



BASIS OF DESIGN MANUAL

STR Project Number 14120

D97 ADMINISTRATION BUILDING

260 W. Madison Street
Oak Park, IL 60302

Prepared for:

Oak Park Elementary School District 97

970 W. Madison Street
Oak Park, IL 60302

In-Progress Review:

April 21, 2015

Civil

Basis of Design Narrative.

General

The project will be located at 260 W. Madison St. in Oak Park on the site of a former automobile dealership and repair shop. The total contiguous property area is 22,750 square feet (0.52 acres), and the proposed site area is broken up into 10,867 square feet of building, 9,356 square feet of paving, and 2,527 sq ft of landscape area.

Demolition/Earthwork

The existing site will consist of at grade compacted CA-6 course aggregate at the time construction commences for this project. All building improvements, site features, and utility connections will be removed under a separate contract administered by the Village of Oak Park. Demolition for this project will mainly consist of removal of existing paving in the Madison St. right-of-way adjacent to the new building.

Earthwork for the project will consist of removal and stockpile of the existing CA-6 onsite. If approved by the onsite testing agent, the CA-6 material can be reused as select fill for backfill under structures and pavements. Removal of additional fill material below the existing compacted CA-6 will be required for installation of building foundations and the proposed permeable paver parking area. Environmental sampling was completed on soil samples from select soil boring locations onsite. One of the soil samples indicated the soil exceeded permissible concentrations of arsenic to be allowed for disposal as clean construction and demolition debris (CCDD). Further investigation of the findings of the environmental report are warranted to ensure the cost for disposal of contaminated soil is limited to the extent possible and is captured in the contract documents.

Erosion and Sedimentation Control

As the total site disturbance will not exceed 1.0 acres the project will not be required to apply for a stormwater discharge permit through the Illinois Environmental Protection Agency (IEPA). However, the contractor will be required to provide erosion and sedimentation control measures to control polluted runoff from leaving the construction site. Such measures will include:

- Silt fencing
- Dust screening on construction fencing
- Inlet Protection
- Stabilized Construction Entrance
- Concrete wash-out Bay

The general contractor shall inspect erosion control measures weekly and after any storm event in excess of 1/2". Should the volume, velocity, sediment load or peak flow rates of stormwater runoff temporarily increase during construction, then additional measures to protect adjacent properties shall be undertaken.

Pavements

Paving for the project will consist of the following:

- Concrete pavement in vehicular areas shall consist of an 8" thick reinforced concrete slab on a six inch aggregate base. Concrete paving shall be finished with a light broom finish and hand tooled joints.
- Sidewalk pavement shall be a minimum of 5.0' wide, consisting of 5" thick, reinforced concrete on a six inch aggregate base. Walks shall be finished with a light broom finish with hand tooled joints.
- Asphalt pavement and base along street pavements shall consist of 10" crushed limestone (CA-10), 2.5" Binder Course (N Mix C), and 1.5" Surface Course (N50, Mix D).

- Permeable pavers in vehicular areas will consist of heavy duty precast concrete unit pavers laid in a herringbone or running bond pattern per manufacturer's specifications. Permeable concrete unit pavers will be supported on a setting bed of CA-16 aggregate chips overlaid on a drainage course of CA-7 aggregate. Below the CA-7 a layer of geotextile filter fabric shall be provided after compaction and approval of the subgrade.

All paving for the improvements will conform to the Village of Oak Park and ADAAG requirements for accessibility.

Site Grading and Drainage

The building first floor elevation has currently been set at 39.40 Oak Park Datum. All paving and landscape elements in the project will be graded to direct stormwater runoff away from existing and proposed buildings and into nearest drainage structures. In the proposed parking area, two catch basins will be provided for drainage.

New pavements shall be sloped at a minimum 1.0% towards the nearest drainage structure. It is recommended that drainage within landscape areas to be 1.0% minimum to promote positive drainage. All concrete pedestrian walks will be designed to a maximum 2.0% cross-slope and maximum 5.0% longitudinal slope, per current ADAAG requirements. Transitional grading will be required from the new pavement improvements to meet with the existing elevations at the adjacent properties.

Applicable Permits

Village of Oak Park – Review for conformance with Village codes prior to submittal to MWRDGC.

Metropolitan Wastewater Reclamation District of Greater Chicago (MWRDGC) – Sewer Permit and review of Stormwater Management Plan per the current MWRD Watershed Management Ordinance.

Illinois Environmental Protection Agency – Sewer connection permit may be required and will depend on final design sanitary flow from building.

