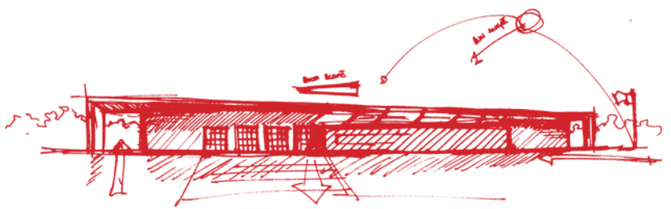
STATION 14

CITY OF MADISON FIRE DEPARTMENT

FIRE STATION 14 - PRE-DESIGN NARRATIVE

OPN ARCHITECTS



PRE-DESIGN

The Madison Fire Department and the City of Madison worked with OPN Architects to develop the program requirements for Fire Station 14. This pre-design narrative address the components of building and site design. This document represents the pre-design phase and is intended to be a work in progress.

Report issued on April 17, 2017

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PROJECT TEAM

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Madison Fire Department	Asst. Chief Clayton Christenson
Madison Fire Department	Captain John Fleming
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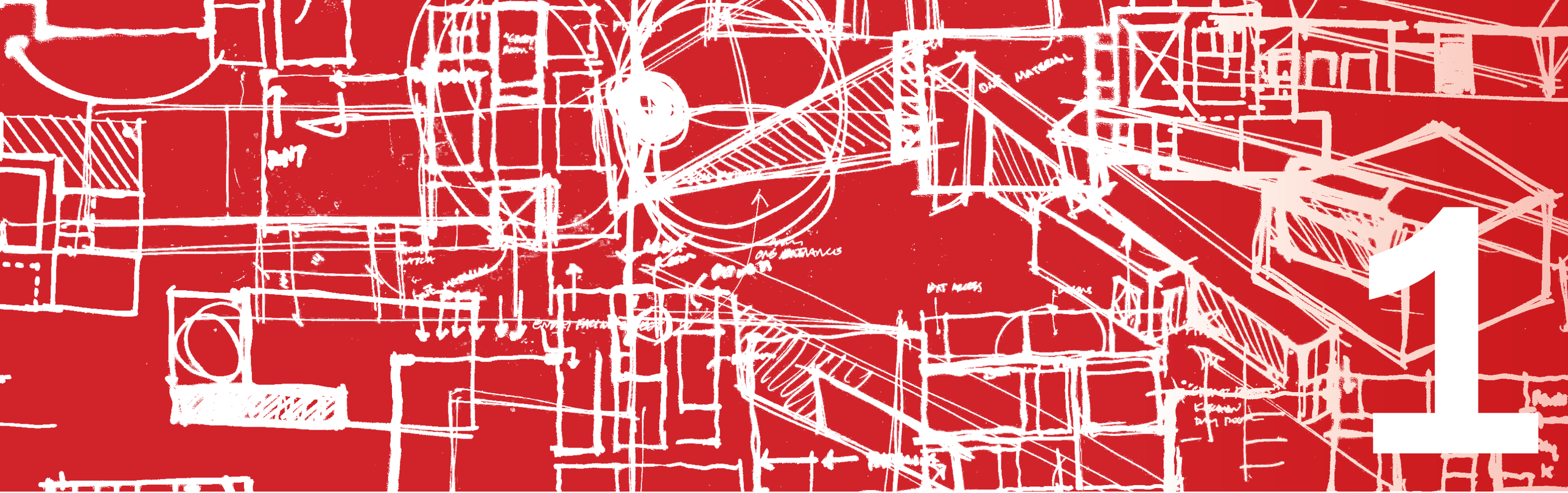
EXECUTIVE SUMMARY

The Madison Fire Department's project goals and requirements for Station 14 were developed in collaboration with representatives from Madison Fire Department, City of Madison, and the design team. The goals are:

- Fire Station 14 is to be a well thought out, designed, and constructed facility which services the Madison Fire Department's need for a new Fire Station and Employee Development Center now and for a generation to come.
- The facility will fulfill a need to minimize response times to residents in this area and to pro-actively prepare for population growth and shifts within the region.
- Fire Station 14 is to include living, sleeping and support spaces for a double company, plus two officers.
- The design will include space for visiting fire vehicles plus training spaces to provide ongoing employee development training.
- The site will maximize open space to retain flexibility for a variety of training techniques and needs that will evolve and be expanded upon over time.
- A large community room with adjoining restrooms and smaller meeting areas will provide space for public use and for fire department classroom training.
- Fire Station 14 is to be a model of energy efficiency and environmental sustainability. The building will be designed to achieve Silver under the USGBC's LEED BD+C v2009 rating system.
- The design and construction process will follow an integrated team approach to include analysis and recognition for solutions to provide a safe and healthy built work environment.

The Pre-Design Narrative describes the project in its first phase. As the design moves through each successive phase, and open questions move towards resolution, more detail will be added to the drawings, specifications, and narratives.



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SITE DESIGN

SITE STATEMENT

Existing Site Features

- The proposed site for Fire Station 14 is on Madison's southeast side and located at 3201 Dairy Drive. The site encompasses three parcels (Lots 34, 35 and 36) east of Dairy Drive and north of Femrite Drive. The parcels are zoned SE (Suburban Employment District) and the gross area of the combined parcels is 481,949 square feet (11.06 acres).
- There are no existing buildings on the proposed site. However, the site has been previously developed. An asphalt paved driveway off Femrite and gravel roads and concrete pads from a previous business remain on the site. Vegetation, soils and wetlands are discussed in sections to follow.
- A major 50-foot wide gas utility easement runs east-west through the southern portion of Lots 34 and 35. Other utility easements exist at other areas of the site.

Existing Site Features

The site is gently sloped and covered in brush with some trees of varying sizes. The street orientation faces west and the building maintains open space access in each direction. The design team will address critical wind directions and the solar path as the building orientation and massing develop integrally with the sustainability objectives of the project.

Topography and Drainage Patterns

The site topography is gradual as it generally slopes east and north toward the adjacent existing wetland. Drainage is generally by sheet flow across the site to the wetland.

Existing Erosion Conditions

There are no existing erosion conditions on the site.

Wetlands and Locations of Flood Plains

The site is not in any known floodplain. The site has wetlands to the north of Lot 34 and east of Lots 35 and 36. This wetland area is part of a larger wetland system known as The World Ag Center Southeast Wetland. An updated wetlands boundary has been performed and is incorporated into the site survey.

On-site storm-water management and sustainable site planning will incorporate requirements for retention and filtration prior to exiting the site or entering the wetland.

LANDSCAPE

Surrounding Buildings (Style, Scale)

- Adjacent and nearby properties accommodate various businesses including Capitol City Sheet Metal, Rose Custom and Collision LLC, Monona Serenity Group, Our Savior Deaf Luthern Church, EMS Industrial, Applewood Climate-Controlled Storage, Anisco, Salon Centinela, Certco and the Dutch Mill Bar.
- The style and architectural character of the buildings on nearby properties is eclectic and of generally of low design quality. They are best described as generally light industrial in character and use. The buildings vary in size but are generally one and two-story structures.

