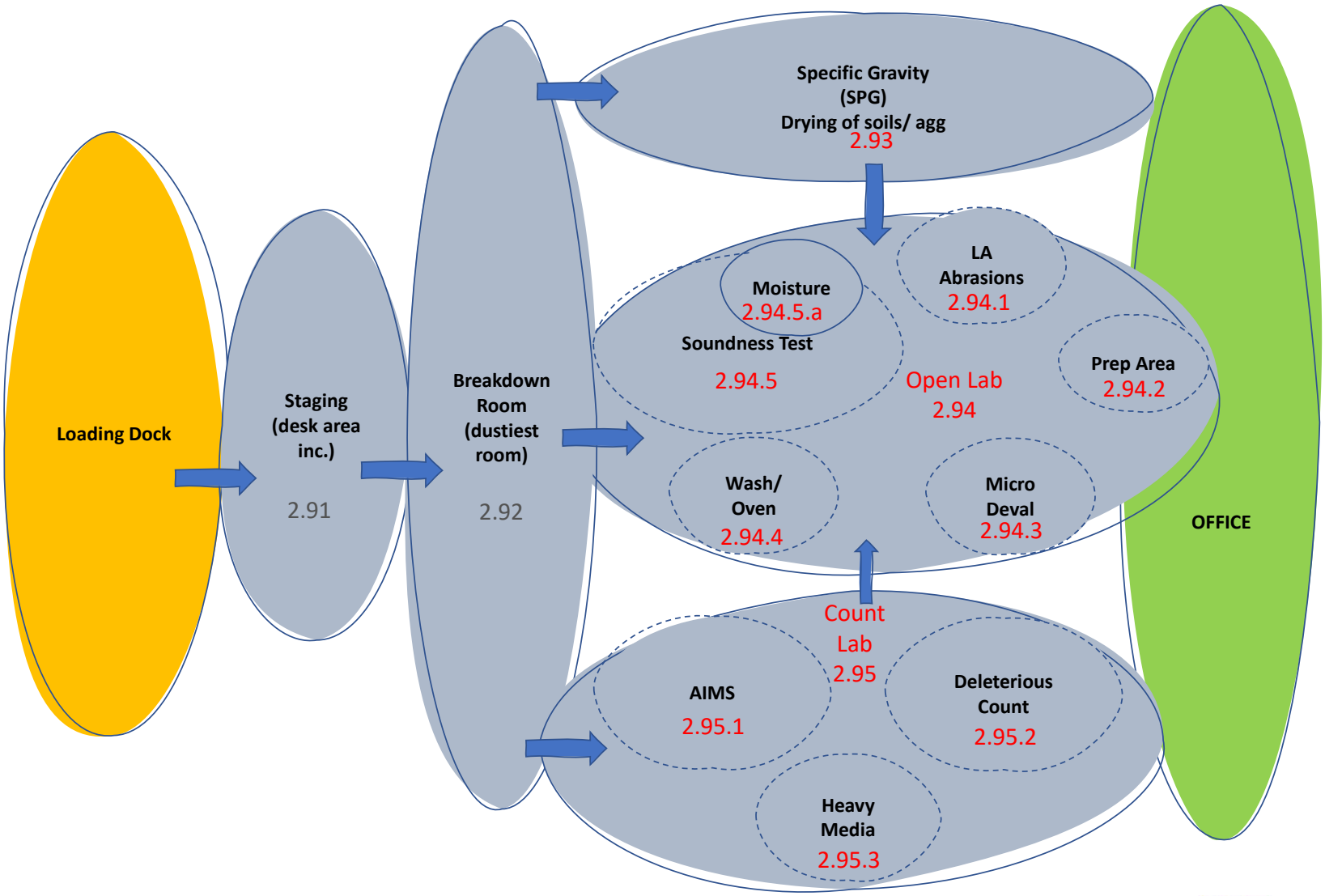
Sample Flow

Equipment

CBD Project #630-442-057

tkb ARCHITECTURE & DESIGN HERA laboratory planners

FLOW DIAGRAMS – AGGREGATE- 2.9



LEGEND

- ISOLATED ISO LAB
- SUPPORT SPACE
- OFFICE
- MAIN LAB
- AREA WITHIN LAB

- BULLET POINT indicate Activities within the space.

One Way Connection

Two ways Connection

Sample Flow

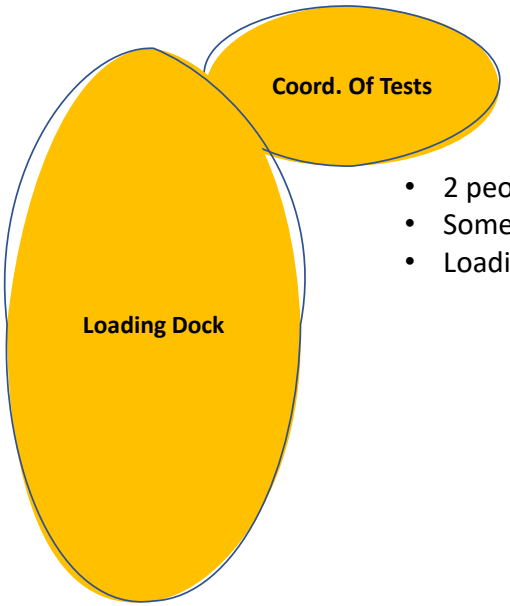
Equipment

CBD Project #630-442-057

tkb ARCHITECTURE & DESIGN

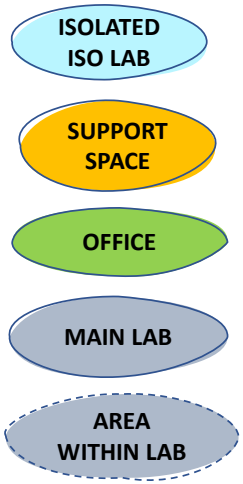
HERA laboratory planners

FLOW DIAGRAMS – COORD. OF TESTS



- 2 people
- Some set up space (1 module)
- Loading and unloading. Good to have near dock

LEGEND



- BULLET POINT indicate Activities within the space.

One Way Connection

Two ways Connection

Sample Flow

Equipment

CBD Project #630-442-057

HERA laboratory planners

I–4 Applicable Design Codes and Standards

Design/Build Team - Include DCM Code Analysis and life safety plans in drawings with each project deliverable review submittal.

Applicable Codes and Standards

1. All Applicable State and Local Ordinances, Amendments and Requirements
2. 2018 International Building Code
3. 2018 International Fire Code
4. 2018 International Fuel Gas Code
5. 2018 International Mechanical Code
6. 2018 Illinois Energy Conservation Code (and by reference 2018 IECC & 2016 ASHRAE 90.1)
7. 2014 Illinois State Plumbing Code
8. NFPA 13 Standard for the Installation of Sprinkler Systems, 2019 Edition
9. NFPA 70 National Electrical Code, 2017 Edition
10. NFPA 72 National Fire Alarm Code, 2019 Edition
11. NFPA 101 Life Safety Code, 2015 Edition
12. 2018 Illinois Accessibility Code
13. 2010 ADA Standards
14. IES (Illuminating Engineering Society) Lighting Handbook, latest edition
15. American Society of Civil Engineers 7: Minimum Design Loads for Buildings and Other Structures, 2016 (ASCE 7-16)
16. Illinois Capital Development Board Design and Construction Manual, 2009 with Supplements (CDB DCM)
17. AISC Manual of Steel Construction, 15th Edition.
18. AISC 360-16 Specification for Structural Steel Buildings
19. AISC 341-16 Seismic Provisions for Structural Steel Buildings, including Supplement No. 1
20. ACI 318-14 Building Code Requirements for Structural Concrete and Commentary
21. TMS 402/602-16 Building Code Requirements and Specification for Masonry Structures
22. Steel Deck Institute (SDI)
23. Design Manual for Composite Decks, Form Decks and Roof Decks No. 31.
24. SDI C-2017 Standard for Composite Steel Floor Deck – Slabs
25. SDI NC-2017 Standard for Non-Composite Steel; Floor Deck
26. SDI RD-2017 Standard for Steel Roof Deck
27. Steel Joist Institute (SJI). Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders 44th Edition.
28. PCI Design Handbook 7th Edition

29. ANSI/AWC NDS-2018 National Design Specification (NDS) for Wood Construction with 2018 NDS Supplement and 2018 NDS Special Design Provisions for Wind and Seismic.
30. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
31. AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
32. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
33. BNI Publications, Inc. - Standard Specifications for Public Works Construction (Greenbook), 2012 Edition, referenced as PWC Specification. References to methods of measurement and payment, temporary facilities and controls, means and methods of construction, safety and health protection, and other like conditions shall not apply to work.
34. IDOT - State of Illinois, Department of Transportation, Standard Specifications for Road and Bridge Construction, January 1, 2022 Edition, referenced as IDOT Specification. References to methods of measurement and payment, temporary facilities and controls, means and methods of construction, safety and health protection, and other like conditions shall not apply to work.
35. OSHA 29 CFR1910 Occupational Safety and Health Standards, for requirements relative to personnel protection associated with permanent work and installation.
36. The Standard Specifications Committee (SSC) - Standard Specifications for Water and Sewer Main Construction in Illinois. References to methods of measurement and payment, temporary facilities and controls, means and methods of construction, safety and health protection, and other like conditions shall not apply to work.
37. ANSI/ASHRAE Standard 188-2018, Legionellosis: Risk Management for Building Water Systems.
38. USDOJ - Americans with Disabilities Act (ADA).
39. Disabled person accessibility codes and regulations of public authorities having jurisdiction over the Work.

Laboratory Specific Criteria

1. 2018 International Building Code
2. NFPA 10 – Latest Edition – Standard for Portable Fire Extinguishers
3. NFPA 33 – Latest Edition– Standard for Spray Application Using Flammable or Combustible Materials
4. NFPA 45, Life Safety Code, latest edition – Standard on Fire Protection for Laboratories
5. NFPA 654, Standards for prevention of Fire and Dust Explosion
6. NFPA 484, Standards for combustible particulate Solids.
7. ANSI Z358.1 – Standard for Emergency Eyewash and Shower Stations
8. Scientific Equipment and Furniture Association – SEFA Standards for casework and fixtures

9. American Association of State Highway and Transportation Officials (AASHTO) Guidelines
10. Scientific Equipment and Furniture Association – SEFA Standards for casework and fixtures
11. American Association of State Highway and Transportation Officials (AASHTO) Guidelines
12. Illinois Emergency Management Agency (IEMA) nuclear equipment storage requirements
    - 1.16 Isolation Room
    - 1.17 Nuclear Storage
    - https://www2.illinois.gov/iema/laws/Pages/regs-title32.aspx
13. ASTM C70-13 **-** Standard Test Method for Surface Moisture in Fine Aggregate
14. AASHTO T310 (ALARA) – Standard Method of Test for In-Place Density and
    - Moisture Content of Soil-Aggregate by Nuclear Methods.
15. ASTM D7013/ D7013M-11 - Standard Guide for Calibration Facility Setup for Nuclear Surface Gauge
    - 2.31 Nuclear Diagnostics / Shop
    - 2.32 Nuclear – Hot Room
    - 2.33 Nuclear – Storage
    - 2.34 Nuclear – Calibration Lab
16. OSHA Requirements:
    - OSHA-1926.1153 - Respiratory crystalline silica
    - OSHA 1910.22 - Housekeeping
    - OSHA 1910.1200 - Hazardous Location
    - 29 CDR 1910.1450 - OSHA Laboratory Standards
17. OSHA 29 CDR 1910 contains the following requirements:
    - Means of Egress (Exits, Exit Markings)
    - Occupational Health and Environmental Controls (Ventilation, Noise, Radiation)
    - Hazardous Materials (Compressed Gases, Flammable and Combustible Liquids, etc.)
    - Personal Protective Equipment (Eye and Face Protection, Respiratory Protection, etc.)
    - General Environmental Protection (Sanitation) Medical and First Aid
    - Fire Protection (Fire Brigades, Portable Fire Extinguishers, etc.)
    - Material Handling and Storage (Powered Industrial Trucks, Cranes)
    - Machinery and Machine Guarding (Mechanical Power Presses, Abrasive Wheels, etc.)
    - Hand and Portable Powered Tools
    - Welding, Cutting, and Brazing

Radiation Safety Criteria

The Nuclear Labs are in both the Central Bureau and District 6.

2.12 Occupational Exposure Limits:
The NRC and Agreement States have placed a 5,000 mrem limit on the amount of radiation a worker can receive in any cumulative year.
- Authorized (Occupational) = 5,000 mRem/year

- Unauthorized (members of the public) = 100 mRem's/year

2.13 Security and Control of Licensed or Registered Sources of Radiation**:**
See, 32 IL Admin Code Section 340.810

1) Distance – Distance may be the most important and effective component of ALARA. Maintain your distance whenever possible from a radioactive source.
2) Security of radioactive materials:
   All gauges must be stored in an approved and secure storage area. Only authorized personnel are allowed with the space.
3) Location of Signs, Labels, and Authorizing Documents:
   Post a "Caution Radioactive Materials" sign in rooms or areas where nuclear gauges are stored. Post an NRC Form-3 "Notice to Employees," in areas where employees will see it, for example, on a safety bulletin board.

In addition, the following information must be posted to be readily observable or be readily accessible via computer:

- 10 CFR 19 Notices, Instructions and Reports to Workers:
- Inspection and Investigations
- 10 CFR 20 Standards for Protection Against Radiation the material license.

Hazardous Materials Storage

1. See attached IDOT, CBM 2022 waste lists for reference - Hazardous Materials Storage space 7.15.
2. EPA Hazardous Waste Code – F002 (Spent Halogenated Solvents)
3. EPA Hazardous Waste Code – F003 (Spent Non-halogenated Solvents)
4. EPA Hazardous Waste Code – D001 (Ignitable Waste)

HAZ or Non-Haz	2022 CBM WASTE MATERIAL DESCRIPTION	Container Type	Container Size	Number of Containers
	BOX 1 (Swarco)			
NH	Swarco Colorado Paint, 3180 MFUA-10, Urethane acrylate modified epoxy, Part A, white	Metal Can	Pint	11
NH	Swarco Colorado Paint, 3186 MFUA-10, Urethane acrylate modified epoxy, Part A, yellow	Metal Can	Pint	6
HAZ	Swarco Colorado Paint, 1185 Epoxy hardener, Part B, modified polyamine, UN3267, Corrosive liquid, basic, organic, n.o.s., Class 8, PGII	Metal Can	Pint	1
NH	Swarco Colorado Paint, 1186 Epoxy Traffic Marking Paint, Yellow, Part A	Metal Can	Pint	1
NH	Swarco Colorado Paint, 1180 Epoxy Traffic Marking Paint, White, Part A	Metal Can	Pint	1
NH	Swarco Colorado Paint, 6186 MFUA-12 Polyurea Traffic Marking Paint, Yellow, Part A	Metal Can	Pint	2
NH	Swarco Colorado Paint, 6180 MFUA-12 Polyurea Traffic Marking Paint, White, Part A	Metal Can	Pint	4
HAZ	Swarco Colorado Paint, 3185 MFUA-10, Modified polyamine, Catalyst Part B, UN3267, Corrosive liquid, basic, N.O.S., nonylphenol, Class 8, PGIII	Metal Can	Pint	6
	BOX 2 (Swarco)			
NH	Swarco Colorado Paint, 3180 MFUA-10, Urethane acrylate modified epoxy, Part A, white	Metal Can	Pint	12
NH	Swarco Colorado Paint, 3186 MFUA-10, Urethane acrylate modified epoxy, Part A, yellow	Metal Can	Pint	8
HAZ	Swarco Colorado Paint, 3185 MFUA-10, Modified polyamine, Catalyst Part B, UN3267, Corrosive liquid, basic, N.O.S., nonylphenol, Class 8, PGIII	Metal Can	Pint	8
HAZ	Olin Poly-Carb, Mark 65.5 Modified Epoxy Pavement Marking, Part A, White, UN 3082, Environmentally Hazardous Substance, Liquid, n.o.s. (epoxy resin) Class 9, PG III	Metal Can	Pint	1
HAZ	Olin Poly-Carb, Mark 65.5 Modified Epoxy Pavement Marking, Part A, Yellow, UN 3082, Environmentally Hazardous Substance, Liquid, n.o.s. (epoxy resin) Class 9, PG III	Metal Can	Pint	1

HAZ	Olin Poly-Carb, Mark 65.5 Modified Epoxy Pavement Marking, Part B, Epoxy Hardener, UN3267, Corrosive liquid, basic, organic N.O.S., Diethylenetriamine, nonylphenol, Class 8, PGII	Metal Can	Pint	1
	BOX 3 (Swarco)			
NH	Swarco Colorado Paint, 3180 MFUA-10, Urethane acrylate modified epoxy, Part A, white	Metal Can	Pint	11
NH	Swarco Colorado Paint, 3186 MFUA-10, Urethane acrylate modified epoxy, Part A, yellow	Metal Can	Pint	9
NH	Swarco Colorado Paint, 6186 MFUA-12 Polyurea Traffic Marking Paint, Yellow, Part A	Metal Can	Pint	1
HAZ	Swarco Colorado Paint, 3185 MFUA-10, Modified polyamine, Catalyst Part B, UN3267, Corrosive liquid, basic, N.O.S., nonylphenol, Class 8, PGIII	Metal Can	Pint	9
	BOX 4 (Swarco)			
NH	Swarco Colorado Paint, 3180 MFUA-10, Urethane acrylate modified epoxy, Part A, white	Metal Can	Pint	7
NH	Swarco Colorado Paint, 3186 MFUA-10, Urethane acrylate modified epoxy, Part A, yellow	Metal Can	Pint	5
NH	Swarco Colorado Paint, 1186 Epoxy Traffic Marking Paint, Yellow, Part A	Metal Can	Pint	1
NH	Swarco Colorado Paint, 1180 Epoxy Traffic Marking Paint, White, Part A	Metal Can	Pint	2
NH	Swarco Colorado Paint, 6186 MFUA-12 Polyurea Traffic Marking Paint, Yellow, Part A	Metal Can	Pint	2
NH	Swarco Colorado Paint, 6180 MFUA-12 Polyurea Traffic Marking Paint, White, Part A	Metal Can	Pint	3
HAZ	Swarco Colorado Paint, 1185 Epoxy hardener, Part B, modified polyamine, UN3267, Corrosive liquid, basic, organic, n.o.s., Class 8, PGII	Metal Can	Pint	1
HAZ	Swarco Colorado Paint, 3185 MFUA-10, Modified polyamine, Catalyst Part B, UN3267, Corrosive liquid, basic, N.O.S., nonylphenol, Class 8, PGIII	Metal Can	Pint	6
NH	Swarco Colorado Paint, 3180 MFUA-10, Urethane acrylate modified epoxy, Part A, white	Metal Can	Pint	1
NH	Swarco Colorado Paint, 3186 MFUA-10, Urethane acrylate modified epoxy, Part A, yellow	Metal Can	Pint	1

HAZ	Swarco Colorado Paint, 3185 MFUA-10, Modified polyamine, Catalyst Part B, UN3267, Corrosive liquid, basic, N.O.S., nonylphenol, Class 8, PGIII	Metal Can	Pint	1
	BOX 5 (EPOPLEX)			
HAZ	Epoplex white LS 50 epoxy, Part A, UN3082, Environmentally hazardous substance, Liquid, N.O.S., reaction product: bisphenol-a-(epichlorhydrin) epoxy resin, Class 9, PG III	Metal Can	Pint	6
HAZ	Epoplex LF yellow LS 50 epoxy, Part A, UN3082, Environmentally hazardous substance, Liquid, N.O.S., reaction product: bisphenol-a-(epichlorhydrin) epoxy resin, Class 9, PG III	Metal Can	Pint	7
NH	Epoplex White LS 90 polyurea, Part A amine	Metal Can	Pint	7
NH	Epoplex LF Yellow LS 90 polyurea, Part A amine	Metal Can	Pint	6
HAZ	Epoplex LS 50 epoxy hardener, Part B, UN3267, Class 9, PG III	Metal Can	Pint	6
	BOX 6 (DIAMOND VOGEL)			
NH	Vogel, UC35-11445 IL acrylic waterborne traffic marking paint, yellow	Metal Can	Pint	13
NH	Vogel, UC95-19056 IL acrylic waterborne traffic marking paint, black	Metal Can	Pint	5
NH	Vogel, UC15-18882 IL acrylic waterborne traffic marking paint, white	Metal Can	Pint	9
	BOX 7 (DIAMOND VOGEL)			
NH	Vogel, UC15-18882 IL acrylic waterborne traffic marking paint, white	Metal Can	Pint	21
NH	Vogel, UC35-11445 IL acrylic waterborne traffic marking paint, yellow	Metal Can	Pint	12
	BOX 8 (DIAMOND VOGEL)			
NH	Vogel, UC35-11445 IL acrylic waterborne traffic marking paint, yellow	Metal Can	Pint	13
NH	Vogel, UC95-19056 IL acrylic waterborne traffic marking paint, black	Metal Can	Pint	3
NH	Vogel, UC15-18882 IL acrylic waterborne traffic marking paint, white	Metal Can	Pint	16
	BOX 9 (DIAMOND VOGEL)			

NH	Vogel, UC15-18882 IL acrylic waterborne traffic marking paint, white	Metal Can	Pint	13
NH	Vogel, UC35-11445 IL acrylic waterborne traffic marking paint, yellow	Metal Can	Pint	16
NH	Davies Imperial Coatings, IL Fast Dry Yellow, 4636	Metal Can	Pint	1
	BOX 10 (EPOPLEX)			
HAZ	Epoplex white LS 50 epoxy, Part A, UN3082, Environmentally hazardous substance, Liquid, N.O.S., reaction product: bisphenol-a-(epichlorhydrin) epoxy resin, Class 9, PG III	Metal Can	Pint	1
HAZ	Epoplex white LS 65QS epoxy, Part A, UN3082, Environmentally hazardous substance, Liquid, N.O.S., reaction product: bisphenol-a-(epichlorhydrin) epoxy resin, Class 9, PG III	Metal Can	Pint	11
HAZ	Epoplex LF yellow LS 65QS epoxy, Part A, UN3082, Environmentally hazardous substance, Liquid, N.O.S., reaction product: bisphenol-a-(epichlorhydrin) epoxy resin, Class 9, PG III	Metal Can	Pint	6
HAZ	Epoplex LF yellow LS 50 epoxy, Part A, UN3082, Environmentally hazardous substance, Liquid, N.O.S., reaction product: bisphenol-a-(epichlorhydrin) epoxy resin, Class 9, PG III	Metal Can	Pint	2
HAZ	Epoplex LS 50 epoxy hardener, Part B, UN3267, Class 9, PG III	Metal Can	Pint	2
HAZ	Epoplex LS65QS epoxy hardener, UN3267, corrosive liquid, basic, organic, n.o.s., (4-nonylphenol, branched, diethylenetriamine), Class 8, PG III	Metal Can	Pint	8
	MISCELLANEOUS			
	Chemstation 2217-B, Asphalt release agent, Ph=12.0-13.3, Cleaning compound, n.o.s., liquid	Plastic	Gallon	4
	Chemstation 2217-B, Asphalt release agent, Ph=12.0-13.3, Cleaning compound, n.o.s., liquid	Plastic	Quart/ Liter	5
	Chemstation 2217-B, Asphalt release agent, Ph=12.0-13.3, Cleaning compound, n.o.s., liquid	Metal	Quart	19
	DuBois Slickem, Asphalt release agent, pH=14.3	Plastic	Quart	2
	Compound Technologies No. 1 Asphalt Release, pH=14.7	Plastic	Liter	4

	ARA Chemstation 2087-B, Asphalt release agent, pH=12-13	Plastic	Gallon	1
	ARA Chemstation 2087-B, Asphalt release agent, pH=12-13	Metal	Quart	4
NH	BG Chemical Loose Juice, Asphalt Release agent	Metal	Quart	1
HAZ	UN1993, waste flammable liquids, n.o.s., Class 3, PG II (F002, F003, D001)	Metal	55 gallon drum	3
NH	Non-Hazardous water based concrete admixture samples and non-hazardous water based asphalt release agent samples	Metal	55 gallon drum	2
HAZ	Trichloroethylene asphalt extraction waste, UN1710, Trichloroethylene, Class 6.1, PG III	Plastic	5 Gallon	5
	Fluorescent light bulbs, 4 foot			11

HAZ or Non-Haz	2022 CBM ATTACHMENT to B463 WASTE MATERIAL DESCRIPTION	Container Type	Container Size	Number of Containers
	MISCELLANEOUS			
NH	Dayton Superior, Clean Strip J1A concrete form release agent	Plastic pail	5 gallon	1
NH	Cresset Chemical, Crete-Lease 20-VOC-Xtra Release Agent	Metal	5 gallon	1
	SWARCO-INSIDE			
NH	Swarco Colorado Paint, 6180 MFUA-12 Polyurea Traffic Marking Paint, White, Part A	Metal Can	Pint	7
NH	Swarco Colorado Paint, 6186 MFUA-12 Polyurea Traffic Marking Paint, Yellow, Part A	Metal Can	Pint	4
HAZ	Swarco Colorado Paint, 1185 Epoxy hardener, Part B, modified polyamine, UN3267, Corrosive liquid, basic, organic, n.o.s., Class 8, PGII	Metal Can	Pint	2
NH	Swarco Colorado Paint, 1180 Epoxy Traffic Marking Paint, White, Part A	Metal Can	Pint	3
NH	Swarco Colorado Paint, 1186 Epoxy Traffic Marking Paint, Yellow, Part A	Metal Can	Pint	2
NH	Swarco Colorado Paint, 3186 MFUA-10, Urethane acrylate modified epoxy, Part A, yellow	Metal Can	Pint	14
	OZARK-INSIDE			
NH	IL Fast dry Waterborne Latex Paint, White 14217	Metal Can	Pint	9
NH	IL Fast dry Waterborne Latex Paint, White 14217	Metal Can	Quart	6
NH	IL Fast dry Waterborne Latex Paint, Yellow 24217	Metal Can	Pint	7
NH	IL Fast dry Waterborne Latex Paint, Yellow 24217	Metal Can	Quart	2
	DIAMOND VOGEL-INSIDE			
NH	Vogel, UC35-11445 IL acrylic waterborne traffic marking paint, yellow	Metal Can	Pint	9
NH	Vogel, UC95-19056 IL acrylic waterborne traffic marking paint, black	Metal Can	Pint	3
NH	Vogel, UC15-18882 IL acrylic waterborne traffic marking paint, white	Metal Can	Pint	4
NH	Ozark, IL Fast dry Waterborne Latex Paint, White 14217	Metal Can	Quart	1

NH	Ozark, IL Fast dry Waterborne Latex Paint, Yellow 24217	Metal Can	Pint	1
	DIAMOND VOGEL ACETONE-INSIDE			
HAZ	Illinois Yellow Acrylic Traffic Fast Dry, TM37-20287, UN1263, Paint, Class 3, PG II	Metal Can	Pint	9
HAZ	Illinois White Acrylic Traffic Fast Dry, TM37-20287, UN1263, Paint, Class 3, PG II	Metal Can	Pint	9
	EPOPLEX-INSIDE			
NH	Ennis HPS-3, epoxy resin Part A, white	Glass	Pint	2
NH	Ennis HPS-3, epoxy resin Part A, yellow	Glass	Pint	2
HAZ	Ennis HPS-3, epoxy catalyst, Part B, UN3267, Corrosive liquid, basic, organic, 4-nonylphenol, branched, Class 8, PG III	Glass	Pint	2
HAZ	Epoplex, LS60 Slow cure epoxy traffic marking paint, White, UN3082, Environmentally Hazardous Substance, Liquid, n.o.s. reaction product: bisphenol-a-(epichlorhydrin) epoxy resin, Class 9, PG III	Glass	Pint	2
HAZ	Epoplex, LS60 Slow cure epoxy traffic marking paint, Yellow, UN3082, Environmentally Hazardous Substance, Liquid, n.o.s. reaction product: bisphenol-a-(epichlorhydrin) epoxy resin, Class 9, PG III	Glass	Pint	2
HAZ	Epoplex, LS60 Slow cure epoxy, Hardener, UN3267, Corrosive liquid, Basic, Organic, n.o.s. (contains aminoethylpiperazine, 4-nonylphenol, branched) Class 8, PG III	Glass	Pint	2
HAZ	Epoplex LS65QS epoxy hardener, UN3267, corrosive liquid, basic, organic, n.o.s., (4-nonylphenol, branched, diethylenetriamine), Class 8, PG III	Metal Can	Pint	2
HAZ	Epoplex white LS 65QS epoxy, Part A, UN3082, Environmentally hazardous substance, Liquid, N.O.S., reaction product: bisphenol-a-(epichlorhydrin) epoxy resin, Class 9, PG III	Metal Can	Pint	3
NH	Epoplex White LS 90 polyurea, Part A amine	Metal Can	Pint	3
NH	Epoplex LF Yellow LS 90 polyurea, Part A amine	Metal Can	Pint	2
NH	Epoplex White LS 90 polyurea, Part A amine	Metal Can	Quart	1
	ENNIS-INSIDE			
NH	Ennis HPS-4, modified urethane traffic paint, Part A	Plastic	Pint	11

HAZ	Ennis, HPS-4, Urethane epoxy catalyst Part B, UN3267, Corrosive liquid, basic, organic, n.o.s., Class 8, PGIII	Plastic	Pint	6
NH	Ennis HPS-3, traffic marking paint, epoxy resin, Part A	Plastic	Pint	8
HAZ	Ennis HPS-3, epoxy catalyst, Part B, UN3267, Corrosive liquid, basic, organic, 4-nonylphenol, branched, Class 8, PG III	Plastic	Pint	4
NH	Ennis HPS-2, traffic marking paint, epoxy resin, Part A	Plastic	Pint	1
	PPG-INSIDE			
HAZ	PPG Amercoat 68 HS, Organic Zinc Bridge Paint, epoxy resin, Part A A46/05, UN1263, paint, Class 3, PG III	Plastic Metal	Quart Gallon	1 1
HAZ	Amercoat 68 HS epoxy catalyst, Part B B46/01, UN1263, paint, Class 3, PG III	Plastic Metal	Quart Quart	1 1
HAZ	Amercoat 68 HS, Zinc dust, UN3077, Environmentally hazardous substance, solid, n.o.s. (zinc powder) Class 9, PG III	Metal	Gallon	1
HAZ	Amercoat 399 epoxy resin, Part A, UN1263, paint, Class 3, PG III	Plastic	Quart	2
HAZ	Amercoat 399 epoxy resin, Part B hardener, UN3469, Paint related material, flammable, corrosive, Class 3 (8), PG III	Plastic	Quart	2

I–5 Illinois Department of Central Management Services Space Standards

Although compliance is not specifically required, the proposed lab building program utilizes Illinois Department of Central Management Services Space Standards for administrative components including offices, workstations, collaboration spaces, and breakrooms.

Exhibit Attachments:

Title 44, Subtitle D, Chapter 1, Section 5000. (3 pages)

Illustrations of New CMS Space Standards (8 pages)

Joint Committee on Administrative Rules
ADMINISTRATIVE CODE

TITLE 44: GOVERNMENT CONTRACTS, GRANTMAKING, PROCUREMENT AND PROPERTY MANAGEMENT
SUBTITLE D: PROPERTY MANAGEMENT
CHAPTER I: DEPARTMENT OF CENTRAL MANAGEMENT SERVICES
PART 5000 ACQUISITION, MANAGEMENT AND DISPOSAL OF REAL PROPERTY
SECTION 5000.APPENDIX A SPACE STANDARDS

Section 5000.APPENDIX A Space Standards

These space standards guide the design of interior spaces by establishing policies and requirements to provide State employees with functional work environments appropriate for their required tasks, maximize the efficient use of space, and enhance work areas for all employees and the public. Please note that, in some cases and based upon operations, unique functions and existing building conditions and dimensions that do not meet the space requirements of this Appendix may be greater and/or smaller than what is indicated. DCMS will evaluate and make final recommendations on a case by case basis.