Stormwater Management

The project is regulated for stormwater management under the MWRDGC Watershed Management Ordinance (WMO). Specifically, this project is required to provide "volume control", with a goal of retaining the first 1" of stormwater that falls on impervious area within the site. To meet this requirement, permeable concrete unit pavers are being proposed for the parking area. Stormwater from the building and surrounding impervious surfaces will be piped to the stone aggregate base below the permeable unit pavers. This will allow for treatment of stormwater by filtering through the aggregate base of the pavers, as well as a volume reduction by allowing infiltration into the existing subgrade to the extent possible. In the event stormwater runoff flow from the building and site exceeds the capacity of the permeable unit paver aggregate base, stormwater overflow will be directed into the adjacent alley. This design will meet the requirements of the MWRDGC WMO.

Site Utilities

New sewer and water connections are proposed to Madison St. It is currently anticipated the sewer connection will be a 10" connection, and the water service size is under evaluation. The building electrical service will be provided from the existing utility poles in the alley, and further coordination is required with Com Ed and the electrical engineer. Other utilities including gas, telecom, and cable are being evaluated currently, and the location of these services will be indicated for coordination on the civil site utility plan.

Architectural

Basis of Design Narrative

General

The new Administration Building for Oak Park Elementary School District 97 (D97) is the result of an Intergovernmental Agreement between D97 and the Village of Oak Park (VOP). Through a combination of land swapping and TIF money and other factors, the VOP will assume the current D97 Administration Building property and provide the District with a new facility at 260 W. Madison Street, the site of a former Volvo Dealership currently owned by the VOP. D97 will remain in the current facility until construction is complete on the new building. VOP is responsible for the demolition of the existing building and hardscape, providing D97 with a site consisting of 6" of CA-6.

To the east and west directly adjacent to the 260 W. Madison Street property are single story masonry buildings that will remain in place. To the south is Madison Street and to the north is Percy Julian Middle School play fields separated from the site by an alley. The site is therefore part of a Commercial zone that is also included in the Madison Street Overlay District. (The Zoning Analysis is included with this manual.)

Sitework

The site layout is organized so that the building fronts Madison street on the south portion of the site, and a parking lot covers the north portion of the site. In accordance with the Zoning Ordinance allowing 0-5 feet of setback, the building setback along Madison is 0 feet on the east portion and 3 feet on the west portion. A 7foot wide landscape strip with ornamental fence will buffer the parking lot on the north edge. Landscaped islands will also be located within the parking lot along with a trash and loading berth.

The parking lot itself will consist of permeable paving providing the required storm water volume control as governed by the Metropolitan Water Reclamation District and reviewed for approval by the VOP.

In order to meet the quantity of parking spaces required by Zoning, a portion of the diagonal spaces to the north of the alley on the Percy Julian MS property will need to be designated for use by the Administration Building. STR has confirmed that there will be enough remaining spots on the MS property to meet the parking requirements for the MS after this re-designation of spaces.

STR will also be working with a landscape architect to design the parkway along Madison Street as well as the landscape in the 3-foot setback at the west portion of the building.

Building

The new facility is a 2-story structure housing 50 employees within seven departments including Superintendent, Business and Finance, Human Resources, Communications, Teaching and Learning, Technology, and Special Instruction. In addition, there is the Oak Park Education Foundation, a Print Shop, meeting facilities, high-density storage, toilet facilities, an elevator, loading and receiving, a break room, collaborative work areas and registration functions.

The square footage of the building is as follows:

1 st floor:	10,859
2 nd floor:	11,224
Total:	22,083

Exterior

Reacting to goals of focus group desiring an open and welcoming building using materials that provide The exterior elevation and materials have been selected with direct input and reaction from the D97 Cabinet. The exterior materials used are as follows:

- Cordova Stone Masonry (4x4x24)
- Wood Grain Aluminum Siding (Longboard) – Rainscreen System
- Insulated Glazing (Clear, back-painted spandral, colored and fritted glass)
- Ribbed Metal Panel (at roof penthouse)

On the south façade, there is a pattern of wood grain aluminum siding installed vertically and curtainwall with alternating clear and fritted glazing. The pattern of materials appears to be random but actually consists of (2) standard curtainwall systems and standard widths of siding arranged in alternating patterns (with the exception of a few odd locations). The intent at this more public façade is providing a sense of transparency both from the exterior and the interior affording 54% glazing in the south façade.

To provide a buffer between the pedestrians on the sidewalk and the work space on the interior of the building at the west portion, we have set this portion of the building back 3 feet. This will be designed as a landscaped planter giving some visual relief to the staff located on the street front.

