EWEB HEADQUARTERS SITE

Draft Report

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Robertson Sherwood Architects pc
132 East Broadway, Suite 540
Eugene, Oregon 97401

www.robertsonsherwood.com
541.342.8077

ACKNOWLEDGEMENTS

City Council

Kitty Piercy, Mayor
George Brown, City Council
Mike Clark, City Council
Greg Evans, City Council
George Poling, City Council
Chris Pryor, City Council
Claire Syrett, City Council
Betty Taylor, City Council
Alan Zelenka, City Council

City of Eugene Staff

Jon Ruiz, City Manager
Jeff Perry, Facilities Director
Jan Bohman, Community Relations Director

City of Eugene Staff Task Force

Sarah Medary, Assistant City Manager
Kristie Hammitt, Central Services Director
Mike Penwell, Principal Facilities Project Manager

Consultant Team

Robertson Sherwood Architects
James Robertson, FAIA, FCSI, Principal-In-Charge
Carl Sherwood, AIA
Lana Sadler, AIA

Cameron McCarthy Landscape Architecture & Planning
Larry Gilbert, Principal
Colin McArthur, Project Manager
Zach Rix, Landscape Architect
Vivian Schoung, Associate
Kelsey Zlevor, Associate

Rider Levitt Bucknall
Graham Roy, Executive Vice President

KPFF Consulting Engineers
Systems West Engineers
Hohbach-Lewin Structural Engineers

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EXECUTIVE SUMMARY

A Project Team of professional consultants was retained by the City of Eugene to assess the riverfront EWEB Headquarters located at 500 East Fourth Avenue as an option for relocation of City Hall functions. As directed by the City, the Project Team conducted this analysis based on renovating the existing facility to meet council-mandated goals for the new Phase 1 City Hall building as closely as possible. These goals include achieving a minimum LEED certification of Silver with a preference for Gold, maximizing energy efficiency, upgrading the seismic resistance to at least code minimum for a new building, and using a planning horizon of at least fifty years for maximizing the long-term usability of the building and site.

The EWEB Headquarters complex was constructed in 1988 and consist of two buildings totaling 99,914 SF, related parking area of 174 spaces, on a site of approximately 4.01 acres. The North building is a two-story structure of 14,350 SF. The South building is a four-story structure of 85,564 SF. An enclosed pedestrian bridge links the second floors of the two buildings.

EWEB currently occupies all but 33,849 SF of the building, which is leased to Electrical Geodesics, Inc (EGI). The EGI lease expires in 2018. EWEB has estimated that they could vacate most of the building by the end of 2019. They also expressed a desire to continue use of the 13,323 SF fourth floor of the South building for as much as five additional years.

The project team completed an initial evaluation of available information and toured the complex on November 8, 2016. The buildings appear to be of high quality construction and in relatively good condition. Specific issues that were identified include:

- Need for renovation to meet City of Eugene functional requirements, including a Council Chamber;
- Age and condition of HVAC System and related controls;
- Age and type of site and interior building lighting systems;
- Age of fire sprinkler system;
- ADA accessibility issues at site and building;
- Poor exterior envelope performance compared to current code;
- Seismic restraint issues compared to current code.

From a land use and building code perspective, the proposed city functions are compatible with the current building occupancy classification, construction type, and land use requirements. There would be no change of occupancy that would trigger required upgrades. Thus, the city is in a position to define the extent of the upgrades that are needed or wanted. The only exception may be in the placement of the council chamber. The North building currently contains meeting spaces on the first floor. The council chamber may be compatible with that use in the North building but there would be potential upgrades required in the South building if the council chamber were located there.

While it is possible for the City to move in and reuse the buildings with minimal renovation, it would require the City to live with less than optimal functional layouts, aging building systems, high energy costs, and ongoing maintenance issues.

Phase 1 Development

The current Phase 1 City Hall program envisions space for City Council and City Manager functions with a total area of 32,000 SF. This is significantly less than the 99,914 SF available in the two existing buildings. Due to the nature and extent of the potential renovations required to meet City functional requirements and energy performance goals as established by the council, it is prudent to assume that the entire building (with the exception of the 4th floor) would be renovated and improved as a single project prior to occupancy. This would allow the City to occupy a “Phase 1 Plus” of 86,591 SF initially, which is all but the 4th floor of the South building, assuming EWEB would continue to occupy until the end of 2025. The City Hall Phase 1 Plus project improvements are anticipated to include:

- Repair of the paving and concrete walks;
- Related interior demolition and renovation to meet city programmatic requirements;
- ADA upgrades at toilet rooms;
- Replacement of the HVAC system, reuse of recently replaced components where possible;
- Replacement of the lighting and low voltage systems;
- Exterior building envelope upgrades;
- Seismic upgrades to meet Risk Category II, Importance Factor 1.0;
- Upgrades necessary to achieve an Energy Utilization Index (EUI) of 45 (City goal of 30).

It should be noted that reuse of the EWEB building will present some challenges to meeting all of the City's established standards and sustainability goals, especially the targeted EUI and higher seismic resistance. Due to the design of the current South building and the expanse of the atrium, it would not be possible to achieve the City's EUI goal of 30. Increasing the seismic resistance of the building beyond what is noted above would add to the cost of upgrades. To reach a Category IV, essential services level, would require considerably more extensive demolition and replacement of structural components.

The project would continue to use the existing 174 parking spaces for staff and public use. EWEB is anticipating that they will continue to occupy the buildings until the end of 2019. Planning work and construction bidding for the renovation project could begin prior to EWEB vacating the building but the actual construction could not commence until early 2020.

The estimated project cost for the City Hall Phase 1 Plus project at the EWEB Headquarters is $48,700,000, excluding acquisition costs. This estimate includes direct construction costs, owner's project costs, and cost escalation to 2020. The anticipated additional project cost of designing seismic upgrades to Risk Category III, Importance Factor of 1.25 would be approximately $2,000,000. Upgrading to Risk Category IV for continued operation after a seismic event would cost even more and is beyond the scope of this analysis.

Phase 2 Development

In order to meet the City's overall space needs and potential desire for future consolidation of city services located in the downtown area, the Phase 2 project envisions constructing a new building with a total floor area of 67,086 SF. Overall, the total City Hall space including the Phase 1 space will total 167,000 SF, which is the total programmatic need identified for consolidated city services. As a new building it can be built to meet all of the established city standards and sustainability goals.

The future building is assumed to be five stories, located between the South building and the viaduct, with one level of below-grade parking providing 47 spaces. This structure would displace 121 existing parking spaces. The net resulting total remaining parking plus the new below grade parking would total 100 spaces.

It is projected that the Phase 2 development would be bid in 2027 and require 18 to 24 months to complete. Occupancy would occur in 2028.

The estimated total project cost of future Phase 2 development is $71,700,000 in 2027 dollars. This cost includes the new Phase 2 building, renovation of the 4th floor in the South building after it is vacated by EWEB, and one level of below grade parking.

In summary, the EWEB Headquarters complex is a viable alternative to meeting Phase 1 City Hall needs and offers the ability to include additional city functions due the extent of necessary renovation and upgrades. The Phase 1 Plus project would have a higher total cost, considering acquisition and renovation, but would provide additional space not currently envisioned in the planned Phase 1 project. As a result the future cost of Phase 2 City Hall would be less as the space needs would have been partially met in the Phase 1 Plus project.

1.0 INTRODUCTION

The related but separate Downtown Development Project explores opportunities before the City of Eugene and Lane County specific to the development of publicly owned properties in downtown Eugene that include:

- The full-block site of the former City Hall;
- The full-block on which the County Courthouse, Public Service Building (PSB), Harris Hall, and the Wayne Morse Free Speech Plaza are sited; and
- The half-block on which the Butterfly Lot is currently sited.

This report is an extension to the Coordinated Downtown Development Project and evaluates the EWEB Headquarters property for the purpose of locating City Hall. A Task Force comprised of City staff guided the process. The Project Team identified and analyzed key benefits as well as specific issues by developing conceptual plans and modeling that illustrate the dynamics presented. These dynamics include architectural and urban design considerations, cost implications, impacts to individual project schedules, and other prerequisites and considerations.

This report documents the work of the Project Team. The following sections provide detail on project methodology, existing conditions and site analysis, specific facility needs, the subject property, renovation considerations, and recommended next steps. Supporting background documentation is organized in Appendices A-E City of Eugene. The report is accompanied by a Development Concept Overview summary, which is a distilled and condensed version of the report contents.

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2.0 METHODOLOGY

The EWEB Headquarters building evaluation study seeks to evaluate the overall condition of the building and site and determine the opportunities and constraints of repurposing the building for city use. The report evaluation is organized into nine key actions:

1. Collect available information on the existing building and site;
2. Identify opportunities and constraints of the site;
3. Assess condition of existing site infrastructure;
4. Assess condition of existing building and systems;
5. Assess opportunities and constraints to converting building to City Hall functions;
6. Identify opportunities and constraints to building expansion;
7. Estimate potential costs;
8. Identify potential project schedule and phasing;
9. Develop final work product similar to those being prepared for the Coordinated Downtown Development study.

To collect available information on the existing building and site, the Project Team toured the site and developed a subsequent base site plan and building model. The Project Team identified opportunities and constraints in terms of zoning compatibility, site area and setback requirements, existing easements, existing parking/required parking, and utilities.

The Project Team then assessed the condition of existing site infrastructure based on pervious areas, impervious surfaces, stormwater systems, and site lighting. The condition of the existing building and systems were assessed based on structural systems, envelope, MEP systems, calculating existing building EUI, fire sprinkler systems, alarm systems, low voltage systems, and elevators.

Following these assessments, the Project Team assessed the opportunities and constraints of actually converting the EWEB building to City Hall functions. These assessments considered the available square footage in comparison to the program area, and the functional use of space for City Hall. Opportunities and constraints for building expansion were evaluated based on potential locations, impact to parking, and stormwater management.

Estimates of potential costs performed by the Project Team explored site improvements, building and system upgrades, renovation for Phase 1 City Hall, renovation and expansion for Phase 2 City Hall, and cost escalation to dates established by the schedule.

The Project Team then identified potential project schedules and phasing including consideration of the anticipated relocation of EWEB functions, term of existing tenant leases, anticipated start date for building upgrades and renovation, and anticipated start date for building additions.

These actions concluded with the assembly of this document.

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3.0 EXISTING CONDITIONS & SITE ANALYSIS

3.1 Land Use Requirements

The EWEB Headquarters site is located at 500 East 4th Avenue in Eugene. The overall site is comprised of 21 parcels totaling 27.06 acres in size. The site contains 22.76 acres of prior developed land and 4.30 acres of open space. The site is located adjacent to the Willamette River, the Eugene Downtown Core area, and the 5th Street Market commercial corridor. Across the Willamette River from the site is Alton Baker Park, the city's largest metropolitan park. Further upstream is the University of Oregon's Riverfront Research Park. To the south of the site, across E. 6th Avenue, is the U.S. Federal Courthouse. Skinner Butte is located approximately ¼ mile to the northwest.

The Union Pacific railroad corridor forms the southwestern boundary of the site. The rail corridor is the primary passenger and freight rail line serving the Eugene-Springfield Metropolitan area. The Eugene Amtrak station is located approximately ¼-mile west of the intersection of 4th Avenue and High Street, the northwest corner of the site. The Ruth Bascom Riverfront Trail stretches along the west bank of the Willamette River within the site. Ferry Street Bridge, located north of the site, is a significant transportation arterial and primary vehicular route across the Willamette River. The Peter DeFazio Bridge, located north of the site, is a primary pedestrian and bicycle route across the Willamette River from Downtown Eugene to Alton Baker Park, Autzen Stadium, and beyond.

The EWEB Headquarters site is located within the heart of Downtown Eugene and in proximity to many defining natural, cultural, and economic amenities. Access to the property from the rest of the city is constrained by the railroad corridor and elevated Ferry Street Viaduct.

The property contains several existing structures including the 99,914 SF EWEB Headquarters Building, the 49,000 SF Operations Warehouse, the 28,000 SF Steam Plant, the 21,000 SF Communications and Equipment Repair Building, the 18,600 SF Midgley's Building, and the 17,800 SF Vehicle Repair Shop. The Willamette Substation and a former manufactured gas plant site are located within the southeastern end of the property.

The City is considering the EWEB Headquarters building and immediate surrounding property (subject property) as a potential site for City Hall. The subject property includes two buildings at the northern and southern end of the site with an enclosed pedestrian bridge linking both buildings. Located between these buildings is a public plaza and fountain that overlooks the Willamette River. The public plaza spans the entire east side of the subject site. Directly north of the Headquarters building is parkland containing the Ruth Bascom Bike Path and access to the DeFazio

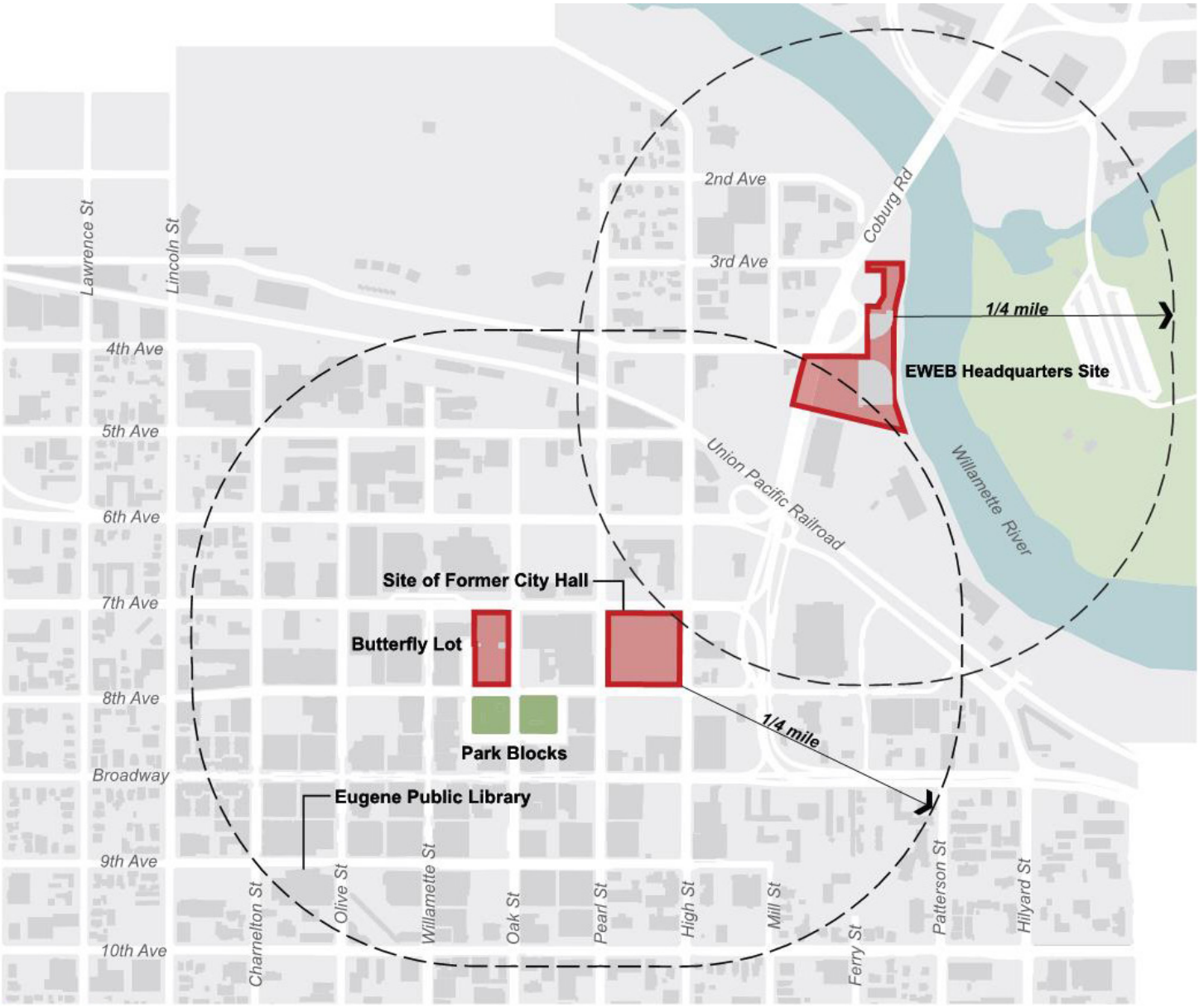


Figure 3-1 Study Area Context

Bridge. The site is accessed from the west by 4th Avenue and Coburg Road.

Metro Plan land use designations for the subject property include parcels designated for Mixed Use where existing structures are located, and Parks and Open Space along the waterfront. All of the parcels located south of 4th Avenue and west of the Ferry Street Viaduct have the Nodal Development Overlay designation.

The majority of the riverfront property is within the City of Eugene S-DR Downtown Riverfront Special Area Zone. Five (5) parcels located north of 4th Avenue are within S-W Whiteaker Special Area Zone. The subject site is entirely within the S-DR zone, which contains two subdistricts: S-DR/CL (Cultural Landscape and Open Space) and S-DR/MU (Mixed-Use). The area immediately surrounding the Headquarters building, mainly the plaza, Ruth Bascom Bike Path, and riverfront walkway are designated S-DR/CL. The Headquarters building itself and surrounding property are designated S-DR/MU. Civic uses such as a City Hall are permitted outright in the S-DR/MU subdistrict.

3.1 Site History

The EWEB Downtown Riverfront site housed community water facilities prior to 1900. However, EWEB's history and its history on the subject property can be traced to an event in 1906. Privately owned companies originally provided water and electric service to the citizens of Eugene. Following increasing prices and a typhoid outbreak in 1906, actions were initiated to revise the City Charter and state legislation to allow for public ownership of water, electric, and sewer service. On November 18, 1908 the City Council purchased the private domestic water system and on March 11, 1911 the Eugene Water Board was formed. The utility's name was later changed to Eugene Water & Electric Board (EWEB) to reflect the provision of electrical service.

The facilities purchased in 1908 were housed on the east side of the subject site where the Willamette Substation is today. As Eugene grew, more land was purchased downstream which facilitated construction of the Steam Plant in 1931 and the McClain Filter Plant in 1934. As growth continued, EWEB purchased additional surrounding properties and added new facilities, including the first onsite headquarters building in 1949. In 1988 four parcels north of 4th Avenue and west of Mill Street were purchased, which were the last parcels EWEB purchased for the Downtown Riverfront site. Construction of EWEB's current administrative headquarters was completed in 1988.

The Eugene Code (EC) and the Eugene Downtown Plan, an adopted refinement plan, called for a master plan for the EWEB riverfront site prior to any redevelopment. In 2007, in preparation for EWEB vacating the majority of its operations from the Downtown Riverfront site, EWEB and the City of Eugene entered into a Memorandum of Understanding (MOU) that directed the development of a Master Plan for the subject property. A Community Advisory Team (CAT) was jointly appointed by the EWEB Board of Commissioners and Eugene City Council to help guide the creation of the EWEB Riverfront Master Plan. Rowell Brokaw Architects (RBA) led the design team, coordinated with community members in individual and group interviews, held a series of large public events to discuss design elements, and conducted extensive public outreach and involvement as part of the project. In April 2010, RBA completed the Master Plan for the EWEB Downtown Riverfront site. The Master Plan was unanimously approved by the EWEB Board of Commissioners on June 1, 2010.