These space standards will be reflected in the Space Request form, which is available from DCMS.

In the analysis of the basic units of activity, the following standards of space were developed to reflect the requirement of recurring, typical activities. The standards provide the occupant of each work station with space sufficient to conduct his/her business in an efficient manner. The amount of space allocated to each activity type includes allowances for various units of equipment and intrawork station circulation. Additional allowances are used for supporting space for each job position, as well as general circulation, conference rooms, reception area, special storage, and other unusual space requirements.

A) Enclosed Interior Office Space Standards
Enclosed private office space for agency Directors, Deputy Directors, the head of a Division, Bureau or Office, and similar employees requiring space to conduct private and confidential business shall be sized in accordance with one of the following 3 types.

1. Small Office Type: 100 through 120 SF

2. Medium Office Type: 120 through 150 SF

3. Large Office Type: 225 through 250 SF

B) Open Interior Work Station Space Standards

1. All open interior work stations shall be sized in accordance with the following (for work stations and cubicles):

a. Bench Type: 25 SF to 30 SF work areas and desks, with or without separators

b. Small Cubicle Type*: 36 SF

c. Medium Cubicle Type: 48 SF

d. Large Cubicle Type: 64 SF to 80 SF

2. Huddle/Collaboration Areas:

a. For 4 Staff: 64 SF

b. For 6 to 8 Staff: 144 SF

c. For 10 to 14 Staff: 225 SF

3. Reception Areas:

a. With No Waiting: 100 through 120 SF

b. With 4-6 Chairs for Waiting: 144 through 160 SF

c. With 8-12 Chairs for Waiting: 225 through 250 SF

Part-time or Field Personnel
Whenever personnel use the assigned space less than 50% of the work week, the area allowances shall be adjusted to maximize efficient space utilization. Generally, 60 square feet or less should be adequate. If operational requirements permit, desks and space should be shared by multiple staff.

C) Common Space Standards

1. New conference rooms shall have appropriate sizes (20 SF per person with required circulation and clearances) and may be smaller in size than the dimensions listed in a, b and c. All requests shall be evaluated by DCMS to determine the size of the conference room that can be constructed:

a. Small Conference Room for 6 to 10 Staff: 100 through 144 SF

b. Medium Conference Room for 14 to 16 Staff: 400 through 425 SF

c. Large Conference/Training Room for 20+ Staff: 625 through 750 SF

2. Breakrooms and Kitchenettes:

a. Small Breakroom: 120 through 150 SF

b. Medium Breakroom for 8 to 10 Staff: 225 through 250 SF

c. Large Breakroom for 20+ Staff: 400 through 425 SF

3. New storage area requests will be evaluated by DCMS to determine if physical walls are required. DCMS will determine the appropriate size of the storage room, which may be smaller than the following dimensions:

a. Small Storage Area: 100 through 150 SF

b. Medium Storage Area: 225 through 250 SF

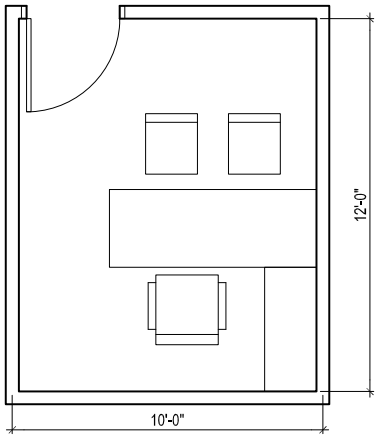
c. Large Storage Area: 400 through 425 SF

D) Federal Space Standards
Agencies requesting to use standards other than those established in this Appendix shall supply a copy of those standards to DCMS. In instances in which federal regulations require the use of federal space standards, the agency shall estimate its space requirements in accordance with the federal standards.

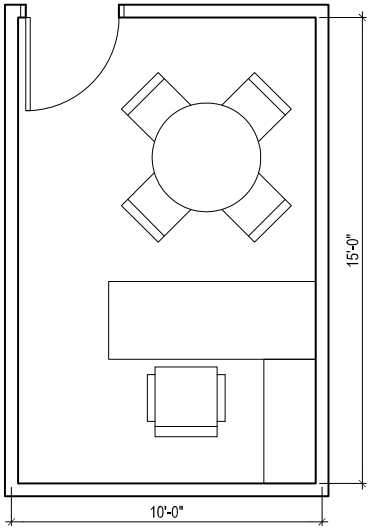
(Source: Amended at 44 Ill. Reg. 14851, effective September 1, 2020)

ILLUSTRATIONS OF NEW CMS SPACE STANDARDS

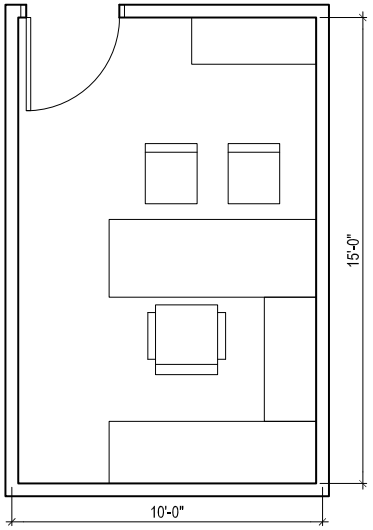
9/1/2020



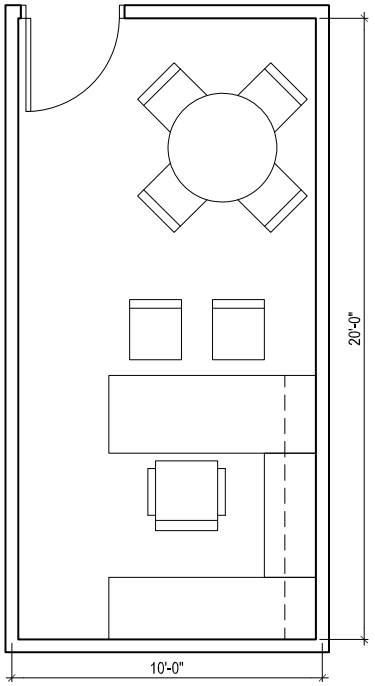
STANDARD OFFICE:
115 SF



MEDIUM OFFICE ALT. 1:
144 SF



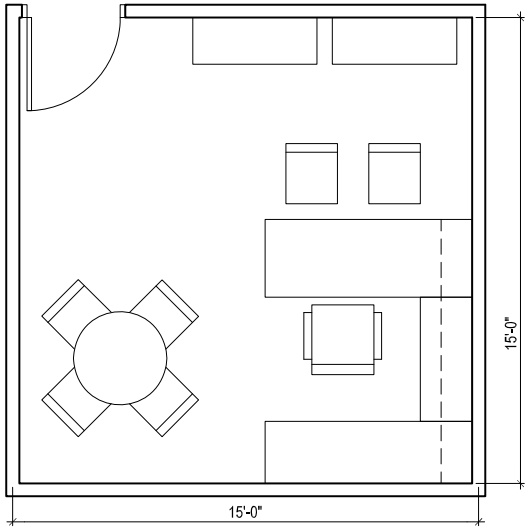
MEDIUM OFFICE ALT. 2:
144 SF



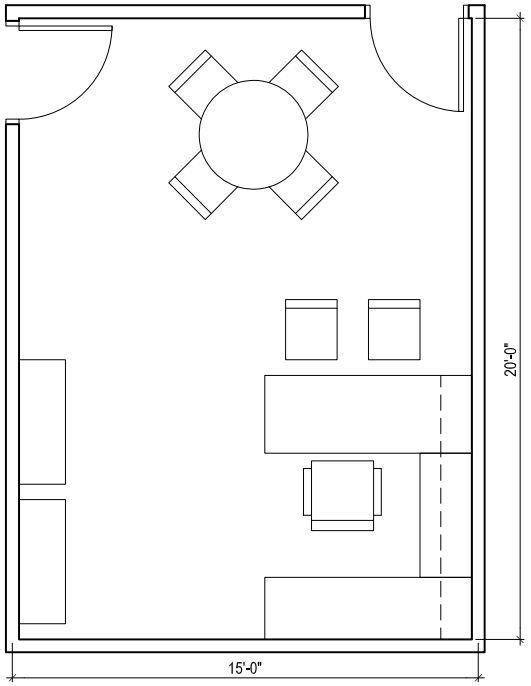
EXECUTIVE OFFICE ALT. 1:
192 SF

CMS SPACE STANDARDS - OFFICE PLANS

THESE LAYOUTS WITH FURNITURE ARE FOR ILLUSTRATION PURPOSES OF THE NEW CMS SPACE STANDARDS WHICH ARE IN EFFECT AS OF 9/1/2020. CMS WILL EVALUATE EACH SPACE TO DETERMINE THE BEST LAYOUT AND OPTIONS



EXECUTIVE OFFICE ALT. 2:
218 SF



EXECUTIVE OFFICE ALT. 3:
291 SF

CMS SPACE STANDARDS - OFFICE PLANS

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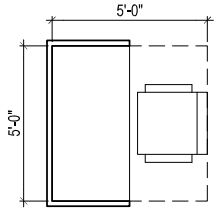
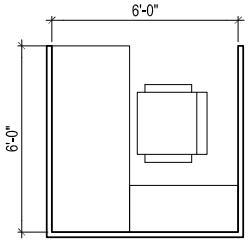
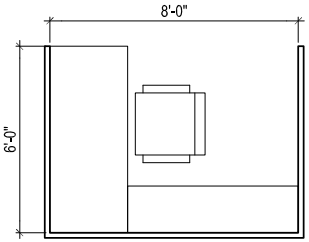


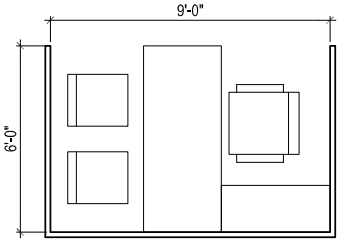
BENCH TYPE WORKSTATION:
25 SF



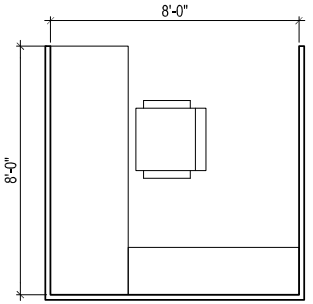
SMALL WORKSTATION:
36 SF



MEDIUM WORKSTATION:
48 SF



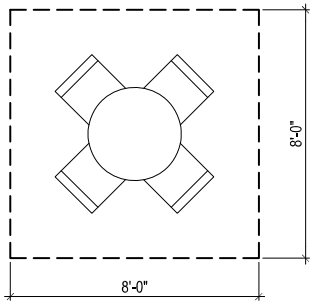
LARGE WORKSTATION ALT. 1:
54 SF



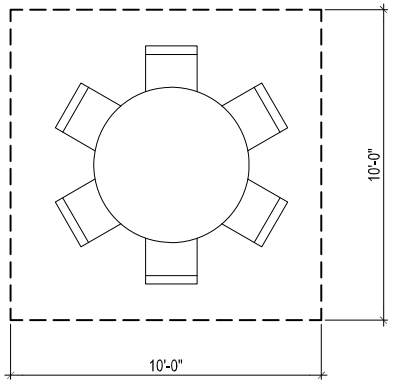
LARGE WORKSTATION ALT.2:
64 SF

CMS SPACE STANDARDS - WORKSTATION PLANS

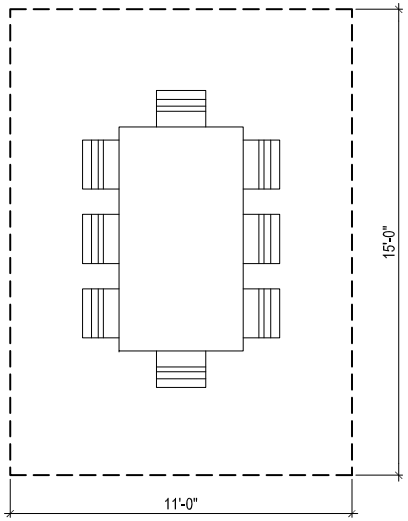
THESE LAYOUTS WITH FURNITURE ARE FOR ILLUSTRATION PURPOSES OF THE NEW CMS SPACE STANDARDS WHICH ARE IN EFFECT AS OF 9/1/2020. CMS WILL EVALUATE EACH SPACE TO DETERMINE THE BEST LAYOUT AND OPTIONS



SMALL HUDDLE:
4 SEATS/ 64 SF



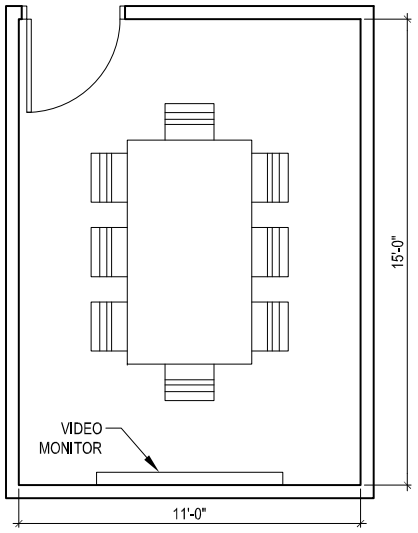
MEDIUM HUDDLE:
6 SEATS/ 100 SF



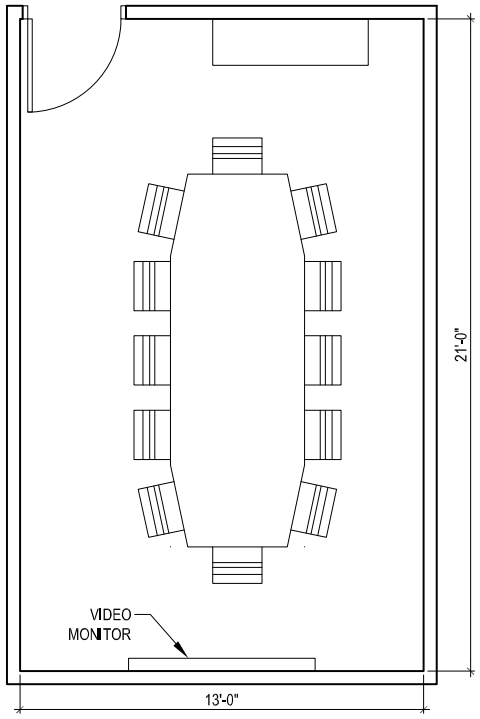
MEDIUM HUDDLE:
8 SEATS/ 165 SF

CMS SPACE STANDARDS - COLLABORATION PLANS

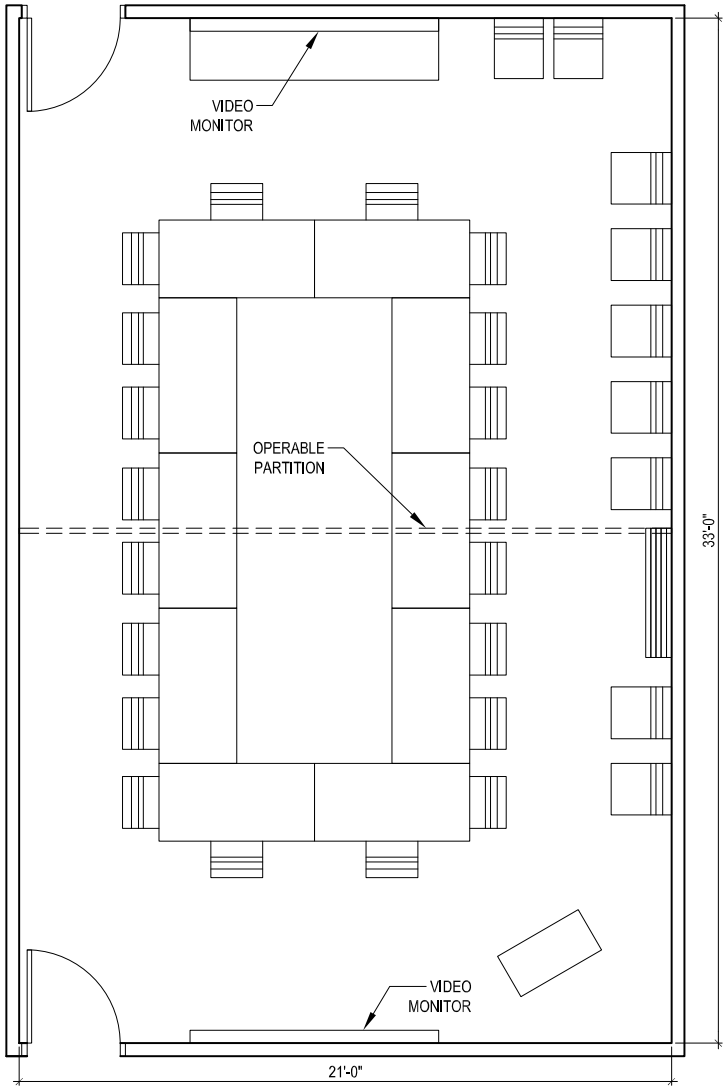
THESE LAYOUTS WITH FURNITURE ARE FOR ILLUSTRATION PURPOSES OF THE NEW CMS SPACE STANDARDS WHICH ARE IN EFFECT AS OF 9/1/2020. CMS WILL EVALUATE EACH SPACE TO DETERMINE THE BEST LAYOUT AND OPTIONS



SMALL CONFERENCE:
8 SEATS / 165 SF



MEDIUM CONFERENCE:
12 SEATS / 273 SF



LARGE CONFERENCE ALT. 1:
20-30 SEATS / 700 SF

CMS SPACE STANDARDS - COLLABORATION PLANS

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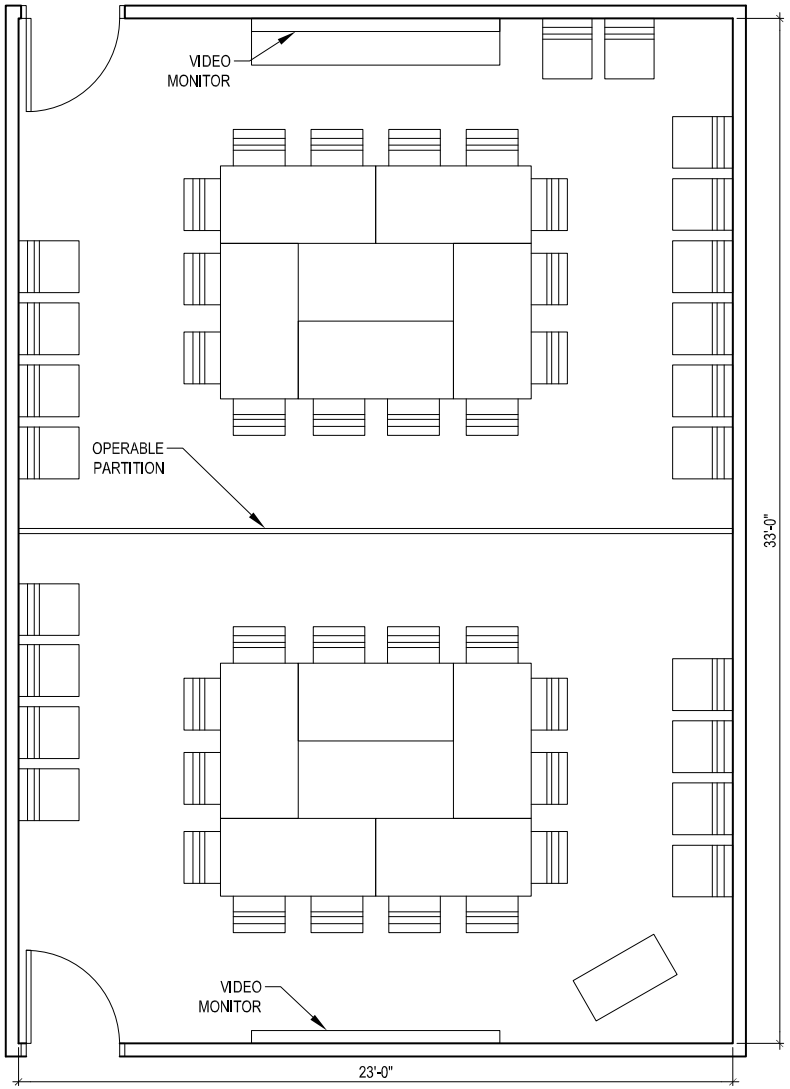
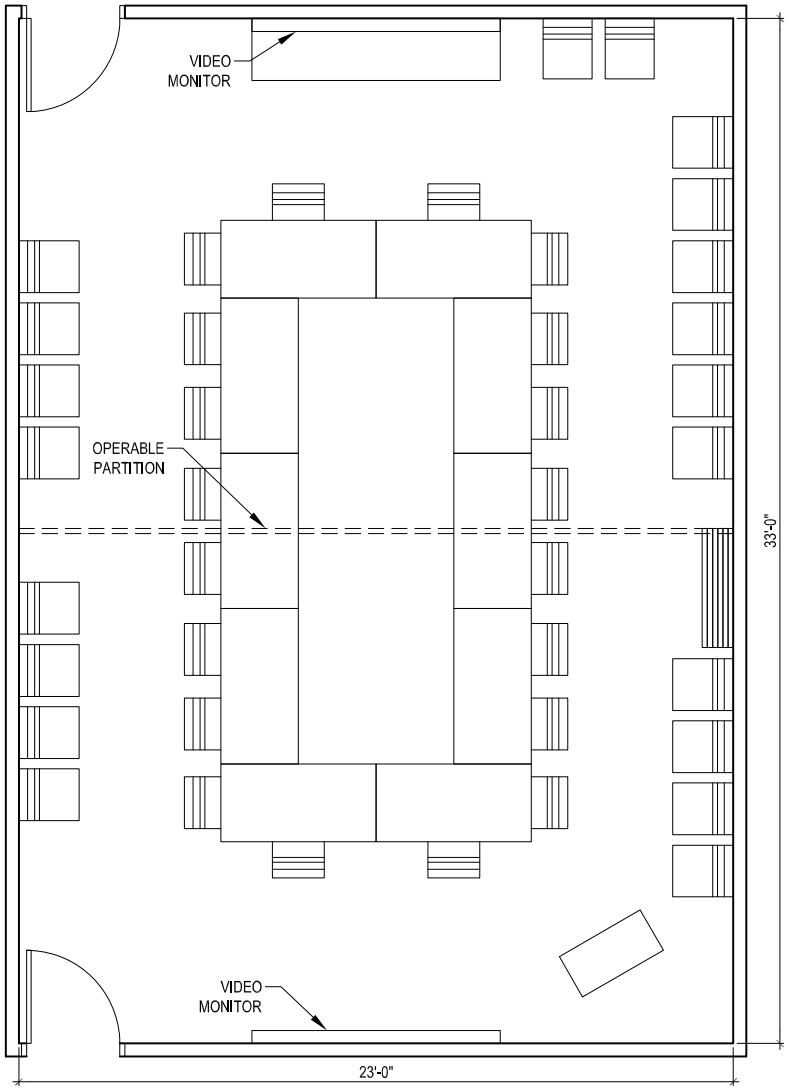


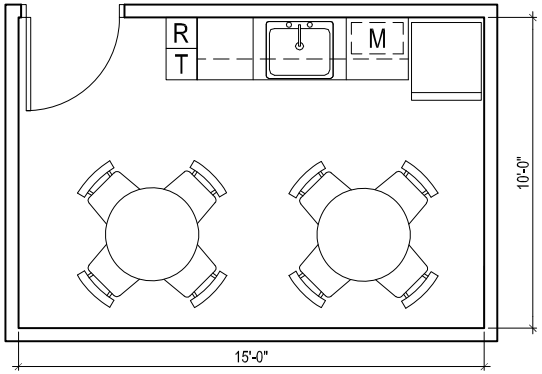
LARGE CONFERENCE ALT. 2A:
20-40 SEATS / 760 SF



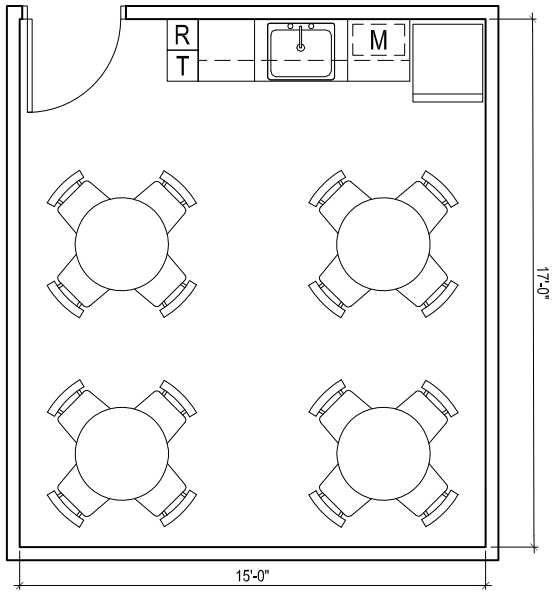
LARGE CONFERENCE ALT. 2B:
20-40 SEATS / 760 SF

CMS SPACE STANDARDS - COLLABORATION PLANS

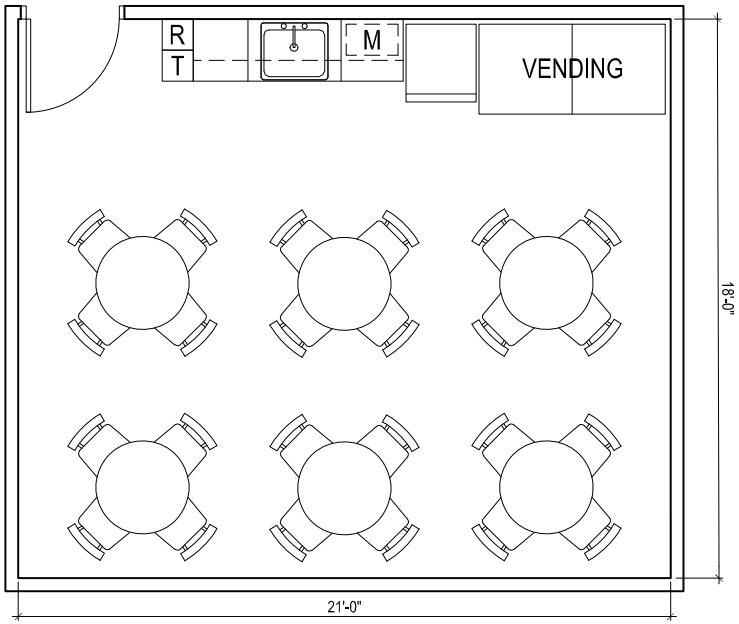
THESE LAYOUTS WITH FURNITURE ARE FOR ILLUSTRATION PURPOSES OF THE NEW CMS SPACE STANDARDS WHICH ARE IN EFFECT AS OF 9/1/2020. CMS WILL EVALUATE EACH SPACE TO DETERMINE THE BEST LAYOUT AND OPTIONS



SMALL BREAK ROOM AREA:
8 SEATS / 150 SF



MEDIUM BREAK ROOM AREA:
16 SEATS / 250 SF



LARGE BREAK ROOM AREA:
24 SEATS / 378 SF

CMS BREAK STANDARDS - BREAK ROOM PLANS

THESE LAYOUTS WITH FURNITURE ARE FOR ILLUSTRATION PURPOSES OF THE NEW CMS SPACE STANDARDS WHICH ARE IN EFFECT AS OF 9/1/2020. CMS WILL EVALUATE EACH SPACE TO DETERMINE THE BEST LAYOUT AND OPTIONS

I-6 LEED Criteria

LEED Certification

LEED Certification – The design-build team is required to achieve the project's LEED Silver certification target per the requirements established in the LEED Rating System for LEED v4. Version 4.1 substitutions shall only be considered on an individual credit basis, as advantageous. The goal in achieving LEED Silver certification is to deliver a facility that provides an excellent work and educational environment for employees and visitors while delivering long-term energy and water resource savings.

It is anticipated that the design-build team will utilize an integrative design process and sustainability best practices to develop a facility that achieves the Owner's project LEED goals. This will require early and collaborative goal setting, early energy modeling, and water budgeting. Updates to this modeling and other technical analyses must be integrated throughout the design process to guide decisions.

Specific Design-Builder responsibilities shall include:

- Coordinate project design strategies within all construction documents and specifications required to meet Owner Sustainability and LEED goals.
- Provide a qualified LEED Administrator to coordinate and assemble certification documentation throughout project design and construction.
- Provide plans, procedures, calculations, and any documentation necessary to obtain all prerequisites and credits required for LEED certification.
- Develop a LEEDv4 scorecard that complies with Owners Project Requirements (OPR) document. The scorecard is to be developed as an outcome of Goal Setting meetings. The scorecard is not accepted until reviewed and approved by the Owner and Stakeholders as identified by Owner.
- LEED Online Submittals: Upload project LEED forms, documentation, and submittal data directly to USGBC's "LEED Online" website.
- Respond to questions and requests for additional information from the Owner, Owner's Consultants, and the USGBC regarding LEED Prerequisites and credits through the final determination of certification. Respond in a format acceptable to the Owner, Stakeholders as identified by Owner, and USGBC.
- Completed LEED certification process. Work is not complete until Owner has accepted USGBC's final review of LEED certification, and the LEED plaque is procured and installed.
- Include all costs associated with LEED review, and with the purchase and installation of plaque upon project certification. Include Appeals should they be required to earn the LEED prerequisites and necessary credits.

Meetings:

- LEED Goal Setting meeting: Coordinate with the Owner, LEED AP, CxA, and Stakeholders as identified by Owner, to schedule, participate in, and document a LEED Goal Setting meeting within 14 days of award. Ensure Owner goals are met to their satisfaction before the further commitment to design direction.
    - A LEED Scorecard with targeted credits to achieve project LEED goals will be produced from this meeting.
    - Develop a LEED Action Plan to support the Scorecard that describes how each targeted credit will be achieved by the project's design and construction.
- LEED Progress meetings: Facilitate and document monthly LEED progress meetings. These shall be conducted throughout design and construction to ensure progress in meeting LEED goals. For each meeting provide updates regarding design, calculations, documentation, and reporting as appropriate by project phase. LEED Action Plan updates may be used to provide design phase updates.
- LEED Construction Kick-off meeting: Coordinate with the Owner and LEED AP to schedule, conduct, and document meetings before site mobilization. Review LEED requirements as outlined in the LEED scorecard and Action Plan. Review construction phase LEED Plans for compliance with LEED requirements.
- Attendees: Authorized representatives of the Owner, LEED Administrator, Commissioning Authority, A&E, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend meetings. Participants at the meetings shall be familiar with the project and authorized to conclude matters relating to the Work.

Submittals:

- Basis of Design (BOD): Provide a BOD for review by the Owner, Stakeholders as identified by Owner, and Commissioning Authority that shows in detail how the requirements of the OPR are met in the design. The BOD content and format should follow requirements in the LEED Fundamental Commissioning at a minimum.
- Energy modeling iterations, site assessment, and water budgeting calculations.
    - Initial modeling and calculations must be undertaken to inform decision-making and provide evidence of compliance with the Integrative Design process before committing to design direction. To provide value, these activities must take place as early as possible.
    - Provide iterations of modeling and calculations to support LEED Action Plan updates at each design milestone.
- Commissioning and LEED review of construction documents shall be undertaken in conjunction with the Owner project milestone reviews. Per LEED requirements, Cx

reviews must be undertaken no less than the equivalent of mid-construction documents. A back-check set must be provided with review comments addressed and incorporated. Provide complete construction documents and specifications for these reviews.