Also at this south façade, the solar heat gain is of concern. District 97 was not in favor of any shading techniques that may obscure the views to the exterior, so STR is pursuing the development of a horizontal louver located at the second floor slab elevation. This overhang matches the set back in depth at the west portion of the building, but then jogs out over the sidewalk on the east portion. STR is working with the Village on the encroachment easement required for this element.

The north façade fronts the parking lot. Therefore, the exterior wall at the first floor will consist of masonry for better durability. Punched windows will be located 4'-8" above the ground again for durability and for shield as possible the parking lot from the interior views.

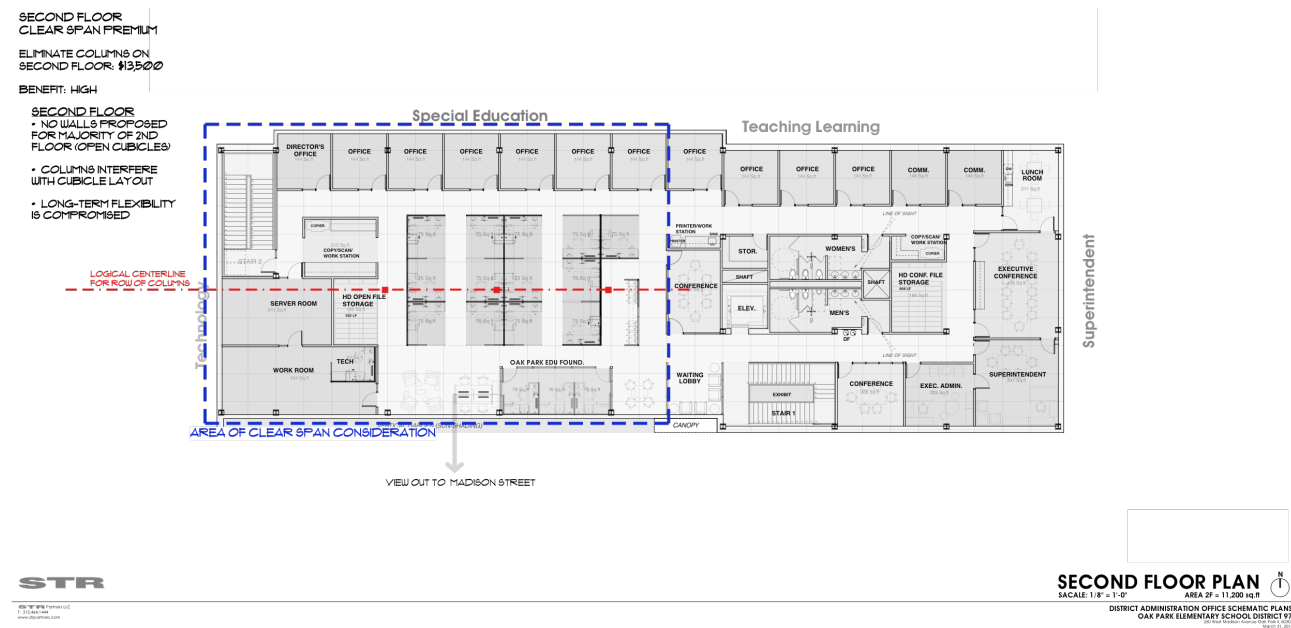
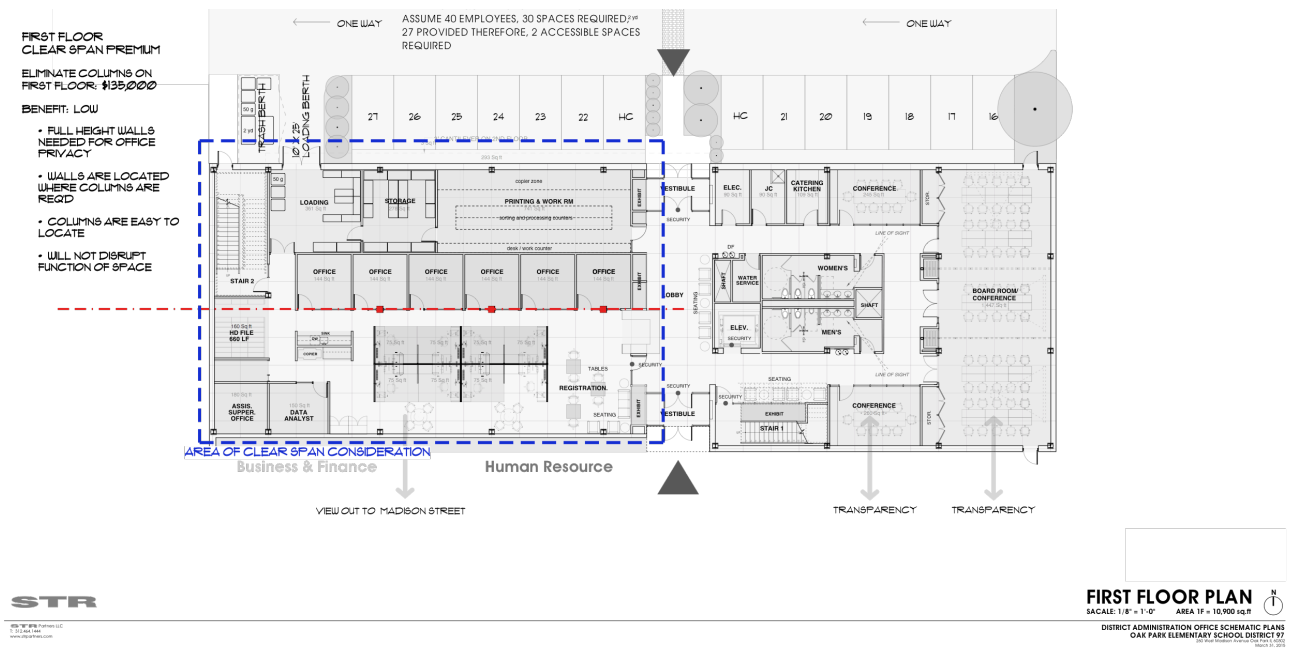
At the second floor, there is a return to the wood grain aluminum siding material incorporating a couple of colors. Along the west portion, there is an overhang of 3 feet to relate to the setback on the south. A curtainwall system is incorporated to provide a significant amount of glazing to the offices at this wall. Spandral glazing is incorporated at the locations where an interior wall meets the exterior wall. At the east portion, the windows are set at the floor slab to maximize the opening sizes, but these are conceived as punched openings using the language from the first floor. Overall, 35% of the exterior wall is glazing at this north façade.