Circulation Patterns Around Site

- Traffic circulation for fire and rescue vehicles, and for the general public, is expected to enter or exit to and from the north and south directions along Dairy Drive. The exiting location for fire and rescue vehicles during emergencies is proposed to be directly across from Prairie Dock Drive where its southern intersection with Dairy Drive exists. The entry location for fire and rescue vehicles and entry and exit location for the public and building employees is a minimum distance of 150 feet to the south of the fire and rescue vehicle exit.
- Dairy Drive provides access by bicycle to the site from both the north and south directions.
- A sidewalk exists on the west side of the property along the entire length of the Dairy Drive boundary. This will provide barrier free pedestrian access to the building public entry.
- Figure represents traffic circulation to-and-from the proposed site.

Preliminary Landscape Calculations

Total Developed Area:

- ...(5) landscape points shall be provided for each three hundred square feet of developed area
- 47,816 SF of developed area / 300 sf = 160 X 5 = **800 points**

Development Frontage Landscaping:

- (1) overstory deciduous tree and (5) shrubs shall be planted for each (30) lineal feet of lot frontage
- 322LF / 30 = 10.7
  - 1 x 11 = **11 Trees**
  - 5 x 11 = **55 Shrubs**

Interior Parking Lot Landscaping:

- ...a minimum of eight percent (8%) of the asphalt or concrete area of the parking lot shall be devoted to interior planting island, peninsulas, or landscaped strips.
  - 25,441 SF x 8% = **2,036 SF Landscape Area**
- The primary plant material shall be shade trees with at least (1) deciduous canopy tree for every (160) SF of required landscape area.
  - 2,036 / 160 = **13 Trees**

Foundation Plantings:

- Foundation planting s shall be installed along building facades, except where building facades directly abut the sidewalk, plaza or other hard-scape.

Screening Along District Boundaries:

- N/A

Screening of Other Site Elements:

- Trash Enclosure: TBD
- Mechanical Equipment: TBD

SITE ACCESS

Noise/Visual Considerations

The site is not expected to contribute nuisance level noise or visual concerns due to its separation from residential neighborhoods and its location within a light industrial area.

Federal Aviation Administration Requirements

None noted.

Hazardous Waste (Report to be Supplied by City)

Refer to report furnished by city in the RFQ.

Pollution

None noted.

Local Zoning Restrictions

City of Madison Suburban Employment District (SE) Zoning Requirements		
Lot Area (minimum)	20,000 SF	Complies
Lot Width	65 FT	Complies
Front Setback	None	Only corner lot restriction
Side Setback (greater of)	15 FT or 20% of building height	Complies
Rear Yard	30 FT	Complies
Max Coverage	75%	Complies
Min Height	22 FT measured to building cornice	Complies
Max Height	5 stories/68 FT	Complies
Permitted uses (Table 28F-1) Public Safety or Service Facilities, Solar Energy Systems (among others)		
Building Forms (Table 28F-2) Civic or Institutional (among others)		
No minimum parking requirements, majority of parking to be to the side and/or rear of building. On street parking on one side of Dairy Drive is allowed but no parking signage exists		

SITE ACCESS DIAGRAM

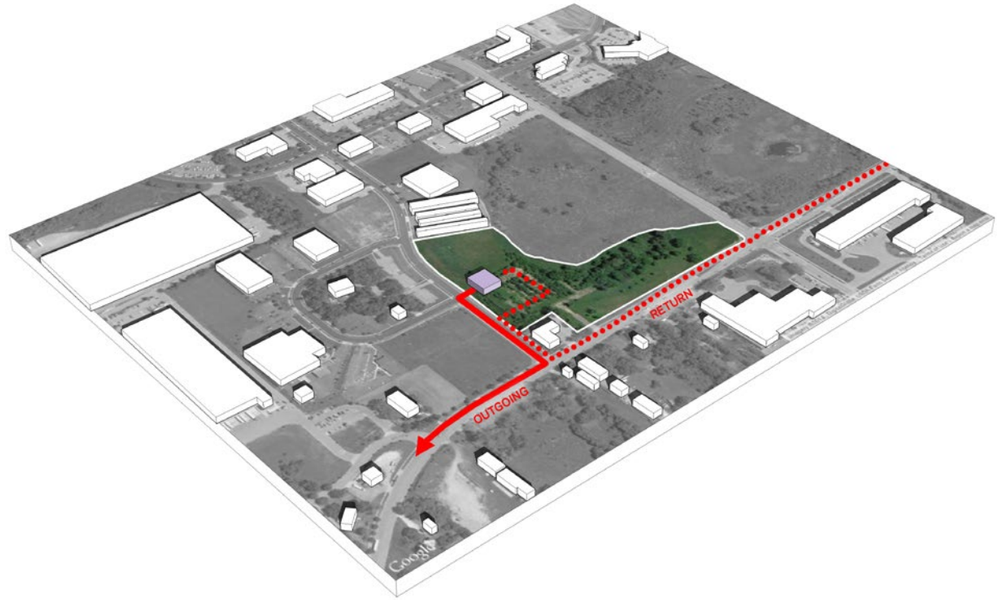


FIGURE 1.1 - **SITE ACCESS DIAGRAM**

The location of the apparatus bay centered on the intersection of Prairie Dock Drive and Dairy Drive is ideal for fire station operations. Locating a curb cut to the south allows for fire vehicles to pull through the apparatus bay.

SITE AND HISTORIC PRESERVATION

Historic Considerations

This is a light industrial area without any historic or culturally significant structures or sites. There are no known preservation zones in the vicinity. Please refer to site photographs in the next section.

Site Considerations

- *Major Gas Main Easement* - a 50-foot wide easement containing an underground Michigan –Wisconsin Pipeline Company gas main passes through the southerly portion of Lot 35 and extends through Lot 34. Proposed planning will allow avoidance of this easement but will require consideration during any future planning for training expansion.
- *Public Utility Easements* - An existing 15-foot wide public utility easement exists along the east property line and paralleling the wetlands boundary. Electrical and telecommunications utilities exist in this easement. A15-foot wide easement exists along the west side of Lots 34 and 35 and contains both underground gas and electric utilities. Additional underground public utility easements exist near the northwest corner of Lot 35 and along the north boundary of Lot 35. These easements and utilities may require relocation to accommodate new construction. An existing 10-foot public utility easement exists along the south side of Lot 34 and approximately paralleling Femrite Drive. This easement extends north and then west along the south boundary of Lot 35.
- *Storm-water Easement* - An existing 25-foot wide storm-water easement exists along the east boundary and paralleling the wetlands.
- *Storm Sewer* – Storm sewer is located in the Dairy Drive ROW as 12" RCP with an existing 12" RCP extension into the site near the southwest corner of Lot 35.
- *Water and Sanitary Sewer* - Water (10") and sanitary sewer (8" PVC) utilities are available in Dairy Drive with an existing 6" sanitary sewer lateral extended to the property line at Lot 35. The survey does not show a current water lateral extended to the site at Lot 35.
- *Gas* - extends to the site from the north paralleling Dairy Drive near the northwest corner of Lot 35, then crosses to the west side of Dairy Drive and the south side of Prairie Dock Drive.
- *Fire Hydrants* - an existing fire hydrant is located near the northwest corner of Lot 35. A second hydrant may be required within the distance prescribed by City of Madison ordinances once final building location and layout is confirmed.
- *Street Lighting* – existing street lights are located along Dairy Drive. Locations of these street lights will require verification and relocation if necessary if in conflict with proposed curb cuts.