The approved Master Plan represents the community's vision for the redevelopment of the Downtown Riverfront. The Master Plan is a framework that builds certainty about the vision for the subject property, while being flexible enough to allow this vision to be realized in different ways. It outlines the context, principles, objectives, recommendations, and requirements for the redevelopment of the EWEB riverfront property, as well as the public process conducted to arrive at this vision. The Master Plan gives form and specificity to goals and principles outlined in the Eugene Downtown Plan. The Master Plan also includes design guidelines, the basis for clear and objective development standards, and descriptions of design intent, the basis for adjustment or design review criteria.

In 2010, a consultant team led by Cameron McCarthy translated the Master Plan into land use implementation tools. The process involved the development of a Special Area Zone (SAZ) and Special Area Plan (SAP) for adoption as Eugene Code, along with the preparation of land use applications for needed approvals and entitlements including Code Amendments, Refinement Plan Amendments, TPR Compliance, and Willamette Greenway. The plan and code established the redevelopment framework for specific land uses, development standards and guidelines, and phasing. Implementation tools also included establishment of a Greenway Setback Line to separate development from the Willamette River. In 2013, the Eugene Planning commission and City Council unanimously approved the implementing ordinance.

Figure 3-2 Existing Conditions

3.2 Subject Site

Of the approximate 27 acres of the EWEB Downtown Riverfront site, a little over 4 acres comprises the subject site (study area). The north and south building footprints assume one-quarter of this site and the remainder includes surface parking, the River Edge Public Plaza, landscapes and open spaces.

The surface parking is located to the west and south of the southern building. West parking has a total of 156 parking spaces including ADA parking and two electric charging spaces. 53 of these parking spaces are positioned under and between the concrete columns that support the Ferry Street Bridge viaduct. The surface of this lot is asphalt paved and is in acceptable condition with some surface cracking. There are pole-type light fixtures and some landscape islands with mature trees and shrubs. The west lot appears to have sufficient drainage. The south parking lot is along the south face of the south building and contains 18 parking spaces. There is an existing emergency generator enclosure and other significant utilities that will limit access to this lot once the adjacent properties are developed.

The entry plaza and landscapes are in acceptable conditions. Most of the plantings are mature and there are a few areas that have opening in the landscapes due to loss of plant material. Some cracking and heaving of concrete paving and concrete retaining walls has occurred and will need to be repaired or replaced.

There are accessibility issues regarding ramps, stairs, and walking slopes between the north and south buildings that could be improved depending on the need to connect the north and south buildings facing doorways. Universal accessibility could be corrected by redesigning and re-grading this portion of the site.

Most of the east facing Rivers Edge Public Plaza could remain as is. This plaza, with its fountain, walls, landscapes and seating, is an iconic community open space along the river's edge. Some repairs to the landscapes and walls would improve the space.

There is a small service access drive and loading area at the NW corner of the north building for deliveries. Since this is a direct on-grade access to the north building elevator, depending on how the north building is developed in the future, there is an opportunity to expand this area slightly with improved ADA access including limited parking for people with disabilities.

The entire site areas have minimal bike parking for both open and covered spaces. Additional bike parking would be needed to support the accessibility issues of the program.

The remaining areas within the study are open space and park landscapes comprised of riparian and park-like landscapes. These should remain untouched as an enhancement to the river environment.

3.3 Existing Buildings

Architectural

Overall the buildings are of high quality construction, generally appears to be in good condition and adequately serves the current EWEB functions. However, the current internal room configurations would not likely meet the functional requirements of City Hall use without significant renovation. Furthermore any significant changes to the buildings HVAC system will warrant the need for major renovation and reconfiguration.

The buildings consist of concrete shear wall and steel frame construction supported on isolated pile caps at concrete columns and mat slabs supported by piles. The primary exterior cladding is pre-cast concrete panels.

The South building is primarily offices and would be classified as B Occupancy under the Oregon Structural Specialty Code. Reuse of this building for city office functions would not require a change of occupancy. The North building contains meeting rooms and is classified as an A Occupancy. Reuse of the North building as a council chamber would be allowed. However, renovation of a portion of the South building for a council chamber would require a change of occupancy and additional code requirements would apply. This may involve a requirement for a higher level of seismic resistance.

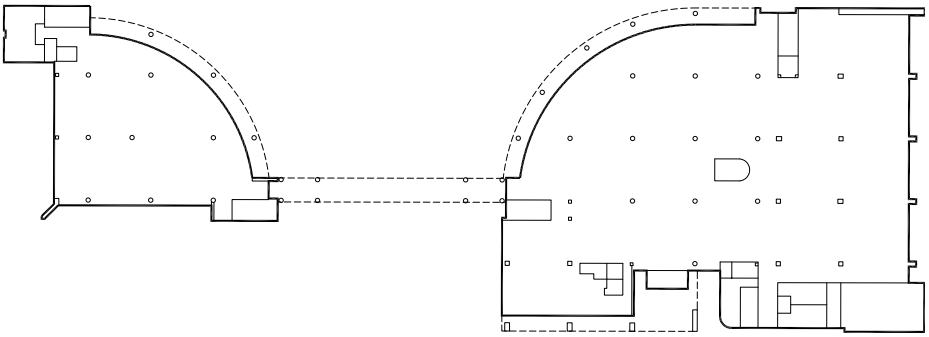
Mechanical Electrical Plumbing (MEP) General

The facility was constructed in 1988 and a majority of the existing mechanical and electrical equipment is 28 years old. In Systems West Engineer's experience, major mechanical and electrical components typically have a useful life of approximately 25 to 30 years. As a result, with the exception of some equipment that has been added or replaced since initial construction, most equipment has reached or will soon reach the end of its life. In addition, while the building was considered to be energy efficient at the time of construction, much of the equipment and most system types cannot approach target efficiencies.

Based on energy data supplied for the building, the apparent EUI for the facility is 155 KBtu/square foot/year. Based on various sources for typical building energy consumption, a facility with this use type constructed at the same time should have an EUI of around 70. The reason facility energy consumption is so high is not immediately evident although some contributing factors include:

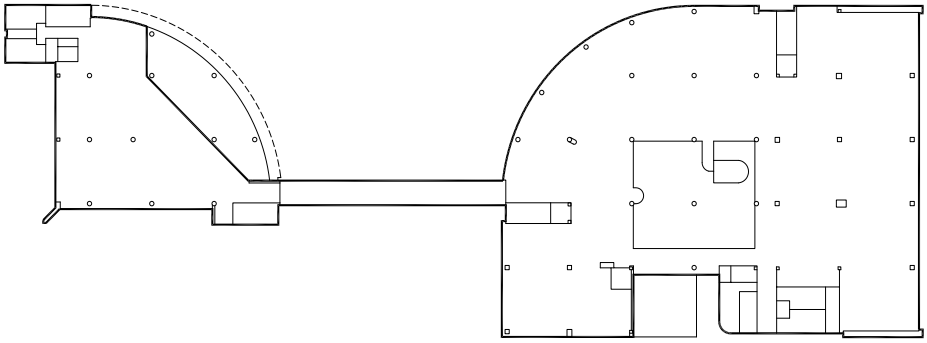
- The facility includes a three-story atrium, which contains a very large volume but relatively little actual floor space. For comparisons sake, if the area of the upper levels of the atrium were built out as useable space and energy consumption remained the same, the building EUI would be significantly lower at around 119 KBtu/square foot/year. In reality, some additional energy would be consumed in the new interior spaces, and the actual EUI would be closer to 125.
- The south building includes the majority of building area and is operated 24 hours a day, seven days a week to accommodate occupancy in the third-floor energy trading center.
- The fourth-floor data center is a very high EUI space not typically found in an office-type building.
- Building control systems are somewhat limited and may not be optimized to minimize energy use.

Of these factors—all would be eliminated with the exception of the atrium—if the building was recommissioned and converted to a city hall use.



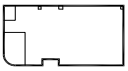
FIRST FLOOR
1'/16" = 1'-0"

Figure 3-3 EWEB Existing Building Floor Plan First Floor

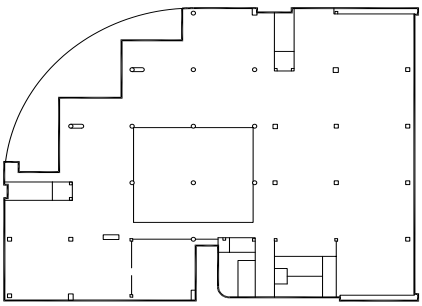


SECOND FLOOR
1'/16" = 1'-0"

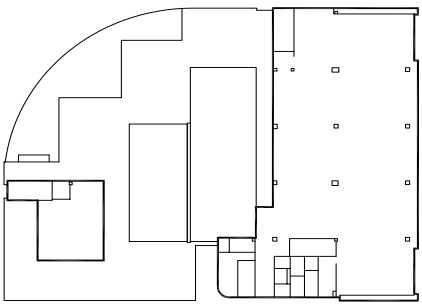
Figure 3-4 EWEB Existing Building Floor Plan Second Floor



FIFTH FLOOR – MECHANICAL LOFT
1'/16" = 1'-0"



THIRD FLOOR
1'/16" = 1'-0"



FOURTH FLOOR
1'/16" = 1'-0"

Figure 3-5 EWEB Existing Building Floor Plan Third Through Fifth Floor

Existing EWEB Headquarters Building Area Summary - 500 East 4th Avenue			
South Building			
First Floor	25,299	GSF	
Second Floor	24,616	GSF	19,499 SF Leased to EGI*
Third Floor	22,326	GSF	
Fourth Floor	13,323	GSF	EWEB Power Dispatch/Data Center/Mechanical
Total	**85,564**	**GSF**	
North Building			
First Floor	7,542	GSF	2,100 SF Leased to EGI*
Second Floor	6,808	GSF	Entire Floor Leased to EGI*
Total	**14,350**	**GSF**	
Total Area North and South Buildings	**99,914**	**GSF**	

Existing EWEB Headquarters Building Site Summary			
Parking Area	43,872	SF	174 Parking Spaces
Site Development Area	28,081	SF	
Total Site Area	**71,953**	**SF**	

** EGI Lease Expires November 2018*

Figure 3-6 Building Area Summary

Since the impact of the atrium on EUI would still remain, the actual EUI is expected to be somewhat higher than a typical facility, likely around 73 KBtu/square foot/year.

Heating, Ventilating and Air Conditioning Systems

Heating water and chilled water is delivered to the building HVAC equipment as a source for heating and cooling. Chilled water is produced by a standard chiller and a heat recovery chiller. The standard chiller was installed at the time of construction. The heat recovery chiller was replaced, and the new unit is approximately eight years old. A single large cooling tower was recently installed on the roof.

A large majority of the building, including virtually all standard office space, is served by variable-volume reheat systems. The systems include central air handling units that deliver cooled air to terminal units located at individual zones. In zones where cooling is required, the terminal units regulate the volume of air delivered to meet demand. Where heating is required, air flow is reduced to a minimum, and the air is reheated at the terminal unit heating coil. The need to reheat air is inherently wasteful, and this type of system is not used in newer, high-performance buildings because of efficiency limitations.

The fourth floor of the South building includes a data center, the power dispatch control room, UPS room, and related spaces. This floor is served by independent equipment including a variable volume reheat system that serves all spaces except the data center which is served by three computer room air conditioning units. All equipment serving the fourth floor is cooled by the heat recovery chiller. The energy captured by cooling the fourth floor is rejected from the chiller at a temperature high enough that it can be used to meet simultaneous building heating loads. Since the data center requires continuous cooling, the potential for energy recovery is significant.

A direct digital control system is connected to major mechanical equipment. The system is somewhat limited since it is not connected to local terminal units.

Most equipment has reached the end of its service life, and replacement is needed to provide the efficiency and reliability expected for the city hall building. Equipment that can potentially be reused, because it is relatively new, includes the heat recovery chiller, cooling tower, condensing boilers, and some of the central plant pumps.

Plumbing

The North and South buildings currently have separate domestic water service, both equipped with reduced pressure principal backflow preventers located in the respective fire riser rooms. The services appear to be adequate for the current building configuration.

Fire Suppression Systems

The north and south portions of the existing building are currently protected by separate wet pipe sprinkler systems with separate fire water services, backflow preventers, and fire department connections. The south building is also equipped with standpipe risers in the stairwells, FM-200 clean agent dry chemical fire suppression systems for the first-floor inverter room and two data rooms on the fourth floor, and a double-interlock dry pipe suppression system for the main data room on the fourth floor. Sprinkler heads generally appear to be fusible link standard response type. The fire sprinkler systems appear to be appropriate for the applications and have significant remaining life. Sprinkler heads should be updated to a more modern quick response type.

Electrical Distribution

North Building

The existing electrical service consists of a single utility transformer feeding an 800A main distribution assembly (MDA), at 208Y/120 volt, located on the second floor. This service is separately metered. The utility transformer is located on the north side of the building. The distribution equipment is still serviceable and would not require replacement.

The MDA feeds distribution panelboards located on the first and second floors of the building. Circuit space in the existing panelboards is limited, and a new panelboard will be required on each floor to accommodate renovations.

South Building

The existing electrical distribution system consists of three services fed from a single utility transformer at 480Y/277 volt. The existing utility transformer is sized at 1000kVA and located near the southwest corner of the south building. The three main electrical services serve switchboards located on the first-floor main electrical room and UPS room, and are separated as follows:

- Normal Power: Served from 1200A switchboard.
- Emergency Power: Served from 800A switchboard.
- Fourth Floor Data Center/Power Dispatch: Served from 800A switchboard.

The normal power is metered separately from other services, and feeds transformers and sub-distribution and branch panelboards in electrical closets located on each of the floors above. Two electrical closets are located on each floor. This distribution equipment is still serviceable and would not require replacement. Circuit space in the existing panelboards is limited and additional panelboards will be required on each floor to accommodate renovations. The normal switchboard also serves an existing motor control center located in the first-floor mechanical room.

The emergency power switchboard feeds branch panelboards located in electrical closets throughout the building as well as motor control centers located on the first and fourth floor and in the penthouse. This service is metered separately from the other services. This system has its own automatic transfer switch and is backed up by an existing 750kW diesel generator on site.

The data center/power dispatch switchboard is metered separately and serves equipment associated with the fourth-floor data center/power dispatch center and the corresponding UPS cabinets located on the first floor. This system has two automatic transfer switches and is backed up by the same existing 750kW diesel generator on site.

Site Lighting

Exterior site and building lighting consists mainly of HID fixtures that are pole-mounted or building-mounted. Fixture HID lamps sources have a high lamp-lumen depreciation over the life of the lamps.

The pole-mounted exterior lighting serving the parking area at the adjacent Midgley Building is currently controlled from the south EWEB building.

The existing systems are nearing the end of their service life and will likely not conform to current energy code standards.

Internal Lighting

Existing building interior lighting remains largely unchanged from the original installation. Existing lighting is a mix of fluorescent with both T8 and T12 lamps, incandescent, and metal halide fixtures. General lighting fixtures consist of 2x4 recessed fluorescent 3-lamp troffers. Some fixtures are fitted with parabolic louvers, while others have acrylic lenses. During the walkthrough, many fixtures had lamps that were either turned off or were no longer functional. Existing light levels range from 10 foot-candles to 50 foot-candles throughout the open office areas and a have a max-to-min ratio greater than 5:1.

Select fixtures are equipped with integral battery ballasts to provide emergency lighting. The state of these battery ballasts is unknown. Exit signs consist of a mixture of LED type and fluorescent. The existing fluorescent-type exit signs will likely not conform to the current energy Code standard.

Existing lighting control panels are used to control lighting in the corridors, stairways, the atrium, the exterior of the building, and large open office areas. Manual controls for lighting are used in private offices and other enclosed spaces. Apart from select spaces, there is little to no occupancy-based lighting control system within the building.

Low-Voltage Systems

Existing incoming data service enters the building and is routed to the fourth-floor main data center. From this location, fiber cabling is routed down through the building to the IDF rooms, two located on each floor. Horizontal distribution cables are routed from these IDF rooms to data outlets located throughout their respective areas.

The existing fourth floor main data center serves the EWEB operations in the power dispatch room, UPS room, and related spaces. This service will need to remain in operation until EWEB vacates this space.

The existing location and sizes of IDF rooms on each floor is adequate to provide distribution throughout the building.

Fire Alarm Systems

The existing main fire alarm panel consists of an automatic fire alarm located on the fourth floor that activates the notification appliances upon fire sprinkler flow. In addition to the automatic system, the building is equipped with full area detection and manual pull stations. The smoke detectors are used for initiation of the dedicated smoke exhaust system in the three-story atrium.

A firefighter's smoke control panel is located at the main entrance lobby for manual control and override of the smoke exhaust system.

Structural

The structural evaluation was limited to conducting an ASCE 14-13 Tier 1 Screening of the buildings to rapidly identify potential deficiencies and potential structural behavior. It is highly recommended that a Tier 2 and Tier 3 evaluation be made if the City intends to pursue purchase of the complex.

A tour of the building did not reveal any significant cracking or signs of distress at any of the exposed concrete walls. The building construction appears to generally conform to the available structural drawings and to be in good overall condition.

The Tier 1 Screening has identified several potential deficiencies in the South Building related to the configuration and detailing of the concrete shear walls and diaphragms.

- Shear walls support gravity loading from steel beams and from the concrete topped steel deck. If the walls become overstressed in an earthquake, their ability to support gravity loads can be compromised, resulting in potential partial collapse of the building floors and roofs.
- Shear walls do not appear to have diagonal reinforcement and stirrups above openings to create ductile coupling beams. Seismic forces that cause yielding in the wall elements above

openings may result in spalling and damage to those elements. At exit doors, this can create a falling hazard preventing safe egress from the building. Additionally, yielding of these element can cause the walls to behave like narrow piers between openings instead of monolithic units. This can further increase stresses in the wall elements leading to additional displacement and damage.

- Stair and elevator openings in the floor slabs adjacent to shear walls reduce the transfer of seismic forces to the walls through shear connections and place greater demands on collector connections – such as through steel beams framing into the ends of walls. The steel beam connections at concrete walls consist of shallow embedded anchors and do not appear to be detailed to transfer collector forces to the walls.

The North Building has a potential torsional irregularity – an increased torsional response to a seismic event – resulting in force and displacement demands that exceed those predicted by simple linear static analysis.

The lack of seismic separation between the Bridge and the North and South Buildings could result in damage to the buildings due to impact. Since the Bridge floor aligns with the second floors of both buildings, impact damage at that level is expected to be minor. However, the glazed roof and walls could be significantly damaged by pounding resulting in falling glass hazards on and near the Bridge.

Potential deficiencies were not identified at the concrete columns and concrete over steel deck floor supporting the Bridge. The glazing system that comprises the Bridge walls and roof is not part of the Bridge's lateral force resisting system. However, inertial forces generated within the glazing must be resisted and transferred through the glazing mullions to the floor slab. The available drawings do not provide information on these members and their attachments.

The EWEB buildings were evaluated as a Risk Cat II building, which is appropriate for this facility based on current Oregon Structural Specialty Code (OSSC) designations for its current use and future use as a City Hall. Cat II earthquake design forces have an Importance Factor of 1.0 applied to them.

The OSSC also lists higher risk categories; Risk Cat III (Special Occupancies) and Risk Cat IV (Essential Facilities), which utilize Importance Factors of 1.25 and 1.5, respectively. As noted in the Structural Report, the ASCE 41-13 methodology for existing facilities defines the Basic Performance Objectives for Existing Buildings (BPOE) as a pairing of Seismic Hazard Levels and Performance Levels.