- LEED Action Plan: Provide an initial Plan based on the LEED Goal Setting Meeting for review and refinement. Updates shall be provided at each milestone design submittal and monthly thereafter for the duration of the project.
    - Plan shall be always electronic and accessible for review of progress.
    - LEED Action Plan shall indicate how each targeted LEED credit and prerequisite will be met. Included shall be a list of all required submittals and calculations by credit, percentage complete, progress update notes, applicable product data for material selection, certifications for construction practices, procurement data, cumulative calculations, final calculations, the information needed from Owner, and action items with the name of individuals responsible.
    - Required construction phase LEED Plans shall be identified by the LEED Action Plan for specific LEED Prerequisites and credits. These Plans must be provided as project submittals.
- LEED Progress Reports: Throughout the project duration, concurrent with each Application or Payment, or as directed by Owner, submit monthly reports in the format as directed by Owner and Stakeholders as identified by the Owner to document compliance with the approved LEED Action Plan. Compare actual design and construction and procurement activities with LEED Action Plans, and track progress across all targeted LEED Prerequisites and credits.
- Construction phase LEED product or material submittals are in addition to other technical submittals. If a submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as separate submittals to verify compliance with indicated LEED requirements.

LEED Certification Criteria + Strategy

The required project certification level is LEED Silver, achieving a minimum of 50 points using the USGBC LEED New Construction v4 rating system. It is the responsibility of the Design-Builder to evaluate individual credit criteria and develop a certification strategy that responds to the Owner's project goals. The LEED checklist should identify any risk areas within the proposed certification strategy and provide justification deemed necessary to ensure minimum certification level is achieved. It is the Design-Builder and their designated LEED Administrator's sole responsibility to develop and determine the appropriateness of the project LEED Action Plan. The following material is included for reference only.

Location and Transportation

The proposed project site is within a qualified census tract with previously developed

portions. There is existing parking on-site to be converted with a parking allotment shared within the campus development. Areas of improvement documented within the schematic design phase will need to be evaluated for the viability of additional site points from Sensitive Land Protection, Reduced Parking Footprint, and the feasibility of any required installation of car chargers if desired by the CDB and IDOT. The site's proximity to community amenities renders additional credits likely not feasible.

Sustainable Sites

The civil engineer of record shall ensure stormwater pollution prevention plans developed for implementation during the construction phase comply with the 2012 Environmental Protection Agency Construction General Permit Requirements. The contractor will be responsible for the execution of these plans and providing photographic field reports of implementation.

The LEED Site Assessment Worksheet shall be completed by a combination of the Civil Engineer, Architect, Landscape Architect, and LEED Administrator. Stormwater management strategies within the campus development should be evaluated to maximize onsite retention and infiltration based on historical 95th and 98th percentile rainfall event data.

The landscape design shall document the viability of designing physically accessible open space within the project development exceeding a minimum of 30% of the site area. The landscape design should maximize the extent of native adapted vegetation and use heat island reduction criteria in the selection of hardscape materials. Roofing products should be selected to exceed a minimum SRI value of 72.

Based on the lighting zone definitions provided in the Illumination Engineering Society and International Dark Sky Association (IES/IDA) Model Lighting Ordinance (MLO) User Guide, the site lighting design should be evaluated to maintain acceptable illumination levels while specifying fixtures that meet the Backlight, Uplight, and Glare (BUG) ratings which meet the LEED Light Pollution Reduction credit criteria. See Table 1 and Table 3 of the LEED Reference Manual below.

TABLE 1. Maximum uplight ratings for luminaires

MLO lighting zone	Luminaire uplight rating
LZ0	U0
LZ1	U1
LZ2	U2
LZ3	U3
LZ4	U4

TABLE 3. Maximum backlight and glare ratings					
	MLO lighting zone				
Luminaire mounting	LZ0	LZ1	LZ2	LZ3	LZ4
	Allowed backlight ratings				
> 2 mounting heights from lighting boundary	B1	B3	B4	B5	B5
1 to 2 mounting heights from lighting boundary and properly oriented	B1	B2	B3	B4	B4
0.5 to 1 mounting height to lighting boundary and properly oriented	B0	B1	B2	B3	B3
< 0.5 mounting height to lighting boundary and properly oriented	B0	B0	B0	B1	B2
	Allowed glare ratings				
Building-mounted > 2 mounting heights from any lighting boundary	G0	G1	G2	G3	G4
Building-mounted 1–2 mounting heights from any lighting boundary	G0	G0	G1	G1	G2
Building-mounted 0.5 to 1 mounting heights from any lighting boundary	G0	G0	G0	G1	G1
Building-mounted < 0.5 mounting heights from any lighting boundary	G0	G0	G0	G0	G1
All other luminaires	G0	G1	G2	G3	G4

Water Efficiency

The landscape design should include only native adaptive species which are drought tolerant. After an initial 1-year establishment period, no permanent irrigation system should be included within the development boundary if pursuing full credit for outdoor water efficiency.

In addition to the utility water meter serving the development, a minimum of 2 submeters shall be considered to achieve credit. Sub-metered water end uses must account for a minimum of 80% of that use type and be exclusive to that use.

Indoor plumbing fixtures should evaluate the following design criteria. Where other water-using devices are included in the project scope, those shall be EnergyStar Certified and/or WaterSense Labeled, as required to meet LEED Prerequisite requirements.

- Water Closet: 1.28 GPF
- Urinal: 0.125 GPF
- Lavatory 0.35 GPM
- Kitchen Sink 1.5 GPM
- Shower: 1.75 GPM

If cooling towers are included within the design of mechanical or process systems, procurement of a one-time potable water analysis should be considered to measure the list of controlled parameters listed below for a minimum of 10 cycles to achieve 2 points. See Table 1 and Table 2 of the LEED Reference Manual below.

TABLE 1. Maximum concentrations for parameters in condenser water

Parameter	Maximum level
Ca (as $CaCO_3$)	1000 ppm
Total alkalinity	1000 ppm
SiO_2	100 ppm
Cl^-	250 ppm
Conductivity	2000 μS/cm

ppm = parts per million

μS/cm = micro siemens per centimeter

TABLE 2. Points for cooling tower cycles

Cooling tower cycles	Points
Maximum number of cycles achieved without exceeding any filtration levels or affecting operation of condenser water system (up to maximum of 10 cycles)	1
Achieve a minimum 10 cycles by increasing the level of treatment in condenser or make-up water OR Meet the minimum number of cycles to earn 1 point and use a minimum 20% recycled nonpotable water	2

No once-through cooling with potable water is permitted for heat rejection or process cooling. Additionally, any cooling towers or evaporative condensers are required to include a make-up supply water meter. Both are mandatory LEED Prerequisite requirements. X-ray equipment are within the scope of the project and will be subject to these prerequisite requirements. It will be the responsibility of the design-build team to determine whether air-cooled chillers or utilizing a central condenser water loop is most optimal.

Energy and Atmosphere

The project commissioning agent will work with responsible parties to refine the Owner's Project Requirements (OPR) and Basis Of Design (BOD) documents to complete all commissioning (Cx) process activities for all mechanical, electrical, plumbing, and (if contracted as part of the proposed LEED certification strategy) building enclosure

systems in compliance with ASHRAE Guideline 0-2005, ASHRAE Guideline 1.1-2007, and NIBS Guideline 3-2012 for Exterior Enclosures. This shall include reviewing the OPR and BOD against phased project documents, the development, and implementation of a Cx plan, the incorporation of Cx requirements into construction documents, as well as the development and verification of system test procedures. Any issues arising from testing or through the course of the Cx process shall be tracked and documented within the final Cx report with applicable resolutions. It is the responsibility of the selected contractor and all subcontractors to participate in and facilitate the Cx process as required to ensure the successful verification of system installation and functionality. It is advised to consider engaging the Cx Agent to develop a monitoring-based Cx plan which identifies points of measurement and procedures to assess ongoing building performance after project turnover.

A whole building energy simulation shall be developed based on the proposed building design to demonstrate building performance over LEED minimum requirements. The model shall follow calculation procedures according to ANSI/ASHRAE/IESNA Standard 90.1-2010 Appendix G. An initial set of modeling results will be developed to reflect the schematic phase building layout and systems configuration. The model will represent building loads and operation schedules as advised by IDOT and developed by project consultants during the programming phase. Calculations will be revised for each phase of design to ensure approved building performance criteria are maintained within construction documents.

The project must provide mandatory reporting of monthly utility use data to GBCI as a prerequisite of certification for a minimum duration of 5 years. In addition, all building-level utility meters and submeters required to meet the LEED Advanced Energy Metering Credit must be "smart" meters capable of recording consumption data at an hourly interval or less and be network addressable. These meters must be permanently installed on all individual energy end uses equaling 10% or more of annual energy consumption, as identified with the whole building energy model. Identified end uses shall not mix multiple or unrelated loads within a single qualified submeter. The viability of pursuing advanced energy metering should be based on early energy model results and Design-Builder pricing for proposed systems.

Chlorofluorocarbon (CFC)-based refrigerants are prohibited for use throughout the project in any new equipment as a mandatory prerequisite of LEED certification. Nominal cooling capacity, refrigerant type, and refrigerant charge for each applicable piece of equipment must be included within construction document equipment schedules.

Green Power and Carbon Offsets shall be calculated based on the approved whole building energy simulation predicted annual energy consumption. The requirement to procure Green Power and Carbon Offsets should only be determined after preliminary construction review comments are received based on the needs and discretion of the project.

Materials and Resources

Provision shall be provided throughout the project to facilitate the collection and disposal of recyclable material. This includes point-of-use receptacles in all public areas and

private workstations, as well as central points of collection appropriately sized and accessible to necessary waste haul service vehicles.

The Design-Build contractor must develop a Construction Waste Management Plan and evaluate procurement of construction waste services. As applicable, conduct required on-site activities to facilitate a minimum construction waste diversion rate of 75% of total waste, by weight. Waste haul services must be capable of providing monthly reporting summarizing a minimum of four (4) recycled waste material streams. The contractor must provide an estimate of product waste as a percentage of total waste, that will contribute to achieving the overall required diversion rate. This must be achieved either by on-site segregation or off-site sorting. Contracted waste haulers must be capable of providing a list of destination facilities where recycled construction waste will be processed for reuse.

Consideration should be made to conducting a Whole-Building Life-Cycle Assessment of the building's structure and enclosure to demonstrate a minimum 10% reduction compared with a baseline building. The baseline building must be of similar use, function, and type with a minimum 60-year useful life. Associated designers, product manufacturers, and qualified bidders must be capable of providing quantities and ISO 14044-compliant supporting documentation.

Qualified contractors must provide supporting documentation for minimum quantities of installed materials to meet the requirements of applicable Building Product Disclosure and Optimization credits. The Design-Builder LEED Action Plan must identify required supporting documentation for applicable products within divisions 3-10, 31, and 32.

Indoor Environmental Quality

Smoking shall be prohibited within all interior spaces and throughout the project site. No smoking signage shall be posted at all regularly accessed building entries and near any outdoor air intakes. Where smoking is provided for on-site, it must be within a designated area not within 25 feet of building entries or fresh air intakes.

Filters should be provided on all ventilation equipment serving the building with a minimum MERV 13 rating. All terminal devices and equipment used to recirculate air shall be evaluated for compatibility with individual MERV 13 filtration. Where filters are provided, specify 0'-2" filtration racks for associated equipment.

All space used for chemical storage or having the potential for hazardous gas must be negatively pressurized, provide closer hardware on swing doors, and be fully enclosed with either a hard lid ceiling or drywall partitions from deck to deck.

All swing doors and vestibules transitioning to ventilated and/or conditioned space should be evaluated for either permanently installed walk-off mats, replaceable roll-out mats, or a combination of both. All required entry mats must be a minimum dimension of 10'-0" in the path of travel to achieve LEED credit.

Providing standalone CO_2 monitoring devices in all densely occupied multi-occupant spaces such as breakrooms and conference rooms, open office seating areas, training spaces, auditoriums, and workrooms should be considered. Installed devices must be

capable of providing occupant alerts with either audible or visual alarms based on measured space levels. These are not required to control ventilation rates.

Qualified contractors must provide supporting documentation for minimum categories of materials installed within the building enclosure to meet the requirements of Building Product Disclosure and Optimization credits. For all wet-applied products, the applicable contractors must provide the volume of products purchased. Complete supporting documentation must be provided for proposed products included within divisions 3-10, 31, and 32.

During construction, the contractor must ensure best practices are in place to maintain a clean and orderly construction site. Where permanently installed HVAC equipment is operated during construction, temporary filters must be installed and replaced before final occupancy. The date of replacement, make, and manufacturer of all filtrations must be recorded. Interior finish products and those which are subject to moisture damage or contamination must be protected on-site before and after installation. Any product showing damage must be discarded or replaced. The contractor is responsible to provide dated photographs to document implementation. These must be compiled into monthly reports with descriptions of actions taken on-site and provided to the LEED consultant for review.

Several options for assessing indoor air quality must be considered based on the overall project checklist needs for achieving silver. The project may install new filtration media and conduct a whole building flush out by providing 100% outside air for a minimum number of air changes, either wholly or partially before building occupancy. If the project schedule or energy implications are determined to be prohibitive, indoor air quality testing may occur on-site utilizing qualified equipment to measure required air metrics following the LEED v4.1 substitution. Either of these options would be worth 1 point to the project. If an additional point is deemed necessary, air samples from required locations based on the final project design may be collected and sent to a qualified laboratory for testing. This option under LEED v4 would be eligible for 2 points.

Space heating, ventilation, and air-conditioning systems and the building envelope must be designed to meet the requirements of ASHRAE Standard 55-2010, Thermal Comfort for Human Occupancy. Comfort controls should be evaluated for at least 50% of individual occupant spaces and 100% of shared multi-occupant spaces. Where thermostats are not able to meet requirements, providing individual desk fans will not be acceptable to Owner. Where there are open office workstations, workstations are considered individual occupant spaces and likely will not be able to meet credit requirements.

Lighting control systems should be evaluated to provide dimming controls to occupants throughout regularly occupied spaces. A separate lighting zone with multiple scene control must be provided in conference rooms or where presentations may be given to achieve LEED credit. In open office areas or spaces where there are workstations used by several people within the same space, task lighting must be provided to give occupants control over light levels to comply with credit requirements.

Innovation in Design

Possible strategies to achieve innovation credits shall be proposed within the LEED checklist and be evaluated during the schematic phase for design feasibility and alignment with the Owner’s project goals

BASIS OF DESIGN

PART II

II-1 Basis of Design: General & Sole Sourcing

General
Basis of design narratives have been provided to define criteria for the project. Use of manufacturer names, products, basis of design examples, or any specific proprietary terms are utilized to establish levels of quality and performance, not indications of sole or source limitations, or preferences for specific manufacturers. Alternates of equivalent quality and performance may be proposed.

Basis of design criteria have been developed in coordination with Using Agency requirements. However, they do not relieve the design-build team from performing due diligence in the selection of all components, systems, products, assemblies, equipment, etc. for the project. All selections must be reviewed and approved by CDB and the Using Agency.

Sole Sourcing
The following items are identified as sole sourced by CDB/IDOT:

1. Schlage Primus Door Cylinders
2. Hirsch HID Proximity ProxPoint Plus 6005 Card Readers
3. Hirsch Identiv MX-8 and MX-4 Door Controllers
4. Axis 3245-LVE Exterior Cameras & Axis 3807-PVE Interior Cameras

Instances of sole sourcing do not relieve the design-build team from performing due diligence in the coordination and integration of sole sourced items into the overall project. Confirm exact model numbers with Using Agency to verify availability at time of purchase.

II-2 Basis of Design: Civil

A. EXISTING CONDITIONS

CDB IDOT is proposing to construct an approximately 76,500 SF Materials Lab at the south side of the current IDOT campus at 2300 S. Dirksen Parkway in Springfield, IL. Two warehouse/maintenance buildings and a dense forest area currently inhabit the location for the proposed building. For this phase of the project, the northern of the two warehouses will be demolished, and the forest cleared within the phase limits to the northwest.

The site consists of approximately 6.5 acres and is zoned R-5B.

The proposed building sits at a higher elevation than the surrounding grade, generally sloping to the roadway within IDOT's property along the east of the site, and west to the forested area and natural detention along South Dirksen Parkway. The existing ground cover consists of approximately 23% asphalt (impervious) parking lot, 12% existing building, and 65% fair woodlands, per the cover types found in the Urban Hydrology for Small Watersheds Manual. The soil types within the proposed site consist of 86% Rozetta silt loam at 2 to 5% slopes (hydrologic soil group type B) and 13.6% Elco Silt loam at 10 to 18% slopes (hydrologic soil group type C) as indicated in the NRCS Soil Survey.

The existing northern warehouse building, parking lots and associated features like lighting, fencing, signage, and storm utilities will need to be removed prior to the start of construction. The southern warehouse building is in another phase of this project. New services are planned for the telecommunication, electrical, gas, and water utilities. Any existing utilities shall be removed or abandoned in place if deemed appropriate to do so with the exception of an existing 8" sewer line that is intended to serve the new Materials Lab building. A large portion of this site is to be built where there was previously a vast wooded area. Heavily wooded areas of the site have been cleared to make room for construction of a new warehouse, District 6 parking, and east leg of the new access road under separate contracts. Additional tree clearing may be required to facilitate construction of the new Materials Lab building, sitework, and west leg of the new access road.

B. SITE ANALYSIS/HARLEY CAMPUS PLAN

Per the Zoning and Landscape Ordinances of Springfield, IL site layout and parking criteria to include but not be limited to the following:

- Section 155.097: At least one accessory off-street parking space for each 200 square feet of floor area. To meet this parking requirement, the parking south of the building in a later phase shall be counted towards the building's parking.
- Section 155.126: One off-street loading space shall be provided for each building having 10,000 to 150,000 square feet, plus one additional loading space for each additional 150,000 square feet of floor area.
- Section 155.480: The number of points that must be achieved for parking lots through landscaping shall be equal to the total number of parking spaces provided.
- Section 155.480:
    - The point values are defined in section 155.48; trees = 18 points
    - Landscaping islands must be a minimum of 5' wide to plant trees. An additional 2' must be added for vehicle overhang.

Underground infrastructure to power the stations on the south side of the D6 parking lot is already anticipated along the Phase 3 planned roadway. Consideration to infrastructure that would support additional electrical charging station should be discussed by the team furthering the design development.

The design team should also verify with the finalized design the requirement for exterior equipment and required man or vehicle access. At this time, it is known that the freeze/thaw system for the concrete lab will require a flat-bottom fiberglass storage tank that is to be exterior to the building with a self-monitoring mechanical pump system.

ACCESSIBLE PARKING

Accessible space requirement per the Illinois Accessibility Code.

Total Parking in Lot	Required Minimum Number of Accessible Spaces
1 to 25	1
26 to 50	2

51	to	75	3
76	to	100	4
101	to	150	5
151	to	200	6
201	to	300	7
301	to	400	8
401	to	500	9
501	to	1000	2% of Total
1001	and over		20 plus 1 for each 100 over 1000

PARKING SPACES

Typical 90° Parking Space Dimensions

Type of Space	Dimension
Standard	8.5’ x 18’
Compact	8’ x 16’
Handicap	13’ x 18’
Accessible Aisle	5’ or 8’ wide
Accessible Space	8’ or 11’ wide
Trailer	12’ x 55’
Loading Dock	12’ x 65’

PARKING AREAS

Type of Space	Typical Aisle Widths for 90° Parking	Typical Corner Radii within Site
Standard	24′	4′
Compact	22′	4′
Handicap	24′	4′
Trailer[1]	75′	10′
Loading Dock 12.0′	75′	20′
12.5′	70′	20′
13.0′	65′	20′

1 Assuming a WB-65 tractor-trailer.

ON-SITE PARKING STALL COUNT

- **North Material Lab Lot: 84 Standard Parking Stalls + 4 ADA**
- **West Material Lab Lot: 89 Standard Parking Stalls + 4 ADA**
  - **Total Material Lab: 173 + 8 ADA**
- **North Hanley Motor Pool Lot: 50-60 Standard Parking Stalls (Any additional Bureau Assigned Vehicles may need to be located elsewhere)**
- **Lot D6-D: 18 Standard Parking Stalls**

DRIVEWAYS

Type of Use	Driveway Width	Curb Return

Parking Lot w/ radii	24′	10′
Parking Lot w/ flares	24′	3′ flare
Semi Trucks – Minimum[1]	35′	50′
Desirable[2]	50′	70′
Truck lane	15′	NA
To Mechanical Room	15′	10′

Minimum Driveway Dimensions

- Driveway radii and/or flares should never extend beyond property line.
- Coordinate location of employee and truck entrances with client and municipality.
- [1]Truck will cross over into exiting lanes of driveway. Confirm with client and municipality that this is acceptable.
- [2]This width and curb return will allow a truck in the right lane to turn into the site without crossing over into the exiting lanes.

PAVEMENT MARKING

Typical Pavement Marking Criteria

Type of Use	Color	Width
Parking Lot Striping	White	4″
Handicap Symbol	White in Blue Field	4′ x 4′
No Parking Area	Yellow	4″ – 3′ o.c.
Center Line	Double Yellow	4″
Edge Line	White	4″
Stop Bar	White	24″
Directional arrows	White	Per MUTCD
Crosswalk	White	24″ – 4′ oc.

Note: Roadway striping to conform to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD).

SITE LIGHTING

The existing site lighting infrastructure is to be completely removed and new LED lighting to be added at the north, west, and east parking lots to comply with jurisdictional regulations and IDOT minimum luminance requirements. Lighting shall also be provided along the proposed western roadway and around the building perimeter at door and dock locations. It is the intention that the lighting fixtures for this phase of the project are the same make or of similar style and color of those that were used for the roadway and warehouse phases.

2 PEDESTRIAN/ VEHICULAR CIRCULATION

SIDEWALK

Location	Minimum Width
Parallel to traveled way with parkway buffer	5′
End of parking space with 2′ bumper overhang	6′
Adjacent to roadway curb	6′
Walking / Bike path	8′
Secondary access/exit door	4′

FIRE LANE

- A fire lane should be provided around the building if there is no emergency vehicle access within 150 feet.

- The fire lane is to be 20 feet wide. Minimum distance from building to be the height of the building.

RECEIVING/ VEHICLE SITE ACCESS

Adjacent to the service yard, the building will have 2-4 48" high docks that can service trucks up to a WB-50, which is larger than the typical IDOT vehicle. The docks will be climate controlled and located near to the Traffic Instrumentation Lab (for inside vehicle storage) and near the Concrete Lab for receiving samples.

Programs that need overhead door access:

- Material labs for crane access
  - Concrete lab

Programs that require dumpsters:

- District 6 Materials Lab – (1) 10 CY dumpster
- CBM – (1) 10 CY metals recycling dumpster
- CBM – (1) 20 CY non-metals dumpster

Programs that require external hazardous waste storage:

- It is planned that the existing hazardous waste for District 6 will be stored within the new facility.

3 STORMWATER MANAGEMENT/INFRASTRUCTURE

PIPE MATERIAL

- In most cases use reinforced concrete pipe (RCP), Class III.
- When jurisdictions allow, use a less expensive pipe material, such as ADS N-12 pipe.
- If directional boring is required, use high density polyethylene pipe (HDPE).
- Where the pipe cover is less than 2 feet or the pipe depth is more than 15 feet, consider the use of ductile iron pipe (DIP) as site conditions dictate.

- For downspout laterals less than 12” in diameter, use polyvinyl chloride pipe (PVC).

- All structures are to be precast reinforced concrete. All pipe openings shall be precast. Knock-outs are not allowed.

- Manholes are to be pre-cast concrete having a minimum inside diameter of 48 inches with an eccentric cone positioned so that the man-opening is centered over the manhole steps.

- Where pipes are to be placed under an area that is not to be disturbed, the pipe is to be placed in casing. Casing is to be installed by jacking and boring. The size of the casing pipe shall be as follows:

Carrier Pipe ID (in.)	Casing Pipe OD (in.)	Casing Wall Thickness (in.)
6	20	0.344
8	20	0.344
12	24	0.375
16	30	0.469
24	42	0.625
36	54	0.781
48	72	1.000

PIPE DESIGN

- Downspouts will be routed underground to the nearest storm sewer.

- Stormwater within paved areas to be collected by storm sewer inlets or catch basins.

- In order to maintain level pavement such as at truck docks, place trench drains parallel to the face of the building along the entire dock length.

- All storm sewer pipes shall be designed to have a minimum cover of 2 feet to finished grade.

- In order to provide for self-scouring of the pipes, the minimum design velocity shall be 3 feet/second per the IDOT Drainage Manual.

- In order to prevent cavitation, the maximum design velocity shall be 10.0 feet/second.

- Typically, when calculating gravity flow in the pipe, use a Manning's "n" of 0.013.

- The minimum pipe size for a storm sewer main shall be 12".

- Sewer pipes with slopes greater than 20% are to be provided with anchors spaced at a minimum of 36 feet.

- Manholes are to be placed at the end of each line, at all changes in alignment or slope, and at changes in pipe size.

- Concrete flared end sections or headwalls should be provided at all pipe outlets. The structure should be set into the slope and provided with rip rap outlet protection. Coordinate with jurisdiction or client on the need for grades over the pipe outlet.

DETENTION BASIN DESIGN

- At a minimum, storm water detention facilities shall be designed to detain the 100-year frequency runoff. The allowable release rate shall not exceed that of the existing condition. A preliminary report *IDOT District 6 Hanley Complex Stormwater Study* dated July 2022 summarized that the initial site layout in conjunction with the other proposed improvements on site will only increase the volume in the current lake at the east side of the site by 1 Ac-ft, which is less than an inch increase in the high water surface elevation. The site will drain to the eastern lake via a series of stormwater catch basin structures and pipe networks.

INSTALLATION

- All pipe and fittings to be provided with a minimum 6 inches of bedding to extend to the spring line for rigid pipe and a minimum of 12 inches over the top of the pipe for flexible pipe.

- Storm sewers to be placed no closer than ten (10) feet from any existing water a main. Water mains to be located a minimum of 18 inches above the crown of the sewer for a minimum distance of ten (10) feet on either side of the sewer.

When a water main passes under a sewer, there shall be a minimum vertical separation of 18 inches between the invert of the sewer and the crown of the water main and the sewer shall be constructed of water main type pipe with the length of the pipe centered over the crossing.

4 PAVEMENT

BITUMINOUS CONCRETE PAVEMENT DESIGN

- Bituminous concrete pavement to be designed for a minimum 20-year service life based on site soil conditions and projected traffic volume. Recommended design pavement sections to be provided by the Geotechnical Engineer.

- Bituminous concrete pavement to be provided in areas that will not experience excessive loading or maneuvering. In those cases consider the use of Portland cement concrete pavement.

- In highly traveled areas, bituminous concrete pavement shall be provided with a concrete curb and gutter edge. To minimize cost, a pressure-treated header board or aggregate shoulder could be placed along the pavement edge.

PORTLAND CEMENT CONCRETE PAVEMENT DESIGN

- Portland cement concrete pavement to be designed for a minimum 20-year service life based on site soil conditions. Recommended design pavement sections to be provided by the geotechnical engineer.

- Design thickness to be based on vehicular loading and projected traffic counts.

- The pavement sections recommended by the geotechnical engineer are outlined in the Geotechnical section of this report
- Portland cement concrete pavement to be provided in areas that will experience excessive loading or maneuvering such as driveway aprons, truck docks, trailer parking, truck maneuvering areas, bus drop offs.

- Contraction joints to be provided at a maximum spacing according to the following table:

Slab Thickness (inches)	Maximum Joint Spacing (ft)
5	10
6	12
7	14
8	15
9	15
10	15
12	15

- Joints shall be placed at all inside corners.

- The angle between a joint and the edge of pavement shall be not less than 45°. At curved pavement edges when a joint approaches the edge at an angle less than 45°, provide a minimum 2-foot long intersecting joint perpendicular to the edge of pavement.

- The ratio between the length and width of a concrete pavement slab section should be no greater than 1.5:1.

- Dowels shall be placed at all pavement joints to provide for load transfer.

- Preformed joint filler shall be provided at all expansion joints, along buildings, and around structures within the pavement area.

5 GEOTECHNICAL

Throughout the majority of the site, the geotechnical engineer encountered 2-3 inches of topsoil then brown and gray silty clay down to about 10 feet below grade. The geotechnical report recommended pavement sections for rigid pavement (PCC) are 6 inches of pavement over 6 inches of crushed stone and for flexible pavement (HMA) the recommended pavement section is 6 inches over 8 inches of aggregate. However, based on the IDOT pavement design (Chapter 54 of the BDE Manual) all pavements are required to have 12 inches of improved subgrade, either modified soil or aggregate subbase and a rigid pavement (PCC) section of at least 7.25 inches. It is recommended that the design team further coordinate with the geotechnical engineer on the purpose of each pavement area to provide sections suitable for the pavement use with the underlying soil. The design team should take into account the large vehicles and rates of delivery when dictating the pavement and subgrade thickness at the designated dock area. The design of pavement should meet the minimum IBR value of 3 for pavement as required by Illinois Department of Transportation Regulations.

For site preparations, the geotechnical report recommends removing all soft or unsuitable materials including all building foundations and slabs from the area of the proposed building. For new pavement, existing asphalt and associated subbase should be removed and topsoil stripped in undeveloped areas.

II–3 Basis of Design: Landscape Architecture

General

Basis of design narrative for landscape architecture has been excluded from the bridging documents at the request of CDB. The design-build team will be responsible for identifying the criteria for all planting strategies and requirements including existing tree areas, site hardscapes, site amenities, signage, etc. during the design-build process.

Consideration of landscaping in the bridging documents was limited to cost estimate allowances, possible LEED criteria for site development, and the following requirements identified by the Illinois State Historic Preservation Officer (SHPO) for screening trees as follows.

SHPO Requirements

1. As part of the lab building site development, provide screening trees to screen views of the new warehouse building from Dirksen Parkway and the Hanley Building campus; and,
2. Provide lab building design-build project plans at 30% and 70% showing lab building site development including areas of screening trees for SHPO review, comment, and coordination.

II–4 Basis of Design: Architecture

Existing Hanley Building

Existing District 6 Building

Existing Hanley Campus Architecture

The new lab building will become part of the larger IDOT Hanley campus. Two existing structures of architectural significance bracket the lab building site, the Hanley building to the north and District 6 office building to the south. While not a project requirement, consideration of the existing campus context and identity as influence for the new lab building design is at the discretion of the design-build team.

The Hanley building is characterized by a distinct horizontal form elevated above the ground on multi-story columns creating a continuous loggia around the building at ground level. Lower levels with darker finish set back from the upper form visually recede allowing the upper form and columns visual prominence. A minimal materials palette consists of precast concrete, dark bronze metals & window frames, and glass.

District 6 offices are composed of a multi-story structure with straightforward volumetric massing and minimal articulation with an emphasis on verticality of

forms. A limited materials palette consists of precast concrete components, dark bronze window frames, and glass.

New Lab Building Architecture

Exterior Materiality

Exterior materials should be selected to achieve limited maintenance, long range durability, and levels of quality that complement the existing Hanley and District 6 structures. All materials selections to be reviewed and approved by CDB & Using Agency.