Potential Archaeological Artifacts

The site has been previously disturbed, and had been part of a larger light industrial area. There is no evidence to suggest the site contains artifacts.

SITE PRELIMINARY DESIGN

FIGURE 1.2 - **SITE PRELIMINARY DESIGN**

The preliminary site design concept places the building in a north-south orientation and set back on the site to allow a ladder truck to sit on the apron. Public and private parking is placed along the drive lane to minimize the hard-scape surfaces.

SITE PHOTOGRAPHS

FIGURE 1.3 - **SITE VEGETATION**

FIGURE 1.4 - **SITE PHOTOGRAPH**

FIGURE 1.7 - **SITE PHOTOGRAPH**

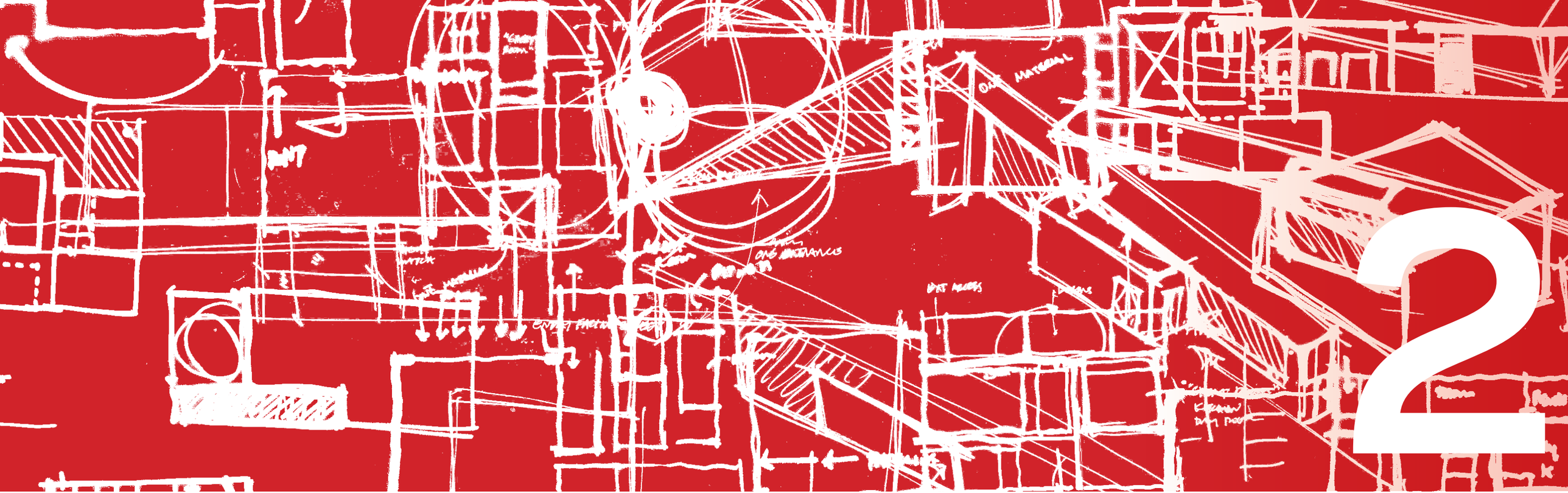
FIGURE 1.8 - **SITE PHOTOGRAPH**

FIGURE 1.5 - **SITE PHOTOGRAPH**

FIGURE 1.6 - **SITE PHOTOGRAPH**

FIGURE 1.9 - **SITE PHOTOGRAPH**

FIGURE 1.10 - **SITE PHOTOGRAPH**



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ARCHITECTURAL DESIGN

ARCHITECTURAL DESIGN

Organizational Concept

The design team conducted a programming and massing study that organized the project into the following distinct space types: Public, Administrative, Operations, Living and Operations. Utilizing massing models with each of these functions color coded and correct in scale, twenty massing models were generated. Following discussion and analysis of each model, the field was narrowed to eight, and eventually to four (*See fig. 2.1*). These are further identified as Linear, L-Shaped, 2-Story and Shifted Schemes.

These massing studies were presented to the City review team on March 17, 2016 for discussion and feedback. The Linear concept was favored for its overall space efficiency and functional relationships between program elements.

Expansion Potential

Since this project is both a fire station and a employee development center, it is desired to have expansion capabilities both in building size and site-based training features. The oversized site allows for future site training amenities and apparatus maneuverability training. The building can expand or change to meet future needs, which are largely unknown at this time.

Building Efficiency

An integrative design process will be used on this facility to support high-performance, cost-effective project outcomes. This process will involve an early analysis of the interrelationships between building systems. A "simple box" energy modeling analysis will be performed before the completion of schematic design that explores how to reduce energy loads in the building. Integrative building efficiency features include:

- Use the building form as a means to explore, model and implement a more energy efficient building.
- Utilize a white or reflective roof to help maintain a cooler ambient temperature around the fire station.
- Evaluate employing a green (or vegetated) roof to aid in maintaining cooler ambient temperatures, filter and store rainwater, increase roof life-expectancy, and aid in roof insulation.
- Utilizing natural daylight will be exploited in proper locations as well as integrating views to the landscape surrounding the station. Evaluate the use of exterior sun shades and tinted glazing to control excess heat gain.
- The exterior envelope shall be designed and constructed to minimize outside air infiltration and minimize cold transfer. High performance insulation materials will be utilized with increased R-values. For example, a wall insulation R-value between 20-25 and roof insulation value between 30-50 based upon forthcoming energy modeling recommendations.

Energy Considerations

Establishing the Employee Development Center and Fire Station 14 as a model of energy efficiency and environmental sustainability is a priority for the City of Madison. The following elements have been established as goals:

- The project is enrolled in the Focus on Energy program
- 30% better than code target
- A preliminary list of energy efficiency measures has been generated.
- The building shall be ready to accept on site renewable energy sources (likely Photovoltaics and Solar Hot Water).
- Adopt new of new building codes (IECC 2015)

Advantages and Disadvantages

Advantages Include:

- A larger apparatus bay can accommodate indoor physical agility testing year-round.
- Increased size for community room will provide space for larger meetings in an under-served part of the city.
- Increased flexibility will result in a more adaptable building with a longer life span.

Disadvantages Include:

- Increased size will increase cost of the new station.