For Risk Cat II and Cat III buildings, the BPOE uses a Seismic Hazard Level of 75% of BSE-1N and a Performance Level of Life Safety. The difference lies in M-factors (magnitude) applied to the capacity of existing elements. In this case, no new retrofit elements would likely be identified but the magnitude of the retrofit by be increased.

For a Risk Cat IV building (Essential Facility), the BPOE uses the same Seismic Hazard Level (75% of BSE-1N) but an enhanced performance level of Immediate Occupancy. A different set of checklists are required and the evaluation is more intensive. It is likely that a seismic upgrade to Risk Cat III structure could increase the size of collector members and their connections and their extent, compared to the Risk Cat II upgrade recommendations. For the Risk Cat IV upgrade, additional analysis is needed to determine whether upgrades for the enhanced performance level would identify other elements of the structural system needing to be upgraded. Upgrades could include the addition of strategically placed shear walls and reinforcing of the concrete coupling beams above the wall openings.

Figure 3-7 Building and Site Photos

Figure 3-8 Building and Site Photos

Figure 3-9 Active Transport

STUDY SITE

BIKE LANE / PATH

HIGH USE PEDESTRIAN ROUTE

LTD TRANSIT STOP

Active Transport

Figure 3-9 illustrates current bike lanes/paths, high use pedestrian routes, and LTD transit stops relative to the study sites. Bikes lanes are located along 4th Avenue, 5th Avenue, and along the riverfront. High use pedestrian routes are located along High Street, 5th Avenue, and along the riverfront. A transit stop is located on the corner of 3rd Avenue and High Street. The site is adequately served by active transport.

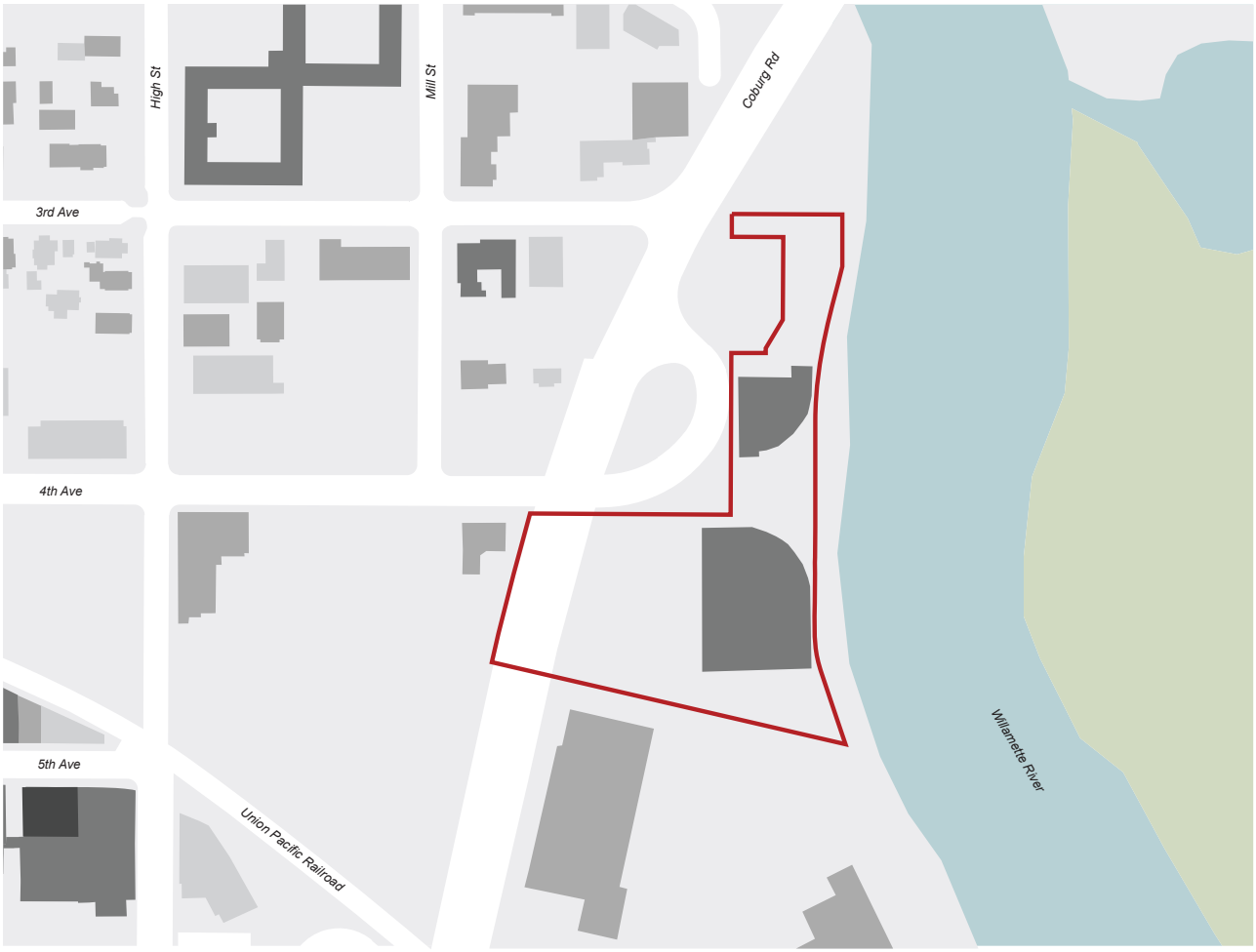


Figure 3-10 Building Heights

STUDY SITE

1 STORY

2 STORIES

3-4 STORIES

5-7 STORIES

Building Heights

Figure 3-10 illustrates building heights within and surrounding the study site to provide context for the proposed development scenario. The tallest building on the study site, the EWEB Headquarters, is four stories in height. The surrounding buildings are under four stories in height.

Figure 3-11 Greenway

STUDY SITE

WILLAMETTE GREENWAY BOUNDARY

WILLAMETTE GREENWAY SETBACK BOUNDARY

Greenway

Figure 3-11 illustrates the site's relationship to the Willamette River Greenway. The entire site, with the exception of Ferry Street Bridge viaduct, is within the Willamette Greenway boundary. Development within the Greenway boundary is subject to additional land use regulations. The prior land use process for the EWEB Downtown Riverfront property to implement the Master Plan established a Greenway setback boundary on the property to keep structures seperated from the river and obtained permit approval for new development consistent with the S-DR zone.

Figure 3-12 Height Limits

STUDY SITE

HEIGHT STANDARD A

HEIGHT STANDARD B

HEIGHT STANDARD C

HEIGHT STANDARD D

HEIGHT STANDARD E

HEIGHT STANDARD F

SKINNER BUTTE HEIGHT LIMITATION AREA

Height Limits

Figure 3-12 illustrates height limits in and around the study site. The majority of the study site is within the Height Standard C area (80' maximum building height). Portions along the river and along a proposed street are within the Height Standard F area (30' maximum building height).

Figure 3-13 Land Cover

STUDY SITE

PERVIOUS SURFACE

TREE CANOPY

Land Cover

Figure 3-13 illustrates tree canopies and pervious surfaces within and surrounding the study site. The northern end of the site contains significant areas of pervious open space and landscape.

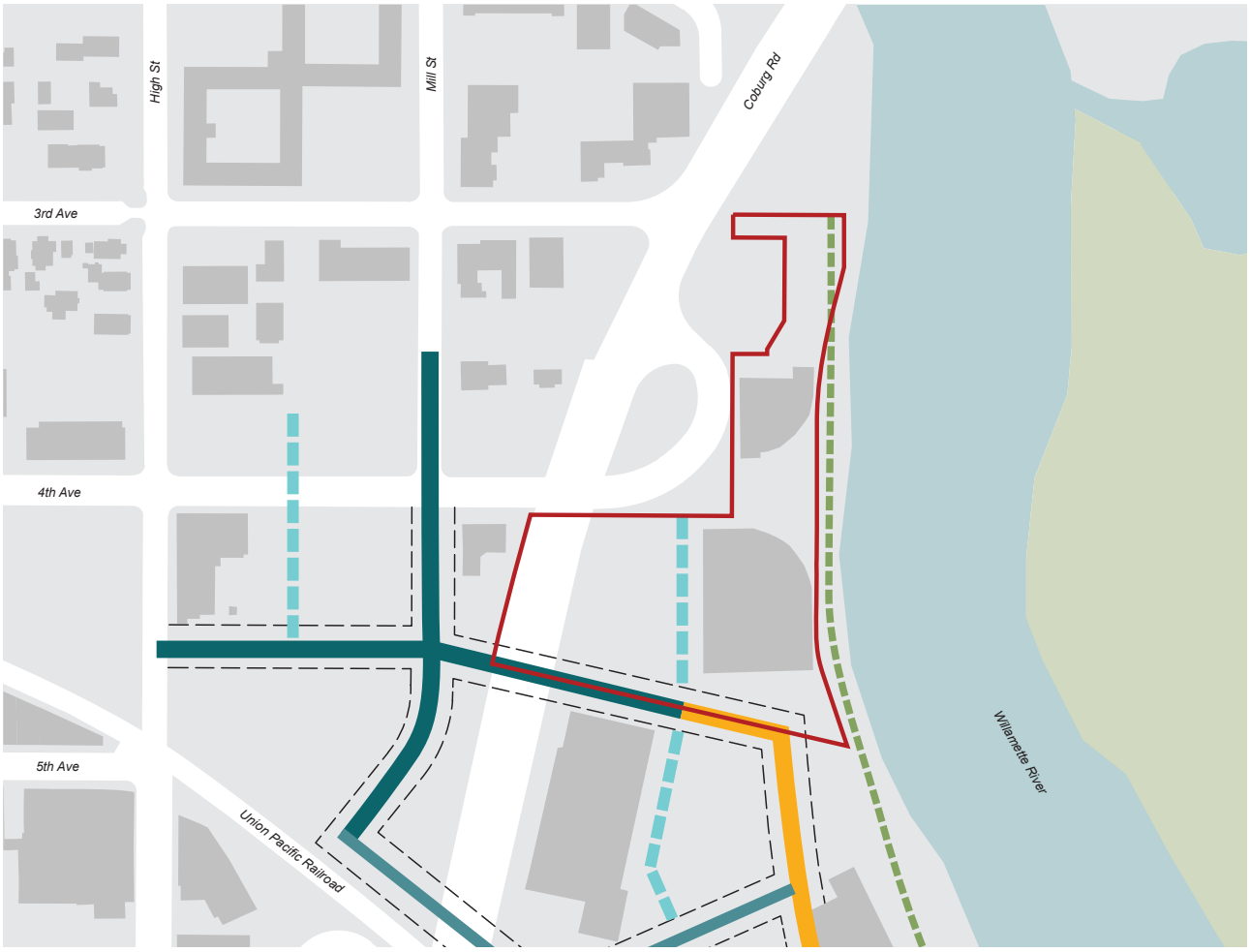


Figure 3-14 Proposed Transportation

STUDY SITE

PRIMARY STREET / GREAT STREET

PRIMARY STREET / FESTIVAL STREET

SECONDARY STREET

ALLEY

ACCESSWAY

RIGHT OF WAY

Proposed Transportation

Figure 3-14 illustrates proposed transportation facilities within and surrounding the study site. An accessway is located to the east of the study site along the riverfront. Alleys are located between High Street and Mill Street, and through the site. Mill Street, to the west of the site, is proposed as a primary street/Great Street. To the south of the site is a proposed primary street/ Festival Street, and a proposed secondary street are located to the southwest along the Union Pacific Railroad. The site is adequately served by proposed transportation facilities.

Figure 3-15 City Utilities

STUDY SITE

WASTE

STORMWATER

Wastewater and Stormwater

Figure 3-15 illustrates wastewater and stormwater lines surrounding the study site. Wastewater main lines are located between Mill and High Street, and from Third to Fourth Avenue. Wastewater main lines also across Coburg Road and dips south along the Ruth Bascom Bike Path. Stormwater lines are located on 4th Avenue, Mill, and High Streets, and a longer line crosses High Street and Coburg Road onto the study site. The study site is adequately served by existing wastewater and stormwater services.

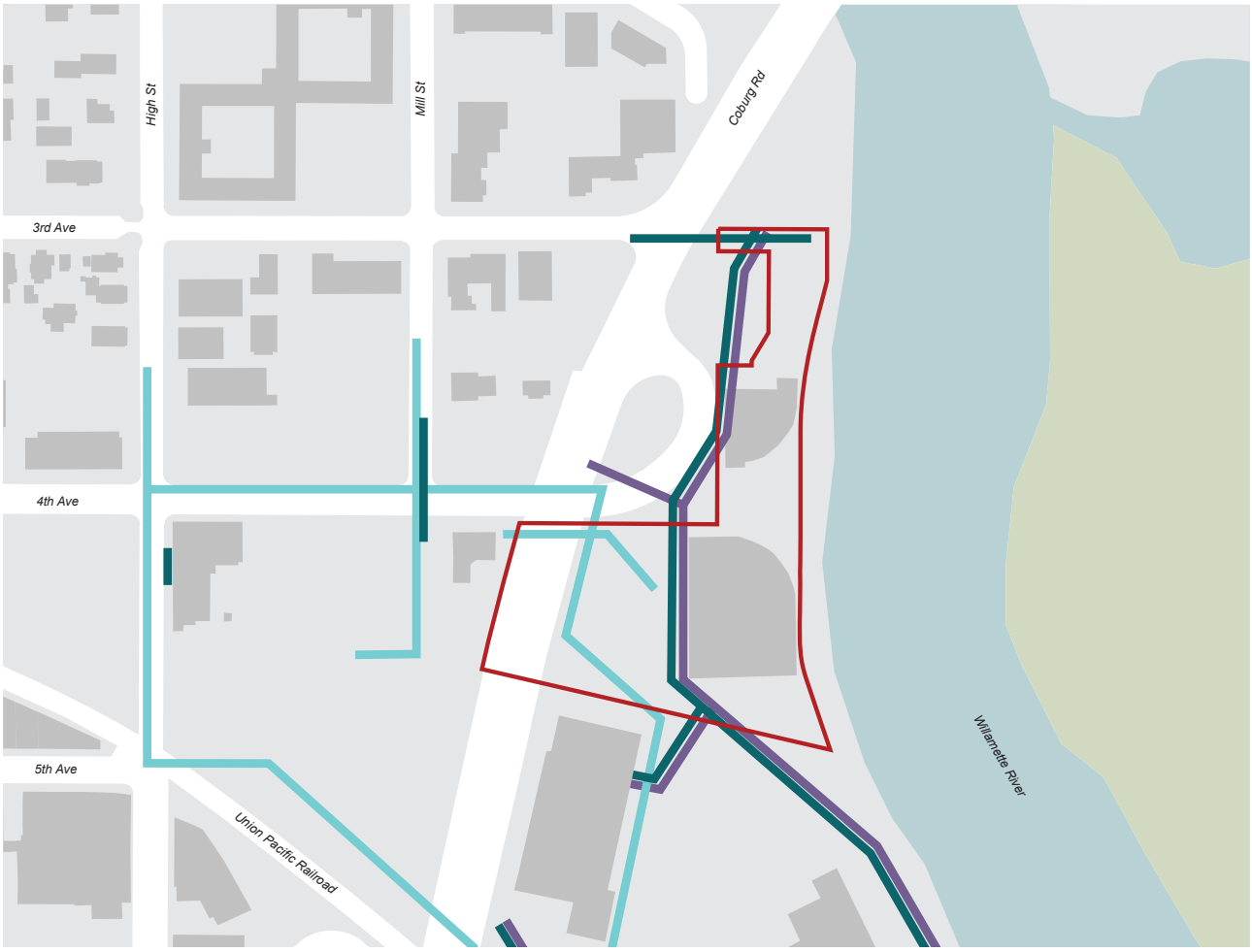


Figure 3-16 EWEB Utilities

STUDY SITE

WATER

ELECTRIC

FIBER

Other Utilities

Figure 3-16 illustrates water, electric, and fiber lines surrounding the study site. Water lines are located along 4th Avenue and High Street, and cross Coburg Road into the study site. Electric and fiber lines are located along the site study to the east of Coburg Road and runs south along the river. The study sites are adequately served by water, electric, and fiber services.

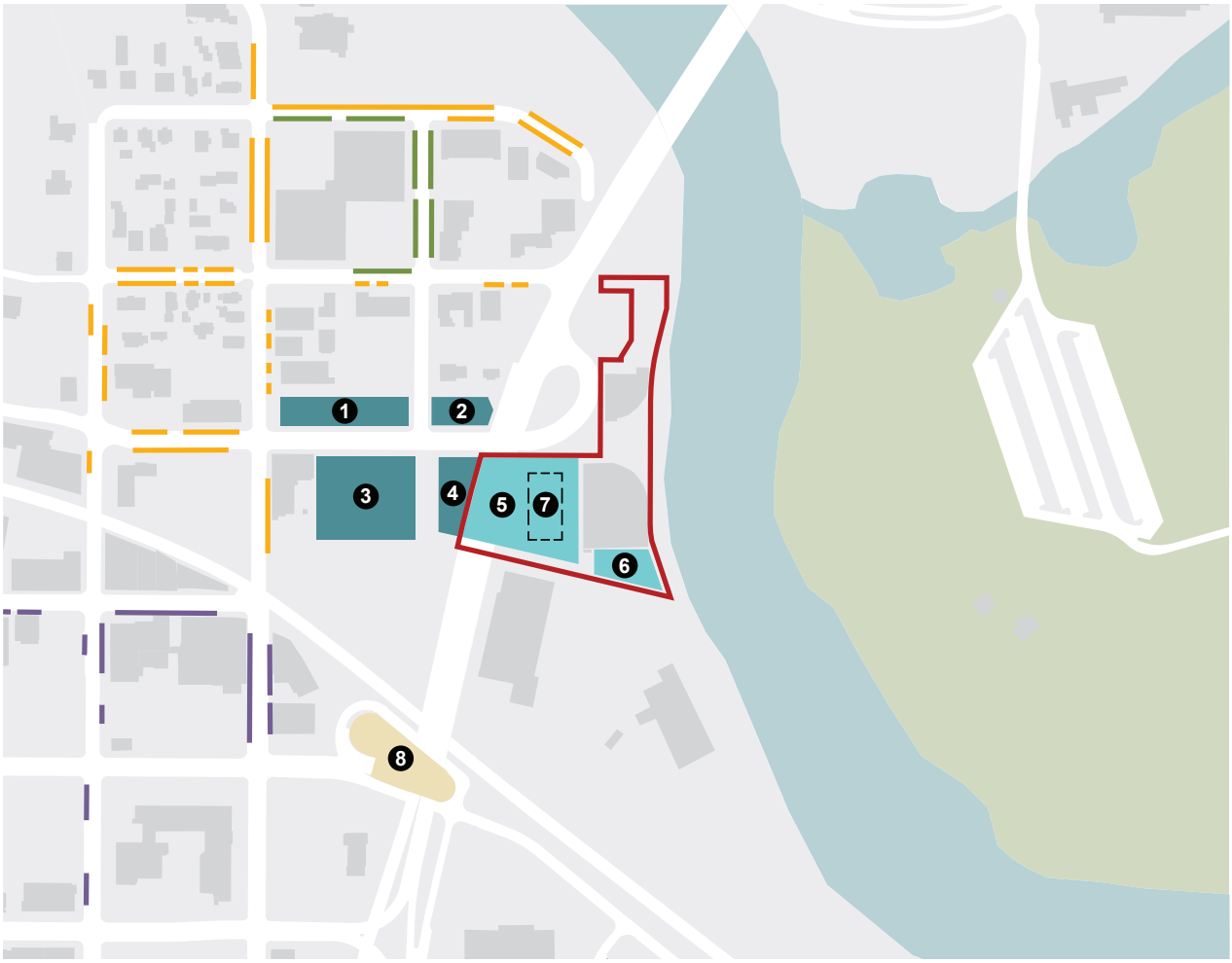


Figure 3-17 Parking Supply

EXISTING PARKING

CITY SURFACE PARKING
36 spaces

8 **Ferry Street Bridge Lot**
36 spaces

METERED PARKING

SIGNED PARKING

PERMIT PARKING

STUDY AREA PARKING

ON SITE PARKING
174 existing spaces

Phase 1+

5 **West Lot**
156 spaces

6 **South Lot**
18 spaces

Phase 2

5 **West Lot**
53 spaces (under viaduct)

7 **Parking Structure**
47 spaces
(single below ground level)

POTENTIAL ADDITIONAL PARKING

EWEB-OWNED SURFACE PARKING
221 potential new spaces

1 **Northwest Lot**
53 spaces

2 **Northeast Lot**
30 spaces

3 **Southwest Lot**
108 spaces

4 **Southeast Lot**
30 spaces

Parking

The project includes an evaluation of the availability of public parking within and surrounding the study site. In total, 174 existing parking spaces were identified with the study site. An addition 221 parking spaces are adjacent to the study site and on land owned by EWEB.