Exterior Materials Guidelines:

- Wall – Masonry Veneers (Brick, Decorative CMU, Cut Stone)
- Wall – Precast Concrete Panels
- Wall – Pre-finished Metal Panels
- Windows & Doors – Thermal Storefront and Entrance Systems
- Glazing – 1" clear, Low-e Insulating Units
- Soffit – Pre-finished Metal Panels
- Roofing – 60 mil, Fully Adhered PVC Membrane in compliance with CDB roofing standards

Glazing

As a free-standing structure, the new lab building will have ample opportunity for fenestration. Glazing extents and locations should be considered in terms of daylighting, views, thermal envelope performance, and solar control. Various programmatic areas require different levels of natural light and views. Possible fenestration strategies by space type include:

- Primary Entry – Direct exterior fenestration to provide daylighting, views and interior/exterior connection.

- Training Rooms – Direct exterior fenestration to provide daylighting and/or views with the ability to control light levels for space needs.

- Open Offices – Direct and/or indirect exterior fenestration to provide daylighting and views. Possibly zone open office areas with direct exterior fenestration strategically to allow indirect daylighting and views into lab areas across the space.

- Private Offices & Conference Rooms – Direct exterior fenestration to provide daylighting and views at perimeter spaces. Private offices or conference rooms utilizing sidelites or interior windows could also provide indirect access to daylighting and views from other interior spaces.

- Office Circulation – Direct and/or indirect exterior fenestration at intervals to modulate long interior circulation paths.

- Laboratories – Direct and/or indirect fenestration for daylighting such as clerestory windows, or interior glazing between lab spaces and adjacent office areas with direct fenestration. Individual labs may have specific light sensitivity criteria. Coordinate with Using Agency to determine appropriate fenestration strategies during design. Reference Laboratory basis of design for additional information.

Entry Points
Lab building entrances should facilitate efficient access from new parking areas around the structure and egress requirements within the building. Separate entrances are necessary for the greater lab building and District 6 lab/office unit. The main building entrance should be visually distinct as the primary staff and public access point. District 6 exterior entrance is specifically for District 6 staff and should be convenient to District 6 parking without creating confusion with the main entrance. Controlled interior access between District 6 and the greater lab building can be accomplished via door connecting to internal office circulation.

Equipment Screening
Exterior equipment is anticipated at both rooftop areas and at ground level adjacent the building. Screen rooftop equipment with louvered or opaque systems that coordinate and compliment exterior building materials and massing while maintaining access for equipment maintenance and replacement. Ground mounted equipment may or may not be screened but should be located to mitigate negative visual and acoustical impacts on other areas of the building and surrounding structures and/or public facing outdoor spaces. Recommend coordination review of roof mounted mechanical equipment, RTUs, lab exhaust fans, general exhaust fans, etc. to verify adequate screening is provided.

Interiors – General Considerations
- All materials selections to be reviewed and approved by CDB & Using Agency.
- Dirty vs Clean – Activities in various labs generate significant dust and other particulates that require removal and management to maintain lab environmental standards. Consideration should be given to mitigating the spread of dust and other contaminants into office and other clean areas of the building from lab spaces. Such measures may include, but are not limited to, separate HVAC distribution systems, walk-off mats or carpets, door seals, etc.
- Noisy vs Quiet – Similarly, certain labs generate significant noise and vibrations that should be addressed by measures such as slab isolation, mass construction, sound insulation and sealing systems.

- Public vs Private – Visitor spaces should be zoned inside the structure convenient to the primary entrance/security points and restrooms and to minimize access to non-visitor areas of the facility.
- Critical Pressure Relationships – Provide measures to maintain pressure differentials between spaces where required. Passive or active solutions are acceptable with the exception of laboratory anterooms or vestibules due to maneuvering difficulties through additional openings and confined spaces.
- Ceiling Heights – Varied ceiling heights are required. A general outline of ceiling heights includes the following:
    1. Metals & Miscellaneous Products Lab – 16’ min.
    2. Other Lab/Storage Spaces – 12’ min.
    3. Office & Administrative Areas – 9’ min.
- Signage – Provide comprehensive building signage package.
    1. Interior - ADA compliant surface mounted plastic with raised characters. Provide signage for all spaces within the facility and any signage required by applicable codes including lab specific signage (see Laboratory Basis of Design.)
    2. Exterior – Cast or cut metal building identification and address characters.
    3. LEED – Signage required for LEED certification.
- Fire Extinguishers – Recessed stainless steel cabinets.
- LEED Compliance – Consider materials and systems required for LEED compliance including, but not limited to:
    1. VOC compliant paints, coatings, adhesives, and sealants.
    2. Entrance mats.
    3. Recycling collection and processing requirements.

Floor Vibration Control

The building structure will largely dictate the building’s response and susceptibility to vibration sources. Special consideration is required for the design of floor slabs at lab areas supporting high sound impact equipment to mitigate sound and vibration transmissions to adjacent areas in addition to measures required for sensitive lab equipment and procedures.

Acoustical Separation

Review and discussion with Using Agency representatives should be undertaken during the design phase to ensure that project specific acoustical design criteria are consistent with sound control expectations and budget parameters. The standard metric for acoustical separation performance is in terms of Sound Transmission Class (STC) which is a rating on the ability of a construction element to reduce sound transmission. Consider all aspects of partition designs that may require upgrades to maintain STC ratings between spaces, for example:

1. Additional layers of drywall.
2. Double stud or staggered stud partition construction.

3. Acoustical clips or resilient channels for attaching drywall to studs.
4. Acoustically enhanced gypsum board.

For spaces where controlling sound transmission and maintaining speech privacy at the entrance condition is more critical, the use of acoustically upgraded doors and glazing assemblies may need to be considered.

Room Acoustics

Reverberation Time (RT) Guidelines:

1. Private Office ≤0.6 seconds
2. Huddle Room ≤0.6 seconds
3. A/V Conference Room ≤0.6 seconds
4. Wellness Room ≤0.6 seconds
5. Training/Conference Room ≤0.8 seconds

Mechanical Noise Control

Background Noise Criteria (NC) and design guidelines, as produced by normal operation of mechanical, electrical, and plumbing systems:

1. A/V Conference Room NC 25 to 30
2. Wellness Room NC 30 to 35
3. Open Office Area NC 35 to 40
4. Private Office NC 35 to 40
5. Training/Conference Room NC 35 to 40
6. Lab w/o Fume Hood NC 35 to 40
7. Lab w/ Fume Hood NC 40 to 45
8. Huddle Room NC 40 to 45

The use of internal fibrous duct liner in supply and return ductwork for noise control of air handling equipment has proven effective in most applications in terms of cost and acoustical performance.

Main Mechanical Equipment Noise Control Guidelines:

1. Careful selection and specification of fans.
2. Units with plenum or fan-wall type supply fans.
3. Casing panels selection of the air handling unit.
4. Variable speed.
5. Manage duct runs.
6. Manage ductwork sizing.

Terminal Box Noise Control:

1. Avoid locating terminal or fan coil units above spaces with NC 30 or less.
2. Consider valve-only VAV terminals in lieu of fan-powered boxes.
3. Select diffusers at least five points below NC rating of room served.
4. Do not exceed 1” static pressure at VAV box inlets.

5. Avoid face dampers. Locate volume dampers as far upstream as possible.
6. Allow for at least 3’ of ducting prior to each supply diffuser and return grille, where possible.
7. Lining within terminal boxes and downstream ducting.

Plumbing Noise Control

General Guidelines:

1. Mount pumps on spring isolated inertia bases.
2. Minimum ½” nominal dimension between the outside of any pipe and a building element.
3. Resilient piping attachments.
4. Proper pipe velocities per ASHRAE.
5. Limit pressure at fixtures to 70 psi.
6. Avoid pipe/conduit routes through sensitive spaces.
7. Locate toilet rooms away from sensitive spaces.
8. Provide air chambers or shock-absorbing devices to prevent water hammer.

Vibration Isolation

All rotating mechanical and electrical equipment should be resiliently mounted to the building structure on appropriate vibration isolation devices in compliance with ASHRAE. General guidelines:

1. Locate major equipment on grade or near structural columns and above main girders. Support suspended equipment from major structural members. Avoid mid-span locations whenever possible.
2. All rotating mechanical equipment and large piping to have vibration isolation mounting corresponding to equipment selections.
3. Piping connected to vibration isolated equipment should be vibration isolated from the building structure within mechanical rooms or a distance of 50 feet from the equipment, whichever is greater. For noise critical spaces, provide resilient mounted pipe runs.
4. Connect ductwork to air handling equipment with flexible connections.
5. Mount transformers resiliently from the building structure.
6. 360-degree turn of flexible conduit for conduit connections to vibration isolated equipment.
7. 6-inch minimum clearance between vibrating equipment and building structure.
8. Adequate clearance under mechanical equipment for vibration isolators.
9. Seismic restraints, if required, separate from vibration isolation devices. Requirement, detailing and specification for seismic restraint by others.

Interiors - Program Spaces

Main Entrance Lobby (ID# 8.11)

Primary building entry point to accommodate staff and public access including large groups utilizing the building training center. Provide an entrance vestibule or similar interior/exterior buffering strategy. Entry lobby also requires accommodation for on-duty guard (reference Security basis of design).

Finish Guidelines:

1. Ceilings – 2'-0" x 2'-0" Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16" Recessed Grid. Consider 10'-0" plus ceiling height contingent upon building massing and entrance design.

2. Walls – 5/8" painted gypsum wall board over metal stud framing.
    - Gypsum finish Level 4 at painted walls, Level 5 at areas with sheen, color, lighting, graphics or specialty finish requirements.
    - Paint grade such as Sherwin Williams Promar 200, semi-gloss sheen, LEED VOC compliant.
    - Ratings as required by codes.

3. Floors – Sealed or polished concrete with 4" high resilient base.
    - Consider provisions for entrance mats required for LEED certification.

4. Doors/Windows/Hardware – Thermal anodized aluminum storefront and entrance system.
    - Hardware - pivot or continuous hinges, exit devices, ADA operators, weatherstripping and sweeps.
    - Reference security basis of design for access requirements.
    - Ratings as required by codes.

5. Reception/Guard Casework – AWI custom grade, flush overlay construction and hardware reception center with 1/2" thick solid surface counter. Reference Security basis of design.

Office Circulation (ID# 8.11)

Finish Guidelines:

1. Ceilings – 2'-0" x 2'-0" Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16" Recessed Grid. Minimum 9'-0" finished ceiling height.

2. Walls – 5/8" painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)

- Gypsum finish Level 4.
- Paint grade such as Sherwin Williams Promar 200, semi-gloss sheen, LEED VOC compliant.
- Ratings as required by codes.

3. Doors/Frames/Hardware
    - Doors; 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames; painted custom hollow-metal.
    - Hardware; butt hinges, office latch, recessed door bottom, jamb/head compressible sound gasketing, frame silencers, door stop, vision panel.
    - Ratings as required by codes.

4. Floors – Sealed or polished concrete with 4” high resilient base.

5. Corner Guards – 6” above finished floor to ceiling height flush/recessed satin stainless steel corner guards at outside corners.

Open Office Areas (ID# 1.20, 3.13, 4.12, 5.14, 5.15, 6.14, 6.15)
Finish Guidelines:

1. Ceilings – 2’-0” x 2’-0” Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16” Recessed Grid. Minimum 9’-0” finished ceiling height.

2. Walls – 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.
    - Ratings as required by codes.

3. Floors:
    - CBM Tech/Admin & Bureau of Research Open Offices - 24” by 24” modular tile carpeting such as Shaw Contract with 4” high resilient base.
    - CBM Lab Offices, District 6 Lab Offices, Bureau of Programming Lab Offices, Coordinator of Tests Open Offices – Sealed or polished concrete with 4” high resilient base.

4. Window Sills – 1/2” thick solid surface.

5. Solar Shades – Manual roll-up fabric window shades (3% openness factor) with recessed pocket.

Private Offices (ID# 1.19, 3.12, 4.11, 4.13, 5.11, 5.12, 5.13, 6.11, 6.12, 6.13)
Finish Guidelines:

1. Ceilings – 2'-0" x 2'-0" Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16" Recessed Grid. Minimum 9'-0" finished ceiling height.

2. Walls – 5/8" painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.
    - Acoustical batt insulation.
    - STC-45 minimum acoustical performance.
    - Ratings where required by codes.

3. Doors/Frames+Sidelites/Hardware
    - Doors - 3'-0" x 7'-0" x 1 3/4" flush, solid core, premium wood or plastic laminate veneer.
    - Frames + Sidelites - painted custom hollow-metal.
    - Hardware - butt hinges, office latch, recessed door bottom, jamb/head compressible sound gasketing, frame silencers, door stop.
    - Ratings where required by codes.

4. Floors
    - CBM Tech/Admin & Bureau of Research Offices - 24" by 24" modular tile carpeting such as Shaw Contract with 4" high resilient base.
    - CBM Lab Offices, District 6 Lab Offices, Bureau of Programming Offices, Coordinator of Tests Offices – Sealed or polished concrete with 4" high resilient base.

5. Window Sills – 1/2" thick solid surface.

6. Solar Shades – Manual roll-up fabric window shades (3% openness factor) with recessed pocket.

Conference Rooms (ID# 1.21, 5.16, 6.16)
Finish Guidelines:

1. Ceilings – 2’-0” x 2’-0” Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16” Recessed Grid. Minimum 9’-0” finished ceiling height.

2. Walls – 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.
    - Acoustical batt insulation.
    - STC-55 minimum acoustical performance.
    - Ratings where required by codes.

3. Doors/Frames+Sidelites/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames + Sidelites - painted custom hollow-metal.
    - Hardware - butt hinges, passage latch, recessed door bottom, jamb/head compressible sound gasketing, frame silencers, door stop.
    - Ratings where required by codes.

4. Floors
    - CBM Tech/Admin Conference Room, Bureau of Research Conference Room - 24” by 24” modular tile carpeting such as Shaw Contract with 4” high resilient base.
    - District 6 Lab Conference Room – Sealed or polished concrete with 4” high resilient base.

5. Window Sills – 1/2” thick solid surface.

6. Solar Shades – Manual roll-up fabric window shades (3% openness factor) with recessed pocket.

7. Marker Boards – White, dry-erase type.

Huddle Spaces (ID# 4.14, 5.17)
Finish Guidelines:

1. Ceilings – 2’-0” x 2’-0” Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16” Recessed Grid. Minimum 9’-0” finished ceiling height.

2. Walls – 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)

- Gypsum finish Level 4.
- Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.
- Acoustical batt insulation.
- STC-55 minimum acoustical performance.
- Ratings where required by codes.

3. Floors
    - CBM Tech/Admin Huddle Space - 24” by 24” modular tile carpeting such as Shaw Contract with 4” high resilient base.
    - CBM Lab Offices Huddle Space – Sealed or polished concrete with 4” high resilient base.

Workrooms (ID# 7.17)
Finish Guidelines:

1. Ceilings – 2’-0” x 2’-0” Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16” Recessed Grid. Minimum 9’-0” finished ceiling height.

2. Walls – 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.
    - Acoustical batt insulation.
    - STC-50 minimum acoustical performance.
    - Ratings where required by codes.

3. Doors/Frames/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames - painted custom hollow-metal.
    - Hardware - butt hinges, passage latch, frame silencers, door stop.
    - Ratings where required by codes.

4. Floors – 24” by 24” modular tile carpeting such as Shaw Contract with 4-inch high resilient base.

5. Casework – AWI custom grade, flush overlay construction and hardware with plastic laminate counters and backsplash.
    - Recycling and trash collection provisions.

Central Filing (ID# 7.16)
Finish Guidelines:

1. Ceilings – 2’-0” x 2’-0” Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16” Recessed Grid. Minimum 9’-0” finished ceiling height.

2. Walls – 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.
    - Ratings where required by codes.

3. Doors/Frames/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames - painted custom hollow-metal.
    - Hardware - butt hinges, passage latch, frame silencers, door stop.
    - Ratings where required by codes.

4. Floors – 24” by 24” modular tile carpeting such as Shaw Contract with 4” high resilient base.

Break Rooms (ID# 1.22, 4.15, 5.18, 6.17)
Finish Guidelines:

1. Ceilings – 2’-0” x 2’-0” Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16” Recessed Grid. Minimum 9’-0” finished ceiling height.

2. Walls – 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.
    - Acoustical batt insulation.
    - STC-50 minimum acoustical performance.
    - Ratings where required by codes.

3. Doors/Frames/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames - painted custom hollow-metal.

- Hardware - butt hinges, passage latch, frame silencers, door stop, vision panel.
- Ratings where required by codes.

4. Floors
    - CBM Tech/Admin & Bureau of Research Break Rooms - LVT with 4" high resilient base.
    - CBM Lab, District 6 Lab Break Rooms – Sealed or polished concrete with 4" high resilient base.

5. Casework – AWI custom grade, flush overlay construction and hardware with solid surface counters and backsplash.
    - Recycling and trash collection provisions.

6. Appliances – Not included in contract.
    - Refrigerator/Freezer.
    - Microwave.
    - Provide provisions for (2) vending machines at large breakrooms.

Training/Conference Centers (ID# 7.11, 7.12)
Training/Conference Centers should be located adjacent to the main lobby and near restrooms for convenient visitor access. Visitor spaces should be organized to minimize access to non-visitor areas of the facility. Provide adequate transition space between the main lobby and training/conference centers to allow people to gather outside the spaces before sessions to avoid crowding the main lobby.

Finish Guidelines:

1. Ceilings – 2'-0" x 2'-0" Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16" Recessed Grid. Consider 10'-0" plus ceiling height contingent upon building massing and roof design.

2. Walls – 5/8" painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.
    - Acoustical batt insulation.
    - STC-55 minimum acoustical performance.
    - Ratings where required by codes.

3. Doors/Frames+Sidelites/Hardware

- Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
- Frames + Sidelites - painted custom hollow-metal.
- Hardware - butt hinges, exit device, recessed door bottom, jamb/head compressible sound gasketing, frame silencers, door stop.
- Ratings where required by codes.

4. Floors – 24” by 24” modular tile carpeting such as Shaw Contract with 4” high resilient base.

5. Window Sills – 1/2” thick solid surface.

6. Solar Shades – Motorized roll-up fabric window blackout shades with recessed pocket.

7. Casework – AWI custom grade, flush overlay construction and hardware with solid surface counters and backsplash.

8. Appliances – Not included in contract.
    - Refrigerator/Freezer.
    - Microwave.

9. Projection Screens – (3) Motor operated drop-down screens such as Da-Lite Wireline Advantage.

10. Marker Boards – White, dry-erase type.

11. Acoustical Panels – Wall mounted panels with stretched fabric face covering.

12. Folding Partition – Manually operated, fabric faced, track suspended, STC 52/NIC 42 minimum, with storage pocket.

Library Stacks (ID# 6.18)
Finish Guidelines:

1. Ceilings – 2’-0” x 2’-0” Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16” Recessed Grid. Minimum 9’-0” finished ceiling height.

2. Walls – 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.

- Acoustical batt insulation.
- STC-55 minimum acoustical performance.
- Ratings where required by codes.

3. Doors/Frames+Sidelites/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” stile & rail with full vision panel, premium wood or plastic laminate veneer.
    - Frames + Sidelites - painted custom hollow-metal.
    - Hardware - butt hinges, passage latch, recessed door bottom, jamb/head compressible sound gasketing, frame silencers, door stop.
    - Ratings where required by codes.

4. Floors – 24” by 24” modular tile carpeting such as Shaw Contract with 4” high resilient base.

5. Window Sills – 1/2” thick solid surface.

6. Solar Shades – Motorized roll-up fabric window blackout shades with recessed pocket.

Ganged Restrooms (ID# 8.13, 8.14)
Finish Guidelines:

1. Ceilings – Painted suspended gypsum board.
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, semi-gloss sheen, LEED VOC compliant. Minimum 9’-0” finished ceiling height.

2. Walls – Ceramic tile over 5/8” cementitious backer units over metal stud framing. (Framing over CMU at lab walls)
    - Stainless steel tile wall trims where required.
    - STC-50 minimum acoustical performance.
    - Ratings where required by codes.

3. Doors/Frames/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames - painted custom hollow-metal.
    - Hardware - butt hinges, push/pulls, closer, kick plate, frame silencers, door stop.
    - Ratings where required by codes.

4. Floors – Epoxy flooring and integral 4” high cove base.

5. Casework – AWI custom grade, flush overlay construction and hardware with solid surface counters and backsplash.

6. Toilet Accessories – Provide ADA:
    - Stainless steel grab bars.
    - Recessed stainless steel waste receptacles.
    - Soap dispensers.
    - Stainless steel sanitary napkin disposals.
    - Unit mirrors in stainless steel frames.
    - Paper towel dispensers.
    - Toilet Paper dispensers.
    - Sanitary Napkin dispensers.
    - Stainless steel toilet seat cover dispensers.

7. Toilet Partitions - Through-color, ceiling hung, solid phenolic toilet stalls and urinal screens with standard hardware. Provide above ceiling steel supports and blocking as required.

Single User Restrooms (ID# 8.15)
Finish Guidelines:

1. Ceilings – Painted suspended gypsum board.
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, semi-gloss sheen, LEED VOC compliant. Minimum 9’-0” finished ceiling height.

2. Walls – Ceramic tile over 5/8” cementitious backer units over metal stud framing. (Framing over CMU at lab walls)
    - Stainless steel tile wall trims where required.
    - STC-50 minimum acoustical performance.
    - Ratings where required by codes.

3. Doors/Frames/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames - painted custom hollow-metal.
    - Hardware - butt hinges, privacy latch (with occupancy indicator), closer, recessed door bottom, jamb/head compressible sound gasketing, kick plate, frame silencers, door stop.
    - Ratings where required by codes.

4. Floors – Epoxy flooring and integral base cove.

5. Toilet Accessories – Provide ADA:
    - Stainless steel grab bars.
    - Recessed stainless steel waste receptacles.
    - Soap dispensers.
    - Stainless steel sanitary napkin disposals.
    - Unit mirrors in stainless steel frames.
    - Paper towel dispensers.
    - Toilet Paper dispensers.
    - Sanitary Napkin dispensers.
    - Stainless steel toilet seat cover dispensers.

Lactation/Wellness Room (ID# 8.12)
Finish Guidelines:

1. Ceilings – 2’-0” x 2’-0” Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16” Recessed Grid. Minimum 9’-0” finished ceiling height.

2. Walls – 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, egg-shell sheen, LEED VOC compliant.
    - STC-50 minimum acoustical performance.
    - Ratings where required by codes.

3. Doors/Frames/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames - painted custom hollow-metal.
    - Hardware - butt hinges, privacy latch (with occupancy indicator), closer, recessed door bottom, jamb/head compressible sound gasketing, frame silencers, door stop.
    - Ratings where required by codes.

4. Floors – LVT with 4” high resilient base.

5. Casework – AWI custom grade, flush overlay construction and hardware with solid surface counters and backsplash.

6. Appliances – Not included in contract.
    - Small Refrigerator.

- Microwave.

7. Accessories – Provide ADA:
    - Baby changing station.

Shipping + Receiving/Mechanical/Electrical/Storage Rooms (ID# 7.13, 7.14, 7.15, 8.16, 8.17)
Finish Guidelines:

1. Ceilings – Open to structure.

2. Walls – 5/8" painted gypsum wall board over metal stud framing or painted CMU. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, semi-gloss sheen. Epoxy paint at Janitor's rooms. LEED VOC compliant.
    - Ratings where required by codes.

3. Doors/Frames/Hardware
    - Doors - 3'-0" x 7'-0" x 1 3/4" (coordinate sizes with equipment requirements) flush, solid core, premium wood or plastic laminate veneer.
    - Frames - painted custom hollow-metal.
    - Hardware - butt hinges, storeroom latch, closer, recessed door bottom, jamb/head compressible sound gasketing, kick plate, frame silencers, door stop.
    - Ratings where required by code.

4. Floors – Sealed or polished concrete with 4" high resilient base.

IDF/MDF Rooms (ID# 8.18)
Finish Guidelines:

1. Ceilings – Open to structure.

2. Walls – 5/8" painted gypsum wall board over metal stud framing or painted CMU. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, semi-gloss sheen. Epoxy paint at Janitor's rooms. LEED VOC compliant.
    - At one (1) wall of IDF/MDF rooms, provide 5/8" thick fire-treated plywood 8'-0" high x length of wall.

- Ratings where required by codes.

3. Doors/Frames/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames - painted custom hollow-metal.
    - Hardware - butt hinges, storeroom latch, closer, recessed door bottom, jamb/head compressible sound gasketing, kick plate, frame silencers, door stop.
    - Ratings where required by code.

4. Floors – Static dissipative (ESD).

Janitor Closets (ID# 8.19)
Finish Guidelines:

1. Ceilings – Painted suspended gypsum board.
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, semi-gloss sheen, LEED VOC compliant. Minimum 9’-0” finished ceiling height.

2. Walls – 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, semi-gloss sheen. Epoxy paint at Janitor’s rooms. LEED VOC compliant.
    - Fiberglass reinforced panel wall finish for a minimum of 4’ at each wall adjacent to mop sink.
    - Ratings where required by codes.

3. Doors/Frames/Hardware
    - Doors - 3’-0” x 7’-0” x 1 3/4” flush, solid core, premium wood or plastic laminate veneer.
    - Frames - painted custom hollow-metal.
    - Hardware - butt hinges, storeroom latch, closer, recessed door bottom, jamb/head compressible sound gasketing, kick plate, frame silencers, door stop.
    - Ratings where required by codes.

4. Floors – Epoxy flooring and integral 4” high cove base.

5. Accessories – At Janitor’s rooms, wall mounted stainless steel mop rack & shelf.

Materials Distribution Paths (ID# 8.11.1)
Finish Guidelines:

1. Ceilings – Open to structure or 2’-0” x 2’-0” Suspended Acoustic Panels such as USG Eclipse Climate Plus with 9/16” Recessed Grid. Minimum 12’-0” finished ceiling height.

2. Walls – Painted CMU or 5/8” painted gypsum wall board over metal stud framing. (Framing over CMU at lab walls)
    - Gypsum finish Level 4.
    - Paint grade such as Sherwin Williams Promar 200, semi-gloss sheen. LEED VOC compliant.
    - Ratings where required by codes.

3. Floors – Sealed or polished concrete with 4” high resilient base.

II-5 Basis of Design: Laboratory

General:

Basis of Design narratives have been provided to define criteria for the project. Use of manufacturer names, products, basis of design examples, or any specific proprietary terms are utilized to establish levels of quality and performance, not indications of sole or source limitations, or preferences for specific manufacturers unless specifically indicated as such. Alternates of equivalent quality and performance may be proposed. Basis of Design criteria have been developed in coordination with Using Agency requirements. However, they do not relieve the design-build team from performing due diligence in the selection of all components, systems, products, assemblies, equipment, etc. for the project.

4.0 Design goals of the facility include the following:

Flexible and Adaptable – Design to accommodate future changes in technology, scientific equipment, and methodology, as well as adapt to the changing demands of testing.

Inviting Work Environment – Provide a professional, healthy, and pleasant work environment for the occupants, while making use of natural day lighting, and exterior views.

Collaboration – Encourage user interaction and professional development using both formal and informal spaces.

Security – Design and construct a secure facility that clearly defines public areas and secure zones, inside and outside of the building.

4.1 General Laboratory Environments:

The interior environment conditions for the labs/ shops shall be characterized by natural light and ambient indirect, diffused lighting provided direct/indirect pendant ceiling-hung lights, augmented with task/exam lights where needed. Some labs may require dimmable-to-off light controls and alternative light sources, among other activities.

Refer to the Room Data Sheets and Mechanical Narrative for additional information.

4.2 Laboratory Casework:

All casework and finishes shall be coordinated and approved between Illinois DOT, and design team and shall be designed to support the general design while providing the full safety and compliance with the Scientific Equipment Furniture Association

(SEFA). See section of report titled, "Laboratory Specific Criteria" under "I–4 Applicable Design Codes and Standards" for more information.

Fixed Casework:
Heavy duty and durable casework are required for all labs. Casework profile to be flush overlay with square edges Refer to Room Data Sheet for locations and additional information.

- Base Cabinets:
  - Base cabinets shall consist of a mixture of sitting and standing height base cabinets, with a combination of door and drawer styles.
  - Ratio of doors and drawers is expected to be about 50/50 each but shall be further developed during the design phase.
- Upper Cabinets:
  - Upper cabinets shall be of matching materiality and color, in relation to the base cabinets.
  - Upper cabinets shall have glass inserts. Glass can be clear or frosted, to be determined.
  - Task light can be provided under the upper cabinets.
- Upper Adjustable Shelving:
  - Upper adjustable shelving shall consist of painted metal shelving, to match materiality and color of the base cabinets.
- Lab sinks shall match work surface finish (see below under "Work Surfaces"). All sinks have removable overflows. Sediment traps may be required at specific sinks, to be determined.
  - Scullery Sinks shall be custom units based on department needs. Refer to Room Data Sheet for additional information.

Casework Hardware:

- Lab-grade hinges
- Casework Hardware capacity shall be determined at a later date considering the weight of materials and equipment to be stored:
  - Chemistry and Transportation Labs: Full extension zinc plated slides with 100lbs capacity, and soft closers
  - All other Labs: Full extension slides with 600 lb. load capacity, full-extension design, and lengths up to 60" and widths of 42" for heavy loads.
- Pulls to be selected during the design phase.

Tall Cabinets:

Disposable and non-disposable supplies can be stored in casework drawers, cabinets, and shelves, while solid and liquid waste shall be stored in room-specific locations. Rooms shall be zoned so that material deliveries and waste removal occur at the entrances, so operations are not disrupted.

Wall Protection:

- Bumper Guards: Aluminum, bracket-mounted, Life Science Products, Inc. "Sani-Rail," on all walls without casework at labs
- Corner Guards: Stainless steel, 6" AFF to ceiling height, all outward facing corners in all labs.

Manipulated/Adjusted Cabinetry (as needed):

All Manipulated/Adjusted Cabinetry criteria shall match fixed casework requirements.

- Manipulated/Adjusted casework:
  - Manipulated/Adjusted Cabinetry shall consist of 50% door and drawer units. Match general casework materiality and finish.
  - Manipulated/Adjusted Cabinetry tops to match the finish of fixed casework work surfaces.

Tables:

- Fixed tables:
  - Tables shall consist of heavy-duty, height adjustable, painted metal frames.
  - See section on work surfaces for types.
- Manipulated/Adjusted tables:
  - Tables shall consist of heavy-duty, height adjustable, painted metal frames, with lockable casters.
  - See section on work surfaces for types.

Work surfaces:

Countertops shall meet general SEFA 3 guidelines. Provisions in pricing should include up to 33% countertops for epoxy, 33% wood butcher block and 33% stainless steel.

- Epoxy or Dekton
- Wood butcher block
- Stainless steel

Utilities (General):

All utilities except for drains shall be delivered to the benchtops and instrumentations via overhead systems. Alternates for running utilities under slab or through trenches may be explored at the beginning of the next phase if IDOT would like to explore. Expected utilities will range from exhaust devices, gases, water, and/ or electrical and data ports.

- **Exhaust Devices:**
  There are 3 types of exhaust devices.
  - Exhaust devices that collect fumes
  - Exhaust devices that collect dust or particles
    - Wood
    - Metal
    - Silica
    - Plastics
  - Exhaust devices that are directly connected to equipment.