ROOM DATA

ROOM NAME	PROPOSED	COMMENTS
PUBLIC AREAS		
Vestibule	80	
Training	1097	56 Chairs in classroom setting; verify room useage style, TV, Phone
Training Room Storage	144	Tables, Chairs, Miscellaneous Equipment
Public Toilet	250	(2) Unisex
Break Room / Open Seating	330	
Small Meeting Room (x2)	174	
TOTAL	**2075**	
ADMINISTRATIVE		
Workroom	80	printer / copier / sink / supplies
Vestibule	82	
Lieutenant's Office	270	
Watch Room	274	4 workstations
TOTAL	**706**	
OPERATIONS SUPPORT		
Turnout Gear Storage	230	Needs proximity to apparatus bay
Dirty Restroom	65	Needs proximity to apparatus bay, shower not included
SCBA Fill / Storage	67	SCBA / Oxygen Fill - storage rack and cascade fill tank
General Storage	216	
Tool Storage / Workshop	200	Proximity to apparatus
Utility Alcove	25	Mop sink and hose reel
Locker Room	368	Unisex(24) 2'x2' lockers, 2 benches adjacent to 4 unisex restrooms
EMS Supply Storage	71	
TOTAL	**1242**	

ROOM NAME	PROPOSED	COMMENTS
LIVING AREAS		
Lieutenant's Quarters	380	2 officer dorm rooms with 3 lockers, desk, chair, bed
Lieutenant's Shower	104	Shared between the (2) LT offices
Dorm Rooms	970	8 sleeping areas in the proposed - hot sheet operations
Domestic Laundry	100	Combine function with Linen - 100 total SF, comment
Great Room	1429	Day Room / Break Room / Pantry - includes circulation
Fitness Room	437	
Janitor's Closet	134	
TOTAL	**3554**	
OPERATIONS		
Apparatus Bay	9000	6 Bay
TOTAL	**9000**	
UNASSIGNED		
Penthouse / Mezzanine	1500	Need equipment schedule and Engineering analysis
TOTAL	**1500**	

TOTALS	
PUBLIC AREAS	2,075
ADMINISTATIVE	706
OPERATIONS SUPPORT	1,242
LIVING AREAS	3,554
OPERATIONS	9,000
UNASSIGNED	1,500
SUBTOTAL	18,077
GROSS FACTOR - 25%	2,269

Gross Factor is not being applied to Apparatus Bay

TOTALS	
AREA TOTAL	20,346

DESIGN PROCESS

Color Scheme

OPN Architects will be using a consistent color scheme throughout the design process. Form diagrams, room data sheets, building blocks and floor plans; the color s will correspond to the building department. A consistent color scheme facilitates an easier understanding of architectural materials and creates a better and more productive conversation.

The department color scheme for Fire Station 14:

- PUBLIC AREAS
- ADMINISTRATIVE
- OPERATIONS SUPPORT
- LIVING AREAS
- OPERATIONS

Iterative Design

OPN Architects uses an iterative design process. This process allows for the exploration of a multitude of possible design solutions quickly and efficiently. Sketches, Diagrams, Building Blocks, Physical Study Models and Computer Generated Models are all used to explore the design of the building and ensure the best possible solution to the unique requirements of the program and site

Design Process

The process of designing a building consists of several parallel path items that each need to be considered and evaluated. The process includes:

- *Room Data* - The first step is to understand the program requirements of the building. The room data sheets are used to determine the specific square footage requirements for each room and to build an inventory of all of the items that require space within the building.
- *Organizational Diagrams* - Using the square-footage developed from the room data / building program, these early stage diagrams are used to explore the adjacent of building departments. Organizational Diagrams are used to explore the overall building configuration.
- *Floor Plan Development* - The next level of refinement turns the organizational diagrams into basic floor plans. This step verifies circulation paths, correctly sizes each room and validates the concepts outlined in the organizational diagram.
- *Floor Plan* - The basic floor plan from the previous stage is refined and iterated upon several times to create a highly functional floor plan.
- *The "BIG" Picture* - A sequence / progression of diagrams that expands upon the concept outlined in the organizational diagram. The concept is translated 3-dimensionally into the building massing. The result of this step is a thesis statement and clear concept for the building.

ORGANIZATIONAL DIAGRAMS

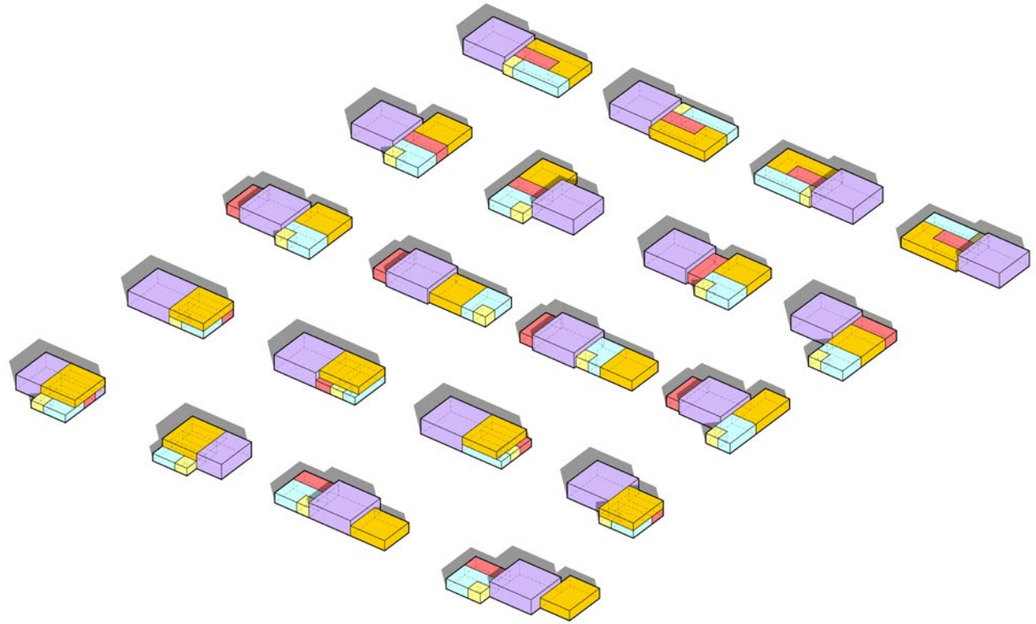


FIGURE 2.1 - **CONCEPT DIAGRAMS**
Organizational diagrams are used to quickly and iteratively explore many potential design solutions. Four diagrams were selected for continued development based upon: clarity of concept, uniqueness, functionality and design potential.

ORGANIZATIONAL DIAGRAMS

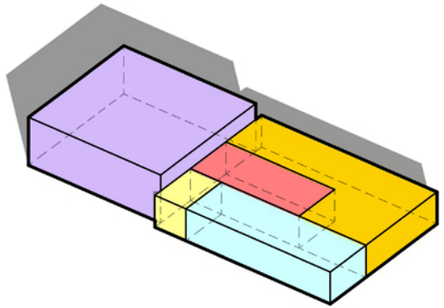


FIGURE 2.2 - **LINEAR**

The linear organizational diagram creates a long and linear arrangement along the North / South axis. The apparatus bay is located centered upon the intersection of Dairy Drive and Prairie Dock Drive the Administration Department is located adjacent to the apparatus bay for functionality. Operations support is located in the core of the facility. Public spaces are located along Dairy Drive creating a public facing side of the design. The living spaces are then located in the back of the facility to create privacy and provide views over the wetlands.

This option was selected by the Fire Department, City and Design Team for continued development.

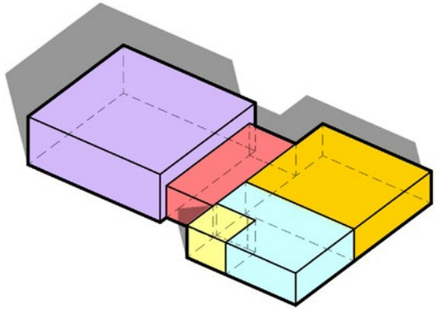


FIGURE 2.3 - **L-SHAPED**

The L-shaped organizational diagram shares a similar configuration of the public spaces, living quarters, administration and operations support. The arrangement allows variation in the facade allowing the opportunity for changing materials.