Interior

The interior of the building is conceived of a balance between office space, conference space and collaborative space. The administration has committed to designing a facility that provides flexibility for internal and potentially external functions.

1. All individual offices with the exception of the Superintendent's office are the exact same size providing parity and allowing for any shift in department personnel.
2. Spaces are not devoted to a single use or a use that happens infrequently.
 - a. Registration Area will accommodate non-confidential meetings or collaboration.
 - b. Board room is be divisible into 2 or 3 spaces to accommodate multiple sized functions at one time.
3. Interior partitions are to be metal stud and drywall, with the exception of the masonry shear walls at the elevator core and the exterior walls of the main stair.
4. The roof structure is a clear span over the west portion of the building, eliminating interior columns on the second floor at this portion of the building and accommodating a dynamic arrangement of furniture and offices depending on needs.

This clear span of structure was studied to test the viability of having a clear span for both floors. The sketches below illustrate the findings.



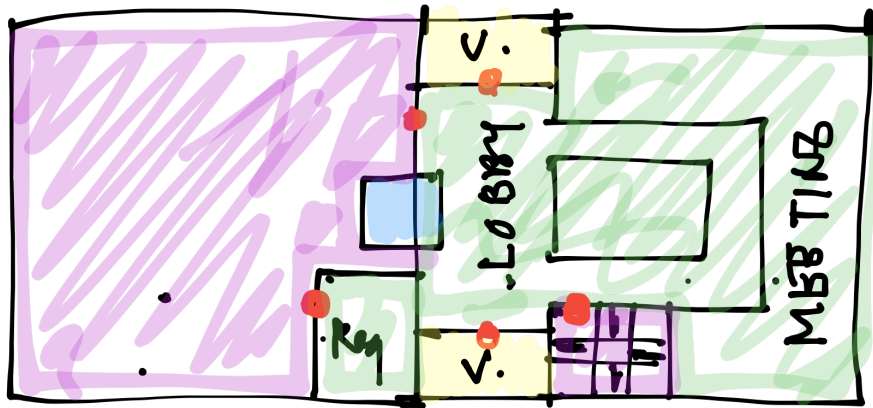
It is our recommendation to maintain a line of columns for the second floor framing where they are easily accommodated, and a clear span for the roof framing where there is greater benefit to having open space.

The workspaces are a combination of individual or private offices and open cubicles. STR prepared a study of the open cubicles and the open space around them showing options on types of space that can be achieved. This study ranged from showing the existing cubicle size (9'-6" x 8'-0") as the largest down to an idea of benching (desk of 6'-0" wide). The study showed that as you reduce personal workspace, or "I" space, we are able to increase collaborate work areas, or "We" space. The Administration selected a cubicle size of 8' x 8' cubicles affording a good balance of collaborate space.