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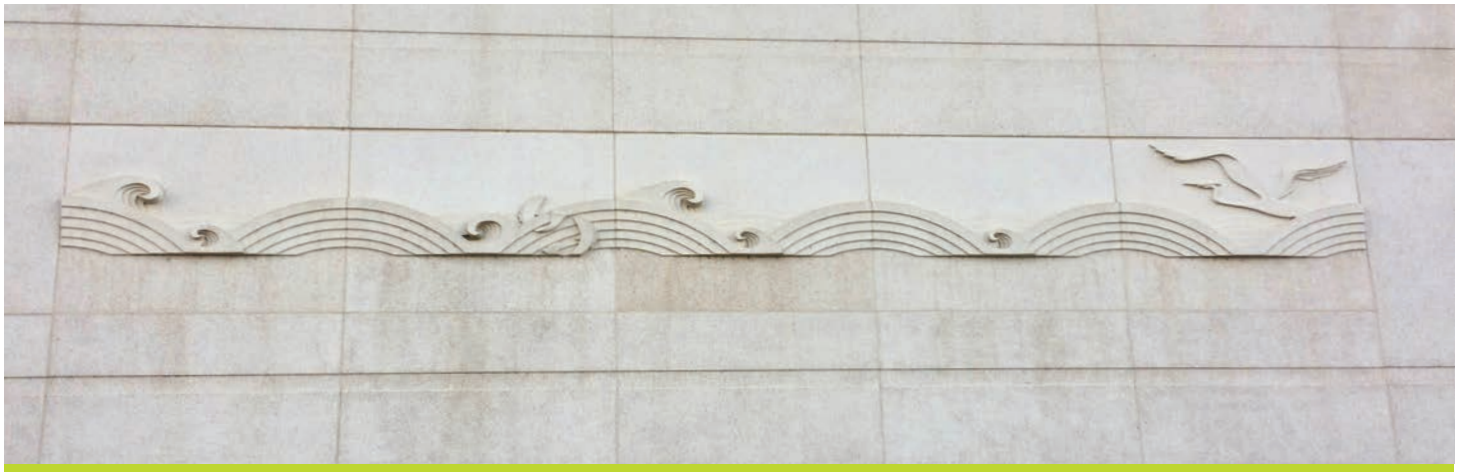
4.0 FACILITY NEEDS



The current plan for City Hall is to construct an initial Phase 1 building of 32,000 SF and 20-space parking area to support City Manager and City Council functions. The anticipated Phase 2 needs totals 135,000 SF of building to house Public Works, Planning & Development, Information Services, Human Resources and Rick Services, Finance and Central Services Administration and Municipal Court. The City has a goal of meeting LEED Gold standard and a building EUI of 30.

4.1 City of Eugene

The Eugene City Hall is planned in two phases, Phase 1 and Phase 2. The City of Eugene completed design for Phase 1 of the Site of Former City Hall in 2016. The project received bids for construction in June 2016 and the City Council voted to reject bids in July 2016 due to increased construction costs.

The currently planned City Hall Phase 1 functions are 32,000 SF. This option, Phase 1 Plus, involves renovation of all the North Building and all but the 4th Floor of the South Building for a total of 86,600 SF. This would include the originally anticipated 32,000 SF for the Council Chamber and City Managers functions and allow for relocation of 54,600 SF of additional city functions.

Phase 2 involves renovation of the 4th Floor of the South Building and Construction of a new Office Building. In 2025 when EWEB vacates the 4th floor, the area would be renovated for additional city functions. The remainder of Phase 2 space needs is accommodated in a new building located west of the South Building.

City of Eugene Use of EWEB Headquarters Buildings

Phase 1 Plus - Occupy all but 4th Floor of South Building			
Building			
Council and City Manager	32,000	GSF	City Use
Other City Functions to be Determined	54,591	GSF	City Use
Fourth Floor - EWEB Occupied	0	GSF	EWEB Power Dispatch/Data Center
Total	**86,591**	**GSF**	City Use North and South Buildings
Site			
Existing Public Parking	174	Spaces	

Phase 2 - Occupy 4th Floor of South Building and Construct New Building			
Building			
Renovate 4th Floor South Building	13,323	GSF	City Use
Construct New Building at Site to be Determined	67,086	GSF	City Use
Total	**80,409**	**GSF**	
Total Phase 1 Plus and Phase 2	**167,000**	**GSF**	

Table 4-1 City Hall Program Summary

5.0 DEVELOPMENT OPTION

The existing EWEB Headquarters building at 99,914 SF is just over three times larger than the currently planned City Hall Phase 1 functions of 32,000 SF. While it is possible to execute phased upgrades, it would be the most cost-effective and least disruptive to renovate all of the existing building area except for the EWEB-occupied 4th floor of 13,323 SF. This would be the most cost effective approach and eliminate disruptions to ongoing operations of a partially occupied building under renovation. The following approach was considered:facilities that resulted in the selection of a preferred scenario.

This section provides an overview of each scenario, an accompanying long-term parking strategy, a summary of key considerations, a summary of required agreements needed to realize the strategy, a summary of estimated costs, and an overall timeline for implementation. Detailed cost information is provided in Appendix E.

5.1 Renovation Approach

Phase 1 Plus: Renovation of all the North Building and all but the 4th Floor of the South Building for a total of 86,600 SF. This would include the originally anticipated 32,000 SF for the Council Chamber and City Managers functions and allow for relocation of 54,600 SF of additional city functions. The anticipated renovations and upgrades would include:

- Interior Selective Demolition and Reconfigurations to meet City Program Requirements:
  - New walls
  - New ceiling finishes
  - New flooring
- Exterior Building Envelope:
  - Replacement of windows
  - Additional exterior wall insulation
  - Resealing joint in cladding system
- HVAC system:
  - Chilled beams, ceiling-mounted, equipped with integral heating/cooling coils
  - Chilled water and heating water provided from a central plant
  - High efficiency condensing boiler, High-efficiency standard chiller, Heat recovery chiller
  - New control system compatible with City standards

- Plumbing Systems:
  - Install new aerators on existing lavatory and sink faucets
  - Replacement of existing urinals and water closets with water efficient fixtures
- Fire Sprinkler Systems:
  - Modify fire protection systems to meet required floor plan modifications
  - Replace existing sprinkler heads with new, quick response type
- Lighting and Control Systems:
  - Replace existing light fixture with LED-type fixtures
  - Replace lighting control panels
- Electrical systems:
  - Add new panelboards and connect to new mechanical system components
  - Replace low-voltage systems
- Seismic upgrades:
  - Retrofit the steel beam to concrete wall connections at approximately 34 locations
  - Add steel beams to collect shear forces at ends of the concrete walls at 18 locations
  - Retrofit the Bridge glazing to incorporate appropriate isolation joints
- Elevator upgrades:
  - Modernize the two existing elevators
  - New car finishes
- ADA upgrades to meet current standards
  - Modifications to existing toilet rooms as required
- Exterior site upgrades and repairs
  - Replace site light fixtures with new LED-type fixtures
  - Repair existing asphalt paving and concrete sidewalks
  - Restripe parking lots

The analysis of the existing building and systems by Systems West Engineers concluded that it is not possible to achieve the City's energy performance goals with an EUI of 30. The current building has an EUI of 155 while a comparable office building would have an EUI of about 70. If all of the improvements were made the lowest EUI achievable would be about 45. Note the minimum current energy code would be an EUI of about 54.

The path of to the City goal of LEED Gold would need to be analyzed as it beyond of scope of this study.

Though not evaluated in this report, it may be possible to approach the renovation with the goal of retaining as much of the existing internal space layout as possible. This would have the potential benefit of reducing the extent of demolition and remodeling.

Phase 2: Renovation of the 4th Floor of the South Building and Construction of a new Office Building.

In 2025 when EWEB vacates the 4th floor that area would be renovated for 13,323 SF of additional city functions. The remainder of Phase 2 space needs is assumed to be accommodated in a new 5-story 67,086 SF building located west of the South Building. We have assumed one level of below grade parking to provide 47 spaces. The new building would displace all but 46 parking spaces that would remain under the viaduct. The total of the full Phase 1 and Phase 2 development would total 167,000 SF.

This new building could be designed and constructed to meet all of the City's sustainability goals.

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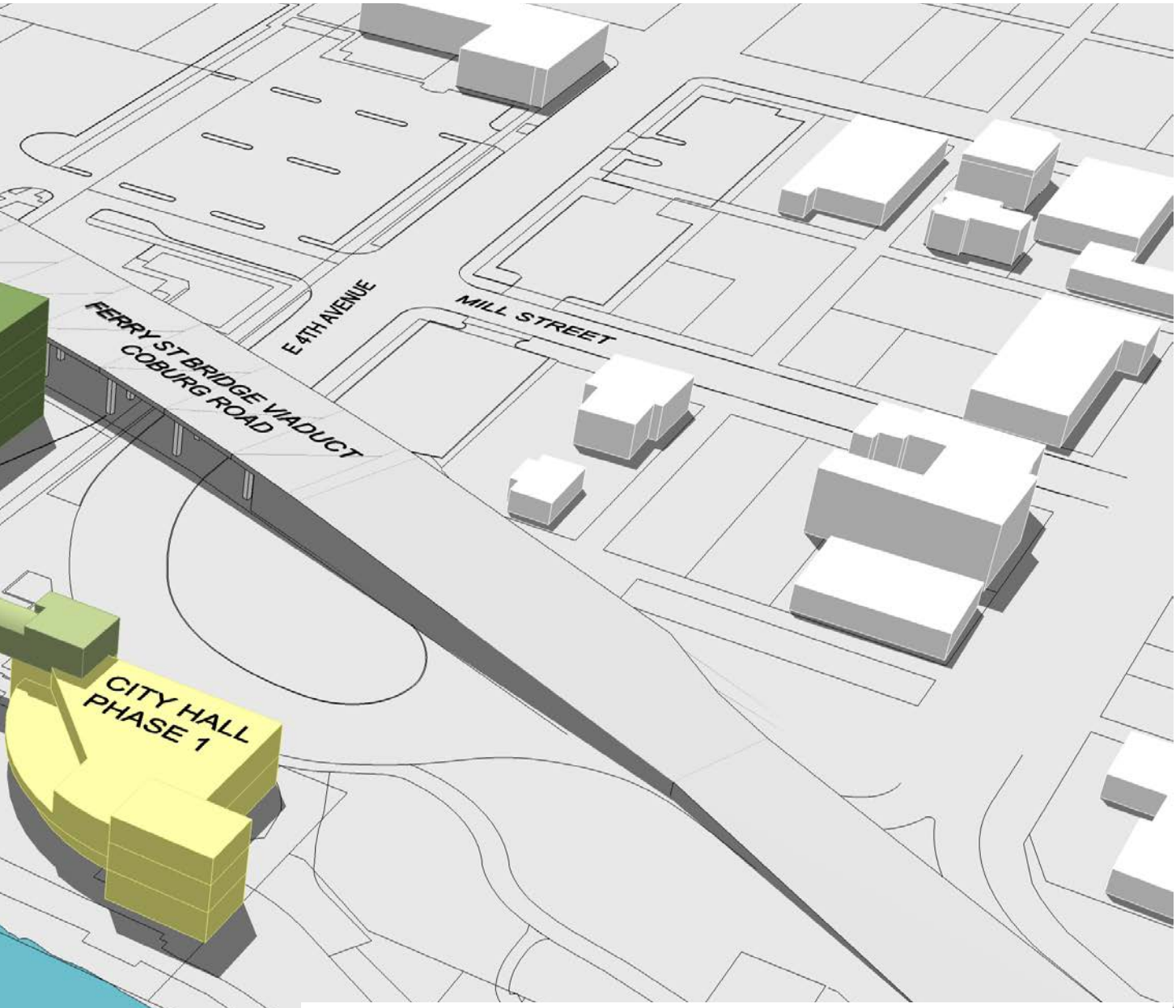
Figure 5-1 Perspective

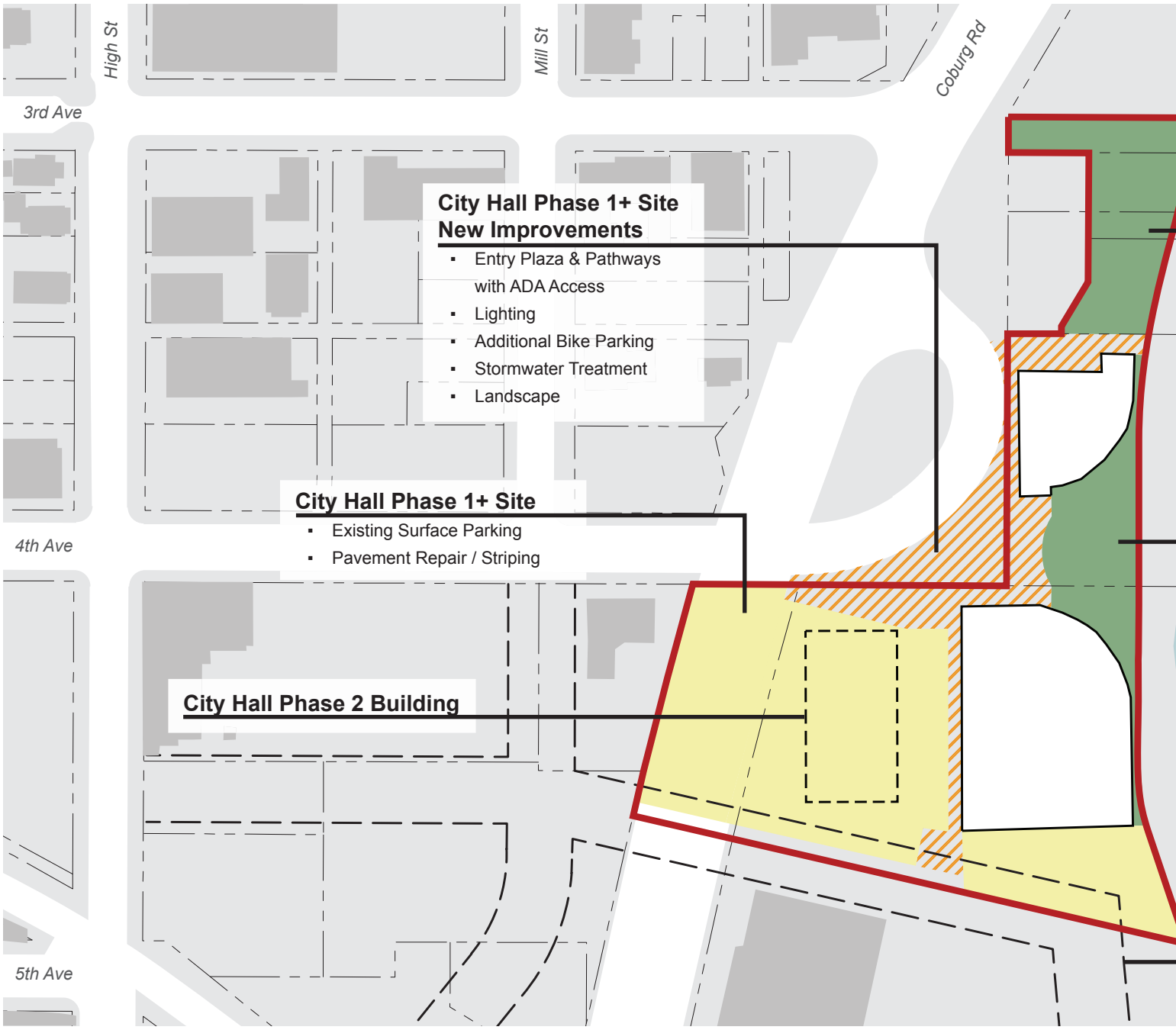


5.2 City Hall at EWEB Headquarters Site

Overview

In this option, the City would acquire the EWEB Headquarters and surrounding property and renovate it for City functions. The complex consists of the North and South buildings totaling 99,914 SF and surface parking containing 174 parking spaces.

The EWEB Headquarters was constructed in 1988 and will require major upgrades to lighting and HVAC systems, ADA improvements, and seismic work. EWEB plans to continue to occupy the 13,323 SF 4th Floor of the South Building for 8 years. The remainder of City Hall Phase 2 program functions would be located in a new building at a site to be determined.