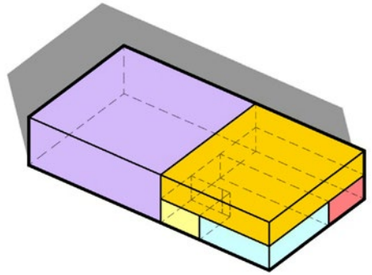


FIGURE 2.4 - **2-STORY**

The 2-story organizational diagram separates the public and private functions of the facility. The administration, public and operations support are located on the first level. The living quarters are located on the second level. The 2-story diagram creates a smaller building footprint creating efficiencies on the site. The intent is to have a contiguous roof covering the apparatus bay and the second level.

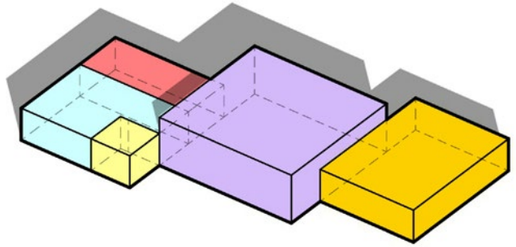


FIGURE 2.5 - **SHIFTED**

The shifted organization diagram separates the public and private functions of the facility but keeps all of the building program located on a single level. The living quarters is on one side of the apparatus bay while the administration, public and operations support are located on the other. The diagram has the opportunity to have a roof of the ungulates between a lower roof to a higher roof and back again. The public spaces are brought forward to create more of a street presence. The living quarters are pushed back to create additional privacy from the street.

FLOOR PLAN DEVELOPMENT

FIGURE 2.6 - **LINEAR PLAN**

The linear organizational diagram developed into a floor plan that consisted of a central core containing the operations support spaces and the restroom core. Circulation around the core creates efficient double loaded corridors and an easy to understand floor plan.

This option was selected by the Fire Department, City and Design Team for continued development.

FIGURE 2.7 - **L-SHAPED PLAN**

The L-shaped organizational diagram shares a similar configuration of the public spaces, living quarters, administration and operations support. The circulation is similar to the linear option with the double loaded corridor around a central core of support spaces. The configuration of this option is longer in the east / west axis resulting in a more compressed appearance with more undulation along Dairy Drive.

FIGURE 2.8 - **2-STORY PLAN**

The 2-story organizational diagram has a simple double loaded corridor running down the center of the design. A circulation core in the center of the plan creates an efficient floor plan.

FIGURE 2.9 - **SHIFTED PLAN**

The shifted organization diagram separates the public and private functions by locating the apparatus bay in the center of the plan. The circulation consists of double loaded corridors and a central spine that connects public and private.

FLOOR PLAN

FIGURE 2.10 - **FLOOR PLAN**
Continued refinement of the floor plan creates an efficient and highly function floor plan that was approved by the Madison Fire Department.

THE "BIG" PICTURE

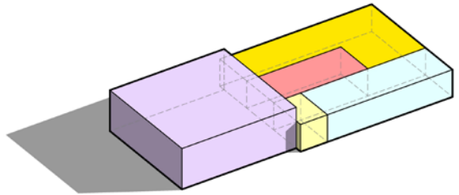


FIGURE 2.11 - **LINEAR START**
The "Big" picture building design starts with the approved concept from the organization diagrams. Public Spaces in the front of the building, private in the back of the building, a central core of amenity spaces and Administration spaces adjacent to the apparatus bay the anchors the building on the site.

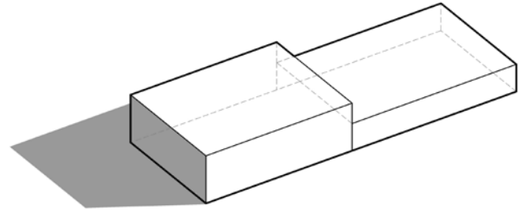


FIGURE 2.12 - **LINEAR MASSING**
The height requirements of the apparatus bay and the rest of the building create a two stepped design.

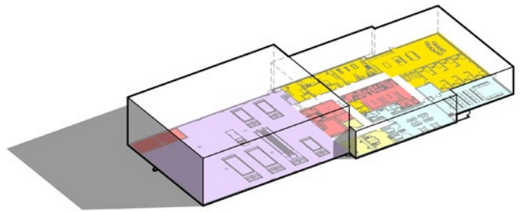


FIGURE 2.13 - **FORM AND FUNCTION**
The building massing responds to the floor plan refinement. This creates a bump out located in the front and back of the building where the floor plan requires additional thickness. Form follows function.

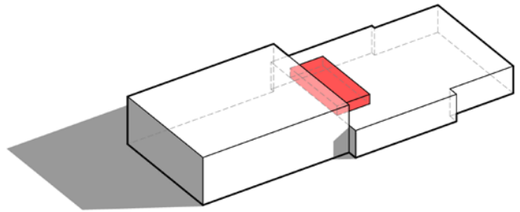


FIGURE 2.14 - **MEZZANINE**
The mechanical mezzanine is an additional element that will need to be considered.

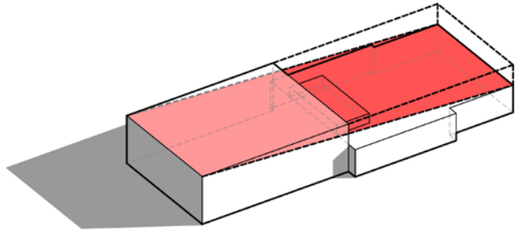


FIGURE 2.15 - **CONNECTING THE DOTS**
A single slope roof connects the high roof required in the apparatus bay and the lower roof required in the public and private spaces.

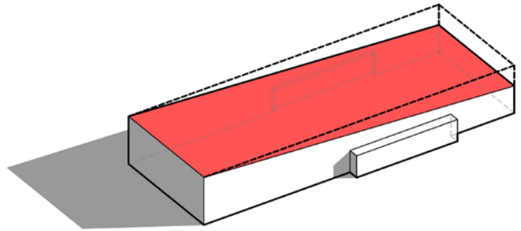


FIGURE 2.16 - **SINGLE SLOPE ROOF**
The single slope roof simplifies the building massing and creates height where it is needed for the building program. The gesture is simple, clean and creates an iconic building.

THE “BIG” PICTURE

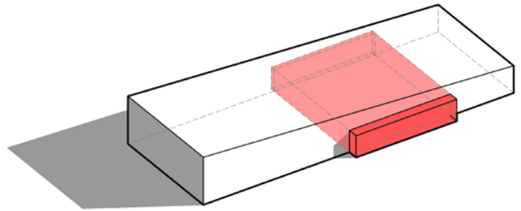


FIGURE 2.16 - **BOX UNDER A SLOPE**
The bump outs created by the building program can be accentuated architecturally by changing the material in these locations.

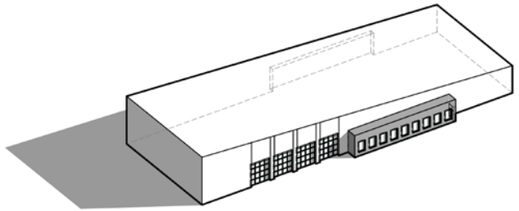


FIGURE 2.17 - **MATERIAL**
The garage door openings, material change and massing begin to create a building that has a clear concept.