There is a conscious effort to dramatically increase access to daylight and views as compared to the existing facility.

1. All individual offices shall have glass walls facing the interior allowing views to the exterior front to back.
2. At the first floor, there are individual offices that do not have exterior windows.
 - a. These office do have a glass wall to the interior to allow for a view to the exterior.
 - b. Additionally, the first floor is a tall volume that will allow light to penetrate deeper into the space.
3. Window openings are being maximized allowing for the different conditions around the building.

Security has been discussed at length with the Administration. The result is a healthy balance of providing safety and security for the staff while remaining welcoming and open for visitors. See diagram and description below



F SECURE VESTIBULE - KIMMA OPEN
 • REGISTRATION + MEETING - SEC.
 STAFF OFFICE

First Floor

- Entry requires a person to buzz someone in
- Only D97 employees may access the Print shop and the HR/Business areas.
- The main stair and elevator may be locked down after hours
- The areas to the east of the lobby are accessible – but individual rooms may be locked as needed.
- All visitors to be checked in by reception – staff member notified of visitors

Second Floor

- A waiting area at the top of stair/elevator is provided for visitors to be greeted by a staff member
- The stair and elevator will be locked to prevent non-D97 visitors after hours.

Storage is being centralized; multiple file cabinets will be eliminated in individual. Locations are earmarked for high-density storage and structure has been sized to accommodate. Final size of these spaces is pending assessment of storage needs by vendor.

Other Features

- We are currently identifying locations and guidelines for involving students to contribute to the building in the form of artwork, or tiles, or other creative mediums – yet to be determined. This celebration of students is in initial concepts, but we hope to incorporate ways of creating both permanent and rolling exhibits from students.
- An exhibit case is planned as the core of the main staircase to be seen at the first floor overflow waiting area and as one ascends or descends the stairs.
- Colored glass incorporated in the exterior wall of the main stairs facing Madison. Intent is to show a bit of the student celebration on the exterior.

Structural

Basis of Design Narrative

Parameters:

- The structure is designed based on 2009 IBC and ASCE 7-05.
- The 2nd floor is designed for a typical 100 psf live load.
- The high-density storage areas will be designed for the capacity of the high-density storage system to be coordinated with the manufacturer.
- The roof is designed for code prescribed snow loads, including drift.
- Wind and seismic loads are per code requirements.

Foundation Design:

- The foundations consist of spread footings with a 3000 psf allowable bearing pressure.
- The east, west and south sides of the building are located very close to the property line. The foundations will need to be eccentric to the wall at these locations. Strap beams will be required to prevent these eccentric footings from rotating under the building loads.
- The perimeter foundations will be located at frost depth of 4'-0" below grade. The interior foundations will be located just below the interior slab on grade.
- The elevator pit and the adjacent walls will have their foundation dropped down to the elevator pit depth of approximately 5'-0", depending on the elevator requirements.
- Fill was found at the southwest corner of the site extending to a depth of approximately 6'-6". Overexcavation and backfill will be required in this area to obtain a suitable soil bearing pressure.
- There are adjacent one-story buildings on the east and west ends of the site. Care needs to be taken during excavation to maintain the stability of the existing foundations of these two buildings.
 - The bottoms of the new footings adjacent to these neighboring properties need to match the bottom of the neighboring foundations.
- The first floor will be supported with a conventional slab on grade.

Superstructure:

- The superstructure consists of steel framing with reinforced masonry shear walls.
- The columns will be wide flange steel sections.
- The second floor will be framed with steel beams and a composite slab.
- The roof framing will be steel bar joists supported by steel beams. There will be 1 ½" metal roof deck over the main roof level.

HVAC

A. Basis of Design Narrative

i. Design Criteria

- a. Temperature – Indoor
 - (1) Summer – 72°F DB / 50% RH
 - (2) Winter – 72°F DB
 - 1. Exception: Vestibules – 65°F DB
 - 2. Exception: Mechanical Penthouse – 40°F DB
- b. Temperature – Outdoor
 - (1) Summer – 95°F DB / 75°F WB
 - (2) Winter – -10°F DB