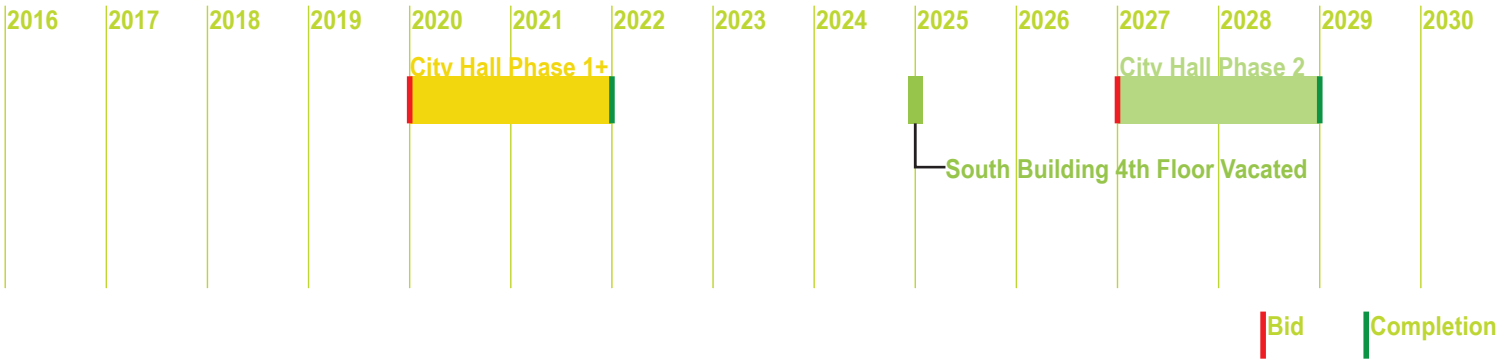


Figure 5-3 Timeline

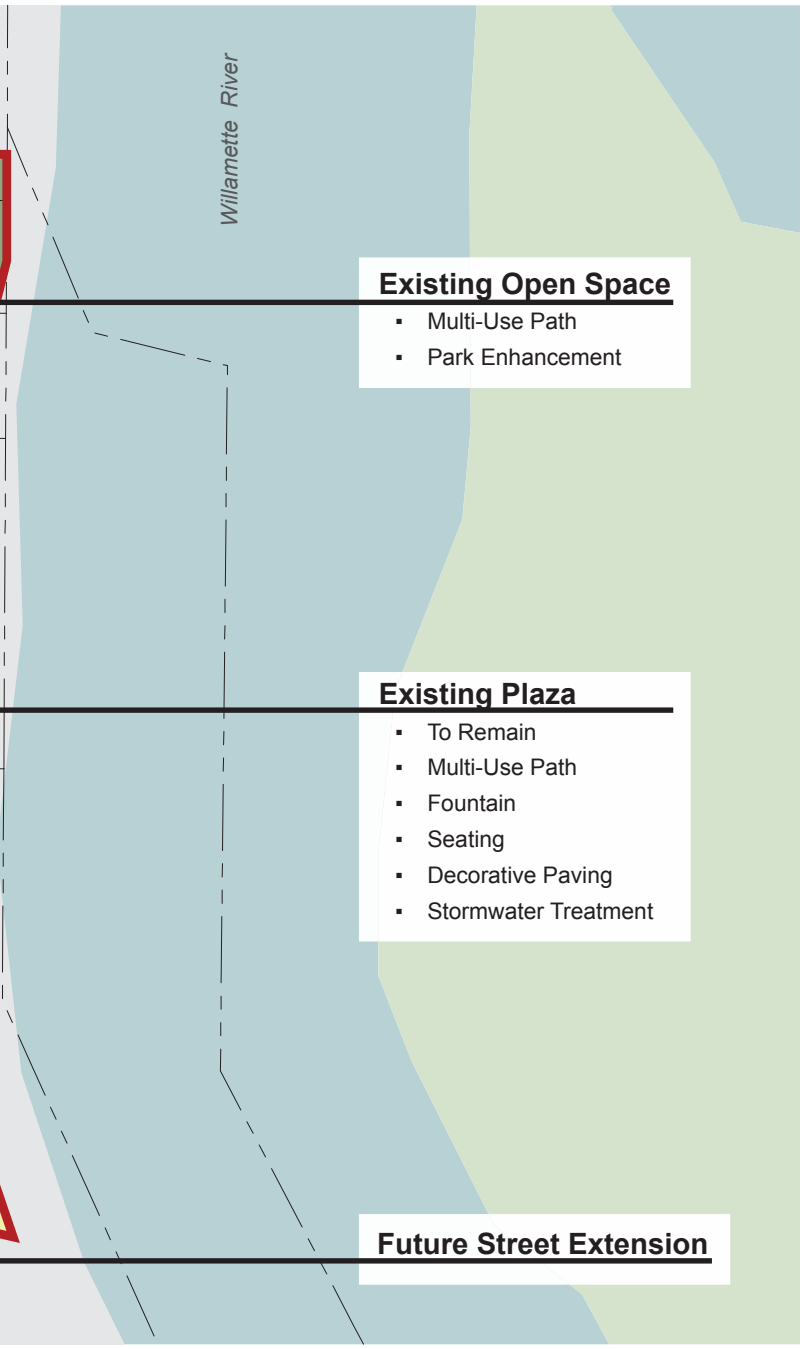


Figure 5-2 Annotated Site Plan

Key Considerations

Site / Building

- The site and buildings are currently served by existing infrastructure.
- The location on the river has a dramatic setting but is several blocks from the city center.
- The site has an existing public plaza.
- The current building can be used without a change in occupancy type which limits the amount of upgrades needed to meet code.
- The existing buildings have sufficient floor area to accommodate Phase 1 and some portions of anticipated Phase 2 City Hall functions.
- There is area on the site for a Phase 2 building, although it is less than ideal due to its close proximity to the Mill St. viaduct.
- The current building cannot be readily renovated to achieve the City's desired EUI of 30.
- Seismic upgrades will be required to achieve a Risk Category II, Importance Factor of 1.0.

Transportation

- Some access routes to the site can be impacted by train traffic.
- The site under Phase 1 development would have 174 parking spaces available for staff and the public.
- Some parking would be displaced if Phase 2 development was constructed within the identified site.

Cost

- The site and existing buildings will need to be acquired from EWEB at some unknown cost.
- City Hall Phase 1 Plus construction costs will be higher than the current Phase 1 project as the entire building would need to be upgraded.
- Redevelopment opportunities are created at the Site of Former City Hall.

5.3 Cost Analysis

This section is intended to define the anticipated costs associated with reuse of the riverfront EWEB Headquarters for city functions. Several key assumptions greatly influence the estimated costs presented in this report. It is important to understand how these assumptions were derived and how subsequent decision-making could alter the estimated costs. The analysis represents costs in general terms as provided by the Project Team, and specifically, by the cost estimating consultant Rider Levett Bucknall.

Improvement Costs

Improvement Costs consist of the hard costs for materials and labor required to construct improvements. These items include:

- **Renovation Costs:** This includes work required to renovate and upgrade the existing building and associated site for city functions. Total Renovation Costs used are $261.17/SF based on 2017 dollars. This amount includes the following:
  - Selective Demolition - $15.00/SF
  - Interior Remodel - $90.00/SF
  - Seismic Upgrades - $30.00/SF
  - HVAC Replacement - $48.45/SF
  - Plumbing/Fire Protection - $1.41/SF
  - Electrical/Lighting/Low Voltage Systems - $28.00/SF
  - Exterior Envelope - $48.31/SF

- **New Building Costs:** This category accounts for the new Phase 2 building (structure, walls, fixtures, and all associated systems). Building Costs are $320/SF based on 2017 dollars.

- **Site Preparation Costs:** This category includes work to repair the existing site and make appropriate modifications to separate the site from adjacent property that would be outside the scope of the project site. The scope includes repairing parking lots, concrete walks, and associated landscape improvements, and new Right of Way improvements (sidewalk, curb and gutter, street trees, street lighting, accessibility upgrades). Site Preparation Costs are estimated at $45/SF for new sitework and $20/SF for repairs.

- **Parking Costs:** Parking costs include the cost for constructing secure below grade parking under the new Phase 2 building. Parking Costs are estimated at $45,000 per below grade parking space.

RLB used similar relevant project costs as benchmarks to compare against the unit rates used in this study. The benchmarks cited are from construction projects in the Portland Metro area. Current construction cost data indicates no significant deltas between work in Portland and Eugene with the exception of modest increases in cost for mechanical, electrical, and other trades within the Metro area.

An explanation for the pricing methodology for each building is provided:

- **City Hall Phase 1 Plus Renovations - $261/SF:** The study assumes extensive renovations and upgrades of the current two buildings to a minimum of LEED Silver and seismic improvement to higher level of safety. The anticipated scope included

upgrades to the building envelope, new HVAC systems, and updated electrical and low-voltage systems with a 50 year life expectancy.

- **City Hall Phase 2 - $320/SF:** The pricing assumes a minimum LEED Gold building consisting primarily of office space with public areas, sustainable design strategies, and energy efficiency features consistent with City policy.

Related Construction Costs

Related Construction costs consist of mark-ups and contingencies. Generally, mark-ups are applied to the total improvement costs and account for the necessary costs associated with performing the work. These items include:

- **Phasing & Temporary Work:** The project(s) will be phased and costs should be included for creating phased operations and temporary utilities while each phase is completed. Phasing & Temporary Work is estimated at 1.5% of Improvement Costs.

- **General Conditions:** General conditions account for all the Contractors site supervision and management, site accommodation, utilities, office equipment and supplies as well as head office costs. General Conditions is estimated at 6.5% of Improvement Costs + Phasing & Temporary Work.

- **Bonds & Insurances:** The Contractor will be required to take out various bonds, sub-guards and insurances to protect the Owner (and the Contractor) against construction claims. Bonds & Insurance is estimated at 2.85% of Improvement Costs + Phasing & Temporary Work + General Conditions.

- **Contractor's Fee:** The Contractor will charge a fee on the project. Contractor's Fee estimated at 4.5% of Improvement Costs + Phasing & Temporary Work + General Conditions.

- **Design Contingency:** The estimates are at a very conceptual level and therefore it is necessary to have a design contingency to account for any scope that has not been considered in the estimate. As the design progresses and more is known about the project, the design contingency would reduce accordingly. Design Contingency is estimated at 15% of Improvement Costs.

- **CM/GC Contingency:** The study assumes that the selected construction process will follow a Construction Management / General Contractor method and consequently there will be a need to account for the Contractors contingency that they will place against risk as they offer their guaranteed maximum price. CM/GC Contingency is estimated at 3% of Improvement Costs.

Escalation Costs

The estimates have been priced in today's dollars. As the construction activities are planned to commence in the future, there is a need to account for construction cost escalation. This escalation allows for labor increases over time as well as price increases on materials and components. Escalation is estimated at 5% in 2017, 4% in 2018, and 3% for every year thereafter.

Direct Construction Costs

Direct Construction Costs are the compounded total of Improvement Costs + Related Construction Costs + Escalation Costs.

Owner Costs

Owner Costs include administration, staffing, permitting, system development charges, design fees, topographic survey, geotechnical investigation, furnishings, commissioning, and other miscellaneous costs. Owner Costs are estimated at 35% of Direct Construction Costs.

Total Project Costs

Total Project Costs are the compounded total of Direct Construction Costs + Owner Costs + Escalation. It should be noted and well understood that the costs are primarily based on indexed square footage values applied to space programs that reflect the functional needs of these facilities. There will be opportunities throughout the design process to refine these space needs and influence the actual cost per square foot of these facilities. For this reason, the improvement costs, and all of the other costs that are derived from these, should be viewed as conservative rough-order-of-magnitude costs and, perhaps most usefully, relied upon to understand relative comparative costs.

Other Costs

The cost to acquire the EWEB buildings and site is not included in the cost analysis but needs to be identified to determine the complete project cost.

5.4 Estimated Costs

Table 5-1 summarizes the estimated project costs associated with the proposed Phase 1 Plus, Phase 2, and Phase 2 Underground Parking, as defined in the previous section.

Table 5-1 Estimated Project Costs

ESTIMATED PROJECT COSTS	Phase 1 Plus 86,591 SF	Phase 2 Building/Renovation 80,409 SF	Phase 2 Parking 47 Spaces
Direct Construction	$32,600,000	$36,100,000	$3,100,000
Owners Other Costs	$11,500,000	$12,700,000	$1,100,000
Escalation	$4,600,000	$17,300,000	$1,400,000
Total Project Cost	**$48,700,000**	**$66,100,000**	**$5,600,000**

6.0 CONCLUSION

The Conclusion section contains a list of next steps that are actions to be taken by the City or EWEB in order to advance the option.

6.1 Next Steps

- Determine and confirm a final project schedule; verify existing lease agreements; verify EWEB move-out schedule.
- Obtain assessment of fair market value of the EWEB building and property through appraisals or other means.
- Negotiate property sale.
- Determine property line adjustments and other land use actions needed.
- Obtain a Phase 1 Environmental Site Assessment; conduct a Phase 2 assessment if recommended by initial study.
- Commission a more detailed structural analysis as recommenced in the Hohbach-Lewin report.
- Determine the city functions to be accommodated in the Phase 1 Plus project.

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APPENDIX A: KPFF EVALUATION OF EWEB HEADQUARTERS BUILDING

1201 Oak Street, Suite 100 Eugene, OR 97401 541.684.4902 **kpff.com**

November 14, 2016

James Robertson, FAIA, FCSI, CCS
Robertson Sherwood Architects
132 East Broadway, Suite 540
Eugene, OR 97401 **Via Email:** jrobertson@robertsonsherwood.com

RE: Evaluation of EWEB Headquarters Building for use as City Hall (DRAFT)
1600324 – EWEB HQ Building Study

KPFF Report

Assess condition of existing site infrastructure

Pervious

The existing pervious areas on site consist of landscaped planter beds along the perimeter of the two EWEB buildings as well as some planted buffer areas along the edges of the parking lot. The landscape areas are irrigated and have well established planting. The existing site does not include landscape areas that are used for stormwater treatment.

Impervious

The site is predominantly impervious paved surface and impervious roof area. The site paving is in fair condition, with some cracking and spalling in the parking areas.

Stormwater Systems

Record drawings for the existing stormwater systems were not available at the time of this study. Given the age of the buildings, it is unlikely that storm runoff is treated. The site and building stormwater runoff is currently collected in drains and inlets, conveyed in underground pipes, and discharged directly into the Willamette River without stormwater treatment.

There are three existing storm drainage outfalls to the Willamette River that serve EWEB's Headquarters (HQ) site. An existing 36-inch line runs west to east between the two buildings under the plaza. This 36-inch line serves off-site areas to the west and will need to be maintained. An existing 12-inch line that runs west to east along the south side of the HQ site currently serves the south HQ building as well as the Bow-Truss building. Finally an existing 60-inch main provides storm drainage for the southern portion of the HQ site. The 60-inch main conveys the Millrace and will need to be protected in-place, but it is south of the study area.

Identify opportunities and constraints to building expansion

Stormwater Management

The design of the storm drainage and stormwater treatment within EWEB's riverfront property will be based on goals, objectives and standards detailed in the Riverfront Master Plan, the City of Eugene's S-DR Downtown Riverfront Special Area Zone, and the City of Eugene Stormwater Management Manual. Storm drainage will be designed to convey the 25-year rainfall event. According to the goals of the Master Plan, the stormwater treatment design should aim to mimic the hydrology of a natural, undeveloped site in order to reduce net runoff by integrating a number of low-impact, best management practices that include bioswales, rain gardens, infiltration and filtration planters, pervious pavement, water-wise planting, and rainwater retention. In addition to on-site stormwater treatment, the Special Area Zone identifies locations of public green stormwater infrastructure such as "green streets."

Any runoff from new or replaced impervious surfaces (new building, building expansion, roof replacement, or site paving) will require stormwater quality treatment. The 2014 City of Eugene Stormwater Management Manual (SWMM) implements a hierarchy system that prioritizes treatment through vegetation. Vegetated infiltration facilities must be considered first. If infiltration is not possible, filtration facilities must be sized; and finally, if vegetated facilities are not possible, a greatly increased SDC fee may be paid. Vegetated stormwater treatment will most likely be provided utilizing several approaches, such as rain gardens, bio-swales, as well as infiltration and filtration planters.

Implementing vegetated stormwater treatment in order to meet the goals and standards described above can be an asset to the site, but will also require dedicating some of the landscaped areas to stormwater. For every 1,000 square feet of new paving or roof area, approximately 75 square feet of landscaped area should be set aside for stormwater facilities.

The EWEB HQ site is not within a stormwater flow restricted drainage basin; therefore, on-site detention or retention facilities are not required.

Utility Relocations

Some existing utilities may need to be relocated if a new building is constructed west of the existing Headquarters buildings.

- A 4-inch natural gas line that serves EWEB's HQ will need to be relocated.
- An 8-inch water main that serves EWEB's HQ and Bow Truss buildings will need to be relocated.
- A 10-inch sanitary sewer main that serves EWEB's HQ, Bow Truss and Steam buildings will need to be relocated.
- A concrete encased duct bank with primary power, second power, and a critical EWEB fiber service that runs from EWEB's Willamette Substation to the south HQ building will need to be protected or relocated.
- Mechanical and electrical equipment at the south side of the south HQ building will need to be protected.

Estimate of potential costs

Site improvements

Detailed pricing for site improvements cannot be completed at this time, because a site and building development plan has not been developed. For the purposes of this study, a preliminary construction cost estimate of $10 to $12 per square foot of site area could be used for budgetary purposes. This cost includes all of the site improvements (paving, utilities, site lighting, planting, irrigation, earthwork, demolition, etc.).

If you have any questions or require additional information, please contact me.

Sincerely,
KPFF Consulting Engineers

Matt Keenan, PE
Associate

1600324-sb

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APPENDIX B: HOHBACH-LEWIN INC STRUCTURAL EVALUATION

HOHBACH-LEWIN INC.

STRUCTURAL ENGINEERS

Fifth Street Public Market, Suite 302
296 East Fifth Ave
Eugene, OR 97401
Phone: (541) 349-1701

EWEB Headquarters

500 East Fourth Ave, Eugene, OR

Structural Evaluation Report

Prepared For:
Robertson Sherwood Architects
132 East Broadway, Ste. 540
Eugene, OR 97401

Project No: H-L 11766E
Date: December 5, 2016

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Appendix A: ASCE 41-13 Tier 1 Screening

BACKGROUND

Hohbach-Lewin Structural Engineers, Inc. has performed a structural assessment of the EWEB Headquarters located at 500 East Fourth Avenue in Eugene, Oregon. It consists of two buildings constructed circa 1989: the two-story North Building and the fourth-story South Building. The two buildings are connected by a bridge at the second floor level (see Figure 1).

The purpose of this assessment is to determine the general condition of the buildings, identify potential seismic deficiencies, provide recommendations for repairs and seismic upgrades, and identify opportunities and constraints that potentially affect conversion for use of the buildings as a City Hall.

As part of the evaluation, the following tasks were completed:

- Available construction documents were reviewed.
- A site visit was performed to verify that the available drawings appear to be representative of the existing conditions.
- A Tier 1 Screening was performed for each building in accordance with ASCE 41-13. The Tier 1 Screening is a rapid assessment tool that identifies potential seismic deficiencies based on construction type, geometry, and limited quantitative analysis.
- Potential deficiencies were identified and general recommendations for additional analysis and/or retrofit have been provided.
- Per Robertson Sherwood Architects' request, we have also assessed the structural implications of infilling the atrium openings at the South Building second and third floors.

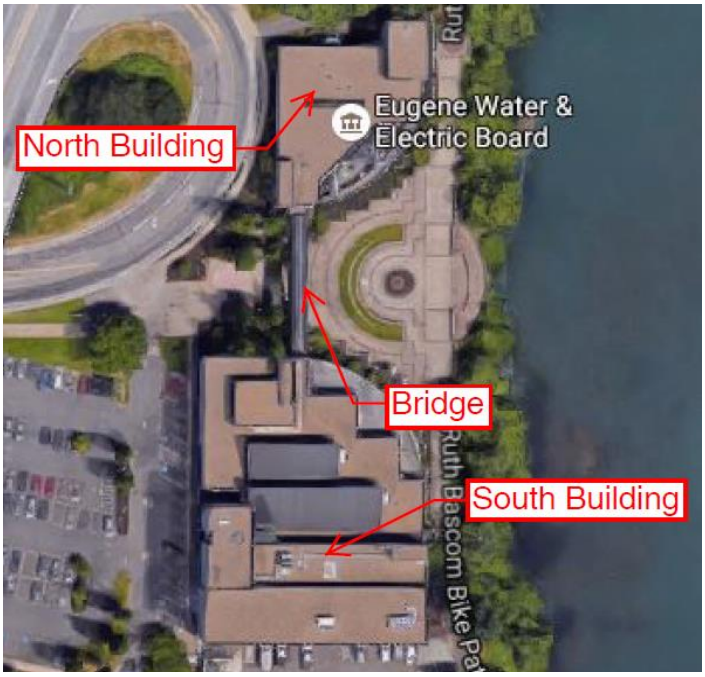

Figure 1. Site Plan.