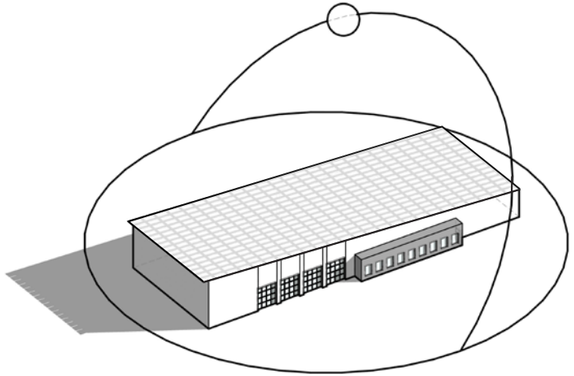


FIGURE 2.18 - **SUSTAINABLE DESIGN**
The single slope roof is an example of integrated sustainable design. The southern facing exposure of the roof creates an ideal surface for photovoltaics.

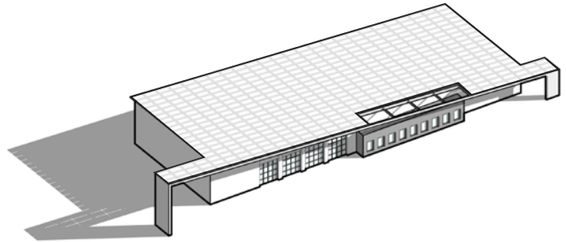
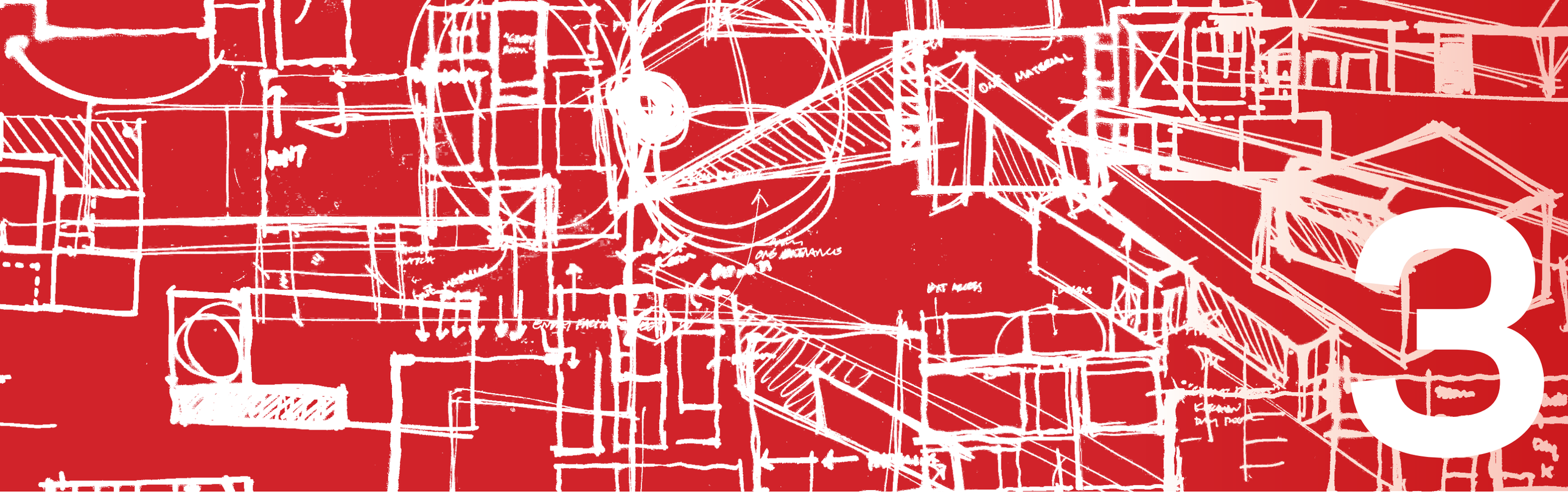


FIGURE 2.19 - **ARCHITECTURE**
The final move in “Big” Picture is to bring the photovoltaics forward with an overhang. By bringing the photovoltaics forward, we are communicating to the community that this is a highly sustainable building. Additionally, this gesture creates a covered main entry and overhang to protect the front of the apparatus bay.



3

SUSTAINABLE DESIGN

SUSTAINABLE DESIGN

Overview

Fire Station 14 will be a model of energy efficiency and environmental sustainability for the Fire Department and the City of Madison. The one thing that all deeply sustainable buildings have in common is an integrated design process. Very simply, this means bringing the whole team to the table early in the project to highlight opportunities, set goals, and establish roles and responsibilities for the team through design, construction, and into the occupancy period of the new building. The project team took the following steps in the Pre Design Phase to establish a high performance, cost effective project:

- A workshop with all members of the team invited
- A document listing the Owner's Project Requirements (OPR)
- A preliminary Energy Efficiency Measure (EEM) List

The project team used the AIA's COTE Top Ten measures of sustainability as a framework to highlight sustainable design opportunities. The following section documents the feedback received at the workshop.

COTE Top Ten Measures of Sustainable Design

The following section documents the findings of the sustainability workshop using the COTE Top Ten Measures:

- Measure 1 - Design for Integration
- Measure 2 - Design for Community
- Measure 3 - Design for Ecology
- Measure 4 - Design for Water
- Measure 5 - Design for Economy
- Measure 6 - Design for Energy
- Measure 7 - Design for Wellness
- Measure 8 - Design for Resources
- Measure 9 - Design for Change
- Measure 10 - Design for Discovery

COTE TOP TEN MEASURES

Measure 1

Design for Integration

What's the big picture? How does the project demonstrate the intersection of design excellence and sustainable performance?

- The building will tell the story of a fire station by displaying the apparatus bay and its vehicles as a symbol of pride and transparency for the community it serves.
- The building will celebrate its function as an employee development center by integrating training props throughout the building and site.
- The building will be an important civic work in a neighborhood currently without any landmarks.

Measure 2

Design for Community

How does the project make the most of its surrounding community, integrate with it, and give back?

- Visibility of the community room
- Adjacency to the soccer fields across the street
- Social equity is addressed through RESJI and their similar measures
- Flexible meeting spaces for the community (S,M,L & XL)
- Governmental Transparency
- Explore LEED pilot credit for social justice
- Showcase Firefighting
- Measure to enhance safety and security of the neighborhood.
- Connect to transportation infrastructure

Measure 3

Design for Ecology

How does this project respond, connect and contribute to the surrounding climate & ecosystem, and build a connection to place?

- Building Design and shape as an ecological force
- Building Responds to passive heating and cooling opportunities
- Rotation / Orientation of the building
- Walking path similar to FS12 along the wetlands
- Additional thought is needed where water meets earth
- Pave Drain Tiles
- Wetlands
- Use reduced Storm-water connection fees to pay for treatment measures

Measure 4

Design for Water

How does the project use water wisely and handle rainfall responsibly?

- Increase Quality and Decrease Quantity
- 80% or better TSS removal is target
- Green Roof
- Hold as much rain water on site as possible and slow down the flow of water off site
- No irrigation with domestic water
- Low / No Maintenance landscape
- Design for 100 / 200 yr storm events
- Look for opportunities in the shape of the building to capture and reuse rain water.