ii. System Description

- a. Space heating and cooling will be provided by an air-source heat pump, heat recovery variable refrigerant flow (VRF) system, with individual indoor cassette units for each space. Ventilation will be provided via a roof-mounted dedicated outside air unit (DOAS) with an energy recovery wheel. All VRF components, DOAS, and controls to be provided by a single manufacturer – Daikin, LG, or Mitsubishi.
- b. Variable Refrigerant Flow (VRF) System
 - (1) The VRF system will utilize (4) 12 ton air-source heat pumps, connected in parallel to stage the building load (12.5 EER and 3.8 COP or greater at design conditions). VRF condensing units will be located in the mechanical penthouse.
 - (2) Refrigerant piping will be provided from the VRF condensing units to (15) heat recovery boxes to allow simultaneous heating and cooling. The heat recovery boxes will be located in the ceiling plenum.
 - (3) Refrigerant piping will be provided from the heat recovery boxes to (56) ceiling mounted cassette units located in each thermal zone. Each cassette unit to contain MERV 8 filters and ECM fan motors. Provide condensate piping for all cassette units, and route piping to open site drains provided by plumbing.
- c. Dedicated Outside Air System (DOAS)
 - (1) The dedicated outside air system (DOAS) will provide 5,500 cfm of outdoor ventilation air to serve the entire building. The unit will be a split DX cooling and indirect gas-fired heating unit. Heating will be via a stainless steel, heat exchanger, sized at 200 MBH, and minimum 80% efficiency. The cooling coil is sized at 25 tons, and minimum 10 EER. Outdoor air intakes will be located at a minimum 10' from any exhaust source.
 - (2) DOAS will also contain an energy recovery wheel, variable frequency drives (VFDs) for supply and return fans, MERV 7 pre-filters, MERV 13 final-filters, hot gas reheat, and an inverter for the lead compressor. The unit will have full size access door to each

section and will be roof-mounted on roof curb sized to accommodate the unit operating weight.

- (3) Medium pressure gas line from city main will be routed to rooftop to serve gas-fired heat exchanger for DOAS. Gas meter to be provided for service to building.
 - (4) Provide ventilation air distribution to each thermal zone via a ducted system with diffusers located centrally in each zone. Unit to supply 55°F air in summer operation and neutral, 72°F air in winter operation. Metal ductwork must be insulated and lined for thermal and acoustical performance.
- d. Temperature Control
- (1) The building will be provided with a Building Automation System (BAS). The system will incorporate all HVAC equipment and metering.
- e. Miscellaneous Systems
- (1) The mechanical penthouse will contain louvers for summer operation of the VRF condensing units, sized to maintain the summer outdoor design conditions. For winter operation, the louvers will be closed and gas-fired unit heaters will be provided to maintain the indoor room temperature setpoint.
 - (2) Provide electric cabinet heaters in all vestibules, the loading dock, and at the lower level of each stairwell. Size unitary heating devices at 25 Btu per square foot of the space served.
 - (3) Provide constant volume roof-mounted exhaust fan with gravity backdraft dampers to operate continuously during occupied hours for toilet rooms, sized per code.
 - (4) Rooms requiring cooling year-round are the server room and the elevator machine room. A split DX cooling unit consisting of a roof mounted condensing unit, a room cassette, and piping connecting the two will be provided in these spaces. Condensate drainage will be pumped back to open site drains. Each of the two units will be 1 ton.

B. Code Analysis

- i. **At a minimum, the design of the HVAC system should meet the following codes and standards:**
 - a. 2012 International Energy Conservation Code (IECC)
 - b. 2003 International Fuel Gas Code (IFGC)
 - c. 2003 International Mechanical Code (IMC)
 - d. 2010 Illinois Accessibility Code
 - e. Sheet Metal and Air Conditioning (SMACNA)
 - f. American Society of Mechanical Engineers (ASME)
 - g. NFPA 90A-1 996
 - h. NFPA 10-1998

Plumbing

A. Basis of Design Narrative

i. Plumbing Systems Description: Fixtures

- a. Water Closets: Wall mounted, vitreous china, high-efficiency 1.28 gallons per flush with top spud by Zurn.
- b. Water Closet Flush Valves: Hard Wired, automatic, exposed, single flush, high-efficiency 1.28 gallons per flush, with 1-1/2" supply by Zurn.
- c. Urinals: Wall mounted, vitreous china, high-efficiency 0.125 gallons per flush with top spud by Zurn.
- d. Urinal Flush Valves: Hard Wired, automatic, exposed, high-efficiency 0.125 gallons per flush, hard wired with 1-1/2" supply by Zurn.
- e. Lavatories: Drop in, vitreous china, self rimmed sink by Zurn.
- f. Lavatory Faucets: Deck mounted, low flow 0.5gpm, hard wired, electronic faucet by Zurn.
- g. Kitchen Sinks: Drop in, two bowl, stainless steel kitchen sink by Elkay.
- h. Kitchen Sink Faucet: 4-hole, 8" centers, deck mount, 1.5 gallon per minute, chrome plated solid brass with hand held sprayer by Zurn.
- i. Janitor's Sinks: Floor mounted terrazzo with stainless steel bumpers.
- j. Janitor's Sinks Faucets: Wall mounted with pail hook and threaded outlet.
- k. Hose Bibs: Non-freeze wall hydrants with lock & key at each side of the building maximum 100ft apart. And exposed internal hose bibbs in all mechanical equipment rooms. All hose bibbs shall be protected by a double check valve backflow preventer.
- l. Water Coolers: Dual height, Stainless steel, wall mounted, energy efficient electric water coolers with in-the-wall refrigeration system by Elkay.