REFERENCE DOCUMENTS

The following documents were available and used for this study.

- Structural drawings titled EWEB Headquarters by John H. Herrick, Consulting Engineers, Inc., Sheets S1-S19, dated June, 1989.
- Architectural drawings, titled EWEB Headquarters by WeGroup Architects & Planners, Sheets A3, A10-12 and A18, dated August, 1989.
- Geotechnical report, titled Foundation Investigation Headquarters Buildings – Proposed EWEB Expansion, L.R. Squier Associates, dated December 23, 1986.

SITE VISIT

A site visit comprising observation of the buildings' exteriors and interiors including the roof of the South Building was made on November 8, 2016 to verify that as-built information from the structural drawings appears to be representative of the existing conditions. Observation was limited to exposed conditions, building configuration, building components, the building site, and adjacent structures. Foundation construction was not observed.

Structural walls and framing were exposed to view in mechanical rooms and at the stairwells. Steel beams are covered with fire-proofing preventing observation of connections and hardware. Significant cracking or signs of distress were not observed at any of the exposed concrete walls.

The building construction appears to generally conform to the available structural drawings to be in good overall condition.

North Building:

The North Building is a two-story concrete shear wall building with overall plan dimensions of approximately 90 feet east-west by 130 feet north-south (see Figure 2).

Roof framing consists of 1.5-inch steel deck supported by steel wide-flange beams. The east edge of the roof is set back from the exterior cladding creating a well with a low roof at the second floor level (see Figure 3). The stair towers at the northeast and southwest corners of the building project above the main roof level (see Figure 4). High roof framing at both towers is similar to the framing at the rest of the building. However, at the northeast tower, the roof level north of the stairs consists of concrete over steel deck similar to the second floor.

The second floor consists of three inches of concrete topping over three-inch steel deck supported by steel wide-flange beams. The steel beams at both levels are supported by 24-inch diameter concrete columns and the concrete walls. A portion of the second floor level forms a low roof at the east side of the building.

Steel beam connections at concrete walls consist of embedded plates anchored with shallow welded headed studs. The connection detail does not appear to be able to transfer axial forces in the beams into the shear walls.

The ground floor consists of slab on grade construction.

Ten-inch concrete shear walls form the stair and elevator cores at the northeast and southwest corners of the building. Typical wall reinforcement consists of two curtains of #4 rebar at twelve inches on center horizontal and vertical.

Foundations consist of isolated pile caps at the concrete columns and mat slabs supported by piles at the shear walls. Pile caps are interconnected by concrete tie beams. Piles consist of ten-inch diameter steel pipes filled with concrete and are reinforced with four #7 longitudinal rebar that extends to the top of the pile cap and #3 rebar ties at twelve inches on center.

Cladding at non-structural exterior walls consists of precast concrete panels that vary in thickness from 2.5 to 6 inches. The panels are anchored at the floors and roof via steel channel fascia at the roof level and steel channel edge forms anchored into the floor slab with deformed bar anchors at the floor level. The east wall of the building is curved and steps out at each level. At the roof level (i.e., above the low roof) concrete beams cantilever from the concrete columns to brace the wall panels (see Figure 5).

Figure 2. North Building south elevation.

Figure 3. North Building curved east wall and low roof.

Figure 4. North Building northeast stair tower.

Figure 5. North Building concrete beams bracing curved east wall elements.

South Building:

The South Building is a three-story concrete shear wall building with a partial fourth floor at the south end. Overall plan dimensions are approximately 150 feet east-west and 195 feet north-south (See Figure 6).

The upper roof level at the south portion of the building consists of concrete over steel deck framing similar to the building floors. The lower roof level consists of a penthouse at the stair tower at the north end of the building and sloped pop-up roofs in the middle of the building (see Figure 7). The penthouse and pop-up roof framing consists of 1.5-inch steel deck over wide flange beams.

Floor framing at the second, third, and partial fourth floor levels consists of three inches of concrete topping over three-inch steel deck supported by steel wide-flange beams which are supported in turn by a mixture of 24-in diameter concrete and wide-flange steel columns. A 60-foot by 50-foot area in the center of the second floor is open to the level below. At the third floor and low roof the open area increases to approximately 60 feet by 80 feet creating an atrium space that extends the full height of the building (see Figure 8). The atrium openings create isolated 10-foot wide by 60-foot long diaphragm segments that tie the north and south portions of the building together at the second and third floors (see Figure 9). The sloping roof pop-ups form the roof of the atrium (see Figure 10).

The ground floor consists of slab on grade construction.

Ten-inch concrete shear walls are located at stair towers on the north, east, and west sides of the building. Additional single-segment shear walls are located on the east and west sides of the building. Shear wall reinforcement is similar to the North Building. The shear walls are penetrated by door openings for the stairs, elevators, restrooms, and mechanical spaces (See Figure 11). Coupling beam reinforcement above these door openings is not shown on the available drawings.

Foundations consist of isolated pile caps at the concrete columns and mat slabs supported by piles at the shear walls. Pile caps are interconnected by concrete tie beams. Foundation detailing is similar to the North Building.

Exterior cladding consists of precast concrete panels anchored to the structure similar to the North Building.

Figure 6. South Building northwest elevation.

Figure 7. South Building roof popups and penthouse.

Figure 8. South Building atrium.

Figure 9. South Building atrium.

Figure 10. South Building roof pop-up above atrium.

Figure 11. South Building door openings at concrete wall.

Bridge:

A bridge connects the second floor of the North Building to the second floor of the South Building (see Figure 12). The Bridge is ten feet wide and spans approximately 70 feet between 30-foot long abutments at each end. Framing for the Bridge floor is similar to the building floor framing: three inches of concrete topping over three-inch steel deck supported by steel wide-flange beams and concrete columns. The Bridge walls and roof are formed from glazing and metal mullions that create a self-supporting storefront system. The Bridge is seismically separated from both

buildings by a two-inch seismic gap at each end. Its lateral force resisting system consists of cantilever 24-inch diameter concrete columns.

Figure 12. Bridge east elevation.

ASCE 41-13 TIER 1 SCREENING

The Tier 1 Screening process consists of checklists of qualitative evaluation statements and quantitative "quick checks" that require limited structural analysis. Each evaluation statement is marked "Compliant (C)", "Non-Compliant (NC), "Not Applicable (N/A)," or "Unknown (U)". Non-Compliant and Unknown statements indicate the presence of a potential deficiency. Further investigation, typically quantitative structural analysis, is required to determine if these conditions indicate structural deficiencies that require retrofit.

The purpose of the Tier 1 Screening is to rapidly identify potential deficiencies and potential structural behavior. Conversely, the Tier 1 Screening also identifies buildings and portions of buildings that comply with the ASCE 41-13 standard and may not require additional evaluation. The Tier 1 Screening does not provide retrofit recommendations. It serves only to identify potential deficiencies for further evaluation.

Tier 1 Screening consists of the following steps.

I. Determine the Performance Objective.
II. Determine the Building Type.
III. Complete Tier 1 Screening checklists.
IV. Report potential deficiencies.

I. Performance Objective

ASCE 41-13 defines Performance Objectives as pairings of Seismic Hazard Levels and Performance Levels. The Basic Performance Objectives for Existing Buildings (BPOE) shown on ASCE 41-13 Table 2-1 are based on the regulatory policy traditionally applied to existing buildings in seismically active regions of the United States. The BPOE is also a function of building Risk Category as defined by the local Building Code (i.e., the *2014 Oregon Structural Specialty Code*). For a Tier 1 evaluation of a Risk Category II building, ASCE 41-13 defines the BPOE as a Seismic Hazard Level of BSE-1E and a Performance Level of Life Safety. Following the recommendations of the Oregon State Amendments, we have instead used a Seismic Hazard Level of 75% of BSE-1N for this evaluation.

II. Building Type

The north and south headquarters buildings are type C2: *concrete shear wall buildings*. For the Life Safety Performance Objective, the Tier 1 procedure is acceptable for buildings of up to eight stories and may therefore be used for EWEB Headquarters.

The bridge is not a building type defined by ASCE 41-13. Its lateral force resisting system consists of cantilevered concrete columns, which behave similarly to building type C1: *concrete moment frame*.

III. Tier 1 Checklists

The following Tier 1 checklists for each building are required per ASCE 41-13 Table 4-7. Only applicable items on the C1 checklist were completed for the bridge. See Appendix A for the completed checklists.

- Basic Configuration (16.1.2LS)
- C2 for Life Safety (16.10LS) – North and South Buildings
- C1 for Life Safety (16.8LS) – Bridge

IV. Tier 1 Potential Deficiencies

Descriptions of potential deficiencies identified on each checklist are provided below. Unknown items are noted with “(U)”. All others are Non-Compliant.

General:

Basic Configuration Checklist

- **Liquefaction (U):** The project geotechnical report does not discuss liquefaction potential. It is noted that the site abuts the Willamette River and is underlain by granular fill over bedrock of the Eugene Formation. The buildings have pile foundations embedded in the bedrock and so liquefaction settlement is not expected to affect the primary structural elements. Non-structural exterior walls

and slabs on grade may be subject to liquefaction induced differential displacements.

North Building:

Basic Configuration Checklist

- **Torsion:** The distance between the center of mass and center of rigidity of the second floor exceeds 20% of the building width in the east-west direction.

Building Type C2 Checklist: Concrete Shear Wall

- **Complete Frames:** The shear walls function as bearing walls, supporting steel beams and concrete topped steel deck. This could lead to loss of load bearing capacity if the shear walls yield in a seismic event.

- **Coupling Beams:** Concrete wall segments above openings do not appear to be detailed as coupling beams (i.e., with diagonal reinforcement and stirrups). In a seismic event, this could result in the wall piers between openings acting as independent segments after damage to the coupling beams causes the wall to become "uncoupled".

- **Openings at Shear Walls:** Openings in the diaphragm for stairs and elevators abutting concrete walls exceed 25% of the wall length in several locations. This limits the ability of the diaphragm to transfer shear forces directly to the walls, increasing the reliance on collector elements to transfer forces.

South Building:

Basic Configuration Checklist

No potential deficiencies were identified.

Building Type C2 Checklist: Concrete Shear Wall

- **Complete Frames:** The shear walls function as bearing walls, supporting steel beams and concrete topped steel deck. This could lead to loss of load bearing capacity if the shear walls yield in a seismic event.

- **Coupling Beams:** Concrete wall segments above openings do not appear to be detailed as coupling beams (i.e., with diagonal reinforcement and stirrups). In a seismic event, this could result in the wall piers between openings acting as independent segments after damage to the coupling beams causes the wall to become "uncoupled".

- **Openings at Shear Walls:** Openings in the diaphragm for stairs and elevators abutting concrete walls exceed 25% of the wall length in several locations. This limits the ability of the diaphragm to transfer shear forces directly to the walls, increasing the reliance on collector elements to transfer forces.

Bridge:

Basic Configuration Checklist

- **Adjacent Buildings:** The two-inch gap between the Bridge and each Headquarters Building is less than 4% of the elevation of the Bridge above grade, which could result in pounding between the structures during an earthquake. However, since the Bridge floor aligns with the building floors, impact between the structures is not expected to greatly affect their gravity or lateral load carrying capacities.

Building Type C1 Checklist: Concrete Moment Frame

No potential deficiencies related to the cantilever concrete columns were identified.

FINDINGS AND DISCUSSION

Headquarters Buildings:

The Tier 1 Screening has identified several potential deficiencies at the Headquarters Buildings related to the configuration and detailing of the concrete shear walls and diaphragms.

- Shear walls support gravity loading from steel beams and from the concrete topped steel deck. If the walls become overstressed in an earthquake, their ability to support gravity loads can be compromised, resulting in potential partial collapse of the building floors and roofs.

- Shear walls do not appear to have diagonal reinforcement and stirrups above openings to create ductile coupling beams. Seismic forces that cause yielding in the wall elements above openings may result in spalling and damage to those elements. At exit doors, this can create a falling hazard preventing safe egress from the building. Additionally, yielding of these element can cause the walls to behave like narrow piers between openings instead of monolithic units. This can further increase stresses in the wall elements leading to additional displacement and damage.

- Stair and elevator openings in the floor slabs adjacent to shear walls reduce the transfer of seismic forces to the walls through shear connections and place greater demands on collector connections – such as through steel beams framing into the ends of walls. The steel beam connections at concrete walls consist of shallow embedded anchors and do not appear to be detailed to transfer collector forces to the walls.

In addition to the above items, the North Building has a potential torsional irregularity – an increased torsional response to a seismic event – resulting in force and displacement demands that exceed those predicted by simple linear static analysis.

Bridge:

The lack of seismic separation between the Bridge and the Headquarters Buildings could result in damage to the buildings due to impact. Since the Bridge floor aligns with the second floors of both buildings, impact damage at that level is expected to be minor. However, the glazed roof and walls could be significantly damaged by pounding resulting in falling glass hazards on and near the Bridge.

Potential deficiencies were not identified at the concrete columns and concrete over steel deck floor supporting the Bridge. The glazing system that comprises the Bridge walls and roof is not part of the Bridge's lateral force resisting system. However, inertial forces generated within the glazing must be resisted and transferred through the glazing mullions to the floor slab. The available drawings do not provide information on these members and their attachments.

RECOMMENDATIONS

As noted previously, the Tier 1 Screening procedure identifies potential deficiencies, but does not provide retrofit recommendations or validation of proposed retrofit options. Those tasks are addressed in ASCE 41-13 through Tier 2 (Deficiencies-Based) and Tier 3 (Systematic) Evaluation and Retrofit procedures. The Tier 2 and Tier 3 procedures employ quantitative evaluation of the structures to determine the extent of each deficiency and whether retrofit options adequately address the deficiencies.

Headquarters Buildings:

Tier 1 screenings of the EWEB Headquarters buildings have identified potential deficiencies at both the North and South Buildings that require additional analysis to define and address. Since the identified deficiencies are limited to detailing aspects of the walls and diaphragms, Tier 2 analysis of each structure is recommended. This analysis would require a three-dimensional computer model of each building to accurately determine forces in the diaphragm and shear wall elements. Such a model would account for the increased torsional response that potentially occurs at the North Building. Detailed analysis of the shear walls, shear wall coupling beams above openings, diaphragm shear connections and collector connections would then be performed to determine if the elements are adequate or if retrofit is required. Note that structural elements that did not present as potentially deficient, such as foundations, would not be assessed in the Tier 2 analysis.

Based on experience with similar structures and the limited analysis performed for the Tier 1 screening, the most likely elements to require retrofit are the steel beam to concrete wall connections. Figures 13 and 14 identify approximately 34 locations total between both buildings where reinforced connections may be required to transfer seismic forces from the steel framing to the concrete shear walls. In approximately 18 locations between both buildings, it may be necessary to add steel beams to collect diaphragm shear forces into the ends of the concrete walls.

After the collectors, the next most likely retrofit priority is the coupling beams above wall openings. If necessary, these elements could be strengthened with the application of fiber reinforced polymer to both sides of the walls.

Construction of any retrofit measures on the lower levels can be provided while the 4th floor remains occupied though inhabits could possibly subjected to considerable construction noise.

Bridge:

The Tier 1 screening identified the lack of separation between the Bridge and the Headquarters Buildings as a potential deficiency. As noted above, this is a greater concern for the glass enclosure than for the bridge floor. We recommend a Tier 2 analysis to determine the expected displacements of the Headquarters Buildings and Bridge. If the estimated displacements exceed the two-inch gap between the structures, we recommend retrofitting the Bridge glazing to incorporate a larger gap.

The glazing mullions appear to provide lateral support for the glazing. Additional investigation and analysis is required to determine if these members and their connections, which are not detailed on the available drawings, are adequate to transfer inertial forces from within the glazing to the primary bridge structure.

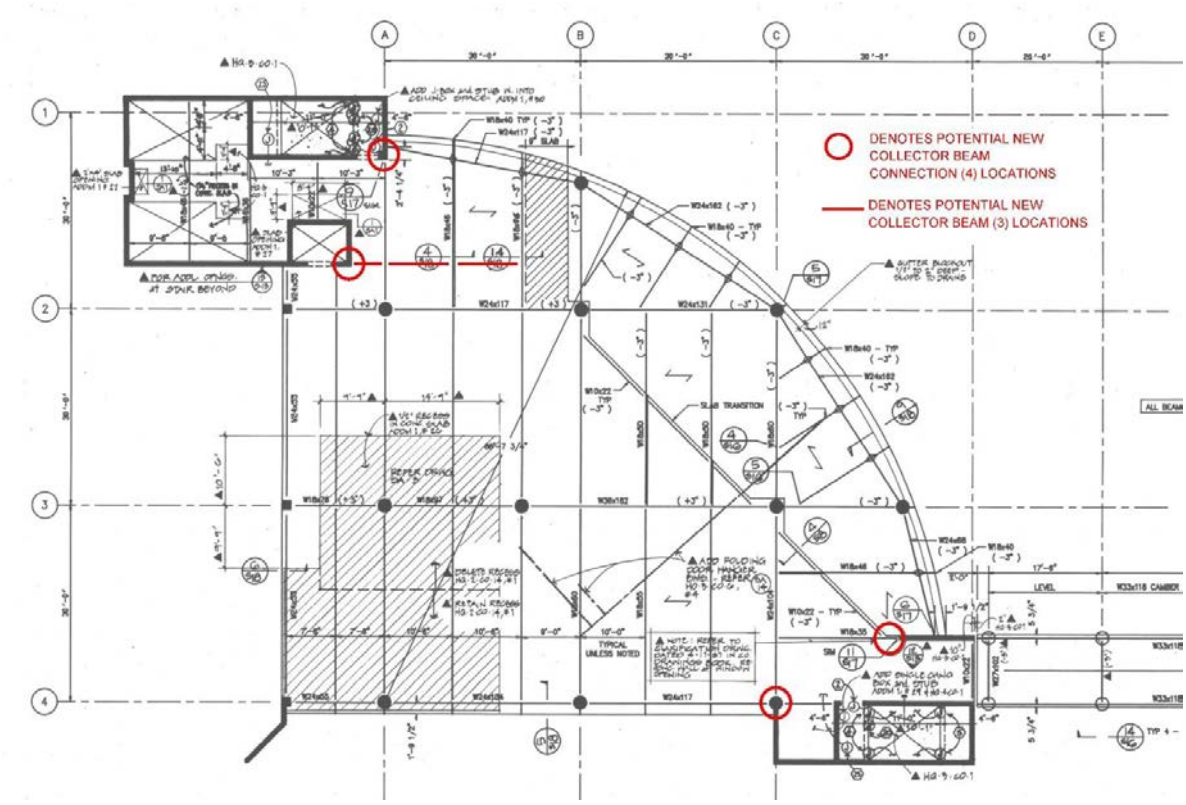

Figure 13. North Building potential retrofit locations.