Measure 5

Design for Economy

How does the design show that higher performance can be cost-effective?

- Combining programs of (2) facilities (EDC and Fire station)
- Metal Roof = durable material selection + 30 yr roof warantee
- PV panel slope = roof slope
- Durable...Not "delicate" like FS12 / FS13
- Industrial context
- Pre-cast = construction speed, durability, simple, integrated insulation & low-cost
- Robust modeling process
- Central mezzanine location for distribution
- Compare proposed design to peer facilities
- Target 25 year simple payback
- How to fund Photovoltaic System
- Utilize utility incentives

Measure 6

Design for Energy

How much energy does the project use, is any of that energy generated on-site from renewable sources, and what's the net carbon impact?

- McKinstry = Focus on Energy + LEED model
- Modeling continuously + Data Comparison
- (3) other fire stations to compare (11, 12, 13)
- Measure / Benchmark the existing
- Next Level Modeling
- Sefaira during early phases
- LED Lighting
- Close the loop = Design - Construct - Operate
- Select HVAC before the end of SD phase (May)
- Radiant floors throughout - decouple heating via radiant floor. Supply cooling and ventilation from the same air handling equipment (combined AHU/ERV)
- Net Zero as target
- Vehicle exhaust capture

Measure 7

Design for Wellness

How does the project promote the comfort and health of those who spend time in it?

- Communal cooking
- Patio + Grilling Space
- Garden and planting beds for staff and community
- “Self-sustaining” facility
- Views to nature
- Color Theory and PTSD considerations for staff
- Community aspect to the group spaces
- Exercise Room
- Acoustical Performance
- Lighting - Circadian Rhythms
- 24/7 facility
- Gradually turning on lights for emergency
- Daylighting into the core of the plan

Measure 8

Design for Resources

How were the decision about the materials used based on an understanding of their impact, especially carbon impact?

- Sheet metal facility next door
- Pre-cast
- Carbon reduction
- 2030 Challenge
- 100% Renewable - is this possible?
- Living building Challenge is all electric
- Gas is needed in this facility for cooking
- Radiant floor
- Polished Concrete Floors
- Open to structure areas
- Eliminate or minimize use of Red-List Materials

Measure 9

Design for Change

How does the project design anticipate adapting to new uses, adapt to climate change, and support resilient recovery from disasters?

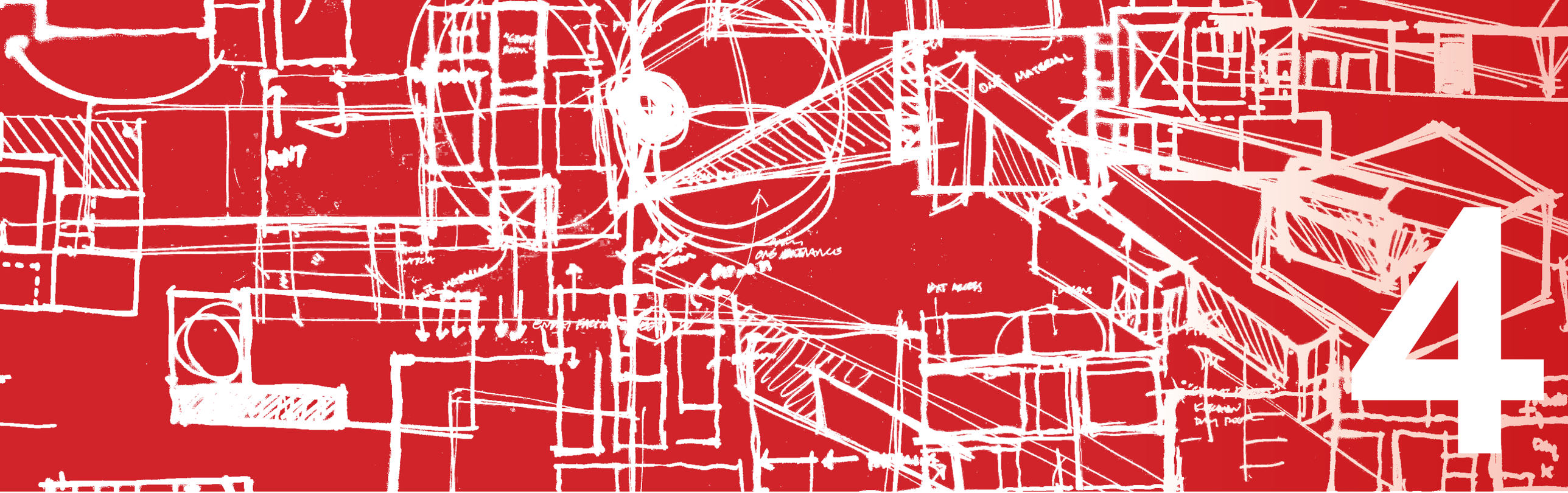
- 50 - 100 yr building
- Use an open plan to facilitate social interaction - build a cohesive crew
- Design for growth - potential double company
- Look at potential for off-grid operations “passive survivability”
- Include storm shelter for increased resilience

Measure 10

Design for Discovery

What lessons for better design have been learned through the process of project design, construction and occupancy?

- Connect the site with a walking path
- Protect the wetland
- Keep the wetland from growing



4

SYSTEMS DESIGN

MECHANICAL DESIGN

The City of Madison will need to install high efficiency cooling and heating systems in order to meet the energy objective of 30% better than ASHRAE 90.1 2007. The design team will evaluate different heating and cooling systems and provide life cycle costing and recommendations. Strategic objectives include:

Mechanical Equipment

- Domestic hot water demand will be met by demand hot water heaters, high efficiency condensing appliances, geothermal heat pumps and/or solar hot water systems.
- Project-specific load calculations will be used to properly size mechanical equipment rather than relying on generic rule-of-thumb sizing criteria.
- Heating and cooling digital control system will integrate with the global facility management software standard.
- Consider an energy recovery system between the ventilation outside-air intake and exhaust-air streams.
- A mezzanine for air handling equipment that serves the classroom portion of Fire Station 14 due to its varied occupancy.
- City prefers only one AHU for all air-conditioned areas. City does not want a seperate AHU/ERV for public area of the facility. Instead use HVAC occupancy sensors to setback temperature and reduce airflow when unoccupied (ie standby mode)
- Radiant floor heating for the entire facility.
- Consider specifying a 3-pipe water system with hot water, cold-hard water and cold-soft water. The cold-hard to be used only for drinking water and hose bibs. This will extend the life of equipment and eliminate excessive maintenance and premature failure of equipment such as dishwashers, washing machines, toilets and faucets.
- Consider a single geothermal field that will serve geothermal heat pumps in the building.

Motors and Drives

- Utilize where possible motors that will meet or exceed NEMA Premium efficiency standards.
- Variable speed drives will be installed on all motors 5 hp or larger that have variable load and operate regularly.

Plug Loads

- Employee workstations will be configured to encourage energy efficiency and make it easy to reduce waste (e.g., location of task lighting controls, desk level access to plug load control).
- ENERGY STAR-rated equipment will be exclusively specified for all appliances, computers and other qualified equipment within the scope of the building project.
- Configure receptacles to be on timer/schedule/occupancy sensors to meet 90.1-2010 mandatory requirements.