ii. Plumbing Systems Description: Domestic Water

- a. A new, 4" incoming combined fire protection and domestic water service will supply the facility. The water service will be ductile iron and will enter the facility through the water meter closet where it will split to a 4" fire main and a 3" water service. The domestic water service then pass through the water meter, strainer and RPZ backflow preventer before being routed to a 1HP duplex booster pump, to raise the water pressure for plumbing fixture operation. Above ground domestic water mains 2 1/2" and larger will be type L copper with wrought fittings and soldered joints, piping 2" and smaller shall be PEX-a with cold expansion fittings, thermal compression type joints and full port valves. Piping will be sized to limit pressure drop to 3PSI / 100ft. Any PEX piping running in return plenums shall have an approved sheet metal type pipe support. Provide full port ball valves to all groups of fixtures from the main. All domestic water piping shall be insulated with fiberglass insulation.

- b. The facility's domestic water shall be heated with one- 76 MBH, 90% efficient, 50 gallon gas fired water heater. The domestic water system includes a hot water return to be recirculated by a 1/3HP recirculation pump.

iii. Plumbing Systems Description: Sanitary& Vent

- a. A new 4" schedule 40, solid wall, CPVC sanitary main shall serve the facility, connecting to the municipal sanitary sewer. All sanitary drainage piping shall have socket type CPVC fittings with solvent cement welded joints. All underground sanitary piping will be 4". All venting shall have the same materials, fittings and joints as sanitary. A Floor drain will be provided in each bathroom and in mechanical rooms near pumps and condensate producing equipment. Hub drains shall be provided for condensate coming from cassettes located in each zone.

iv. Plumbing Systems Description: Storm

- a. The facility will have a roof drainage system consisting of a combination of roof drains, and overflow drains with internal piping for the storm water system. The storm drainage shall exit the building through an 8" main. The overflow drains shall discharge above grade. All Storm piping shall be solid-wall, schedule 40 CPVC pipe, CPVC socket fittings and solvent-cemented joints. All horizontal piping shall be insulated.

B. Code Analysis

i. At a minimum, the design of the plumbing and fire protection systems should meet the following codes and standards:

- a. 2014 Illinois State Plumbing Code
- b. 2009 International Building code
- c. Illinois Plumbing Code, current edition
- d. American Society of Plumbing Engineers Design Handbooks
- e. Local Municipal Code Amendments
- f. American with disabilities Act and Architectural Barriers Act Accessibility Guidelines 2010
- g. ASHRAE 55 - 2004
- h. ASHRAE 90.1-2010

Fire Protection

A. Basis of Design Narrative

i. System Description

- a. A combined new 4" water main shall serve the building. 4" fire protection main will branch off the domestic water, pass through a double detector check valve backflow preventer and serve the building. The entire new facility shall be provided with a standard wet pipe sprinkler system. No Fire pump shall be required.

ii. Building Description

- a. The building is composed primarily of light hazard spaces for offices, corridors, and miscellaneous continuously occupied rooms. Pump and mechanical rooms, and other similar rooms, shall be protected at ordinary hazard levels according to the Illinois Building Code. Recessed heads will be provided in finished ceiling areas. Exposed heads will be provided in exposed areas. Window, sidewall and extended coverage heads may be used within specialty construction or high finish ceilings.

B. Code Analysis

i. At a minimum, the design of the plumbing and fire protection systems should meet the following codes and standards:

- a. Illinois Building Code
- b. NFPA-13
- c. NFPA 10 Fire Protection Code
- d. NFPA 101 Life Safety Code
- e. 2009 International Fuel Gas code
- f. 2009 International Fire Code (IFC)

Electrical

A. Basis of Design Narrative

i. Utility Service

- a. The proposed building will be fed from the existing ComEd 4160 volt aerial electric lines located along the alley (North of the W Madison Avenue, between S Cuyler & Harvey). Copper 800A service conductors in concrete encased steel conduits will be extended to new 800A Main Circuit Breaker (MCB) via C/T and Meter section from new pole mounted transformers with secondary voltage at 277/480V, 3 Phase, 4 Wire.