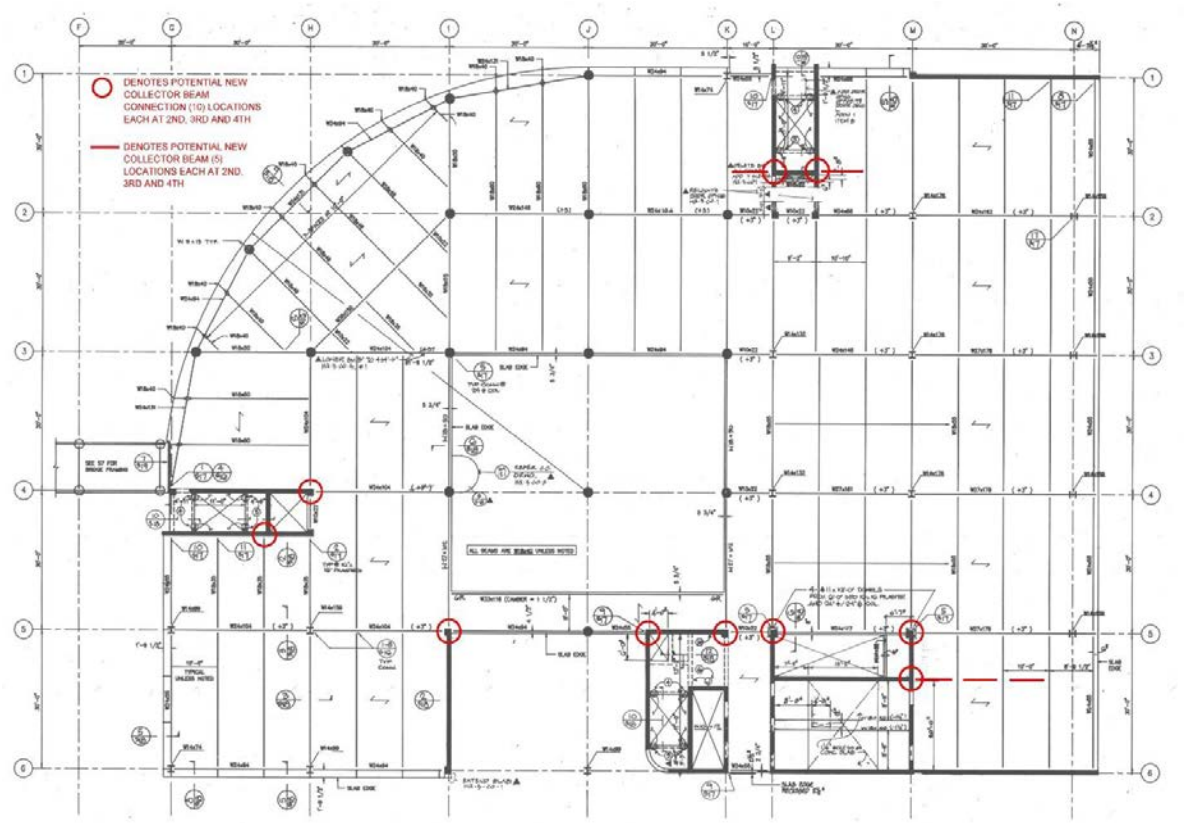

Figure 14. South Building potential retrofit locations.

ATRIUM INFILL AT SOUTH HEADQUARTERS BUILDING

At the request of Robertson Sherwood Architects, we have provided a qualitative assessment of the structural considerations that must be addressed to infill the atrium openings in the second and third floors of the south headquarters building. We have assumed that the infill will be framed similar to the balance of the floor – concrete topping over steel deck and steel beams – and supported by the existing concrete columns.

The infill would increase gravity forces on supporting beams, columns, and foundations by more than 5% and would increase the seismic mass of the structure by more than 10%. Per Section 3404 of the Oregon Structural Specialty Code (OSSC), the increase in design forces would trigger full gravity and lateral analysis of the affected portions of the structure using current OSSC provisions.

Based on our limited assessment the existing structure appears to be largely compliant with current prescriptive OSSC provisions for concrete shear wall detailing. An exception occurs where reinforcement ties have been provided around boundary reinforcement at ends and intersections

of walls. The ties are spaced at four inches on center; the OSSC limits tie spacing to one-third of the wall thickness (three inches for a ten-inch wall). It is common practice to provide tied boundary reinforcement at the ends of heavily loaded shear walls. However, ties are only required if the wall stresses exceed thresholds defined by the OSSC. Additional analysis is required to determine wall stresses. If tied boundary elements are not required due to high stress, then the four-inch tie spacing is acceptable.

Therefore, we do not anticipate that retrofit measures are necessary to meet prescriptive Code requirements. However, retrofits may still be necessary where existing elements are understrength.

Steel beams abutting the atrium openings are shallower than interior floor beams at other locations. Therefore, it will likely be necessary to strengthen the existing beams or add additional columns and footings. One option for strengthening the beams is to weld T-shaped steel sections to the underside of the bottom beam flanges, transforming the beams into deeper members. It may also be necessary to strengthen the beam connections by adding bearing supports below the beam flange to supplement the existing shear tab connections.

Most of the concrete columns and footings that support framing near the atrium openings have been detailed similar to more heavily loaded columns and footings elsewhere in the structure. The one exception is a concrete column at the center of the floor openings that supports only roof structure. It is less heavily reinforced and bears on a smaller pile cap with fewer piles than the typical columns. This column and its foundation likely require strengthening to support additional loading from the infilled atrium openings.

Based on the subjective results of the ASCE 41-13 evaluation, the existing concrete shear walls may have sufficient excess capacity to resist the increased seismic load due to the atrium infills. However, a full lateral analysis of the structure and its foundations is required to demonstrate the adequacy of the existing lateral force resisting system. If it is necessary to increase the strength of the shear walls, there are several options: create new shear walls by infilling between existing floors with concrete or masonry; provide shotcrete over the surface of existing walls creating thicker walls; provide new wall boundary elements at the ends of walls; reinforce the existing walls with fiber reinforced polymer. The first option – creating new shear walls – likely also requires the creation of new foundations. The other options may also require that existing foundation elements be enlarged. It is assumed that any additional foundation work would require driven piles similar to the existing foundations.

OSSC Section 3404.4 requires that lateral force resisting elements that have increased design load or decreased capacity due to the structural alteration be shown to meet the OSSC provisions for wind and seismic load resistance for new construction. This requirement supersedes the ASCE 41-13 Tier 2 lateral analysis described above to address the ASCE 41-13 Tier 1 potential deficiencies.

CONCLUSION

The ASCE 41-13 Tier 1 Screening has identified potential deficiencies at the EWEB headquarters buildings related to the concrete shear wall and floor diaphragm configuration and detailing. Additional analysis is necessary to determine the extent of these deficiencies and the necessary retrofit measures to bring the building into compliance with the Life Safety Performance Objective.

RISK CATEGORY UPGRADES

At the request of the City of Eugene, we were also asked to provide an assessment or comparison of structural improvements and corresponding construction costs relative to the designated Importance or Risk Category.

Based on the original use of the building, the EWEB Headquarters was designed and constructed to meet the requirements for an Occupancy Category II and an Importance Factor of 1.0, which corresponds to a Risk Category II Building per current Code. Similarly, the ASCE 41-13 Tier 1 Screening Evaluation provided in this report assumes a Risk Cat II building which is arguably appropriate for this facility based on current Oregon Structural Specialty Code (OSSC) designations for its current use and future proposed use as City Hall.

The OSSC also lists higher risk categories; Risk Cat III (Special Occupancies) and Risk Cat IV (Essential Facilities) which utilize Importance Factors of 1.25 and 1.5, respectively.

As noted in our report, the ASCE 41-13 methodology for existing facilities defines a Building Performance Objectives (BPOE) as pairings of Seismic Hazard Levels and Performance Levels.

For both the Risk Cat II and Cat III buildings, the BPOE uses a Seismic Hazard Level of 75% of BSE-1N and a Performance Level of Life Safety. The difference lies in M-factors applied to the capacity of existing elements. In this case, no new retrofit elements would likely be identified but the magnitude of the retrofit by be increased.

For a Risk Cat IV building (Essential Facility), the BPOE uses the same Seismic Hazard Level (75% of BSE-1N) but an enhanced performance objective of Immediate Occupancy. A different set of checklists are required and the evaluation is more intensive.

In conclusion, based on our limited understanding of the existing facility, it is likely that a voluntary seismic upgrade to Risk Cat III structure could increase the size of collector members and their connections and their extent, compared to the Risk Cat II upgrade recommendations. Based on our experience with similar projects, we would estimate the increase in cost for structural only seismic upgrades to be 20-30%. For the Risk Cat IV upgrade, additional analysis is needed to determine whether upgrades for the enhanced performance level would identify other elements of the structural system needed to be upgraded. Upgrades could include the addition of strategically placed shearwalls and reinforcing of the concrete coupling beams above the wall openings, noted at the end of the Recommendations section of the report on page 14. Without the additional analysis, which is beyond the scope of the current study, it is difficult to determine the extent and magnetite of additional retrofit recommendations.

VOLUNTARY VERSUS MANDATORY UPGRADES

The proceeding conclusion is based on VOLUNTARY upgrades of the existing structures. If the City of Eugene Building Official required a MANDATORY upgrade (due to change in occupancy), the extent of retrofit measures could be substantially larger A mandatory upgrade could require a host of prescriptive upgrades that are would not be required by analysis, such as jacketing of all of the gravity columns because they don’t meet code prescriptive stirrup spacing of vertical bar laps.

The obvious advantage of voluntary versus mandatory upgrades is that an increase in analysis cost can greatly reduce the amount of construction costs. To that end, there numerous approaches that could be undertaken to avoid or lesson the effects of the change in occupancy/Risk Category, including the following:

- The code description of CAT III is “Buildings whose PRIMARY occupancy is public assembly”. We do not think the council chamber qualifies the building as such. Currently, EWEB has public meeting rooms very similar to occupancy of the council chamber and it is classified as Cat II. This would need to be discussed with the COE building official but we believe it’s a strong, arguable point.
- A new council chamber could be constructed that is seismically separated from the existing building;
- Since currently the North and South Buildings are seismically separated, the existence of the City Council Chamber would only necessitate upgrading the building that houses the Chamber.

APPENDIX A

ASCE 41-13 Tier 1 Screening

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.

Project: EWEB HQ - NORTH Location: _____

Completed by: JSL Date: 11/2016

16.1.2LS LIFE SAFETY BASIC CONFIGURATION CHECKLIST

Low Seismicity

Building System

General

C NC N/A U LOAD PATH: The structure shall contain a complete, well defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)

C NC N/A U ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement shall not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)

C NC N/A U MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)

Building Configuration

C NC N/A U WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above. (Commentary: Sec. A2.2.2. Tier 2: Sec. 5.4.2.1)

C NC N/A U SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)

C NC N/A U VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)

C NC N/A U GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)

C NC N/A U MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)

C NC N/A U TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)

Moderate Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Geologic Site Hazards

C NC N/A U LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)

C NC N/A U SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)

C NC N/A U SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Foundation Configuration

C NC N/A U OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)

C NC N/A U TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)

A-2

Project: EWEB HQ - NORTH Location: _____

Completed by: JSL Date: 11/2016

16.10LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPES C2: CONCRETE SHEAR WALLS WITH STIFF DIAPHRAGMS AND C2A: CONCRETE SHEAR WALLS WITH FLEXIBLE DIAPHRAGMS

Low and Moderate Seismicity

Seismic-Force-Resisting System

C (NC) N/A U COMPLETE FRAMES: Steel or concrete frames classified as secondary components form a complete vertical-load-carrying system. (Commentary: Sec. A.3.1.6.1. Tier 2: Sec. 5.5.2.5.1)

(C) NC N/A U REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)

(C) NC N/A U SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the greater of 100 lb/in.^{2} or $2\sqrt{f'_c}$. (Commentary: Sec. A.3.2.2.1. Tier 2: Sec. 5.5.3.1.1)

(C) NC N/A U REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area is not less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction. (Commentary: Sec. A.3.2.2.2. Tier 2: Sec. 5.5.3.1.3)

Connections

C NC (N/A) U WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have adequate strength to resist the connection force calculated in the Quick Check procedure of Section 4.5.3.7. (Commentary: Sec. A.5.1.1. Tier 2: Sec. 5.7.1.1)

(C) NC N/A U TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls. (Commentary: Sec. A.5.2.1. Tier 2: Sec. 5.7.2)

(C) NC N/A U FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation with vertical bars equal in size and spacing to the vertical wall reinforcing immediately above the foundation. (Commentary: Sec. A.5.3.5. Tier 2: Sec. 5.7.3.4)

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Seismic-Force-Resisting System

(C) NC N/A U DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components. (Commentary: Sec. A.3.1.6.2. Tier 2: Sec. 5.5.2.5.2)

C NC (N/A) U FLAT SLABS: Flat slabs or plates not part of the seismic-force-resisting system have continuous bottom steel through the column joints. (Commentary: Sec. A.3.1.6.3. Tier 2: Sec. 5.5.2.5.3)

C (NC) N/A U COUPLING BEAMS: The stirrups in coupling beams over means of egress are spaced at or less than $d/2$ and are anchored into the confined core of the beam with hooks of 135 degrees or more. The ends of both walls to which the coupling beam is attached are supported at each end to resist vertical loads caused by overturning. (Commentary: Sec. A.3.2.2.3. Tier 2: Sec. 5.5.3.2.1)

Connections

(C) NC N/A U UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps. (Commentary: Sec. A.5.3.8. Tier 2: Sec. 5.7.3.5)

Diaphragms (Flexible or Stiff)

(C) NC N/A U DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)

C (NC) N/A U OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 25% of the wall length. (Commentary: Sec. A.4.1.4. Tier 2: Sec. 5.6.1.3)

A-3

Flexible Diaphragms

C NC N/A U CROSS TIES: There are continuous cross ties between diaphragm chords. (Commentary: Sec. A.4.1.2. Tier 2: Sec. 5.6.1.2)

C NC N/A U STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)

C NC N/A U SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)

C NC N/A U DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)

C NC N/A U OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)

Project: EWEB HQ - SOUTH Location: _____

Completed by: JBL Date: 11/2016

16.1.2LS LIFE SAFETY BASIC CONFIGURATION CHECKLIST

Low Seismicity

Building System

General

(C) NC N/A U LOAD PATH: The structure shall contain a complete, well defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)

C (NC) N/A U ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement shall not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)

C NC (N/A) U MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)

Building Configuration

(C) NC N/A U WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above. (Commentary: Sec. A2.2.2. Tier 2: Sec. 5.4.2.1)

(C) NC N/A U SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)

(C) NC N/A U VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)

(C) NC N/A U GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)

(C) NC N/A U MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)

(C) NC N/A U TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)

Moderate Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Geologic Site Hazards

C NC N/A (U) LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)

(C) NC N/A U SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)

(C) NC N/A U SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Foundation Configuration

(C) NC N/A U OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)

(C) NC N/A U TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)

Project: EWEB HQ - SOUTH Location: _____

Completed by: JBL Date: 11/2016

16.10LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPES C2: CONCRETE SHEAR WALLS WITH STIFF DIAPHRAGMS AND C2A: CONCRETE SHEAR WALLS WITH FLEXIBLE DIAPHRAGMS

Low and Moderate Seismicity

Seismic-Force-Resisting System

C (NC) N/A U COMPLETE FRAMES: Steel or concrete frames classified as secondary components form a complete vertical-load-carrying system. (Commentary: Sec. A.3.1.6.1. Tier 2: Sec. 5.5.2.5.1)

(C) NC N/A U REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)

(C) NC N/A U SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the greater of 100 lb/in.^{2} or $2\sqrt{f'_c}$. (Commentary: Sec. A.3.2.2.1. Tier 2: Sec. 5.5.3.1.1)

(C) NC N/A U REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area is not less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction. (Commentary: Sec. A.3.2.2.2. Tier 2: Sec. 5.5.3.1.3)

Connections

C NC (N/A) U WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have adequate strength to resist the connection force calculated in the Quick Check procedure of Section 4.5.3.7. (Commentary: Sec. A.5.1.1. Tier 2: Sec. 5.7.1.1)

(C) NC N/A U TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls. (Commentary: Sec. A.5.2.1. Tier 2: Sec. 5.7.2)

(C) NC N/A U FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation with vertical bars equal in size and spacing to the vertical wall reinforcing immediately above the foundation. (Commentary: Sec. A.5.3.5. Tier 2: Sec. 5.7.3.4)

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Seismic-Force-Resisting System

(C) NC N/A U DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components. (Commentary: Sec. A.3.1.6.2. Tier 2: Sec. 5.5.2.5.2)

C NC (N/A) U FLAT SLABS: Flat slabs or plates not part of the seismic-force-resisting system have continuous bottom steel through the column joints. (Commentary: Sec. A.3.1.6.3. Tier 2: Sec. 5.5.2.5.3)

C (NC) N/A U COUPLING BEAMS: The stirrups in coupling beams over means of egress are spaced at or less than $d/2$ and are anchored into the confined core of the beam with hooks of 135 degrees or more. The ends of both walls to which the coupling beam is attached are supported at each end to resist vertical loads caused by overturning. (Commentary: Sec. A.3.2.2.3. Tier 2: Sec. 5.5.3.2.1)

Connections

(C) NC N/A U UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps. (Commentary: Sec. A.5.3.8. Tier 2: Sec. 5.7.3.5)

Diaphragms (Flexible or Stiff)

(C) NC N/A U DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)

C (NC) N/A U OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 25% of the wall length. (Commentary: Sec. A.4.1.4. Tier 2: Sec. 5.6.1.3)

A-6

Flexible Diaphragms

C NC N/A U CROSS TIES: There are continuous cross ties between diaphragm chords. (Commentary: Sec. A.4.1.2. Tier 2: Sec. 5.6.1.2)

C NC N/A U STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)

C NC N/A U SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)

C NC N/A U DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)

C NC N/A U OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)

A-7

Project: EWEB HQ - BRIDGE Location: _____

Completed by: MC Date: 11/08/2016

16.9LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE C1: CONCRETE MOMENT FRAMES

Low Seismicity

Seismic-Force-Resisting System

(C) NC N/A U REDUNDANCY: The number of lines of moment frames in each principal direction is greater than or equal to 2. The number of bays of moment frames in each line is greater than or equal to 2. (Commentary: Sec. A.3.1.1.1. Tier 2: Sec. 5.5.1.1)

(C) NC N/A U COLUMN AXIAL STRESS CHECK: The axial stress caused by unfactored gravity loads in columns subjected to overturning forces because of seismic demands is less than $0.20f'_c$. Alternatively, the axial stress caused by overturning forces alone, calculated using the Quick Check procedure of Section 4.5.3.6, is less than $0.30f'_c$. (Commentary: Sec. A.3.1.4.2. Tier 2: Sec. 5.5.2.1.3)

Connections

(C) NC N/A U CONCRETE COLUMNS: All concrete columns are doweled into the foundation with a minimum of 4 bars. (Commentary: Sec. A.5.3.2. Tier 2: Sec. 5.7.3.1)

Moderate Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Seismic-Force-Resisting System

C NC (N/A) U INTERFERING WALLS: All concrete and masonry infill walls placed in moment frames are isolated from structural elements. (Commentary: Sec. A.3.1.2.1. Tier 2: Sec. 5.5.2.1.1)

(C) NC N/A U COLUMN SHEAR STRESS CHECK: The shear stress in the concrete columns, calculated using the Quick Check procedure of Section 4.5.3.2, is less than the greater of 100 lb/in.^{2} or $2\sqrt{f'_c}$. (Commentary: Sec. A.3.1.4.1. Tier 2: Sec. 5.5.2.1.4)