- **Gases:**
  Refer to the Room Data Sheets and the Equipment Matrix for locations and types.

- **Water:** Refer to the Room Data Sheets for type locations.
  - Lab Water: Provide hot and cold lab water at each location, unless noted otherwise.

- **De- ionized water:**
  - Reverse Osmosis (RO): A central system that produces Type III water is preferred. Any labs requiring type II water shall have an owner furnished point of use water purification system with dispenser within the lab.
  - Spaces that require Type II and Type I provide, 120V GFI electrical outlet, data outlet, cold water with access to a drain.
  - Spaces requiring Type III shall have a DI faucet at each sink.

  Table Water Type:

Department	Feed source from central system	Polished Water type
Analytical Chemistry	Type III	Type I
Bituminous Chemistry	Type III	Type I
Instrument Lab	Type III	Not Required
Cement Lab	Type III	Type I
Aggregate Lab	Not required to be piped to lab since a small volume will be used for calibrations	Not Required
Concrete Lab	Type III	Type II
HMA Lab	N/A	N/A
Soils	Type III	Type I

- **Electrical and data ports:**
  Along perimeter walls, electrical raceways shall be provided in all rooms, unless noted otherwise. Above fixed island benches, power reels shall be provided, unless noted otherwise. Refer to MEP Narratives and the Room Data Sheets.

Various systems for providing utilities will be explored during the design phase:

- **Overhead Service Carriers:**
  Carriers are very sturdy and can carry heavy loads including pumps and instruments over tables. Carriers can be fitted out with shelving and a full complement of utilities including task exhaust devices. However, carriers are bulky and expensive.

- **Overhead utility panels:**
  These panels are lighter and can fit within the structure of a typical ceiling grid. They offer more flexibility; however, they are generally located at ceiling

height and difficult to reach. So, selecting the right casework should allow for utilities to be accessible at the work surface.

- **Umbilical:**
  The purpose of umbilical's is to bring utilities to the bench when other methods of bringing utilities such as walls, fume hoods, and overhead service carriers are not practical. Umbilicals are not encouraged, but where necessary, they shall be 30"x6" painted metal to match casework with a 4" curb to match worksurface, and a ceiling collar. Alternately, material finish may be upgraded to resin panels.

- Machine shops and other spaces may require utilities to be brought in from underneath the floor, either via open access trenches or through conduit buried within the concrete due to potential conflicts with crane accessibility. If trenching is considered, care must be taken to protect utilities from wet environments such as using NEMA-X rated enclosures.

Room Finishes:

All finishes shall be easily wipeable and cleanable.

- Floors:
  - General Lab areas: Sealed Concrete
  - ESD flooring is required in areas with sensitive equipment, such as the Nuclear and Traffic Instrumentation departments.
- Walls – Wall paint shall be water-based latex, washable, low-luster, unless noted otherwise.
- Ceilings – 2x2 medium textured acoustical ceiling tile. Refer to Architectural Narrative.
  - Ceilings shall be 12' min. unless noted otherwise.
- See Room Data Sheets for additional information.

Partitions:

Standard wall partitions in laboratories shall be CMU block and extend to structure, unless otherwise noted. Refer to Architectural Narrative and Room Data Sheets for all laboratory wall partitions recommendations for each room and space.

- Nuclear department:
  - Hot Room: Walls shall be 16 inches wide and filled with sand or concrete.
  - Calibration Room: Walls shall be 12 inches wide and filled with sand or concrete. Lead lining on the interior face of the walls (to absorb gamma rays rather than reflect them back to gauges).
- District 6:
  - Nuclear Storage: Walls shall be 16 inches wide and filled with sand or concrete.

4.3 Environmental Rooms:

Finishes:

All finishes shall be easily wipeable and cleanable.

- Floor:
  - Moisture Room floors shall be sloped concrete to trench drain.
  - Salt Scale Room floors shall be sloped concrete to trench drain.
- Wall - Prefabricated 4" thick metal clad insulated panels with baked-on white polyester finish on galvanized steel. Exposed exterior and door shall be stainless steel.
- Ceiling - Prefabricated 4" thick metal clad insulated panels with baked-on white polyester finish on galvanized steel.

System:

Environmental Control Rooms are expected to be prefabricated units, with either air or water cooled systems, and with temperature and humidity controls. Mist system will be integrated into Moisture Room. See the Room Data Sheet for more information.

4.4 Fume Hoods:

Fume hoods shall be high-efficiency bench-top and/ or floor mounted with automatic sash closers, and combination sashes to create maximum safety as well as efficiency. See Room Data Sheets for more information.

All fume hood utilities currently assume cold water, a cup sink at each end, and a raceway with 120V duplex in the inside of fume hood. Unless otherwise noted, 208 outlets are not required. See Room Data Sheets for more information.

Each bench-top mounted fume hood shall also include ventilated specialty purpose cabinets below such as flammable, corrosive and/ or hazardous, and possibly vacuum pump cabinets. Cabinets are to be the same color and finish as the fume hoods.

4.5 Freeze Thaw:

General

This requirement documents describes the freeze-thaw machines for the Illinois Department of Transportation, Bureau of Materials, materials testing laboratory. Scope is to include three (3) identical integrated machines and all necessary components to operate such. To maintain brevity in the text, this will be referred to as the freeze-thaw system. Flexibility shall be integrated in the design so that each of the 3 chambers can operate independently, simultaneously at full capacity, or be isolated in operation, as required.

Freeze-Thaw System Overview:

The system shall be capable of producing temperatures in the range of -40 to +80 F required for the freezing and thawing of one hundred and eight (108) concrete specimens per chamber. Each chamber shall hold and test one hundred and eight (108) concrete specimens at a time. The Freeze Thaw System is used to conduct tests in accordance with ASTM C 666-Procedure B; Illinois Modified AASHTO T 161-Procedure B; and Illinois Evaluation of Aggregates for D-cracking Potential.

The freeze-thaw system components and operation verification shall include, but not be limited to:

1. Freeze-Thaw Chamber (3 each) with;
    a. cabinet
    b. refrigeration section with outdoor air-cooled condenser
    c. Air circulation
    d. Thawing Water System
2. Tempering tank
3. Storage tank
    a. Construction
    b. Level Monitoring
4. Control and Automation System
    a. Programmable Automation Control
    b. Set Point Controller
    c. SCR Controller
    d. Multipoint Data Recorder
    e. 10-inch Circular Chart Recorder
    f. Control Panel
    g. Freeze-Thaw Cycle Control
5. Commissioning
6. Ancillary Equipment and Room Criteria

Description
The component parts of the freeze-thaw system shall be interconnected with insulated water piping, insulated refrigeration piping, drain water piping, make-up water piping, pneumatic air piping, electrical power wiring, electrical control interlock wiring, and instrument lead wiring. Specialties such as motorized valves, check valves, balancing devices, refrigerant driers, sight glasses, etc. shall be included as required for the proper operation of the freeze-thaw system. All interconnecting piping shall be type L copper, plastic piping will only be allowed in drain water lines to disposal if compliant with plumbing codes. There shall be no proprietary parts used in the building of the freeze-thaw system.

The contractor shall provide the following services in the same room and within 10 feet of the freeze-thaw system:
1. 100-amp, 208 Volt, 3-phase fused-disconnect switches, dedicated for each chamber
2. 120 psi pneumatic air source
3. Make-up city water supply
4. Sump drain
5. An overhead, powered, 1-ton rated hoist able to traverse the entire length and width of the freeze-thaw room. The hoist height and traverse shall allow users to lift the freeze-thaw racks out of and into each chamber, tempering tank or floor space.

1. Freeze-Thaw Chamber:
Each of the 3 machines shall have the exact capacity of 108 beams. Each machine shall incorporate a heating system, cooling system, and air and water circulation system. Each chamber shall include an insulated lid with an air-actuated/air-assisted opening system.

a. Cabinet:

i. Exterior: The cabinet shall be constructed of 18-gauge steel. All seams, joints, and corners shall be welded, ground, and polished before the cabinet is primed and finished with two (2) coats of blue enamel as selected by IDOT. The lid shall be top opening to 90 degrees from the closed position and provide full access to the interior working space. Access panel(s) should be available such that any maintenance or repairs can be conducted from the front of the machine.

ii. Lid: The lid of each chamber shall be operated by two (2) heavy duty pneumatic air cylinders controlled by a manual 3-position hand valve. The valve's positions shall be lettered up, hold, and down. The air cylinders shall be capable of opening the lid through a full 90-degree arc so that the chamber can be fully accessed for specimen loading and unloading. The air cylinders shall be operated from a 120-psi pneumatic air source supplied by the buyer. The system shall include a flow control device to balance the speed of the air cylinders as indicated by the operating personnel. The system shall include a pneumatic air filter, pressure regulator, and lubricator. The lid shall be gasketed with neoprene material (1/2" x 2") to provide an airtight seal of the interior chamber when in the closed position.

iii. Interior: The interior wall of the chamber shall be 10-gauge #304 stainless steel. The bottom of the chamber shall be ¼" #304 stainless steel plate and shall be capable of supporting a uniform loading of 150lb/sf. The bottom shall drain chamber water to its center where a bottom drain connection will remove the water. The sides and bottom pieces shall be joined together by welding be watertight. The interior chamber shall be insulated from the exterior cabinet housing with two (2) layers of 2" urethane foam and two (2) layers of 1" fiberglass board on all sides and the lid. Each layer shall be applied with mastic, staggering the joints, to seal the mating surfaces and joints. There shall be a minimum of two (2) 1" ports installed in the vertical wall of the chamber above any possible water level to permit passage of the thermocouple lead wires from the chamber's interior to the control and recording panel.

iv. Specimen supports for concrete beams: Supports shall be provided inside the chamber for the concrete specimen racks and be capable of supporting a uniform loading of 150 lb/sf. The support shall be constructed to allow a minimum of 5" clearance above the bottom of the chamber to allow free flow of refrigerated air and thawing water to all surfaces of the specimens. The top surface of the base support shall be located approximately 18" below the surface of the thawing water when it is at normal operating level. A total of twelve (12) welded sectional stainless-steel racks (holds 18 specimens per rack) shall be provided for keeping the specimens in an upright position, with sufficient net free space around them to allow circulation for the heat exchange medium to produce the temperature conditions specified. Each welded section shall be provided with two (2) hooks and spaced to allow use of the existing hoist to permit the removal of loading of the eighteen (18) specimens at one time. The racks shall be designed such that the pins in the ends of the specimens will not contact the racks or supports. IDOT will provide examples for the contractor to measure as examples.

v. Drains: A 2" safety overflow drain connection shall be installed in the rear of each chamber cabinet to provide run off in the event of accidental excessive water level in the chamber; this shall be piped to the room sump. The drain in the bottom of the chamber shall be 2" and be provided with a strainer plate. Thawing water will be removed via the bottom drain by pump. The drain shall have easy access for cleaning.

b. Refrigeration Section (with outdoor air-cooled condenser): The refrigeration section housing the mechanical and electrical systems shall be constructed from the same material as the chamber cabinet and finished to match its color. The compressor shall be a two-stage semi-hermetic type motor compressor built for low temperature operation using refrigerant R-507. The compressor shall have a remote air-cooled condenser equipped with low ambient control. The compressor shall be supplied with operating and safety controls including, but not limited to motor protection, oil loss

protection, high pressure protection, and refrigerant loss protection. The compressor shall be supplied complete with refrigerant receiver, crank-case heater, suction accumulator, motor control panel, and all additional specialties as required for low temperature operation down to -40 degrees F. The compressor capacity shall be sufficient to freeze the concrete specimens from an average interior temperature of+40 degrees F down to 0 degrees F, within the time frame specified by the ASTM C 666-Procedure B, Illinois Modified AASHTO T 161-Procedure B, and Illinois DOT Evaluation of Aggregates for D-cracking Potential. The unit shall be capable of performing eight (8) freeze-thaw cycles per day, while performing ASTM C 666-Procedure B, Illinois Modified AASHTO T 161-Procedure B, and Illinois DOT Evaluation of Aggregates for D-cracking Potential. The evaporator cooling coil shall be constructed of dehydrated ¾" OD copper refrigeration tubing, having 4 copper fins per inch, and with a #304 stainless steel casing. The coil shall be 16 rows deep and have two (2) row split circuits. Each circuit shall be complete with a refrigerant distributor and thermal expansion valve having external equalizing features.

c. Evaporator Fan: The evaporator fan shall be a backward inclined, self-cleaning, all stainless-steel centrifugal fan direct driven by an electric motor with a stainless-steel shaft. The fan shall be constructed of #304 stainless steel and bolted to the housing for access to the wheel. The air discharge opening shall be fitted with a stainless-steel diffuser complete with adjustable air deflecting vanes for balancing and directing the air flow inside the chamber.

d. Thawing Water System: The thawing water shall be exchanged between the storage tank and the freeze-thaw machine as required for the current freeze-thaw cycle operation. Before the freeze cycle starts, the water shall be pumped from each chamber to the storage tank. This shall be the chamber's drain cycle and be completed within a time frame of 5 minutes. The water shall be contained in the storage tank until the start of the next cycle when it is pumped from the tank to the chamber in 5 minutes. The fill and drain cycles of each chamber shall be monitored and controlled by solid state low- and high-level capacitance level sensors having probes mounted in the wall of each chamber. Mechanical float assemblies for controlling water levels will not be accepted. The water level sensing devices that control the level of water in each chamber and help sequence the filling and draining of each chamber and subsequent fan and pump operation shall measure capacitance on the probe to determine water level. The level of water on the probe shall be electronically set and fully adjustable as well as the differential between on/off and time delays be adjustable.

i. Agitation: Each freeze-thaw chamber shall be supplied with a circulation pump that shall be an iron body bronze fitted pump, 4 in suction x 3 in discharge with a BHP rating of 3HP, and be 3 ph. Agitation of the thawing water shall be by forced circulation inside each chamber to create turbulent flow of the water over the complete surface area of every specimen being tested. The agitation process shall thaw the concrete specimens from an average interior temperature of 0 degrees F to +40 degrees F within the time frame

specified by the ASTM C 666-Procedure B, Illinois Modified AASHTO T 161-Procedure B, and Illinois DOT Evaluation of Aggregates for D-cracking Potential.

ii. Heating System: The thawing water shall be heated as required to thaw the concrete specimens at the correct rate and time frame specified by ASTM C 666-Procedure B, Illinois Modified AASHTO T 161-Procedure B, and Illinois DOT Evaluation of Aggregates for D-cracking Potential. This shall be done by an electric circulation heater installed in the water agitation system. The heater shall be controlled by an SCR controller that will provide time-proportioning power input to the electric element. The heater control circuit shall be interlocked with the refrigeration cycle so that there will be no simultaneous operation of the two.

iii. Fill and Drain Pumps: Fill pumps and drain pumps shall be iron body bronze fitted pumps and be 2" in-line with a BHP rating of 2HP, and be 3 ph. Fill and drain pumps shall be located integral to the refrigeration section and be controlled by automation and manually.

2. Tempering Tank:

The tempering tank shall be capable of holding six (6) racks of freeze-thaw beams. The tempering tank shall be made of 18-gauge steel. All seams, joints, and corners shall be welded, ground, and polished before the cabinet is primed and finished with two (2) coats of blue enamel identified by IDOT. The external tank heater shall work with the outside water storage tank to maintain a water temperature of 72 degrees F +/- 1 degree F. The tank shall include a sump pump or other means to prevent the tank from over filling and a means for water to drain to account for the displaced water as specimens and racks are added to the chamber. A digital display shall be provided to indicate the water temperature of the tank by use of a single thermocouple beam. The control panel for the tempering tank shall be 208V, 3 pH SCR with option for manually adjusting the tank operation. The tempering tank control panel shall include a Manual, Off, and Auto switch and related pilot lights for manual operation of: "Master", "Pump" and "Heat". The tempering tank control panel shall also include indicator lights for the "heater contact closed" and "pump contactor closed". The tempering tank shall include a water circulation pump to continuously circulate the temperature-controlled water. The pump shall be ¼ HP, single phase, and 1725 rpm. Supports shall be provided for the concrete specimens in the tempering tank and be capable of supporting a uniform loading of 150 lb/sf. The support shall be constructed to allow a minimum of 5" clearance above the bottom of the chamber to allow free flow of tempered water to all surfaces of the specimens. Manual opening of the lid through a full 90-degree arc so that the chamber can be fully accessed for specimen loading, unloading, and cleaning shall be required. When placed in an open orientation, the lid shall remain open without propping. A means to completely drain the tank shall be provided for cleaning.

3. Outside Storage Tank:

A water storage tank will be required to store water for the freeze-thaw system. The tank will be placed exterior to the building. The tank shall be sized to simultaneously hold the full amount of water from each freeze-thaw chamber.

A. Construction: The storage tank shall be a vertical flat-bottom fiberglass container. The tank shall be covered with a 2" layer of polyurethane foam insulation having a minimum U factor of 0.086 BTU/hr/sq ft/deg F. The insulation shall be coated with a protective coat of resin and chopped fiberglass strand with a pigmented white gel coat. The tank shall be trimmed with a 2" upper fill connection and a 2" lower drain connection. Fill and drain of thawing water from the freeze-thaw chamber shall be via mechanical pumps. The tank shall have a side-mounted flanged manway for use in cleaning and inspection. It shall be held in place with stainless-steel bolts and be sealed with a neoprene gasket. The tank shall be fitted with a top-mounted air vent, an electric tank heater/colling system to maintain 40+/-5 degrees F.

B. Level Monitoring. The tank water level shall be maintained and controlled by an automatic water feed system including a solenoid fill valve, "Y" strainer, shut-off valve, and manual fast-fill valve. A means for the water fill mechanism to automatically shut off once the tank level is full shall be supplied and installed. Remote monitoring of the storage tank water level shall be supplied inside the lab. Measurements shall be included to know what level the water in the tank is in relation to how many chamber(s) are full/empty of water.

5. Control and Automation System:

The control panel shall house the freeze-thaw control system including programmable automation controller (PAC), setpoint temperature controller, SCR heat controller, chart recorder, multipoint data recorder, motor starters, control relays, terminal blocks, component fuses and other components. The control panel shall be housed inside a free standing NEMA 12 enclosure, primed, and finished with two (2) coats of Blue enamel selected by IDOT. The enclosure shall include a front door window so that the read out displays of the control panel can be viewed while the door is closed. The control panel shall be mounted as a swing-out panel so that all the components can be serviced without removal. The control panel enclosure shall be set adjacent to the freeze-thaw chambers and wired to the various motors, heaters, controls, and sensors mounted on the chambers. Each freeze-thaw machine/chamber and the tempering tank will be monitored individually at the control panel.

A. Programmable Automation Controller (PAC): The freeze-thaw controller shall be a microprocessor-based primary controller capable of programming at least seven (7) events, sixty (60) straight line segments that provide ramp and soak functions, and output analog setpoint commands.

B. Setpoint Controller: The setpoint controller shall be microprocessor-based and contain a nonvolatile memory. It shall include a digital output for control of the refrigeration cycle and an analog (4 to 20 MADC) for control of the heating cycle. The controller shall receive a temperature signal from the thermocouple sensor (type T) that is cast into a specimen in the chamber.

C. SCR Controller: The SCR controller shall receive an analog signal (4 to 20 MADC) from the setpoint controller whenever heating of the thaw water is required. The SCR controller shall send a modulating power voltage to the circulation heater in an amount sufficient to heat the water for thawing the specimens.

D. Multipoint Data Recorder: The data logger shall record temperature inputs from thermocouple sensors (type T). The data recorder shall include a clock for time of day recording of the temperature values. The data recorder shall record the temperature values of the master specimen, various other specimens, and chamber interior (by use of a fixed probe). The data recorder shall record the number of cycles on a continuous basis. The display shall be at a minimum a 5.5” 1.4 VGA display with 16-bit color, touch screen control, and graphic based menu driven programming. It shall have eight user-defined programmable display screens and ten programmable display formats. Data storage shall be at a minimum 32 Megabyte of internal RAM. Data communication will be via an ethernet connection identified by IDOT.

E. 10-inch Circular Chart Recorder: The chart recorder shall record the temperature of the master concrete specimen while the freeze-thaw test is in progress. The input signal shall be from a thermocouple (type T) cast into the specimen. The chart recorder shall have a digital display that indicates current sensor input value. This recorder is to be microprocessor based with programmable chart speeds. The chart recorder shall utilize the same paper charts as the existing freeze-thaw system chart recorder.

F. Control Panel: The control panel shall include a start cycle push button switch, a control panel power switch, and an instrument power switch. The seller shall also supply the Department with the software necessary for programming and data collection, along with a back-up file and ten (10) licenses for the software. The control panel shall include a Manual, Off, and Auto switch and related pilot lights (at a minimum) for manual operation of:

1. Power on
2. System offline
3. System online
4. Cooling fan
5. Condenser fan
6. Cooling cycle
7. Agitation pump
8. Water fill pump
9. Water drain pump
10. Gravity drain valve
11. Thawing cycle

G. Freeze-thaw Control Cycle: The equipment shall meet the requirement of ASTM C 666-Procedure B, Illinois Modified AASHTO T 161-Procedure B, and Illinois DOT Evaluation of Aggregates for D-cracking Potential. The testing method shall be Procedure B-Rapid freezing in air and thawing in water, with the exceptions noted below:

ASTM C 666-Procedure B; AASHTO T 161-Procedure B, and Illinois DOT Evaluation of Aggregates for D-cracking Potential-the normal freezing and thawing cycle shall consist of, alternately lowering the temperature of specimens from +40 degrees F to 0 degrees F and raising it from 0 degrees F to +40 degrees F in not less than 2 nor more than 4 hours. Not less than 20% of the time shall be used for thawing. At the end of the cooling period, the temperature at the center of the specimens shall be 0 degrees F +/- 3 degrees F and at the end of the heating period, the temperature shall be +40 degrees F +/-3 degrees F with no specimen at any time reaching a temperature lower than -3 degrees F nor higher than +43 degrees F. The time required for the temperature at the center of any single specimen to be reduced from +37 degree F to +3 degree F shall be not less than one half of the length of the cooling period, and the time required for the temperature at the center of any single specimen to be raised from +3 degrees F to +37 degrees F shall be not less than on half of the length of the heating period. The unit shall be capable of performing eight (8) freeze-thaw cycles per day, while performing ASTM C 666-Procedure B, AASHTO T 161-Procedure B, and Illinois DOT Evaluation of Aggregates for D-cracking Potential testing.

H. Freeze/Thaw System Integration

The system shall incorporate automated controls and data acquisition to allow the simultaneous operation of all three testing chambers in the same or different portions of the freezing, thawing or transition. All supporting pumps, tanks, piping and drains shall be sized to allow for simultaneous operations.

The system shall be remotely monitored via a desktop, networked IDOT computer. Software must be compatible with State of Illinois and IDOT standards and policies.
The system shall provide an overall status of all data and control points and a display of the thermocouple data. Data to be labeled and separated by chamber.
The system shall incorporate alarms and notifications for system and component failures; power or actuator loss; or data loss.
The system shall include software, back-up media, and licenses for up to 10 desktops. Complete software documentation is required in hardcopy (3 copies) and electronic format.

5. Commissioning:
Upon completing the installation of the freeze-thaw system, the seller shall start and run all components and completely test them for proper operation in accordance with manufacturer's literature. The Freeze Thaw System shall be tested through the various cooling, heating, drain, and fill cycles including calibration checks and adjustments, to ensure that the specifications of ASTM C 666-Procedure B, Illinois Modified AASHTO T 161-Procedure B, and Illinois DOT Evaluation of Aggregates for D-cracking Potential are met. The seller shall then make trial runs using specimens (dummy specimens) supplied by the Department. During these trial runs, the seller shall instruct the Department's personnel in the complete operation of the freeze-thaw system. The seller shall program the system controllers using input values supplied by the Department. The programming strategy shall be completely tested by actual online operation of the freeze-thaw system until the specified testing parameters are achieved.

The seller shall prepare and deliver to the Department, three (3) hard copies, and an electronic copy of the complete operating and maintenance instructions for the freeze-thaw system and any other documentation requested in the project specification produced by the Design Team.

6. Ancillary Equipment and Room Criteria

A. Bridge Crane System

A steel bridge crane system suspended support by the building structure, or stand-alone built such that it does not reduce rooms inside clearances shall be provided to lift of sample racks between a floor-level transport cart, each sample chamber and the tempering tank without obstruction. The hoist system trolley shall have a capacity of 1 ton. The steel bridge crane system shall be OSHA certified through various tests to ensure that it meets the required safety standards. These tests may include load testing, function testing, and visual inspections of the hoist components.

The bridge and runway must allow for access to all freeze machines, tempering tank and floor area for loading/unloading, and transfer between units while free and clear of obstructions.

1. Bridge
2. Runway
3. Trolley: Electric assisted trolley with pendant controls, Hook block with 2 hooks for supporting wire baskets
4. Spreader bar
5. Lifting jig

B. Workstation and Storage

The room will need additional space for cabinets, located close to the machines, this is important for charts, spare parts, pumps, and couplers. A workstation with power and data adjacent to the machines will be required.

C. Ambient Conditions

Recommended conditions are to maintain 10 - 25°C, (50 - 77°F) max. humidity ≤ 60%. Heat output from each freeze/thaw unit is estimated at approximately 60K BTU. General Room Exhaust is located above refrigeration portion of tanks for the elimination of odors and concentration of refrigerants, as well as residual heat generated by the equipment.

D. Power:

Each of the freeze/thaw system units will be hard wired through their respective controller. The power loads of the units shall be designed to meet the requirements of the new facility. The existing facility units are each based on 230v/3ph 100amp power requirements.

Convenience outlets providing 120V service for equipment cleaning shall be provided at the end of each aisle and in-between equipment and adjacent to the sump pump. The workstation adjacent to the machines shall receive one quad receptable and data.

E. Emergency Power:

The freeze/thaw testing units shall be provided with backup emergency power to prevent loss of testing cycle and data collection.

F. General Floor Drainage:

In addition to a sump pump, a floor drain with sediment trap and cleanout is beneficial to the processes around the equipment in the center of the room.

G. Structural Slab:

The slab shall accommodate the weight of the equipment, water, and full load of concrete sample specimens. Equipment weight including water and specimens is estimated at approx. 6,000 lbs and shall be determined during design.

H. Lighting:

Ambient Light Level 60-80FC, typical lab lighting.

4.6 Photometric Lab:

The photometric lab is used for testing the reflectance of light from paints, finishes and other materials at various angles from a specific distance. The test uses a light source and reflectance sensor at one end of a tunnel and a fixture for mounting the objects at the other. A computer control workstation can be located against a wall outside of the test's light path and should be moveable. Tall cabinets for miscellaneous tools should be mobile. The overall room dimensions are governed by the test being performed and are currently 60' long by 8' wide and 10' tall clear.

Refer to Chemistry Lab's Analytical Chemistry Room Data Sheet 2.73.5 for Photometric Lab requirements.

4.7 Safety:

It is recommended that the following safety features be provided in or accessible to each laboratory and meet OSHA and/or ANSI requirements for configuration, operation, and location.

Safety Stations/ Emergency Shower:

Provide safety station with a deluge shower at centralized receiving area, within 75' of all laboratories. Water shall be tempered. Safety stations and emergency showers shall be equipped with flow alarm tied to central security. Height of eye/face wash basin, deluge shower pull ring and deluge showerhead should meet ADA and ANSI requirements.

Provide safety stations, consisting of an eye/face wash and chemical spill kit in each lab at all the sinks within 10 seconds travel distance of any laboratory per ANSI Z358.1. The specific number and location will be based on the most stringent of the following: building configuration, code or owner's standard.

Eye/Face Wash:

Handheld, eye, face and body wash/drench hose unit should be provided at each designated sink in the laboratory. Deck mounted units shall be mounted 15" from the edge of countertop.

Fire Extinguishers:

Fire extinguishers should be located in each laboratory and their adjacent Receiving Area. The specific number should be driven either by code or by owner's standard, whichever is more stringent.

Signage:

Appropriate signage indicating, but not limited to Radioisotope, Flammable, Caustic, Microwave, Magnetic Field, Biological Hazard or Nuclear, should be posted on each appropriate laboratory entry door. A sign is required by the Illinois Department of

Nuclear Safety for the room with the X-ray. Signage to be furnished by contractor and/ or accommodated in the wall-mounted room name/occupants signage system.

Laboratory Accessibility:

Accessible routes, doorways, and door clearances shall be provided throughout the laboratories. Safety stations will also be ADA accessible.

Laboratory casework, sinks, and fume hoods will not be designed to be accessible at this time, but IDOT shall provide casework modifications in the future as the need arises. All workstations shall be at 36” above the finish floor, unless noted otherwise. Eye wash stations provided at casework sinks will be in addition to the accessible safety stations.

II-6 Basis of Design: Structural

Geotechnical

Site specific Geotechnical Investigation Report has been issued by GSG Consultants, Inc. dated August 9, 2022. Based on the results on the subsurface investigation the new material lab could be supported upon a conventional shallow spread and continuous footing foundation system, bearing on the native, stiff silty clay or new engineering fill overlying suitable natural soils. The approximate suitable bearing depths and the anticipated undercuts for the spread footings vary from 2.0 feet to 12.5 feet. Foundations to be designed for allowable bearing capacity of 2,500 psf and minimum depth of any exterior footing should be 3.0 feet below the final exterior grade. If higher bearing capacity is required, aggregate piers or rigid inclusions could be considered which would limit the required undercuts. Refer to geotechnical report for more detailed information.

General

Building structural columns and/or walls to be spaced at 11 foot modular increments to maintain column free open lab spaces.
Structural roof framing members at the laboratories to be designed to support I-beam trolley system which will be used for moving materials within the lab space.
At the loading dock areas, service corridors and laboratories, slabs on grade control joints to be reinforced with trapezoidal plate dowels and construction joints to be reinforced with plate dowels to transfer wheel loads for the forklift traffic and control joints to be filled with semi-rigid epoxy or polyurea joint filler.
Slab-on-grade floor levelness FF at office areas:

Specified overall value: 25
Minimum Local Value: 17

Slab-on-grade floor levelness FF at forklift traffic areas:

Specified overall value: 35
Minimum Local value: 24

Floor mounted heavy equipment to be supported on housekeeping pads or mat foundations as required per design.