ii. Distribution

- a. The new electrical distribution will consist of a new 800A, 480/277V, 3-Phase, 4-Wire Main Service Switchboard complete with MCB and distribution section to feed all mechanical, plumbing, and fire protection equipment, power receptacle panels and lighting panels. This switchboard will be free-standing, floor mounted against the wall on a 4" high concrete housekeeping pad with code required front, and side clearances. The new switchboard will be located in the dedicated Main Electrical Room (MER).
- b. All mechanical, plumbing and fire protection equipment shall be fed from a 400 A power distribution panel rated at 277/480 volts, 3-phase, 4-wire, 60 Hz and will be located in the "MER"
- c. All power receptacles and lighting shall be fed from LRP branch circuit panel boards each rated at 225 amps at 120/208 volts, 3-phase, 4-wire, 60 Hz. These lights and receptacle branch circuit panel boards will be fed from an 800 amp power distribution panel via a 225 kVA pad mounted transformer located within the MER. These panel boards will be strategically located throughout the building to serve lights and receptacles located within that area of the building. 'Server' room receptacles and equipment will be wired to a dedicated 'CP' panel board located within the server room.

iii. Receptacles

- a. All power receptacles shall be commercial grade NEMA 5-20R quadruplex type and shall be located throughout the building to serve each specific receptacle needs for the space. A duplex receptacle within quadruplex will have specific color (Green) and will be wired to Occupancy Sensor (with extended time delay) to automatically turn off the "Ghost" power consumption. Special receptacles shall be provided for equipment with special power requirements.
- b. All power receptacles located in toilet rooms, restrooms, and near sinks shall be ground fault circuit interrupter (GFCI) commercial grade NEMA 5-20R duplex type and shall be mounted 6" above lavatory sink(s) or counter top. GFCI type duplex receptacles

complete with weatherproof covers shall also be located at grade level for landscape equipment connections.

iv. Fire Alarm System

- a. The fire alarm system for this building shall be non-coded, class A, fully addressable, digital system and shall be interfaced with the local Fire Department. The fire alarm system shall consist of detection devices (photo-electric type ceiling mounted smoke detectors and heat detectors, duct mounted duct smoke detectors), notification devices (combination speaker/strobes, visual alarms), and initiation devices (manual pull stations complete with clear protective tamper resistant covers). All fire alarm devices shall be located throughout the building to meet local and national fire alarm codes.
- b. A remote fire alarm annunciator panel shall be located at the main entrance of the building within the entry vestibule not more than 15 feet from the building's main entrance

v. Tele/Data System

- a. The new tele/data service for this building shall be fed from the existing aerial tele/data service lines in the alley (North of the W Madison Avenue, between S Cuyler & Harvey). One new 4" empty PVC schedule-40 conduits from alley to new building main distribution frame (MDF) room will be provided. This room will house the building's communications infrastructure. The new MDF room will require a ¼" thick x 2" high x 18" wide copper ground bar in order to bond all telephone, communications and server equipment rack(s) grounds. This ground bar will be bonded to the building's main service ground bar located in the main electrical room with a #2 AWG green insulated ground conductor in a 1" EMT conduit.
- b. The tele/data system shall consist of empty raceways and back boxes complete with nylon pull rope for future low voltage cabling (¾" conduit for one tele/data outlet, 1" conduit for two tele/data outlets and 1 ¼" conduit for three tele/data outlets) these conduits will originate from the MDF room and shall be located throughout the building to serve each specific tele/data receptacle needs for the space All low voltage cabling, devices, and equipment shall be provided by the owner's low voltage vendor.

vi. Emergency Life Safety System

- a. The life safety system lighting shall consist of 120 volt battery unit exit sign fixtures and battery unit emergency lighting fixtures throughout the building each conforming to UL 924 and with minimum 90 minutes battery back-up.

vii. Grounding System

- a. System and equipment grounding will be provided. All switchboards, motor starters, panel boards, wiring systems, IT rooms, etc., will be effectively grounded.
- b. The main building service entrance grounding system shall be provided with a main water service pipe bond and associated water meter bonding jumper, a minimum of

two building steel ground bonds, and three ground rods driven into ground to achieve 5 ohm of resistance bond.

viii. Lighting System

- a. The lighting fixtures and associated lighting controls will be selected and designed by the lighting consultant to meet all applicable energy codes and standards. We recommend extensive use of LED light fixtures for energy usage reductions.

B. Code Analysis

- i. **At a minimum, the design of the electrical systems should meet the following codes and standards:**
 - a. 2003 International Electric Code (IEC)
 - b. 2008 National Electric Code (NEC)
 - c. National Fire Code (NFPA 72)
 - d. National Life Safety Code (NFPA 101)