Renewable Energy

- The facility will either a) be equipped with on-site renewable energy systems to supply building electric and thermal loads, or b) be equipped with the infrastructure for future on-site renewable energy systems to meet building electric and thermal loads wherever cost effective. Options for on-site systems may include additional photovoltaic (PV) array and solar domestic hot water.
- Consider a PV array used as sun shades over desired covered outdoor areas or parking areas or otherwise roof mounted.
- The size of the PV array on the facility is between 30 kW - 100kW.
- Solar water heating panels will be used to pre-heat the domestic water used in the facility. The max size of a solar water heating system is four

  4'x10' panels. The system is to be integrated with the BAS.

FIRE PROTECTION

Fire Station 14 will have a fully integrated automatic sprinkler system per NFPA 13.

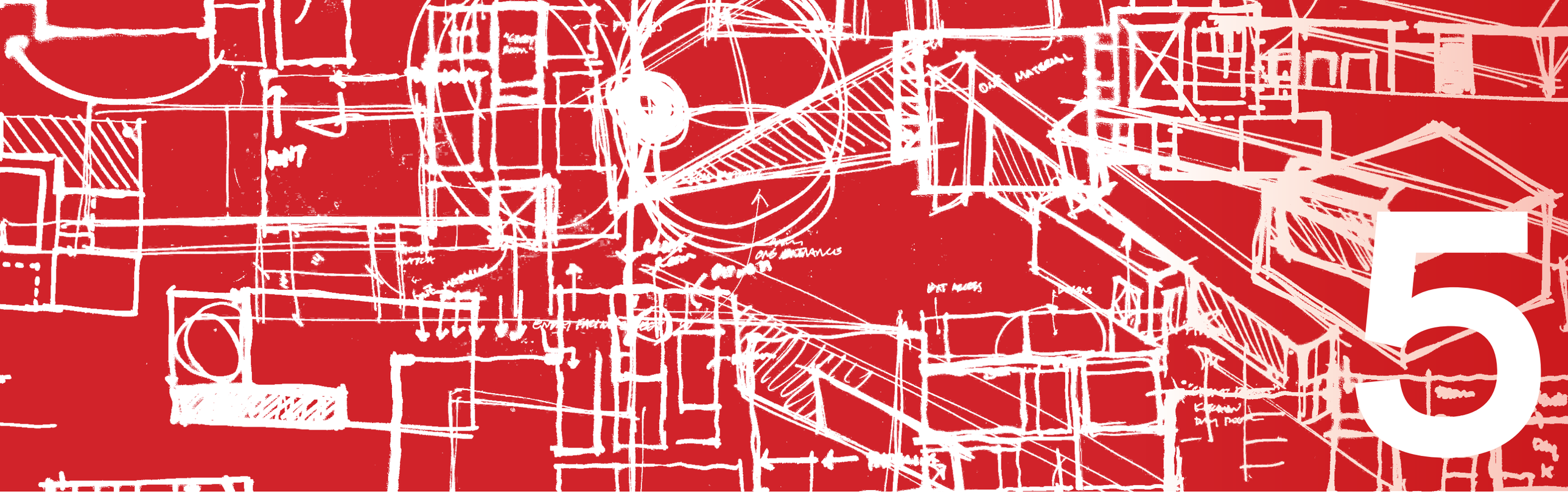
The site is within 500 feet of one fire hydrant, however it may be greater than 250 feet from the nearest hydrant to the rear of the proposed building, exceeding maximum fire hose length. It may be necessary to add a fire hydrant to satisfy fire department requirement to have two hydrants within 500 feet and for hose length.

The site and building plan will be reviewed with the Madison Fire Department at the next phase, the Schematic Design phase, to determine the need for the addition of a fire hydrant on site and recommendations for the hydrant location.

SECURITY FEATURES

Occupant safety and health is achieved by providing appropriate security and accessibility for building occupants and assets. The design and construction process will include an integrated team approach to include analysis and recognition for solutions to provide a safe, healthy and secure built work environment.

Minimal site lighting and fencing in the training yard is desired. Security cameras connected with City of Madison PD will be used. Fencing along Femrite Drive should be screened with landscaping.



5

CODE STATEMENT

CODE STATEMENT

Code Used

Fire Station 14 could be subject to either the current code - IBC 2009 with WI amendments, or a new code - IBC 2015, that is proposed for adoption September 1, 2015. Based on discussions with the city and the fire department, the design team proposes the following path for code compliance:

- Comply with IBC 2015 for the project.
- Study the inclusion of a storm shelter for cost and feasibility in SD phase.
- If a fully compliant storm shelter is not within the budget, submit for permit without it.
- Preliminary code council position is that storm shelter will not be required in WI.
- If 2015 is not adopted in WI by the time CD Phase is complete, either submit the plans under IBC 2015 with a variance for the storm shelter, or revise the plans to be compliant with IBC 2009.

Overview

The building will be designed to meet requirements of the Wisconsin Commercial Building Code, incorporating IBC 2015 and other ICC codes, including accessibility requirements. The actual intent is to go beyond the minimum code requirements to meet express goals of the City of Madison for energy efficiency and sustainable design pursuing LEED certification. Additionally, the building will be equipped with a complete automatic sprinkler system.

The following represents preliminary code outline that will provide a guideline for successive design phases:

Occupancy Classification

Primary Occupancy:

- B: Business

Secondary Occupancies:

- S-2: Apparatus bays (Separated occupancy)
- A-3: Community/Training Room (Separated occupancy)
- R-3: Dorm Rooms (Non-separated occupancy)*

* Although the R-2 spaces meet requirements of Non-separated occupancy, the sleeping units must still be separated by a 30-minute rated assembly when the building is sprinklered. Additionally, the sleeping units must meet the requirements of sound transmission per Chapter 12 (STC 50).

Building Area

First Floor:	18,800 SF
Mezzanine:	1,500 SF
Building Total:	20,300 SF
Construction Type:	II-B

Fire-Resistance Rating

0-HR	Primary Structural Frame
0-HR	Bearing Walls Exterior
0-HR	Bearing Walls Interior
0-HR	Non-bearing Walls Exterior (≤ 30 FT)
0-HR	Non-bearing Walls Interior
0-HR	Floor Construction and Secondary Members
0-HR	Roof Construction and Secondary Members

Fire Protection

Sprinklered per IBC 903 Automatic Sprinkler Systems

Building Occupant Load

B (100 GSF/Occ.)	= 115 Occupants
S-2 (200 GSF/Occ.)	= 44 Occupants
A-3 (15 NSF/Occ.)	= 75 Occupants
S-2 (300 GSF/Occ.)	= 10 Occupants
Total Occupants	= 239 Code Occupancy

Fixture Requirements:

Type	Occ.	W.C.	Lav.	SWR	D.F.	Serv. Sink
B Occ.	166	5	4	--	2	2
R Occ.	8	1	1	1	--	--
Total	174	6	5	1	2	1

Section 423: Storm Shelters

A storm shelter is required in IBC 2015 as a safe room within buildings which provide public safety serviced, including fire stations.

It is projected that Wisconsin will switch to IBC 2015 on or around September 1, 2017, however, Section 423 may not be required. Following discussions with the City and Fire Department, OPN Architects is instructed at this time to plan for IBC 2015 without a storm shelter. An alternate approach would be to submit under IBC 2009.

OPN
ARCHITECTS