Risk Category

Risk Category II: per ASCE 7-16 Table 1.5-1

Dead and Live Loads

Dead loads shall include the self-weight of structural members. Additional superimposed dead loads shall include the weight of non-structural components permanently attached to the structure such as facade weights, flooring, ceiling, mechanical, electrical, and plumbing weights. General assumptions may include but are not limited to weights listed in Superimposed Dead Loads Table below:

Superimposed Dead Loads Table

Area	Zone	Loading (psf)	Notes
Roof Areas	Roofing (membrane, insulation, cover board)	8	
	Ceiling	5	
	MEP	5 / 15	Typical / Above MEP Rooms
	Total	18 / 28	Typical / Above MEP Rooms

Live Loads listed in the Uniformly Distributed Live Loads Table are minimum uniform loads. The loads shall be increased as required at locations where specific equipment exceeds the minimum uniform loads listed in the table below:

Uniformly Distributed Live Loads Table

Area	Loading (psf)	Notes
Lobbies and Corridors	100	
Service Corridors/Loading Dock Areas	250	Or forklift axle wheel load
Laboratories	250	Or forklift axle wheel load
Office Occupancy	65	50 psf + 15 psf Partitions
Training	100	
Heavy Storage	250	
Typical Roof	20	

Snow Load Parameters

Parameter	Value	Notes
Ground snow load, Pg	25 psf	CDB DCM
Snow exposure factor, Ce	0.9	ASCE 7-16: Table 7.3-1
Snow load importance factor, I	1.0	ASCE 7-16: Table 1.5-2
Thermal Factor, Ct	1.1	ASCE 7-16: Table 7.3-2
Flat roof snow load, Pf	17.3 psf	ASCE 7-16: Eqn. 7.3-1
Minimum roof snow load, Pm	20 psf	ASCE 7-16: Section 7.3.4
Snow Drift	Varies	ASCE 7-16: Section 7.7

Lateral Loads

Wind Load Parameters (Strength Level Forces)

Parameter	Value	Notes
Basic Wind Speed, Vult	107 mph	ASCE 7-16: Section 26.5
Wind directionality factor, kd	0.85	ASCE 7-16: Table 26.6-1
Exposure Category	C	ASCE 7-16: Section 26.7.3
Topographic factor kzt	1.0	ASCE 7-16: Table 26.8-1
Gust Effect Factor, G	0.85	ASCE 7-16: Section 26.11

Seismic Load Parameters

Parameter	Value	Notes
Seismic Design Category	C	ASCE 7-16: Section 11.6
Seismic Importance Factor, Ie	1.0	ASCE 7-16: Table 1.5-2
Seismic Site Classification	D	Geotechnical Report by GSG
Mapped Short Period Spectral Response Acceleration, Ss	0.197	ATC online Hazards by Location
Mapped One Second Spectral Response Acceleration, S1	0.102	ATC online Hazards by Location
Design Spectral Acceleration, SDS	0.210	ASCE 7-16: Section 11.4.5
Design Spectral Acceleration, SD1	0.163	ASCE 7-16: Section 11.4.5
Site Coefficient, Fa	1.6	ASCE 7-16: Table 11.4-1
Site Coefficient, Fv	2.396	ASCE 7-16: Table 11.4-2

Serviceability

Deflections (IBC Table 1604.3)

Member Type	Live Load	Snow or 0.42Wind (C&C)	Dead + Live	Dead	50% Live
Roof Members: -Supporting plaster ceiling -Supporting non-plaster ceiling -No ceiling	 L/360 L/240 L/180	 L/360 L/240 L/180	 L/240 L/180 L/120		1″
Floor Members: -Interior bays -Spandrels not supporting masonry or glazing -Spandrels supporting masonry or glazing (DL of wall)	 L/360<1.5" L/360<1.5"	 ----	 L/240 L/240 L/600<0.375″	 L/360<1″ L/360<1″	 1″ 1″
Exterior Walls: (cols/girts/studs) -With brick veneer -With brittle finishes -With flexible finishes -With Insulated Metal Panels	 ---	 L/600 L/360 L/240 L/240	 ---		
Interior Partitions: -With brittle finishes -With flexible finishes	 ---	 L/360 L/240	 ---		
Lintels	---	---	L/600 or 0.3″ max		
Railings -Standard -Architectural	 L/360 L/600				
Mechanical equipment supports	As Rqd by Supplier		As Rqd by Supplier	As Rqd by Supplier	

Building Drift
Wind drift of the structural frame:
(Ref. ASCE 7 Commentary Appendix C and AISC Design Guide 3)
Limit overall building drift to H/400 for 10 year mean return interval (MRI) wind load.

Applicable wind load serviceability combination = D + 0.5L + Wa
(ASCE Commentary Eqn CC-3)

Wa is determined based on serviceability wind speeds for selected MRI from Fig. CC-1 through CC-4: Wa = 0.44W for 10 year MRI

Limit interstory drift due to applicable wind load serviceability combination to maximum of 3/8" to avoid cracking of partitions and glazing.

Seismic Interstory drift:
The design story drift shall be computed as the difference of the deflections at the centers of mass at the top and bottom of the story under consideration. The deflections of Level x at the center of the mass (δx) shall be determined in accordance with the following equation:

$\delta x = (Cd\ \delta xe)/I$ where δxe = the deflections determined by an elastic analysis

For structures assigned to Seismic Design Category C having horizontal irregularity Types 1a or 1b, the design story drift shall be computed as the largest difference of the deflections along any of the edges of the structure at the top and bottom of the story under consideration.

Seismic Interstory drift for any story shall not exceed the following allowable story drift:

Structure	Occupancy Category II
All other structures	0.020hsx

Floor Vibrations:
Vibration Criteria for Sensitive Equipment will require analysis of floor vibrations. Refer to AISC Design Guide 11 Table 6.1 for allowable vibrational velocity limits. The equipment that produce significant vibration to be mounted on isolated mat/foundations to minimize floor vibration transmittal to adjacent areas.

II-7 Basis of Design: Plumbing

Plumbing

General

1. All Plumbing Design to follow current Illinois Plumbing Code and Design and Construction Manual.
2. General Installation: Install pipe, tube, and fittings in accordance with recognized industry practices, which will achieve permanently leak proof piping systems, capable of performing each indicated service without piping failure. Install each run with a minimum of joints and couplings.
3. Provide new domestic water service. Coordinate entry point with Civil. Install new backflow preventer on domestic water service line from the city main and shall be in compliance with applicable law.
4. All connections to non-potable water shall be installed with a backflow preventer and/or check valve. Units include irrigation taps, hose bibbs, roof hydrants, and water to makeup HVAC units.
5. Domestic Water Distribution:
    a. Above grade piping 2 ½'' and smaller shall be Type L copper tubing. Provide dielectric unions or fittings when connecting piping of dissimilar metals.
    b. Operating Pressure in the domestic water system shall be Maximum 80 psi, minimum 35 psi.
    c. Pressure drop due to friction shall not exceed 3 psi per 100 feet
    d. Velocity shall not exceed:
        i. 5 feet per second for cooper branches and riser
        ii. 8 feet per second for steel main
        iii. 5 feet per second for cast iron mains
    e. Deionized and purified water shall be provided to certain labs from a central system.
6. Domestic Hot Water:
    a. Water stored in hot water heater tanks to be at 140° F
    b. Water to be provided to fixtures at a maximum of 110° F unless otherwise noted.
    c. Hot water return line shall be provided back to the domestic hot water heater for all systems where the most remote fixture served is more than 15' away from the heater.
7. Sanitary and Vent Piping:
    a. All underslab plumbing drain and waste lines shall be 4'' diameter minimum.
    b. Cleanouts to be provided on all piping elbows of greater than 45 degrees.

   c. Floor cleanouts to be provided at all elbows of underground piping greater than 45 degrees, and every 100 feet of straight piping.
   d. Below Grade piping shall be: Cast iron, ASTM A 74; CISPI 301
   e. Above Grade piping shall be: Cast iron, ASTM A 74; CISPI 301
8. Storm Piping:
   a. Below Grade piping shall be: Cast iron, ASTM A 74; CISPI 301; ASTM A 888
   b. Above Grade piping shall be: Cast iron, ASTM A 74; CISPI 301; ASTM A 888
9. Piping Insulation: Fibrous glass insulation shall be installed on all domestic water piping above grade and within plumbing walls. Insulate all storm drain bodies and horizontal fittings/runs. Insulate valves, fittings, etc.
10. Plumbing Fixtures for all Restrooms, Breakrooms, Training Center, Janitors Closet:
    a. Water Closet: sensor/solar/battery operated flush valve, 1.28 gpf
    b. Urinal: sensor solar/battery operated flush valve, 0.125 gpf
    c. Lavatory: Sensor Faucet, 0.5 gpm
    d. Handwash/Lab Sinks: stainless steel bowl, faucet 1.5 gpm
    e. Electric Water Cooler: Refrigerated and filtered water with bottle fill station
    f. Mop Basin: 24''x24'', at least 10'' deep, stainless steel, with wall-mounted faucet
11. Plumbing Fixtures for all labs and process areas:
    a. Floor Drains:
       i. Mechanical Equipment rooms – 4'' dia. Heavy Duty Floor Drain (Class C)
       ii. Public toilet rooms – 4'' Floor Drain (Class B)
       iii. Storage rooms larger than 100 sq. ft – 4'' Floor Drain (Class B)
       iv. Floor drains shall have deep seal P-traps except where otherwise prohibited by code. Drains shall have threaded compression joint outlet or caulk outlet.
       v. Finished Areas floor drains shall be flat cast iron body with flashing collar, adjustable nickel bronze round top.
       vi. Trap primers shall be provided on all floor drains.
    b. Trench Drains: 6'' wide with galvanized, heavy duty grate
    c. Hose Bibbs: Lead free, frost proof, with integral vacuum breakers.
    d. Floor Sink: 14 Ga, 304 Stainless Steel, 12''x12'' with 4'' outlet and stainless steel strainer basket
    e. Scullery Sink: Floor mounted, Stainless steel, deep bowl, with single faucet. 1.5 gpm
12. Emergency Fixtures:
    a. Safety Shower:
       i. Minimum supply of 20 gpm for 15 minutes

        ii. Must provide tepid water between 60° F and 100 ° F
    b. Eyewash units:
        i. Minimum supply of at least 3 gpm
        ii. Must provide tepid water between 60° F and 100 ° F
    c. Weekly activation of emergency fixtures needed to ensure proper function.
    d. Floor drains are required under all safety shower and emergency eyewash equipment fixtures.
    e. Floor drains in rooms with hazardous material storage such as Chemistry Lab shall drain to containment tank. Tank and piping shall be made of acid and corrosion resistant CPVC. Tank shall be sized to handle a full flow from the safety shower, i.e. 15 minutes at 20 gpm, plus the full capacity of all hazardous waste containers in the room.

District 6

1. Open Lab:
    a. Provide Hand Wash Sink with Eyewash Station
    b. Provide Safety Shower
2. Aggregate Area:
    a. Provide Floor Drain
    b. Provide Eyewash Station
    c. Provide water connections to Ploog Washer
    d. Provide two-compartment heavy scullery sink, minimum depth 16''. Provide drain boards on both sides. Provide Sediment Trap / Solids Interceptor for sink.
3. Soils Testing
    a. Provide Floor Drain
    b. Provide two-compartment Scullery Sink, minimum depth of 14'', with Sediment Trap / Solids Interceptor. Provide drain boards on both sides.
    c. Provide water connections to Electric Water Bath / Chiller
    d. Provide Eyewash Station
4. Sort/Log:
    a. Provide Handwash Sink with Eyewash Station
    b. Provide Floor Drain
5. Concrete Lab
    a. Provide Floor Sink with Sediment Trap / Solids Interceptor
    b. Provide cold water hose and drain connections for Curing Tanks
6. Isolation Room – HMA
    a. Provide 16''x16'' Floor Sink with minimum sump capacity of 8gal, with Sediment Trap / Solids Interceptor capable of handling

aggregate fines and asphalt sludge. Provide hose connection for cleaning out sediment trap
   b. Provide Floor Sink and water connections for Wet Saw
7. Open HMA Lab
   a. Provide Handwash sink
   b. Provide Eyewash Station
8. HMA Lab – Hamburg Wheel
   a. Provide hot water and drain connection for Hamburg Wheel
   b. Provide floor drain for Hamburg Wheel with Sediment Trap / Solids Interceptor
   c. Provide floor sink with Sediment Trap / Solids Interceptor
   d. Provide cold water hose connection for tank cleanout.
9. I-FIT Area
   a. Provide floor drain
10. Specific Gravity Area
   a. Provide Floor Sink to drain gravity tanks
   b. Provide cold water hose connection to fill gravity tanks
   c. Provide Eyewash Station
11. Mixture Prep Area
   a. Provide Eyewash Station
12. TSR Area
   a. Provide Floor Drain
   b. Provide Eyewash Station
13. Sample Staging
   a. Provide Handwash sink
   b. Provide eyewash station at sink
14. HMA Extraction / Ignition
   a. Provide water and drain connections for chiller / asphalt analyzer
   b. Provide eyewash station
   c. Provide water connection for fume hood
15. Calibration/Repair:
   a. Provide Lab Sink, minimum 14’’ deep compartment, with drain board.

Traffic Instrumentation

1. Open Lab:
   a. Provide Hand Wash Sink
   b. Provide Scullery Sink

Metals & Miscellaneous Products Lab

1. Metals Lab
   a. Provide Lab Sink

   b. Provide Eyewash Station
2. Universal Test Machine Area
   a. Provide Lab Sink
   b. Provide Handwash sink with eyewash station
   c. Provide water connections to tensile machines
   d. Provide sump pump for 5’ deep pit containing 600K Tensile Machine
3. Metals Lab – Sort/Log
   a. Provide Lab Sink
   b. Provide Eyewash Station
4. Miscellaneous Products Lab
   a. Provide Lab Sink
   b. Provide Handwash Sink
   c. Provide eyewash station at all sinks
5. Machine Shop
   a. Provide Lab Sink
   b. Provide Handwash Sink with eyewash station
   c. Provide Floor Drain
   d. Provide water connections to Vertical Band Saw
6. Pipe Storage and Cutting
   a. Provide Eyewash Station

Nuclear

1. Diagnostics / Shop
   a. Provide Lab Sink
   b. Provide Scullery Sink with 15” deep compartment
   c. Provide Eyewash Station at all sinks
2. Calibration Lab
   a. Provide Lab Sink
   b. Provide Eyewash Station at sink

Concrete

1. Open Lab
   a. Provide Handwash Sink
   b. Provide Trench Drain with sediment trap / solids interceptor
   c. Provide double-compartment Scullery Sink with sediment trap
   d. Provide Safety Shower
2. Mixing
   a. Provide Handwash sink
   b. Provide Scullery Sink
   c. Provide Floor drain in pit
   d. Provide Sediment trap / solids interceptor at all sinks and floor drains

   e. Provide Safety Shower
   f. Provide eyewash station at sinks
3. Casting/Molding
   a. Provide Lab Sink at work tables
   b. Provide Handwash Sink
   c. Provide Floor Drain
   d. Provide Safety Shower and Eyewash Station
4. Curing Compound
   a. Provide Lab Sink
   b. Provide Handwash Sink
   c. Provide Floor Drain
   d. Provide Safety Shower and Eyewash Station
   e. Provide Type II Deionized Water and drain connections for Environmental Chamber
5. Open Lab – Compression/Flexural Testing
   a. Provide Lab Sink
   b. Provide Handwash Sink
   c. Provide Safety Shower and Eyewash Station
6. Open Lab – Sample Receiving
   a. Provide Handwash Sink
   b. Provide Trench Drain with sediment trap
7. Open Lab – Sorting and Logging
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Safety Shower and Eyewash Station
8. Polymer Concrete Testing
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Floor Drain
   c. Provide Handwash Sink
   d. Provide Safety Shower and Eyewash Station
9. Moist / Cure Area
   a. Provide Floor Drain
   b. Provide Hose Bibb
10. Utility Room for Moist
   a. Provide Floor Drain
11. Freeze/Thaw Testing
   a. Provide Lab Sink
   b. Provide Handwash Sink
   c. Provide Floor Drain
   d. Provide water and drain connections for freeze/thaw chambers
   e. Provide floor pit for chambers, with sump pump

Cement

1. Open Lab
    a. Provide Handwash Sink with sediment trap / solids interceptor
    b. Provide Type I deionized, purified water
    c. Provide eyewash station at sink
2. Open Lab – Sample Log / Breakdown
    a. Provide Handwash Sink with sediment trap / solids interceptor
    b. Provide Scullery Sink with sediment trap / solids interceptor
    c. Provide Type I deionized, purified water
3. Open Lab – Mixing / Time Sets / Autoclaves
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide Type I deionized, purified water
4. Open Lab – Mixing / ASR
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide Type IV deionized, purified water
5. Open Lab – Mixing / CS / Air Content
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide Type I deionized, purified water
6. Open Lab – Length Measurement Area
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide Type I deionized, purified water
7. Open Lab – Compression
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide Type I deionized, purified water
8. Moist
    a. Provide Floor Drain with sediment trap
9. Open Lab – Air Permeability
    a. Provide Scullery Sink with sediment trap / solids interceptor, adjacent to workstation. Provide special faucet to regulate flow
    b. Provide Type I deionized, purified water

Soils

1. Open Lab
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide purified, Type I deionized water
2. Open Lab - Classification
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide Handwash Sink with sediment trap / solids interceptor
    c. Provide water connection for hydrometer bath
3. Open Lab – Equipment Zone
    a. Provide Handwash Sink with sediment trap / solids interceptor
4. Open Lab – Small Shelby Tube Area
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide purified, Type I deionized water
5. Open Lab - Triaxial

   a. Provide Scullery Sink with sediment trap / solids interceptor
   b. Provide purified, Type I deionized water
6. Breakdown Room
   a. Provide Scullery Sink with sediment trap / solids interceptor
7. EFA Room
   a. Provide Floor Drain
   b. Provide cold and hot water connections to Erosion Fine Apparatus
8. EFA Room – Shelby Tube Prep Area
   a. Provide Scullery Sink with sediment trap / solids interceptor

Chemistry Labs

1. Instrument Lab
   a. Provide Lab Sink
   b. Provide Cup Sink
   c. Provide Handwash Sink
   d. Provide Floor Drain for chiller
   e. Provide sediment trap / solids interceptor at lab sink
   f. Provide Safety Shower
   g. Provide Eyewash Station at all sinks
   h. Provide water connection for chiller
2. Sample Prep Lab
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Safety Shower
   d. Provide Eyewash Station at all sinks
3. Instrument Support
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Safety Shower
   d. Provide Eyewash Station at all sinks
4. Bitumen Lab (QC)
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Sediment trap / solids interceptor at sinks
   d. Provide Safety Shower
   e. Provide Eyewash Station at all sinks
5. Bitumen Lab (QC) – Prep Area
   a. Provide Handwash Sink
   b. Provide Safety Shower
   c. Provide Eyewash station at all sinks and Eyewash Station at sink
   d. Provide Type II Deionized Water
6. Bitumen Lab (QC) – Hot Pour Sealer

   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Safety Shower and Eyewash Station at sink
7. Bitumen Lab (QC) – Emulsified Asphalt
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Safety Shower and Eyewash Station at sink
8. Bitumen Lab (QC) – Cutback Testing
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Safety Shower and Eyewash Station at sink
9. Bitumen Lab (QC) – PG Asphalt
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Safety Shower and Eyewash Station at sink
10. Bitumen Lab (QC) – Naptha Bath
   a. Provide Scullery Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Floor Drain
   d. Provide Safety Shower and Eyewash Station at sink
11. Analytical Lab
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Cup Sink
   d. Provide purified Type I deionized water
   e. Provide Safety Shower and Eyewash Station at sink
12. Analytical Lab – Sort / Log
   a. Provide Handwash Sink with sediment trap / solids interceptor
13. Analytical Lab – Cementitious
   a. Provide Handwash Sink with sediment trap / solids interceptor
   b. Provide Safety Shower and Eyewash Station
14. Analytical Lab – Everything Else
   a. Provide Lab Sink with sediment trap / solids interceptor
   b. Provide Handwash Sink
   c. Provide Safety Shower and Eyewash Station
   d. Provide purified Type I deionized water
15. Analytical Lab – Weather Lab
   a. Provide Handwash Sink
   b. Provide Floor Drain
   c. Provide purified, Type I deionized water
16. Analytical Lab – Photometric Lab
   a. Provide Handwash Sink with sediment trap / solids interceptor
17. Analytical Lab - Thermoplastic
   a. Provide Handwash Sink with sediment trap / solids interceptor

   b. Provide Safety Shower and Eyewash Station at sink
   c. Handwash sink can be used for cold water immersion
18. Chemistry Storage (Shared)
   a. Provide Safety Shower and Eyewash Station

Hot Mix Asphalt

1. HMA Open Lab
   a. Provide Handwash Sink
   b. Provide Trench Drain for Hamburg Wheel
   c. Provide water and drain connection for Hamburg Wheel
   d. Provide Scullery Sink with sediment trap / solids interceptor
   e. Provide eyewash station at all sinks
   f. Provide purified water
2. HMA Open Lab – Compacted and Loose Mix
   a. Provide eyewash station
3. HMA Open Lab - Ovens
   a. Provide purified, deionized water
4. HMA Open Lab – Compaction/Mixing/Splitting
   a. Provide Scullery Sink with sediment trap / solids interceptor
   b. Provide Eyewash Station
5. Open Lab Testing – Microsurfacing / Instrument
   a. Provide Lab Sink
   b. Provide Handwash Sink
   c. Provide Scullery Sink with sediment trap / solids interceptor
   d. Provide purified, deionized water
   e. Provide eyewash station at sinks
6. Receiving – Logging / Storage
   a. Provide Handwash Sink
   b. Provide eyewash station at all sinks
7. Receiving – Loose Aggregate Sizing / Cutting
   a. Provide Lab sink
   b. Provide Scullery Sink with sediment trap / solids interceptor
   c. Provide Trench Drain
   d. Provide Floor sink and water connection for Wet Saws
   e. Provide eyewash station at all sinks
8. Extraction
   a. Provide Scullery Sink with sediment trap / solids interceptor
   b. Provide Lab Sink
   c. Provide Handwash Sink
   d. Provide purified, deionized water
   e. Provide eyewash station at sinks
9. Release Agent

a. Provide Scullery Sink with sediment trap / solids interceptor
b. Provide purified, deionized water
c. Provide eyewash station at sink

Aggregate

1. Staging
    a. Provide Handwash Sink with sediment trap / solids interceptor
2. Breakdown Room
    a. Provide Handwash Sink with sediment trap / solids interceptor
    b. Provide Scullery Sink with sediment trap / solids interceptor
    c. Provide Floor Drain
    d. Provide Floor Sink with sediment trap/ solids interceptor
3. Specific Gravity (SPG)
    a. Provide two-compartment Scullery Sink with sediment trap / solids interceptor
    b. Provide eyewash station at sink
    c. Provide water and drain connection to Water Tank
4. Open Lab
    a. Provide three-compartment Scullery Sink with sediment trap / solids interceptor
    b. Provide eyewash station at sink
5. Open Lab 1 – LA Abrasions
    a. Provide Scullery Sink with sediment trap / solids interceptor
6. Open Lab 1 – Prep Area
    a. Provide Scullery Sink with sediment trap / solids interceptor
7. Open Lab 1 – Micro Deval
    a. Provide Scullery Sink with sediment trap / solids interceptor
8. Open Lab 1 – Wash/Oven
    a. Provide Scullery Sink with sediment trap / solids interceptor
9. Open Lab 1 – Soundness Test
    a. Provide two-compartment Scullery Sink with sediment trap / solids interceptor
    b. Provide eyewash station at sink
10. Moisture Room
    a. Provide Scullery Sink with sediment trap / solids interceptor
11. Count Lab
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide Lab Sink
12. AIMS
    a. Provide Scullery Sink with sediment trap / solids interceptor
    b. Provide Floor Drain
13. Deleterious Count
    a. Provide two-compartment Scullery Sink with sediment trap / solids interceptor
    b. Provide eyewash station at sink

14. Heavy Media
    a. Provide Scullery Sink with sediment trap / solids interceptor

II-8 Basis of Design: HVAC

Heating/Ventilation/Air Conditioning

General Design Criteria

1. The Design-Builder is required to perform a final load and energy model based on the final design for sizing all HVAC equipment and associated elements.
2. All equipment and systems shall be designed so that there are proper clearances for routine maintenance of the equipment and the ability to maintain common elements without disruption of other systems.
3. Redundant systems may be required for critical spaces. Redundant systems shall have at least 50% extra capacity to accommodate any down time in units serving the space. Cycle all units will periodically to maintain performance of the units so no unit is over-worked and prone to failure.
4. All HVAC work shall include all materials, equipment, labor and miscellaneous appurtenances to provide a complete installation of all system functions indicated herein. Items not described in the document but which are expected to be included in the final design include:
    a. Expansion fittings and sleeve seals
    b. Sleeves and sleeve seals
    c. Meters and gauges
    d. Hangers and supports
    e. Vibration and Seismic control elements
    f. Identification for Ductwork, Piping & Equipment
    g. Insulation for Ductwork and Piping
    h. Controls and Instrumentation
    i. Air inlets & outlets
    j. Ductwork accessories
    k. Final commissioning of the system
    l. Final cleaning of the systems
5. Confirm specified pressurization and environmental conditions requirements listed at the end of this section with the owner prior to final design. If no requirements are listed, coordinate final pressurization and environmental condition requirements prior to design & construction.
6. Design Criteria
    a. Ambient Design Conditions

Criteria	Summer	Winter
Dry Bulb	92.6°F	1.1°F
Wet Bulb	76.7°F	N/A

    b. Unoccupied Conditions

	Summer	Winter

Space Type	Temp (± 2°F)	RH (± 5%)	Temp (± 2°F)	RH (± 5%)
Administrative Areas	72°F	50%	72°F	N/A
District 6 (1.1)	77°F	N/A	N/A	N/A
Traffic Instrumentation (2.1)	82°F	N/A	68°F	N/A
Metals & Misc. Products Lab (2.2)	74	45%	74	45%
Nuclear (2.3)	82°F	N/A	68°F	N/A
Concrete (2.4)	82°F	N/A	68°F	N/A
Cement (2.5)	TBD	TBD	TBD	TBD
Soils (2.6)	82°F	N/A	68°F	N/A
Chemistry Lab (2.7)	82°F	N/A	68°F	N/A
Hot Mix Asphalt (2.8)	82°F	N/A	68°F	N/A
Aggregate (2.9)	82°F	N/A	68°F	N/A

c. Outside Air Ventilation Requirements per the International Mechanical Code

Outside air shall meet or exceed the requirements of ASHRAE Standard 62-2013 and is not to be less than prescribed by the International Mechanical Code Ventilation Index. All assemblies and office areas (spaces with significant occupancy and high design outside air rates) shall be provided with controls to automatically optimize air qualities based upon measured indoor air quality (Demand Controlled Ventilation). Design minimum rates shall be generally as follows:

Space Classification	Occupant Density (Occupants / 1000 FT^2)	Outdoor Airflow Rate per Person (CFM / person)	Outdoor Airflow Rate per Area (CFM / FT^2)	Exhaust Airflow Rate (CFM / FT^2)
Wood/Metal Shops	20	10	0.18	0.5
Science Laboratory	25	10	0.18	1.0
Corridors	---	---	0.06	---
Conference Rooms	50	5	0.06	---
Office Spaces	5	5	0.06	---
Main Entry Lobbies	10	5	0.06	---

Warehouse Storage	---	---	0.06	---
Restrooms	---	---	---	70 CFM[1]

[1]Required exhaust rate for every water closet or urinal in room.

d. Filtration Criteria
    i. All Air Handling Systems
        1. 2" deep 30% efficient (MERV 8) pleated pre-filter
        2. 12" dep 85% efficient (MERV 13) main cartridge filter
    ii. Local Recirculating Systems
        1. 2" deep 30% efficient (MERV 8) filter

7. System Requirements
    a. Primary Cooling
        i. The primary cooling source for the project shall be with either roof mounted air handling units (RTU's) or indoor mounted air handling units (AHU's) connections to chilled water via the chiller
            1. Air Handling units shall be designed for variable volume operation
            2. Required components include:
                a. Economizer
                b. Return exhaust fans for general exhaust and economizer relief
            3. Any "X-Ray" related equipment that requires a connection to the cooling towers, must have a separate closed loop in order to meet LEED requirements.
        ii. Water cooled chillers shall be provided with matching cooling towers, chilled water pumps and condenser water pumps
            1. Indoor chillers and pumps. Roof mounted cooling towers
            2. Provide magnetic bearing centrifugal compressors with variable speed for precise capacity control
        iii. Supplemental cooling in remote or specialized spaces (e.g. elevator control room) can be cooled via indoor air-cooled evaporators with outdoor condensing units
    b. Primary Heating
        i. The primary heating source shall be via hot water connections to the aforementioned air handling units
        ii. Hot water boilers shall be condensing type boilers with 20:1 gas heat turndown
        iii. Fan powered and VAV boxes shall have hot water reheat coils where required
        iv. Natural Gas Connections & Piping
            1. Architect and civil engineer to provide location of natural gas pipe inlet and meter
            2. Isolation valve provided for each piece of equipment

c. General Ventilation & Ductwork
    i. Supply diffusers and grilles to be determined by ceiling types and approved by architect
    ii. Return diffusers and grilles to be determined by ceiling types and approved by architect
    iii. Plenum return where possible with transfers where required
d. Office & Administrative Areas
    i. Office and Administrative areas shall have VAV air handling units with fan powered boxes and VAV boxes for the appropriate zones
    ii. Exterior offices to have boxes with hot water reheat coils
    iii. Fin-tube radiation is acceptable along storefront glass for skin losses
    iv. Office spaces adjacent to lab areas must be positively pressurized to prevent odors from infiltrating from the labs
e. Laboratory Spaces
    i. Lab Spaces shall have roof mounted exhaust fans for each lab area. Fans shall meet ANSI Z9.5 Laboratory Ventilation Standards.
        1. Fan shall be up-blast or lab exhaust type with 14” roof curb, pending evaluation of the lab equipment
        2. Discharge shall be a minimum of 10 ft above adjacent rooflines and air intakes in a vertical direction
        3. Airflows and fan quantities shall be sized according to the evaluation of the lab equipment. Exhaust air shall not be shared by separate spaces
        4. Exhaust stack discharge velocity shall be at least 3000 fpm, unless it can be demonstrated that a specific design meets the dilution criteria necessary to reduce the concentration of hazardous materials to safe levels
        5. Fans shall be controlled in accordance to the requirements of any lab equipment and hoods
        6. Provide low exhaust grille in room if necessary depending on room type (e.g. If a gas that’s denser than air is present in a space, and needs to be exhausted)
            a. This also applies to several fume hoods throughout the facility
    ii. Lab spaces with a hood shall be negatively pressurized unless otherwise noted
    iii. Make-up Air units may be required for air balancing against the exhaust system
        1. Units shall be mounted indoors with a roof mounted outside air intake
            a. Intake openings shall be at least 10 feet from lot lines or buildings on the same lot

b. Mechanical and gravity intake openings shall be located atleast 10 feet horizontally from any hazardous or noxious contaminant source
2. Units shall be variable volume to offset the varying exhaust quantities
3. Hot water and chilled water will be used for heating and cooling respectively

f. Restroom Exhaust Systems
   i. Restroom exhaust fans shall be sized according to the requirements of the International Mechanical Code
   ii. One duct header shall be installed per restroom
   iii. Restrooms shall be negatively pressurized and allow make-up air to be transferred from adjacent spaces

g. Compressed Air
   i. A new compressed air system shall be installed in the mechanical room with compressed air lines running above the ceiling to the rooms specified in the sections below
   ii. System shall be comprised of:
      1. Single non-rotary compressor
      2. Refrigerated air dryer with coalescing pre-filter and particulate after-filter
      3. Vertical receiver tank
      4. Discharge flow controller
      5. Automatic drain valves on all components

h. Condensate
   i. All condensate lines shall be routed to the nearest appropriate floor drain.

i. Hazardous Storage
   i. It is assumed that any potential hazardous materials will be under IBC Table 307.1.1 in order to remain in Business Occupancy
   ii. If any hazardous materials exceed this and meet the hazardous materials definition in section 510.2 of the International Mechanical Code, a hazardous exhaust system shall be designed according to the requirements laid out in section 510 of the IMC

j. Dust Collection
   i. Dust collection systems must be capable of collecting dust/particles from various sources, including the following. Refer to room data sheets for type of dust collection in specific rooms/areas.
      1. Wood
      2. Metal
      3. Silica
      4. Plastics

ii. Dust collection methods must be one of the following categories. Refer to the room data sheets for dust collection methods in specific rooms/areas.
    1. Devices that collect fumes (e.g. Hoods)
    2. Devices that collect dust or particles (e.g. Snorkels)
    3. Devices that collect dust via filtration (e.g. Duct filters)
    4. Devices that are directly connected to equipment
iii. Various lab spaces have dust collection requirements. Exhaust ducts associated with dust collection shall be routed up through roof
iv. Associated equipment shall have ECM motors
v. Equipment shall be sized to extract dust based on the type as recommended in the Industrial Hygiene guide
vi. Exhaust fans associated with dust collection shall be controlled by primarily local means

k. Humidifiers
    i. In spaces where with minimum relative humidity requirements greater than standard environmental conditions, humidifiers shall be provided
    ii. Humidifiers can be mounted in the room or supply ductwork depending on room application and constructability
    iii. Humidifiers shall be heated pan humidifiers, jacketed dry steam humidifiers, or self-contained humidifiers
l. Building Management & Controls
    i. A microprocessor based, distributed logic, peer-to-peer, direct digital control building management system shall be provided to monitor, control and optimize the operation of the HVAC systems, and monitor and alarm the operation of critical electrical and plumbing systems
    ii. Control system shall be BACNet compatible
    iii. All new thermostats shall be digital, programmable type with local access by passcode or key
        1. Thermostat to allow for limited local control

District 6

1. Open Lab (1.11)
    a. Pressurization: Negative
    b. 8 Air Changes per Hour
    c. Temperature: 68°F – 72°F
    d. Relative Humidity: 23% - 55%
    e. Aggregate (1.11.1)
        i. Pressurization, air changes, temperature and humidity requirements all to match Open Lab (1.11)
        ii. Dust Collection system required via snorkel

   f. Soils (1.11.4)
      i. Pressurization, air changes, temperature and humidity requirements all to match Open Lab (1.11)
      ii. Dust Collection system required via snorkel
      iii. Compressed Air Connections
   g. Sort/Log (1.11.5)
      i. Pressurization, air changes, temperature and humidity requirements all to match Open Lab (1.11)
   h. Concrete (1.11.6)
      i. Pressurization, air changes, temperature and humidity requirements all to match Open Lab (1.11)
      ii. Dust Collection system required over cylinder breakers via snorkel
2. Isolation Room – Aggregate (1.12)
   a. Pressurization: Negative
   b. 8 Air Changes per Hour
   c. Temperature: 68°F – 72°F
   d. Relative Humidity: 23% - 55%
   e. Dust Collection system required via snorkel
3. Isolation Room – Calibration (1.13)
   a. Pressurization: Negative
   b. 8 Air Changes per Hour
   c. Temperature: 68°F – 72°F
   d. Relative Humidity: 23% - 55%
   e. Dust Collection system required via canopy. Canopy is to supplement the dust collection system that is integral to the sandblaster.
      i. Canopy should have switch to toggle on/off for intermittent operation
   f. Compressed Air Connections
4. Isolation Room – HMA (1.14)
   a. Pressurization: Negative
   b. 6 Air Changes per Hour
   c. Temperature: 68°F – 72°F
   d. Relative Humidity: 23% - 55%
   e. Dust Collection system required via snorkel
5. Isolation Room – Soils (1.15)
   a. Pressurization: Negative
   b. 8 Air Changes per Hour
   c. Temperature: 68°F – 72°F
   d. Relative Humidity: 23% - 55%
   e. Dust Collection System Required via snorkel
6. Nuclear Storage (1.16)
   a. Pressurization: Negative
   b. Temperature: 68°F – 72°F

c. Relative Humidity: 23% - 55%

7. Nuclear Workstation (1.17)
    a. Pressurization: Negative
    b. 6-8 Air Changes per Hour
    c. Temperature: 68°F – 72°F
    d. Relative Humidity: 23% - 55%
8. Storage (1.18)
    a. Pressurization: Negative
    b. 6 Air Changes per Hour
9. Open HMA Lab (1.23)
    a. Pressurization: Negative
    b. 12 Air Changes per Hour
    c. Temperature: 68°F – 72°F
    d. Relative Humidity: 23% - 55%
    e. Compressed Air Connections
    f. Hamburg Wheel Area (1.23.1)
        i. Pressurization, air changes, temperature and humidity requirements to match Open HMA Lab (1.23)
        ii. Compressed Air Connections
    g. I-FIT Area (1.23.2)
        i. Pressurization, air changes, temperature and humidity requirements to match Open HMA Lab (1.23)
    h. Specific Gravity Area (1.23.3)
        i. Pressurization, air changes, temperature and humidity requirements to match Open HMA Lab (1.23)
    i. Mixture Prep Area (1.23.4)
        i. Pressurization, air changes, temperature and humidity requirements to match Open HMA Lab (1.23)
    j. TSR Area (1.23.5)
        i. Pressurization, air changes, temperature and humidity requirements to match Open HMA Lab (1.23)
    k. Sample Staging (1.23.6)
        i. Pressurization, air changes, temperature and humidity requirements to match Open HMA Lab (1.23)
10. HMA Extraction/Ignition Room (1.24)
    a. Pressurization: Negative
    b. 12 Air Changes per Hour
    c. Temperature: 68°F – 72°F
    d. Relative Humidity: 23% - 55% Dust Collection required via snorkel
    e. Fume Hood required
11. Calibration/Repair (1.25)
    a. Pressurization: Negative
    b. 8 Air Changes per Hour
    c. Temperature: 68°F – 72°F

d. Relative Humidity: 23% - 55%

Traffic Instruments

1. Open Lab (2.11)
    a. Pressurization: Negative
    b. 6-8 Air Changes per Hour
    c. Fume Hood Required
2. Storage (2.12)
    a. Pressurization: Negative
    b. 6-8 Air Changes per Hour

Metals & Miscellaneous Products Lab

1. Metal Lab (2.21)
    a. Pressurization: Negative
    b. 6 Air Changes per Hour
    c. Temperature: 68°F – 74°F
    d. Relative Humidity: 50%
    e. Compressed Air Connections
    f. Exhaust canopy required by ovens
    g. Metals Lab (2.21.2)
        i. Pressurization, air changes, temperature and humidity requirements to match Metal Lab (2.21)
        ii. Compressed Air Connections
    h. Metals Lab Sort/Log (2.21.4)
        i. Pressurization, temperature and humidity requirements to match Metal Lab (2.21)
        ii. Compressed Air Connections
    i. Failed Storage (2.21.5)
        i. Temperature and humidity requirements to match Metal Lab (2.21)
        ii. Compressed Air Connections
2. Misc. Products Lab (2.22)
    a. Pressurization: Negative
    b. 6 Air Changes per Hour
    c. Temperature: 70°F – 77°F
    d. Relative Humidity: 45% - 65%
    e. Compressed Air Connections
    f. Exhaust canopy required by ovens
3. Machine Shop (2.23)
    a. Pressurization: Negative
    b. 6 Air Changes per Hour
    c. Temperature: 72°F – 75°F
    d. Relative Humidity: 55%

e. Dust Collection system required for plastic cutting dust & fumes
f. Compressed Air Connections
g. Exhaust located above paint & welding booth

4. Pipe Storage & Cutting (2.24)
    a. Pressurization: Negative
    b. 6 Air Changes per Hour
    c. Temperature: 70°F – 77°F
    d. Relative Humidity: 45% - 65%
    e. Dust Collection system via snorkel required for plastic cutting dust & fumes
        i. Separate dust collection system required for wood & metal
    f. Compressed Air Connections
    g. Non-chemistry lab hood required

Nuclear

1. Diagnostics / Shop (2.31)
    a. Pressurization: Negative
    b. 8 Air Changes per Hour
    c. Temperature: 68°F – 72°F
    d. Relative Humidity: 23% - 55%
    e. Compressed Air Connections
    f. Fume Hood required
2. Nuclear Hot Room (2.32)
    a. Pressurization: Negative
    b. 8 Air Changes per Hour
    c. Temperature: 68°F – 72°F
    d. Relative Humidity: 23% - 55%
    e. Compressed Air Connections
3. Storage (2.33)
    a. Pressurization: Negative
    b. Temperature: 68°F – 72°F
    c. Relative Humidity: 23% - 55%
4. Calibration Lab (2.34)
    a. Pressurization: Negative
    b. 6-8 Air Changes per Hour
    c. Temperature: 68°F – 72°F
    d. Relative Humidity: 23% - 55%
    e. Compressed Air Connections

Concrete

1. Open Lab (2.41)
    a. Pressurization: Negative

b. 6-8 Air Changes per Hour
c. Temperature: 68°F – 72°F
d. Relative Humidity: 23% - 55%
e. Compressed Air Connections
f. Dust collection required via snorkel
g. Mixing (2.41.1)
    i. Pressurization, temperature and humidity requirements to match Open Lab (2.41)
    ii. Compressed Air Connections
    iii. Dust collection required via canopy
h. Casting & Molding (2.41.2)
    i. Temperature and humidity requirements to match Open Lab (2.41)
    ii. Compressed Air Connections
    iii. Dust Collection system required via snorkel
i. Curing Compound (2.41.3)
    i. Pressurization, temperature and humidity requirements to match Open Lab (2.41)
    ii. Fume Hood required
j. Compression/Flexural Testing (2.41.4)
    i. Pressurization, air changes, temperature and humidity requirements to match Open Lab (2.41)
    ii. Compressed Air Connections
k. Sample Receiving (2.41.5)
    i. Temperature and humidity requirements to match Open Lab (2.41)
    ii. Compressed Air Connections
l. Sorting & Logging (2.41.6)
    i. Pressurization, temperature and humidity requirements to match Open Lab (2.41)
    ii. Compressed Air Connections

2. Polymer Concrete (2.42)
    a. Pressurization: Negative
    b. 8 Air Changes per Hour
    c. Temperature: 68°F – 72°F
    d. Relative Humidity: 23% - 55%
    e. Dust Collection system required
    f. Fume hood required. Must be located near the floor level.
3. Salt Scale (2.43)
    a. Meet general requirements
4. Moist/Cure (2.44)
    a. Temperature: 71°F – 75°F
    b. Relative Humidity: 100 %
    c. Dust Collection System required

   d. Utility Room (2.44.1)
      i. Meet requirements of Moist/Cure (2.44)
5. Freeze/Thaw Testing (2.45)
   a. Pressurization: Negative
   b. Temperature and humidity requirements to be determined via testing
   c. Compressed Air Connections
6. Tool Storage (2.46)
   a. Meet general requirements

Cement

1. Open Lab (2.51)
   a. Pressurization: Negative
   b. 6-8 Air Changes per Hour
   c. Temperature: 66°F – 80°F
   d. Relative Humidity: >50%
   e. Dust Collection system required via hood
   f. Compressed Air Connections
2. Moist (2.52)
   a. Temperature: 66°F – 80°F
   b. Relative Humidity: >95%
   c. Compressed air connections
3. Open Lab – Air Permeability (2.53)
   a. Pressurization: Negative
   b. 6-8 Air Changes per Hour
   c. Temperature: 66°F – 80°F
   d. Relative Humidity: >50%
   e. Dust Collection system required
   f. Compressed Air Connections

Soils

1. Open Lab (2.61)
   a. Pressurization: Negative
   b. Temperature: 72°F – 75°F
   c. Relative Humidity: 23% - 55%
   d. Dust Collection system required
   e. Compressed air connections
2. Breakdown Room (2.62)
   a. Pressurization: Negative
   b. 6-8 Air Changes per Hour
   c. Temperature: 72°F – 75°F
   d. Relative Humidity: 23% - 55%
   e. Dust Collection system required
   f. Compressed air connections

3. EFA Room (2.63)
    a. Pressurization: Negative
    b. 6 to 8 Air Changes per Hour
    c. Temperature: 72°F – 75°F
    d. Relative Humidity: 23% - 55%
4. Open Lab – Vibratory Lab (2.64)
    a. Pressurization: Negative
    b. 6-8 Air Changes per Hour
    c. Temperature: 72°F – 75°F
    d. Relative Humidity: 23% - 55%
    e. Dust Collection system required
    f. Compressed air connections

Chemistry Labs

1. Instrument Lab (2.71)
    a. Pressurization: Negative
    b. Temperature: 72°F – 75°F
    c. Relative Humidity: 23% - 55%
    d. Fume Hoods required
    e. Compressed Air Connections
    f. Sample Prep (2.71.1)
        i. Pressurization, temperature and humidity requirements to match Open Lab (2.71)
        ii. Fume Hoods required
    g. Instrument Support (2.71.2)
        i. Pressurization, temperature and humidity requirements to match Open Lab (2.71)
        ii. Fume Hoods required
2. Bitumin Lab (2.72)
    a. Fume Hoods required
    b. Compressed air connections
    c. Equipment in this lab requires a connection to the natural gas line
    d. Sort/Log Lab (2.72.1)
        i. Temperature and humidity requirements to match Bitumin Lab (2.72)
    e. Prep Lab (2.72.2)
        i. Temperature and humidity requirements to match Bitumin Lab (2.72)
        ii. Fume Hoods required
        iii. Compressed Air Connections
    f. Hot Pour Seal (2.72.3)
        i. Temperature and humidity requirements to match Bitumin Lab (2.72)

   ii. Fume Hoods required
g. Emulsified (2.72.4)
   i. Temperature and humidity requirements to match Bitumin Lab (2.72)
   ii. Fume Hoods required
   iii. Compressed Air Connections
h. Cutback (2.72.5)
   i. Temperature and humidity requirements to match Bitumin Lab (2.72)
   ii. Fume Hoods required
i. PG Asphalt (2.72.6)
   i. Temperature and humidity requirements to match Bitumin Lab (2.72)
   ii. Fume Hoods required
   iii. Compressed Air Connections
   iv. Equipment in this sub-area requires a connection to the natural gas line
j. Sample Storage (2.72.7)
   i. Temperature and humidity requirements to match Bitumin Lab (2.72)
   ii. Pressurization: Negative
k. Naptha Bath (2.72.8)
   i. Temperature and humidity requirements to match Bitumin Lab (2.72)
   ii. Pressurization: Negative
   iii. Fume Hoods required. Must be located near floor.

3. Analytical Lab (2.73)
   a. Pressurization: Negative
   b. 6 Air Changes per Hour
   c. Temperature: 72°F – 75°F
   d. Relative Humidity: 40% - 50%
   e. Fume Hoods required
   f. Compressed air connections
   g. Equipment in this lab requires a connection to the natural gas line
   h. Sort/Log (2.73.1)
      i. Pressurization: Negative
   i. Cementitious (2.73.2)
      i. Pressurization, air change, temperature and humidity requirements to match Analytical Lab (2.73)
      ii. Fume Hoods required
      iii. Compressed Air Connections
   j. Paint Test (2.73.3)
      i. Pressurization, air change, temperature and humidity requirements to match Analytical Lab (2.73)

   ii. Fume Hoods required
   iii. Compressed Air Connections
k. Weather (2.73.4)
   i. Pressurization, air change, temperature and humidity requirements to match Analytical Lab (2.73)
   ii. Fume Hoods required
l. Photometric (2.73.5)
   i. Pressurization, temperature and humidity requirements to match Analytical Lab (2.73)
m. Salt Lab (2.73.6)
   i. Pressurization, air change requirements, temperature and humidity requirements to match Analytical Lab (2.73)
n. Thermoplastic (2.73.7)
   i. Pressurization, air change requirements, temperature and humidity requirements to match Analytical Lab (2.73)
   ii. Fume Hoods required

4. Chemistry Storage (2.74)
   a. Pressurization: Negative
   b. Temperature: 72°F – 75°F
   c. Relative Humidity: 23% - 55%
   d. Fume Hoods required
5. PPE Storage (2.75)
   a. Pressurization: Negative
   b. Temperature: 72°F – 75°F
   c. Relative Humidity: 23% - 55%
   d. Compressed air connections
6. Cylinder Storage (2.76)
   a. Pressurization: Negative
   b. Temperature: 72°F – 75°F
   c. Relative Humidity: 23% - 55%
7. Chiller Room (2.77)
   a. Pressurization: Negative
   b. Temperature: 72°F – 75°F
   c. Relative Humidity: 23% - 55%

Hot Mix Asphalt

1. HMA Open Lab (2.81)
   a. Pressurization: Negative
   b. 6 Air Changes per hour
   c. Temperature: 68°F – 86°F
   d. Relative Humidity: 23% - 55%
   e. Compressed air connections
   f. Compacted Mix & Loose Mix (2.81.1.a&b)

i. Air changes, temperature and humidity requirements to match Open Lab (2.81)
ii. Compressed air connections
iii. Fume Hood required

g. Ovens (2.81.2)
i. Air changes, temperature and humidity requirements to match Open Lab (2.81)

h. Compaction/Mixing/Splitting (2.81.3)
i. Air changes, temperature and humidity requirements to match Open Lab (2.81)
ii. Compressed air connections
iii. Fume Hood required

i. Testing – Microsurfing/Instrument (2.81.4)
i. Air changes, temperature and humidity requirements to match Open Lab (2.81)
ii. Compressed air connections

2. Receiving – Logging/Storage (2.83)
a. Pressurization: Negative
b. 6 Air Changes per hour
c. Temperature: 68°F – 86°F
d. Relative Humidity: 23% - 55%
3. Loose Aggregate Sizing/Cutting (2.84)
a. Pressurization: Negative
b. 6 Air Changes per hour
c. Temperature: 68°F – 86°F
d. Relative Humidity: 23% - 55%
e. Fume Hoods required
f. Dust Collection system required via hood
4. Extraction (2.85)
a. Pressurization: Negative
b. 6 Air Changes per hour
c. Temperature: 68°F – 86°F
d. Relative Humidity: 23% - 55%
e. Fume Hoods required
f. Release Agent (2.85.1)
i. Pressurization, temperature and humidity requirements to match Open Lab (2.81)

Aggregate

1. Staging (2.91)
a. 6 Air Changes per Hour
b. Temperature: 68°F – 74°F
c. Relative Humidity: 23% - 55%
d. Dust Collection system required

2. Breakdown (2.92)
    a. 6 Air Changes per Hour
    b. Temperature: 68°F – 74°F
    c. Relative Humidity: 23% - 55%
    d. Dust Collection system required
3. Specific Gravity (2.93)
    a. Pressurization: Negative
    b. 6 Air Changes per Hour
    c. Temperature: 68°F – 74°F
    d. Relative Humidity: 23% - 55%
4. Open Lab (2.94)
    a. Pressurization: Negative
    b. 6 Air Changes per Hour
    c. Temperature: 68°F – 74°F
    d. Relative Humidity: 23% - 55%
    e. Dust Collection system required for lab and all sub-areas of 2.94
    f. Moisture Room (2.94.5.a)
        i. 6 Air Changes per Hour
        ii. Temperature: 71°F – 77°F
        iii. Relative Humidity: 100%
5. Count Lab (2.95)
    a. 6 Air Changes per Hour
    b. Temperature: 68°F – 74°F
    c. Relative Humidity: 23% - 55%
    d. Dust Collection system required

II-9 Basis of Design: Electrical + Lighting

1) Power Distribution

a) A new electrical service will be provided from an exterior, pad-mounted, utility owned transformer at 480/277V, 3PH, 4W to service switchboards located in an electrical room within the building. The service switchboards shall feed 480/277V, 3PH, 4W panelboards as well as 208/120V, 3PH, 4W panelboards via step-down transformers.
b) An emergency generator shall provide back-up power to life safety loads as well as equipment as requested by IDOT. The exterior generator shall be natural gas, 480/277V, 3PH, 4W, in weatherproof skin-tight enclosure with sound attenuation in accordance with local jurisdiction requirements. A minimum of two 4-pole ATS shall be provided downstream of the generator (life safety loads to be on their own ATS and electrical distribution). Generator shall be grounded as separately derived system. The emergency system shall include permanent switching means to connect a portable generator to supply power to life safety items in the event of maintenance and/or repair of the permanent generator.
c) Electronic power monitoring meters with networking capability shall be provided for electrical distribution equipment; ASHRAE 90.1 shall be used as a guide for requirements including separation of like loads.
d) Panelboards shall be provided with approximately 20% spare capacity in spare breakers for future growth.
e) Electrical power from the distribution and branch panels shall include feeders for lighting, general power, appliances, HVAC equipment, and other IDOT equipment.
f) The electrical services and systems shall be grounded in accordance with NEC requirements. A supplementary ground wire shall be included in all conduits for the purpose of grounding all metallic non-current carrying parts of the electrical equipment the conduit is feeding. All electronic system grounds shall be electrically insulated from power system grounds.
g) UPS equipment shall be provided for lab equipment where indicated as a requirement.
h) Provide provisions for future EV charging stations.

2) Wiring and Conduits:

a) Wiring shall be copper, THHN/THWN-2, minimum 12 AWG. All wiring shall be stranded.
b) Minimum conduit size shall be 3/4”.

c) All conduits shall be as follows:
   i.) Rigid aluminum conduit or IMC with compression fittings shall be used where subject to physical damage.
   ii.) EMT shall be used where not subject to physical damage.
   iii.) Liquid-tight flexible conduit shall be used for final connections to all motors, transformers, and other vibrating equipment.
   iv.) EMT shall be used for conduits concealed in walls and ceilings.
d) Plastic connectors, fittings, or junction boxes shall not be allowed.
e) All conduit supports shall be galvanized angle iron or Unistrut with threaded rod.
f) All conduit penetrations shall be suitably sealed. All conduits passing through areas with a temperature difference of more than 20°F between adjacent spaces shall be both insulated and sealed.
g) Fire rated materials shall be used as required to maintain the fire rating of the wall or ceiling assembly.

3) Safety disconnects, starter units, and VFD's:

a) Provide local safety disconnect for motor equipment when not provided with equipment.
b) Starter units and/or VFD's shall be provided at the motor as recommended by the equipment provider. Starters and VFD's shall be sized to match the individual motor.
c) Plastic disconnects shall not be allowed.

4) Wiring Devices:

a) Wiring devices shall be specification grade.
b) Outdoor power outlets shall be 120V, 20A GFCI type, with while-in use cover.
c) Special outlets shall be provided for equipment connections as required. Exact voltage and configuration shall be coordinated with utilization equipment.

5) Equipment Connections:

a) Power feeds including conduit and wire shall be provided to the following equipment.
b) HVAC equipment
c) Appliances and other IDOT equipment
d) General power

6) Lighting:

a) Energy efficient LED lights shall be utilized and shall comply with LEED Silver requirements. The exact type, output, and mounting configuration shall be as required to meet the light levels and functional requirements of the spaces installed.
b) Light levels will be provided in accordance with Illuminating Engineering Society (IES) design guidelines, unless noted otherwise. In general average maintained foot-candle levels for the interior lighting will be considered as follows:
   i.) Offices - 35 to 40 fc
   ii.) Corridors - 15 to 20 fc
   iii.) Restrooms - 10 to 15 fc
   iv.) Labs - average 75 fc; refer to "Requirements for Lab Areas" section of report for additional specifics. Lighting levels for labs shall be considered at counter top height, 36" AFF.
   v.) Building exterior and parking – average 1 fc
c) Installed lighting power densities (LPD) shall be in accordance with all applicable energy codes (adhere to IECC).
d) LED exit lights shall be commercial grade and be rated for the environment.
e) Exterior LED fixtures shall be provided for exterior egress lighting as required. Exterior lighting fixtures shall be listed for damp or wet location, as required, provided with low temperature drivers and dark sky compliant.
f) Exterior lighting shall have a backlight-uplight-glare (BUG) rating (as defined in IES TM-15-11 Addendum A) of no more than B2-U2-G2 in accordance with LEED light pollution reduction credit requirement.

7) Lighting Controls:

a) Controls will consist of a combination of a central system for large open areas and local automatic devices for individual rooms. Manual devices shall be used in locations where there are safety concerns and/or equipment rooms. Lighting control system shall be capable of dimming. Daylighting controls to be provided as required by energy code (IECC). Lighting controls shall conform to LEED Silver requirements.
b) Controls shall be capable of interfacing with BAS (building automation system).
c) All occupancy sensors shall be wired for manual 'on' / automatic 'off' operation unless otherwise permitted by code.
d) Exterior lighting shall be provided with photocell and time clock control.
e) Refer to report for room specific lighting controls.

8) Lightning Protection System

a) Provide lightning protection components and system in accordance with NFPA 780 requirements.
b) System shall have LPI Master Certification.
c) Copper air terminals shall be used for system.

9) Requirements for lab areas

1) General
   a) 20A, 120V duplex receptacle spaced 24” on center at perimeter bench unless otherwise noted
   b) Electrical equipment and devices shall be appropriate for the hazardous classification/zone of the room
   c) 20A, 120V plug connected equipment
2) District 6-Open Lab
   a) 60-80 fc (foot-candle) ambient light level
   b) Floor mounted power required
   c) UPS power required
3) District 6-Aggregate
   a) 60-80 fc ambient light level
   b) Floor mounted power required
   c) UPS power required
4) District 6-Soils
   a) 70-80 fc ambient light level
   b) UPS power required
   c) Floor mounted power required
   d) 220V plug connected equipment
   e) 208V hardwired equipment
5) District 6-Sort/Log
   a) 60-80 fc ambient light level
   b) Floor mounted power required
6) District 6-Concrete Lab
   a) 60-80 fc ambient light level
   b) UPS power required
   c) Floor mounted power required
7) District 6-Isolation Room-Aggregate
   a) UPS power required
8) District 6-Isolation Room-Repair
   a) UPS power required
   b) Floor mounted power required
9) District 6-Isolation Room-HMA
   a) UPS power required
   b) Floor mounted power required
10) District 6-Isolation Room-Soils
   a) Floor mounted power required

11) District 6-Nuclear Storage
    a) UPS power required
    b) 20A, 120V duplex receptacle spaced 24” or 48” on center around perimeter for charging gauges.
12) District 6-Nuclear Workstation
    a) 60-80 fc ambient light level
    b) UPS power required
    c) Floor mounted power required
13) District 6-Storage
    a) 20A, 120V convenience receptacles
    b) 70-80 fc ambient light level
14) District 6-Open HMA Lab
    a) 60-80 fc ambient light level
    b) UPS power required
    c) Floor mounted power required
    d) 208V hardwired equipment
    e) 240V hardwired equipment
    f) 220V plug connected equipment
15) District 6-Hamburg Wheel Area
    a) UPS power required
    b) Floor mounted power required
    c) 208V hardwired equipment
    d) 220V plug connected equipment
16) District 6- I-Fit Area
    a) Floor mounted power required
    b) 208V hardwired equipment
    c) Island Bench power required
17) District 6-Specific Gravity Area
    a) Floor mounted power required
    b) 208V hardwired equipment
    c) Island Bench power required
18) District 6-Mixture Prep Area
    a) Floor mounted power required
    b) 208V hardwired equipment
    c) Island Bench power required
19) District 6-TSR Area
    a) Floor mounted power required
    b) 208V hardwired equipment
    c) Island Bench power required
20) District 6-Sample Staging
    a) Floor mounted power required
    b) 208V hardwired equipment
    c) Island Bench power required
21) District 6-HMA Extraction/ Ignition Room

a) Floor mounted power required
b) 208V hardwired equipment
c) Island Bench power required

22) District 6-Calibration/ Repair
a) 70-80 fc ambient light level
b) Ceiling Mounted power required

23) Traffic Instrumentation-Open Lab
a) 60-80 fc ambient light level
b) UPS power required
c) Task Lighting Required

24) Traffic Instrumentation-Storage
a) 60-80 fc ambient light level

25) Metals & Misc. Products Lab-Open Lab
a) 60-80 fc ambient light level

26) Metals & Misc. Products Lab-Metals Lab
a) 208V hardwired equipment
b) 240V hardwired equipment
c) 220V plug connected equipment
d) 480V hardwired equipment

27) Metals & Misc. Products Lab-Metals Lab- Sort/Log
a) 20A, 120V convenience receptacles
b) Power for computer stations required

28) Metals & Misc. Products Lab-Failed Storage
a) 20A, 120V convenience receptacles
b) 208V hardwired equipment

29) Metals & Misc. Products Lab-Miscellaneous Products Lab
a) 60-80 fc ambient light level
b) 208V hardwired equipment
c) 240V hardwired equipment
d) 220V plug connected equipment
e) 480V hardwired equipment

30) Metals & Misc. Products Lab-Machine Shop
a) 60-80 fc ambient light level
b) 208V hardwired equipment
c) 240V hardwired equipment
d) 220V plug connected equipment
e) 480V hardwired equipment

31) Metals & Misc. Products Lab-Pipe Storage and Cutting
a) 60-80 fc ambient light level
b) 208V hardwired equipment
c) 240V hardwired equipment
d) 220V plug connected equipment
e) 480V hardwired equipment

32) Nuclear-Diagnostics/Shop

a) 60-80 fc (foot-candle) ambient light level
b) Task Lighting required

33) Nuclear-Hot Room
a) 60-80 fc (foot-candle) ambient light level
b) Task Lighting required

34) Nuclear-Storage
a) 20A, 120V convenience receptacles

35) Nuclear-Calibration Lab
a) 60-80 fc (foot-candle) ambient light level
b) Task Lighting Required
c) UPS power required
d) Floor mounted power required

36) Concrete-Open Lab
a) 60-80 fc Direct/ Indirect light level
b) 70-80 fc Task Lighting Required
c) UPS power required
d) 208V power required
e) Emergency Power required

37) Concrete-Mixing
a) UPS power required
b) 208V power required
c) Emergency Power required
d) Island Bench power required

38) Concrete-Casting/Molding
a) 60-80 fc ambient light level
b) Task Lighting Required
c) UPS power required
d) 208V, 480V power required
e) Emergency Power required
f) Island Bench power required

39) Concrete-Curling Compound
a) 60-80 fc ambient light level
b) Emergency power required
c) Task lighting required
d) UPS power required
e) 208V, 480V required
f) 208V plug connected equipment

40) Concrete-Compression/Flexural Testing
a) 60-80 fc ambient light level
b) UPS power required
c) 208V power required
d) Emergency power required

41) Concrete-Sample Receiving
a) 60-80 fc ambient light level

b) Task Lighting required
c) UPS power required
d) Emergency Power Required

42) Concrete-Sorting and Logging
a) 60-80 fc ambient light level
b) 208V power required

43) Concrete-Polymer Concrete Testing
a) 60-80 fc ambient light level
b) UPS power required
c) Emergency power required
d) 208V power required

44) Concrete-Salt Scale
a) 60-80 fc ambient light level
b) UPS power required
c) Emergency power required
d) 208V, 480V power required

45) Concrete-Moist/Cure Area
a) 60-80 fc ambient light level
b) UPS power required
c) Emergency power required
d) 208V, 480V power required
e) Task lighting (waterproof type) required

46) Concrete-Utility Room for Moist
a) 60-80 fc ambient light level
b) Task lighting required
c) UPS power required
d) Emergency power required
e) 208V, 480V power required

47) Concrete-Freeze/Thaw Testing
a) 60-80 fc ambient light level
b) Task lighting required
c) UPS power required
d) 208V, 480V required

48) Concrete-Tool Storage
a) 60-80 fc ambient light level

49) Cement-Open Lab
a) 60-80 fc ambient light level
b) UPS power required
c) Floor mounted power required

50) Cement-Moist
a) UPS power required
b) 208V power required
c) Ceiling Mounted power required

51) Cement-Air Permeability

a) UPS power required
b) 208V power required
c) Floor mounted power required
d) 60-80 fc ambient light level

52) Soils-Open Lab
a) UPS power required
b) Floor mounted power required
c) 70-80 fc ambient light level

53) Soils – Breakdown Room
a) UPS power required
b) Floor mounted power required
c) 70-80 fc ambient light level

54) Soils – EFA Room
a) UPS power required
b) Floor mounted power required
c) 240V plug load required
d) Ceiling mounted power required
e) 208V power required
f) 70-80 fc ambient light level

55) Soils-Open Lab – Vibratory Lab
a) UPS power required
b) Floor mounted power required
c) 70-80 fc ambient light level
d) 208V Power required

56) Chemistry Lab – Instrument Lab
a) UPS power required
b) Floor mounted power required
c) 208V power required
d) Task lighting required

57) Chemistry Lab – Sample Prep Lab
a) Convenience receptacles required

58) Chemistry Lab – Instrument Support
a) Convenience receptacles required

59) Chemistry Lab – Bituminous Lab (QC)
a) Task Lighting required
b) UPS power required
c) Floor mounted power required
d) 208V, 480V power required
e) Island Bench power required

60) Chemistry Lab – Bituminous Lab (QC)-Sort/Log
a) UPS power required
b) Floor mounted power required

61) Chemistry Lab – Bituminous Lab (QC)-Prep Area
a) Perimeter receptacles required

62) Chemistry Lab – Bituminous Lab (QC)-Hot Pour Sealer
    a) UPS power required
    b) Floor mounted power required
    c) 208V power required
    d) Task lighting required
63) Chemistry Lab – Bituminous Lab (QC)-Emulsified Asphalt
    a) UPS power required
    b) Floor mounted power required
    c) Task lighting required
64) Chemistry Lab – Bituminous Lab (QC)-Cutback Testing
    a) UPS power required
    b) Floor mounted power required
    c) Task lighting required
65) Chemistry Lab – Bituminous Lab (QC)-PG Asphalt
    a) UPS power required
    b) Floor mounted power required
    c) 208V power required
66) Chemistry Lab – Bituminous Lab (QC)-Sample Storage
    a) UPS power required
    b) Floor mounted power required
67) Chemistry Lab – Bituminous Lab (QC)-Naptha Bath
    a) UPS power required
    b) Floor mounted power required
    c) Task Lighting required
68) Chemistry Lab – Analytical Lab
    a) Floor mounted power required
    b) 208V power required
    c) Task lighting required
    d) Island Bench power required
69) Chemistry Lab – Analytical Lab-Sort/Log
    a) UPS power required
    b) Floor mounted power required
70) Chemistry Lab – Analytical Lab-Cementitious
    a) UPS power required
    b) Floor mounted power required
    c) Task lighting required
    d) 208V Power required
71) Chemistry Lab – Analytical Lab-Paint Testing
    a) UPS power required
    b) Floor mounted power required
72) Chemistry Lab – Analytical Lab-Weather Lab
    a) UPS power required
    b) Floor mounted power required
73) Chemistry Lab – Analytical Lab-Photometric Lab

a) UPS power required
b) Floor mounted power required

74) Chemistry Lab – Analytical Lab-Salt Lab
a) UPS power required
b) Floor mounted power required

75) Chemistry Lab – Analytical Lab-Thermoplastic
a) UPS power required
b) Floor mounted power required

76) Chemistry Lab – Chemistry Storage (Shared)
a) Perimeter receptacles required

77) Chemistry Lab – PPE Storage-Shared
a) Floor mounted power required

78) Chemistry Lab – Cylinder Storage (Shared)
a) Perimeter receptacles required at 24” on center

79) Hot Mix Asphalt – HMA Open Lab
a) UPS power required
b) Ceiling (reels) power required
c) 208V power required
d) 60-70 fc ambient light level

80) Hot Mix Asphalt – Compact Mix and Loose Mix
a) UPS power required
b) Ceiling (reels) power required
c) Island bench power required
d) 208V power required

81) Hot Mix Asphalt – Ovens
a) UPS power required
b) Floor mounted power required
c) 208V power required
d) 60-80 fc ambient light level

82) Hot Mix Asphalt – Compaction/Mixing/Splitting
a) UPS power required
b) Floor mounted power required
c) Island bench power required
d) 60-80 fc ambient light level

83) Hot Mix Asphalt – Testing-Microsurfacing/Instrument
a) UPS power required
b) Ceiling (reels) power required
c) Island bench power required
d) 208V power required
e) 60-80 fc ambient light level

84) Hot Mix Asphalt – Receiving-Logging/Storage
a) 60-70 fc ambient light level
b) Island Bench power required with power cord reels

85) Hot Mix Asphalt – Loose Aggregate Sizing/Cutting

a) Ceiling (reels) power required
b) Island Bench power required with power cord reels
c) 60-70 fc ambient light level

86) Hot Mix Asphalt – Extraction
a) UPS power required
b) Ceiling (reels) power required
c) Island Bench power required with power cord reels
d) 208V power required
e) 60-80 fc ambient light level

87) Hot Mix Asphalt – Release Agent
a) UPS power required
b) Ceiling (reels) power required
c) Island Bench power required with power cord reels
d) 208V power required
e) 60-80 fc ambient light level

88) Aggregate – Staging
a) UPS power required
b) Floor mounted power required
c) Task lighting required
d) Zoned lighting required

89) Aggregate – Breakdown Room
a) UPS power required
b) Floor mounted power required
c) 208, 220, 230/450 and 480V power required
d) Zoned lighting required

90) Aggregate – Specific Gravity (SPG)
a) UPS power required
b) Floor mounted power required
c) 208 and 480V power required
d) Zoned lighting required

91) Aggregate – Open Lab
a) UPS power required
b) Floor mounted power required
c) 208 and 480V power required
d) Dimmed lighting required

92) Aggregate –LA Abrasions
a) UPS power required
b) Floor mounted power required
c) 208 and 230V power required
d) Task lighting required

93) Aggregate – Open Lab 1 – Prep Area
a) UPS power required
b) Floor mounted power required
c) Dimmed lighting required

94) Aggregate – Open Lab 1 – Micro Deval
    a) UPS power required
    b) Floor mounted power required
    c) Dimmed lighting required
95) Aggregate – Open Lab 1 – Wash/ Oven
    a) UPS power required
    b) Floor mounted power required
    c) 208V Power Required
    d) Dimmed lighting required
96) Aggregate – Open Lab 1 – Soundness Test
    a) UPS power required
    b) Floor mounted power required
    c) 208V Power Required
    d) Task lighting required
97) Aggregate – Moisture Room
    a) UPS power required
    b) Floor mounted power required
    c) 208V Power Required
    d) Task lighting required
98) Aggregate – Count Lab
    a) UPS power required
    b) Floor mounted power required
    c) 208 and 480V power required
    d) Task lighting required
    e) Zoned lighting required
99) Aggregate – AIMS
    a) UPS power required
    b) Floor mounted power required
    c) Zoned lighting required
100) Aggregate – Deleterious Count
    a) UPS power required
    b) Floor mounted power required
    c) 208V power required
    d) Zoned lighting required
101) Aggregate – Heavy Media
    a) UPS power required
    b) Floor mounted power required
    c) 208V, 480V power required
    d) Zoned lighting required

II-10 Basis of Design: Fire Protection

Fire Protection

General

1. Sprinkler system shall be designed in compliance with NFPA 13 and must also meet the requirements of the local authority.
2. Incoming fire water service and backflow preventer are part of the plumbing scope and not included in Fire Protection scope.
3. Fire alarm system shall monitor all tamper switches, water flow switches, double interlock alarm systems, etc.
4. No sprinklers in electrical rooms. See electrical section for additional alarm requirements.
5. Dry Pipe heads and dry pipe valve to be provided in areas prone to freezing, including freezers.
6. Provide concealed heads in finished spaces with ceilings.
7. Hazard Classifications:
    a. Light Hazard:
        i. Density 0.10 gpm / 1500 sq. ft.
        ii. Office areas, corridors, break rooms, toilet rooms
    b. Ordinary Hazard Group 1
        i. Density 0.15 gpm / 1500 sq. ft.
        ii. Lab Area, Bulk Workspace, Mechanical Rooms, Storage room (ceiling height 8 ft. or less)
    c. Ordinary Hazard Group 2
        i. Density 0.20 gpm / 1500 sq. ft.
        ii. Machine Shop, Storage room (ceiling height 12 ft. or less)
8. It is assumed that all storage will be of Class I-IV and will be stored in shelving less than 12 ft. tall. As per NFPA 13 Table 13.2.1, this type of storage will require ceiling sprinkler protection of Ordinary Hazard Group 2 classification, and will not require in-rack sprinklers.
9. Machine shop and lab are expected to produce large amounts of metal dust due to grinding, which could be a fire hazard. Coordinate with MEP to provide dust collection in this area. Refer to HVAC Basis of Design, Section 7 – System Requirements, Subsection J – Dust Collection.
10. Unless otherwise noted, all areas will be protected by an automatic, wet-pipe sprinkler system with design density as noted above.

II–11 Basis of Design: IT/COMM

General

1. DoIT: Illinois Department of Innovation and Technology.
2. Contractor is required to coordinate with DoIT and Using Agency representatives to confirm all IT/COMM and AV design intent and system specifics. This includes confirming all space types, IT/COMM & AV requirements in each space, display and equipment sizing, infrastructure, and network coordination.
3. Data source to the new lab building to connect to service extended under previous phase and contract from existing Hanley building to west side of new east access road.
4. Electric Vehicle Charging Stations: As of the date of the bridging documents final report, there is not enough information to determine if EV charging stations will be required for the lab project. Further discussion and resolution is required during the design-build phase. Coordinate and provide any IT/COMM requirements for EV stations if included in project.
5. Provide IT/COMM services required for site and building security and surveillance systems.
6. Servers to be located at Remote Data Center. Coordinate with DoIT.
7. Size and details of pathway(s) required for incoming service: At minimum 100mb circuit.
8. IT equipment to be accommodated on site: Router, Switches, VG's, PC, WAP's, Printers.
9. Contractor to supply and install:
    A. Cable.
    B. Racks.
    C. Patch panels.
    D. Switches and processors.
10. Equipment may be combined into a single MDF with IDF closets as required to satisfy cabling distance requirements. Reference DoIT wiring standards.
11. Coordinate footprints for MDF & IDF(s) with DoIT.
12. Single rack required for MDF.
13. IDF(s) to be connected to MDF via Fiber.
14. POE device usage dependent upon number of phones plus WAP's.
15. Partitioning of IT racks not needed for security purposes within the MDF.
16. Electrical services required for MDF/IDF(s): Reference DoIT wiring standards.
17. Electrical redundancy for MDF/IDF(s): Reference DoIT standards.
18. Cooling of MDF/IDF's not required in event of power outage.
19. Static dissipative flooring (ESD) required at all IDF/MDF rooms.
20. Extent of wireless network(s) in building: Wireless LAN survey to be complete by DoIT. Coordinate with DoIT to determine amount of WAP's and cable runs needed.

21. AV requirements for presentation & remote participation in conference and training rooms: (See Room Data Sheets + coordinate with Using Agency + DoIT)
    A. Displays.
    B. Voice reinforcement.
    C. Exterior connectivity.
    D. Control system to be determined.
    E. Connections for lighting, solar control.
22. Lab specific data port requirements (Space ID/Quantity) verify locations with Using Agency:

    A. <u>District 6</u>
        i. 1.11.5 Sort/Log – Qty 1
        ii. 1.17 Nuclear Workstation – Qty 1
        iii. 1.23.1 Hamburg Wheel – Qty 1
        iv. 1.23.2 I-FIT – Qty 1
        v. 1.23.4 Mixture Prep – Qty 2
        vi. 1.23.6 Sample Staging – Qty 1
        vii. 1.24 HMA Extraction/Ignition Room – Qty 2
        viii. 1.19 Standard Office – Qty 1
        ix. 1.20 Small Workstation – Qty 6
        x. 1.21 Small Conference – Qty 1
    B. <u>Metals and Miscellaneous Products</u>
        i. 2.21.2 Universal Test Machine Area – Qty 6
        ii. 2.22 Miscellaneous Products Lab – Qty 4
        iii. 2.23 Machine Shop – Qty 2
    C. <u>Nuclear</u>
        i. 2.31.2 Source Rod Inspection Station – Qty 1
        ii. 2.31.4 Workstation – Qty 1
    D. <u>Concrete</u>
        i. 2.41.4 Compression/Flexural Testing – Qty 2
        ii. 2.41.6 Sorting & Logging – Qty 1
        iii. 2.45 Freeze/Thaw Testing – Qty 4
        iv. 2.45.1 Tempering Tank – Qty 1
    E. <u>Cement</u>
        i. 2.51.1 Sample Logging/Breakdown – Qty 1
        ii. 2.51.3 Mixing/Time Sets/Autoclave – Qty 1
        iii. 2.51.7 Compression – Qty 1
    F. <u>Soils</u>
        i. 2.61.2 Consolidometers – Qty 1
        ii. 2.61.4 Write-up Area – Qty 1
        iii. 2.61.7 Triaxial Area – Qty 2
    G. <u>Chemistry</u>
        i. 2.71 Instrument Lab – Qty 10

ii. 2.72.1 Sort/Log – Qty 1
iii. 2.72.6 PG Asphalt – Qty 8
iv. 2.73.1 Sort/Log – Qty 1
v. 2.73.2 Cementitious – Qty 6
vi. 2.73.3 'Everything Else' – Qty 6
vii. 2.73.4 Weather Lab – Qty 2
viii. 2.73.5 Photometric Lab – Qty 2
ix. 2.73.6 Salt Lab – Qty 1

H. Hot Mix Asphalt
   i. 2.81.4 Testing – Qty 3

I. Aggregate
   i. 2.91 Staging – Qty 1
   ii. 2.94 Open Lab – Qty 1
   iii. 2.95.1 AIMS – Qty 2

Attachments:

DoIT LAN Services, Physical Wiring Standards, February 2022.

DoIT LAN Services

Physical Wiring Standards

(February 2022)

Table of Contents

Physical Standards

Where not specified, follow ANSI/TIA-569-C or the latest Building Industry Consulting Service International (BICSI) standard. Any vendor running data wiring (copper or fiber) shall test, certify, and provide documentation of certification for each run.

Wiring Closet Connectivity

Wiring closets should be at least 4’ x 6’ for each rack installed. Closet temperature will be maintained according to The American Society of Heating, Refrigerating and Air-Conditioning Engineers’ (ASHRAE) defined class A3 (5 to 40 Celsius at 20% to 80% relative humidity).

Cable Details

Red Jacketed patch cables should only be used as crossover cables or where network devices connect to other network devices. All cross-over patch cables should have red jackets, and both ends clearly marked with an 'X'. It is recommended that all cables providing a connection to a priority infrastructure device (e.g. router, server) should have a label attached at the switch end of the cable stating the name of that device to which that cable is connected.

The appropriate length of patch cable should always be used in a wiring closet as required for the local closet configuration (i.e. avoid the use of excessively long cables). Where applicable, always follow TIA/EIA and IEEE guidelines for installation, termination, and deployment of cabling.

Network Racks

Rack placement guidelines:

1. Rack placement shall conform to the TIA-569 Standard.
2. Rack will maintain a minimum side clearance of at least 7” from any walls.
3. Rack will maintain a minimum rear clearance of at least 24” from any walls. 36” rear clearance is preferred.
4. Rack will maintain a minimum front clearance of at least 36” from any walls. 48” front clearance is preferred.

Device Layout Within Rack

Recommended device layout withing the rack is as follows:

1. Fiber LIU – top of rack
2. Copper patch panels – top of rack below fiber
3. Router/firewall – middle of rack above switches
4. Switches – middle of rack below router. Enough space between switches should be allowed for proper cooling.
5. UPS/PDU – bottom of rack.

Horizontal cable management is recommended on all racks. Per TIA-569 vertical cable management is required on both sides and between racks.

Electrical Requirements
All electrical installations shall follow appropriate electrical codes. Where equipment need does not provide for specifics, all wiring closets requiring new construction shall provide, at minimum:

1. (2) dedicated 20A circuits with NEMA 5-20r duplex receptacles required for all closets.
2. If an agency has requested an uninterruptable power supply (UPS) for a network closet, the following specs are in addition to line item 1 above:
    a. (2) dedicated 30A circuit with NEMA L5-30r locking receptacle

No network devices are to be connected directly to commercial power without surge and power protection. Should a particular agency require UPS protection for its network devices, that agency is responsible for the cost and maintenance of the UPS. Any UPS connected will meet the following criteria: sufficient power to provide 15 minutes of uptime and a managed network interface. Batteries are to be replaced at a schedule consistent with manufacturer guidelines.

Wiring Standards

All new copper data wiring installed shall be Category 6 or better cabling and installed within the Institute of Electrical and Electronics Engineers (IEEE) and manufacturer specifications.

All copper data cabling for VoIP must be of Category 5e or better and installed within IEEE and manufacturer specifications. Any cabling of lower category than 5e should be replaced as soon as budget will allow.

Split pair wiring or passive devices which split pairs are not permitted on the network. All house-made copper patch cables should always follow related industry standards. Cross-over cables shall follow the EIA/TIA 568A/B configuration.

Copper cabling shall conform to the following specifications.

	CAT 3 / CAT 5	**CAT5e**	**CAT6**	**CAT6a**
Frequency	Not Supported	100 MHz	250 MHz	500 MHz
Impedance	Not Supported	100 ohms	100 ohms	
NEXT	Not Supported	35.3 dB	44.3 dB	27.9 dB
PS-NEXT	Not Supported	32.3 dB	42.3 dB	
EL-FEXT	Not Supported	23.8 dB	27.8 dB	9.3 dB
PS-ELFEXT	Not Supported	20.8 dB	24.8 dB	
PS-ANEXT	Not Supported			45.9 dB
PS-AELFEXT	Not Supported	20.8 dB	24.8 dB	23.0 dB
Return Loss	Not Supported	20.1 dB	20.1 dB	8.0 dB
Delay Skew	Not Supported	45 ns		
Attenuation	Not Supported	22 dB	19.8 dB	
Application	Not Supported	VoIP PoE 1000BASE-T	VoIP PoE 1000BASE-T	Wireless PoE+/UPoE Multi-Gig

All OM1 multi-mode fiber should be replaced as soon as budget allows.

For future implementations, single-mode (SM) fiber is preferred with SC connectors at the patch panel. A standard connector type lessens the number of variants in patch cable types that must be stocked. Alternate connectors may be used under extreme need, but proper patch cords may not be stocked. All fiber shall follow industry standard color codes. Fiber shall not jumper between access closets where possible. Fiber trunks are allowed between large buildings and/or campuses as needed and fusion splicing should be used when possible. Each closet shall have at a minimum of 12-strand SM fiber homerun to the main distribution closet.

Patch Panels

All connections are to be terminated in sequence. No gaps in numbering shall be allowed. For each wiring closet, all jacks shall be numbered consecutively with no breaks in numbering. All connections terminated in a closet shall have a unique label. Enough service loop shall be available to move panels anywhere within a rack.

Requirements – New Copper Installation

All installations must be certified to Cat6 standards and warrantied.

Single Closet, Single Floor

1. All terminations are to be patched in sequence.
2. All terminations shall be completed on the first patch panel before beginning patches on the second.
3. All terminations shall be labeled with numbers only beginning with 1 and numbered consecutively without skipping numbers. Do not duplicate numbers.
4. Where space is available, use 2 post racks with vertical “finger” cable management down each side of the rack.
5. Leave enough service-loop so patch panels may be moved to any other position in the rack and space above copper patch panels for fiber patch panel.
6. If multiple DoIT supported agencies share a wiring closet, they do not require dedicated patch panels.

Single Closet, Multiple Floors

1. Each floor shall have a dedicated rack.
2. If a non DoIT supported entity shares a wiring closet, it may be treated like an additional floor.

Requirements – New Fiber Installation

1. New fiber installations shall be installed in the top of a two-post rack.
2. Maintain separation between fiber and copper wiring and do not intertwine or “zip tie” the two systems together. Hook and loop fasteners should be used where possible.
3. Leave enough service-loop so fiber panels may be moved to any other position in the rack.
4. Use Fusion spliced pigtails, or MPO modules.

The installation of fiber optic cables should always follow related industry standards. All new fiber installations shall be single mode fiber and terminated with SC connectors. Fiber strand sequence in an enclosure (TIA/EIA-598B).

1-Blue	2-Orange	3-Green	4-Brown	5-Slate	6-White
7-Red	8-Black	9-Yellow	10-Violet	11-Rose	12-Aqua

Unless another configuration is specified by this document, cabling shall be installed compliant with the latest relevant BICSI standards and/or ANSI/TIA-568-C.

Preferred Cable Management

Description	Part Number
Hook and Loop	Panduit TTS-35RX0
D-Ring	Panduit CMVDR1
Vertical Cable Management	Panduit WMPV45E
High Capacity Vertical	Panduit WMPVHC45E
2U horizontal	Panduit WMPH2E
1U horizontal	Panduit WMPH1E
12-24 rack screws	Chatsworth 40605-001
2 post rack 45U	Chatsworth 48353-503

II-12 Basis of Design: Security

1. General Requirements

This report outlines the basic requirements of the physical IP based electronic security systems and supporting infrastructures for the CDB IDOT Construction Materials Lab building and site located in Springfield, IL. The security systems include:

a. Access Control and Alarm
b. Video Surveillance (CCTV)
c. Video Doorbell Intercommunications

All equipment, cabling, installation and configuration must comply with DoIT facility standards. Refer to DoIT for supplemental information.

2. Purpose and Intent

The narrative is intended to convey the base design criteria that requires further coordination efforts with agency representatives, architects, engineers, and system users to design and deliver fully functional and complete systems described. Coordination with Illinois Department of Innovation and Technology (DoIT) agency representatives is required to confirm all design intent and system specifications. It is the intent that this project will incorporate and apply the same system manufacturers and methodologies that exist at the remote DoIT monitoring and programming location for the seamless integration of this site onto the existing monitoring and control platform.

The design, components, and installation will meet building codes and standards including:

- Americans with Disabilities Act Standards
- International Building Code (IBC)
- Illinois Accessibility Code
- International Code Council (ICC)
- International Fire Code (IFC)
- National Fire Protection Association (NFPA) 70; National Electric Code (NEC)
- NFPA 101; Life Safety Code
- ANSI/TIA
- BICSI TDMM
- Underwriters Laboratories (UL), Factory Mutual Laboratories (FM), or National Electrical Manufacturers Association (NEMA)
- Manufacturer’s Specifications
- CDB DCM

All aspects of the security systems shall be furnished, complete, and fully functional. All equipment and materials must be in new condition and rated for the location in which they will be installed. The contractor shall specialize in installation of security systems described, have completed (3) three similar projects in the past 36 months, of similar size, scope, and project type. The security electronics contractor (SEC) shall be an authorized dealer of the primary components specified, PSP or CPP credentialed by ASIS, and factory certified on each system that require programming and special configuration.

Interdisciplinary coordination of systems shall occur to avoid conflicts and support system needs including but not limited to the following:

- The security equipment heat loads shall be coordinated with the mechanical systems.
- System power requirements shall be coordinated with electrical.
- Pathways and space provisions shall be coordinated with division 26, 27, and architectural.
- Pathways shall be furnished by the Division 26 contractor. Routing and pathway sizes and pull boxes shall be coordinated with the Division 28 contractor prior to installation.
- Electronic door hardware requirements shall be coordinated with the architectural and the GC.
- All equipment shall be protected from dust for the duration of construction.
- Exterior site poles, pole mount boxes, pedestals, conduits, pull boxes, and power shall be furnished by Division 26. Division 28 shall furnish the security system devices and coordinate the pathway, exterior boxes, mounting needs (poles and or pedestals), and power needs with Division 26 and architect.

3. System Specifications

a. Security Local Area Network (LAN) Infrastructure

A complete security communications network infrastructure is required to support the IP security systems described. The security LAN will interface with remote systems via DoIT established VLAN. POE+ switching hardware compatible with DoIT's network management will be furnished by DoIT. The local security LAN requires spaces, pathways, cabling, and interconnecting components dedicated to supporting the systems. The installation shall meet ANSI/TIA industry standards, and cabling shall be rated for the environment in which it is installed. Level III-E test equipment is required. Backbone cabling will be single mode optical fiber, tested and certified at 1310 NM and 1550 NM in accordance with ANSI/TIA/EIA-526-7 or multi-mode OM4 tested and certified according to ANSI/TIA/EIA-526-14A Method B at 850 NM and 1300 NM wavelengths. Network device cabling shall be Category 6, UTP and terminated on patch panels dedicated to the security LAN. Certification of the

UTP horizontal wiring system must be performed and documented by the contractor. The test must be the most current standard TIA-568, Category-6 permanent link test. All cabling shall be properly supported, concealed, and managed. UTP terminations of modular plugs to the permanent link is not allowed.

All security conduits, cabling, equipment, and boxes shall be color coded and labeled with machine generated labeling as per the DoIT standards.

Fire caulk or listed fire stopping assemblies shall be used at all penetrations throughout the facility to maintain the fire rating of the wall and floor assemblies.

b. Access Control and Alarm System

The building will have a complete access control system which will monitor and alarm programmed events as well as control access to doors throughout the facility. The system shall be coordinated with the GC, division 08, and fire contractor to coordinate electronic door hardware requirements and fire tie relays with the access control system.

Hirsch Velocity and MX controllers will be utilized for the access control system and will interface with the existing remote Hirsch Velocity access control system allowing for central management and control by the Illinois Department of Innovation & Technology (DoIT). The system will be able to operate independently in the event that communication is lost to the remote system. DoIT will furnish and manage the programming of credentials, scheduling, and access profiles.

DoIt will provide additional specifications for all equipment including servers, access control panels, card readers, and credentials. All equipment including licensing of devices will be purchased and installed by the security contractor. The security contractor will need to coordinate with DoIT for all configuration and programming.

Programming of the system will comply with DoIT standards. This includes but is not limited to:

1. Accessibility at the local site as well as at the remote site
2. Establishment of IP addresses
3. Integration with existing system and video surveillance system
4. Initial set up of credentials
5. Coordination with the building authority
6. Reader licensing
7. System back-ups
8. Time zones including customization
9. Door and hardware with custom naming as required

10. Door groups
11. Standard access levels as required
12. Email alerts
13. Alarm inputs and priority designations
14. Enrollment of 10 cards for the purpose of commissioning
15. Remote client access on up to 3 workstations
16. Graphical site map of the facility per floor within the system, identifying all door and alarm devices

Head end equipment including wall mounted controllers and rack mounted equipment will be located in the secured telecom rooms. Equipment shall maintain a minimum of one meter working clearance. Access Control equipment will be connected to UPS/generator power capable of full operation for a minimum of 90 minutes. Controllers shall be equipped with sealed lead acid batteries and connected to generator power.

Card readers and door contacts shall be located on the following doors:

1. Exterior Doors
2. Mechanical Rooms
3. Electrical Rooms
4. Telecom Rooms
5. Nuclear D6 Lab, Nuclear Storage Room(1.16), and Nuclear Workstation (1.17), including both doors air lock entering the nuclear lab (users are required to pass through two doors to access the Nuclear room).
6. D6 storage and Calibration/repair.
7. Other doors as indicated on the individual room data sheets.

All building perimeter entrances, including overhead doors and roof hatches shall be equipped with position switches and monitored by the system.

Panic push button shall be located at:

1. The reception desk in the main lobby

The access control system shall be tested for the following as well as those required by DoIT:

1. Door status
2. Door forced open
3. Door held open
4. Request to exit
5. Emergency request to exit
6. Valid card read and accepted
7. Valid card read and rejected
8. Function on fire alarm system test/alarm/trouble.

c. Video Surveillance System

The building will have a complete video surveillance system which will monitor and record activity throughout the interior and exterior of the building. The video surveillance system will interface with the existing Ocularis/Axis video management system platform allowing for central monitoring and control by the DoIT. The system will be able to operate independently in the event that communication is lost to the remote system. However, DoIT will manage recording settings and camera adjustments.

Ocularis is the current video management software and Axis is the manufacturer used for cameras. DoIt will provide additional specifications for all equipment including servers and cameras. All equipment including licensing of devices will be purchased and installed by the security contractor. The security contractor will need to coordinate with DoIT for all configuration and programming.

Programming of the system will include but not be limited to:

1. Accessibility at local site as well as the remote site
2. Integration with existing system and access control system
3. Set up of record rates, compression, and video quality
4. System back-ups
5. Set up on up to (3) workstations
6. Establishment of IP addresses
7. Enrollment of devices onto recording software
8. Image settings
9. Video call-up based on programmed events

Head end equipment will be located in the secured telecom rooms within network racks provided by the Division 27 contractor. Equipment will maintain a minimum of one meter working clearance. All headend and viewing equipment will be on UPS/generator power supporting the system for a minimum of 90 minutes of full operation. A client workstation with a viewing monitor will be located at the reception desk in the lobby, dedicated to security system monitoring. All surveillance cameras will record to a local server for archive and be programmed to maintain the minimum of 30 days at the frame rate and resolution specified by DoIT, not less than 8 fps with 20% motion at the maximum resolution of each camera. Due to high bandwidth requirements on the security network, the video streams will be segmented from the using agency’s primary network so that the image quality is not degraded.

Cameras shall provide coverage at the following locations:

1. Exterior front entrance
2. Interior front entrance

3. Exterior perimeter
4. Loading dock
5. Lobby area
6. Parking lot

The video surveillance system shall be tested for the following as well as those required by DoIT:

1. Camera powered on and focused
2. Camera recording
3. Recording criteria for each camera
4. Estimated days of storage based upon recording criteria
5. Remote client software functional for live and recorded video viewing

d. Video Intercom Doorbell System

A video intercom system shall be provided to allow for clear two-way intercommunications between the D6 entry door and D6 lab staff office area. The exterior door station will have a combined push button, intercom, and wide-angle camera device. The interior master station will have an audible tone that will sound upon the remote station push-button activation, 7” video touchscreen allowing for clear visitor identification, and have both hands-free and handset audio communication methods. Additionally, an audible tone is to generate in the D6 Open Lab (1.11), D6 Open HMA Lab (1.23), and Calibration/Repair (1.25) when the remote push button station at the D6 entry door is pressed. Integrated door control by this system is not required.

The video intercom doorbell system shall be tested for the following:

1. Master unit powered on and functional
2. Remote unit powered on and functional
3. Audible tone generated at the master station
4. Audible tone generated at D6 Open Lab (1.11), D6 Open HMA Lab (1.23), and Calibration/Repair (1.25)
5. Clear and intelligible audio at both master and remote units
6. Clear video identification of individual at remote station displayed at the master station

e. Grounding and Surge Protection

The security electronics systems shall utilize the telecom grounding system network. Equipment shall be grounded per the manufacturer’s instructions. Surge protection shall be provided to protect all devices from surge events. Grounding wiring will be required to support surge protection on exterior devices.

All rack mounted security electronics systems equipment require on-line double conversion UPS and power from the building generator to deliver clean and consistent power. The video client workstation station located at the lobby, and where indicated elsewhere shall source power from UPS/generator supply.

4. Project Close Out

The contractor shall furnish and install all hardware, software, and firmware, programming, testing, training, and turnover of system hardware and software. A system demonstration and training session shall be provided at the project site to using agency designated personnel on all systems specified. A system factory authorized service representative shall train maintenance personnel to adjust, operate, and maintain equipment. As-built documents shall include point to point drawings of all equipment and devices installed, floor plans detailing all locations of all security equipment installed. Operation and Maintenance manuals shall be produced including equipment data sheets and test procedures.