C NC (N/A) U FLAT SLAB FRAMES: The seismic-force-resisting system is not a frame consisting of columns and a flat slab or plate without beams. (Commentary: Sec. A.3.1.4.3. Tier 2: Sec. 5.5.2.3.1)

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Seismic-Force-Resisting System

C NC (N/A) U PRESTRESSED FRAME ELEMENTS: The seismic-force-resisting frames do not include any prestressed or posttensioned elements where the average prestress exceeds the lesser of 700 lb/in.^{2} or $f'_c/6$ at potential hinge locations. The average prestress is calculated in accordance with the Quick Check procedure of Section 4.5.3.8. (Commentary: Sec. A.3.1.4.4. Tier 2: Sec. 5.5.2.3.2)

(C) NC N/A U CAPTIVE COLUMNS: There are no columns at a level with height/depth ratios less than 50% of the nominal height/depth ratio of the typical columns at that level. (Commentary: Sec. A.3.1.4.5. Tier 2: Sec. 5.5.2.3.3)

(C) NC N/A U NO SHEAR FAILURES: The shear capacity of frame members is able to develop the moment capacity at the ends of the members. (Commentary: Sec. A.3.1.4.6. Tier 2: Sec. 5.5.2.3.4)

C NC (N/A) U STRONG COLUMN—WEAK BEAM: The sum of the moment capacity of the columns is 20% greater than that of the beams at frame joints. (Commentary: Sec. A.3.1.4.7. Tier 2: Sec. 5.5.2.1.5)

C NC (N/A) U BEAM BARS: At least two longitudinal top and two longitudinal bottom bars extend continuously throughout the length of each frame beam. At least 25% of the longitudinal bars provided at the joints for either positive or negative moment are continuous throughout the length of the members. (Commentary: A.3.1.4.8. Tier 2: Sec. 5.5.2.3.5)

(C) NC N/A U COLUMN-BAR SPLICES: All column-bar lap splice lengths are greater than $35d_b$ and are enclosed by ties spaced at or less than $8d_b$. Alternatively, column bars are spliced with mechanical couplers with a capacity of at least 1.25 times the nominal yield strength of the spliced bar. (Commentary: Sec. A.3.1.4.9. Tier 2: Sec. 5.5.2.3.6)

C NC (N/A) U BEAM-BAR SPLICES: The lap splices or mechanical couplers for longitudinal beam reinforcing are not located within $l_b/4$ of the joints and are not located in the vicinity of potential plastic hinge locations. (Commentary: Sec. A.3.1.4.10. Tier 2: Sec. 5.5.2.3.6)

(C) NC N/A U COLUMN-TIE SPACING: Frame columns have ties spaced at or less than $d/4$ throughout their length and at or less than $8d_b$ at all potential plastic hinge locations. (Commentary: Sec. A.3.1.4.11. Tier 2: Sec. 5.5.2.3.7)

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A-8

C NC N/A U STIRRUP SPACING: All beams have stirrups spaced at or less than $d/2$ throughout their length. At potential plastic hinge locations, stirrups are spaced at or less than the minimum of $8d_b$ or $d/4$. (Commentary: Sec. A.3.1.4.12. Tier 2: Sec. 5.5.2.3.7)

C NC N/A U JOINT TRANSVERSE REINFORCING: Beam–column joints have ties spaced at or less than $8d_b$. (Commentary: Sec. A.3.1.4.13. Tier 2: Sec. 5.5.2.3.8)

C NC N/A U DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components. (Commentary: Sec. A.3.1.6.2. Tier 2: Sec. 5.5.2.5.2)

C NC N/A U FLAT SLABS: Flat slabs or plates not part of the seismic-force-resisting system have continuous bottom steel through the column joints. (Commentary: Sec. A.3.1.6.3. Tier 2: Sec. 5.5.2.5.3)

Diaphragms

C NC N/A U DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)

Connections

C NC N/A U UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps. (Commentary: Sec. A.5.3.8. Tier 2: Sec. 5.7.3.5)

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HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

Page:
Project: 11766
By: JSL
Date: Nov-16

PROJECT NAME **EWEB HQ Building**

PENTHOUSES **SLOPE:** 0 in 12

Description	Deck	Beams	Columns	Lateral
Roofing	13.0	13.0	13.0	13.0
B deck	2.3	2.3	2.3	2.3
Insulation	3.0	3.0	3.0	3.0
Beams		6.0	6.0	6.0
Ceiling	1.0	1.0	1.0	1.0
Misc.	1.7	1.7	1.7	1.7
M/E/P	4.0	4.0	4.0	4.0
Partitions				5.0
Total (w/o slope)	**25.0**	**31.0**	**31.0**	**36.0**
Total (w/ slope)	**25.0**	**31.0**	**31.0**	**36.0**

Roof Snow Load: 25 psf

ROOF/FLOOR

Description	Deck	Beams	Columns	Lateral	
Flooring	2.0	2.0	2.0	2.0	(12 psf at Roof)
3" Conc. o/ W3 deck	54.4	54.4	54.4	54.4	
W3 deck	2.9	2.9	2.9	2.9	
Beams		10.0	10.0	10.0	
Ceiling	3.0	3.0	3.0	3.0	
Misc.	2.7	2.7	2.7	2.7	
M/E/P	5.0	5.0	5.0	5.0	
Partitions	15.0	15.0	15.0	10.0	
Total	**85.0**	**95.0**	**95.0**	**90.0**	

Floor Live Load: 50 psf
Exitways: 100 psf

WALLS

Description	Exterior	10" Conc.
10" Conc. Wall		125.0
4" Conc. Cladding	50.0	
Wall Studs	2.0	
Gyp. Board	2.8	
Misc.	1.2	
M/E/P	3.0	
Insulation	1.0	
Total	**60.0**	**125.0**

A-10

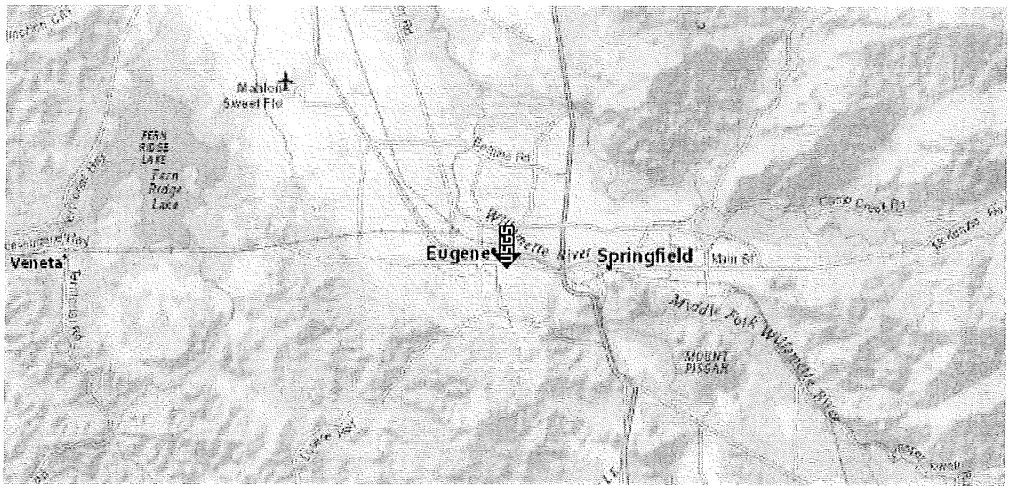
USGS Design Maps Summary Report

User–Specified Input

Building Code Reference Document ASCE 41-13 Retrofit Standard, BSE-1N
(which utilizes USGS hazard data available in 2008)

Site Coordinates 44.055°N, 123.085°W

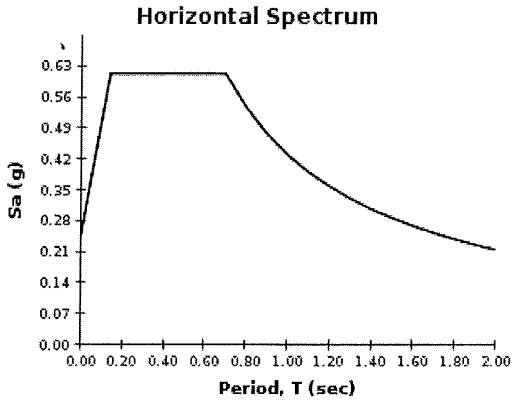
Site Soil Classification Site Class D – "Stiff Soil"

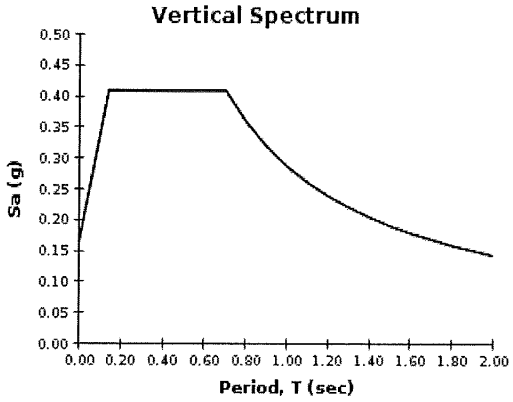


USGS–Provided Output

$S_{XS,BSE\text{-}1N}$ 0.613 g × 0.75 = 0.460

$S_{X1,BSE\text{-}1N}$ 0.430 g × 0.75 = 0.322





Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

A-11

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT:
PROJECT NO: 11766
DATE: 11/3/2016
BY: MC

SEISMIC MASS - NORTH BUILDING

ROOF / 4th FL

$A_{ROOF} = 10,241^{\square}$

$A_{PENT} = 1,362^{\square}$

$A_{CONC\ WALL} = 212'(20.3') = 2456^{\square}$

$A_{EXT\ WALL} = (132' + 191')(13.5') = 3,686^{\square}$

$W_{ROOF/4th} = 1605^{k}$

2ND FL

$A_{FLOOR} = 10,241^{\square}$

$A_{CONC\ WALL} = 212'(14.25') + 160'(7.5') = 4,221^{\square}$

$A_{EXT\ WALL} = 273'(14.25') = 3,890^{\square}$

$W_{2ND} = 1680^{k}$

$W_{TOTAL} = 3285^{k}$

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT: A-12
PROJECT NO: 117066
DATE: 11/20/16
BY: JBZ

SEISMIC MASS - SOUTH BUILDING

ROOF / 5TH

$A_{FIFTH} = (150')(65') + (30')(30') = 10{,}650^{\square}$

$A_{ROOF} = (2)(30')(30') = 1800^{\square}$

$A_{CONC\ WALL} = (15.25' + 6.75')\,130' + (10.2' + 6.75')\,241' = 6{,}957^{\square}$

$A_{EXT\ WALL} = (17')(260') = 4{,}420^{\square}$

$W_{TOTAL} = 2269^{k}$

4TH FLOOR

$A_{FLOOR} = 26{,}281^{\square}$

$A_{ROOF} = 4500^{\square} + 1200^{\square} = 5700^{\square}$

$A_{CONC\ WALL} = 241'(13.5') + 73'(13.5') = 4{,}239^{\square}$

$A_{EXT\ WALL} = 13.5'(170') + 6.75'(236') + 13.5'(255') = 7{,}331^{\square}$

$W_{4TH} = 4163^{k}$

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: A-13
PROJECT NO: 1176
DATE: 11/2/2016
BY: MC

SUBJECT: EWEB HQ

SEISMIC MASS – SOUTH

3RD FLOOR

$A_{FLOOR} = 28,680^{\square} - 5,340^{\square} = 23,340^{\square}$

$A_{CONC\ WALL} = 13.5'(314') = 4,240^{\square}$

$A_{EXT\ WALL} = 13.5'(530') = 7,155^{\square}$

$W_{3RD} = 3,061^{k}$

2ND FLOOR

$A_{FLOOR} = 27,780^{\square} - 3,120^{\square} = 24,660^{\square}$

$A_{CONC\ WALL} = 14.25'(314') = 4,475^{\square}$

$A_{EXT\ WALL} = 14.25'(500') = 7,125^{\square}$

$W_{2ND} = 3,207^{k}$

$W_{TOTAL} = 12,700^{k}$

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

PAGE:
PROJECT NO: 11766
DATE: 11/08/2016
BY: MC

SUBJECT: EWEB HQ

BRIDGE FLOOR

FLOORING	3.0 psf
DECK w/ CONC.	67.0
BEAMS	24.0
CEILING	5.0
MEP.	2.0
MISC.	3.0
	94 psf

GLASS WALLS 12 psf

SEISMIC MASS (BRIDGE)

$W_{ROOF} = 2\pi(15')(111.5')(12\ psf) = 42^k$

$W_{2ND} = 111.5'(10')(94\ psf) = 105^k$

$W_{WALL} = 2(10')(111.5')(12\ psf) = 26.8^k$

$W_{TOTAL} = 173.8^k$

SEISMIC PARAMETERS (BRIDGE)

$T = C_t h_n^{\beta}$

$= 0.018(15)^{0.90} = 0.206\ sec$

$S_a = \frac{S_{x1}}{T} < S_{xs}.$

$V = C_s W = 1.3(0.46)W = 104^k$

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT: A-15
PROJECT NO: 117666
DATE: 11/2016
BY: JSL

TIER 1 SEISMIC PARAMETERS

$S_{XS} = 0.460$
$S_{X1} = 0.322$

$T_S = S_{X1}/S_{XS} = 0.70s$

$T_0 = 0.2T_S = 0.14s$

$T = C_t h_n^{\beta} = 0.41s$

$C_t = 0.020$
$h_n = 55.5'$
$\beta = 0.75$

$\therefore S_a = S_{XS} = 0.460$

$V = C S_a W$

$C = 1.0$ (SOUTH BLDG)

$V = 0.460W = (0.460)(12{,}700^{\#}) = 5842^{\#}$ (SOUTH)

$C = 1.2$ (NORTH BLDG)

$V = 0.552W = 1813^{\#}$ (NORTH)

A-161

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT:
PROJECT NO: 11766
DATE: 11/2/2016
BY: MC

SOFT STORY CHECK (SOUTH BLDG)

1st - 2nd FL

$\Sigma k_x = 4.0$

$\Sigma k_y = 2.3$

2nd - 3rd FL

$\Sigma k_x = 4.6$

$\Sigma k_y = 2.6$

— CHECK IF STIFFNESS IS LESS THAN 80%

$k_x = 0.80(4.6) = 3.68 < 4.0$ ∴ O.K.

$k_y = 0.80(2.6) = 2.08 < 2.3$ ∴ O.K.

— STIFFNESS FROM 1st - 2nd IS GREATER THAN 80% OF THE STIFFNESS of THE AVERAGE OF THE 3 FLS ABOVE ∴

NO SOFT STORY

A-17

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT:
PROJECT NO: 11766
DATE: 11/3/2016
BY: MC

TORSION : NORTH BUILDING

$20\% \cdot X_{PLAN\ DIR} = 0.2\,(130') = 26'\text{-}0''$

$20\% \cdot Y_{PLAN\ DIR} = 0.2\,(92') = 18.4'$

2ND FL

$\bar{X}_{CM} = 70'$

$\bar{Y}_{CM} = 38.6'$

$X_{CR} = 34.7^{FT.}$

$Y_{CR} = 53.7'$

$\Delta X = 35.3'$ $> 26'\text{-}0''$ $\therefore$ N.C.

$\Delta Y = -15.1'$ $< 18.4'$ $\therefore$ C

3RD FL/ROOF

$\bar{X}_{CM} = 70'$

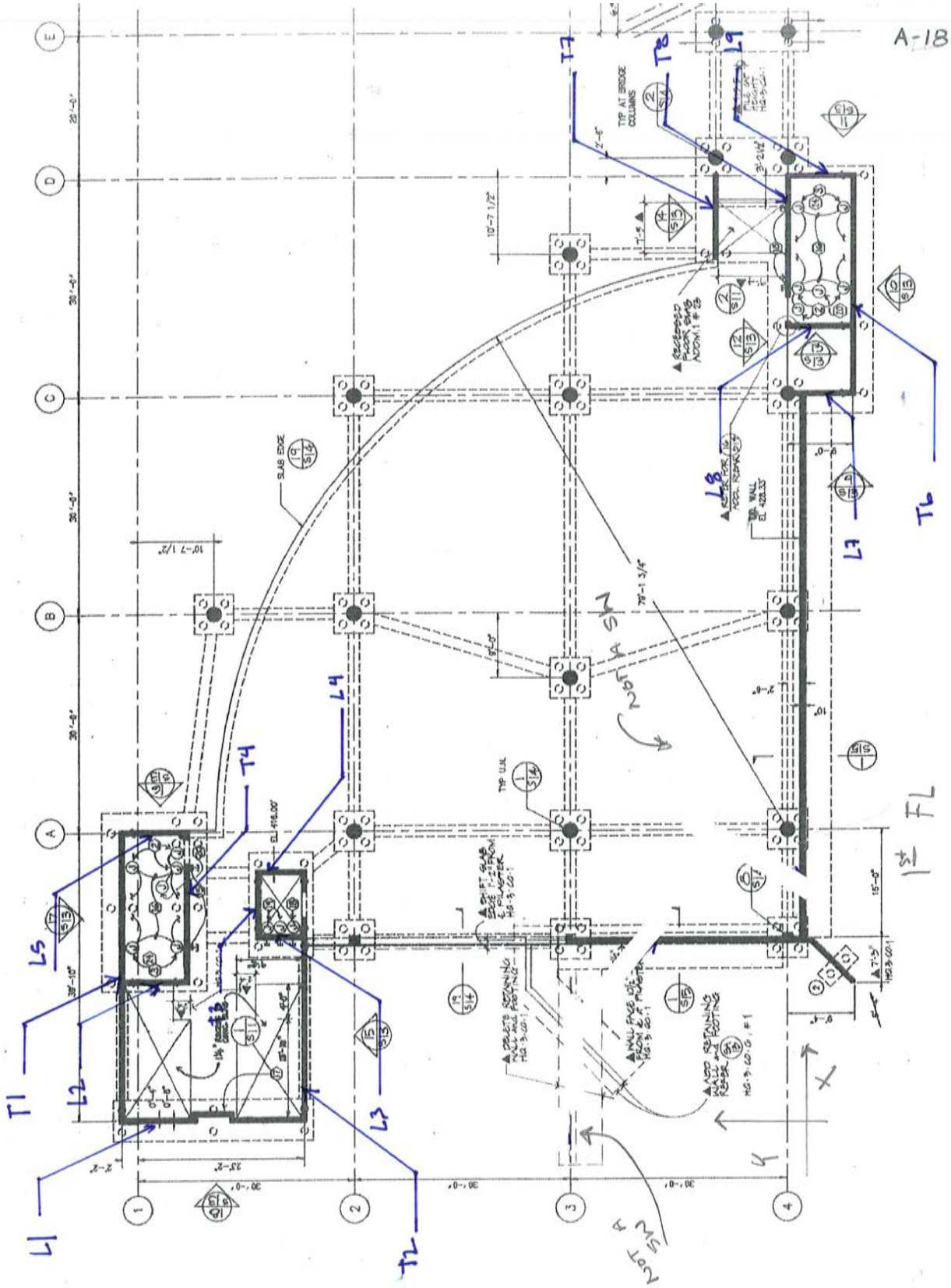
$\bar{Y}_{CM} = 38.6$

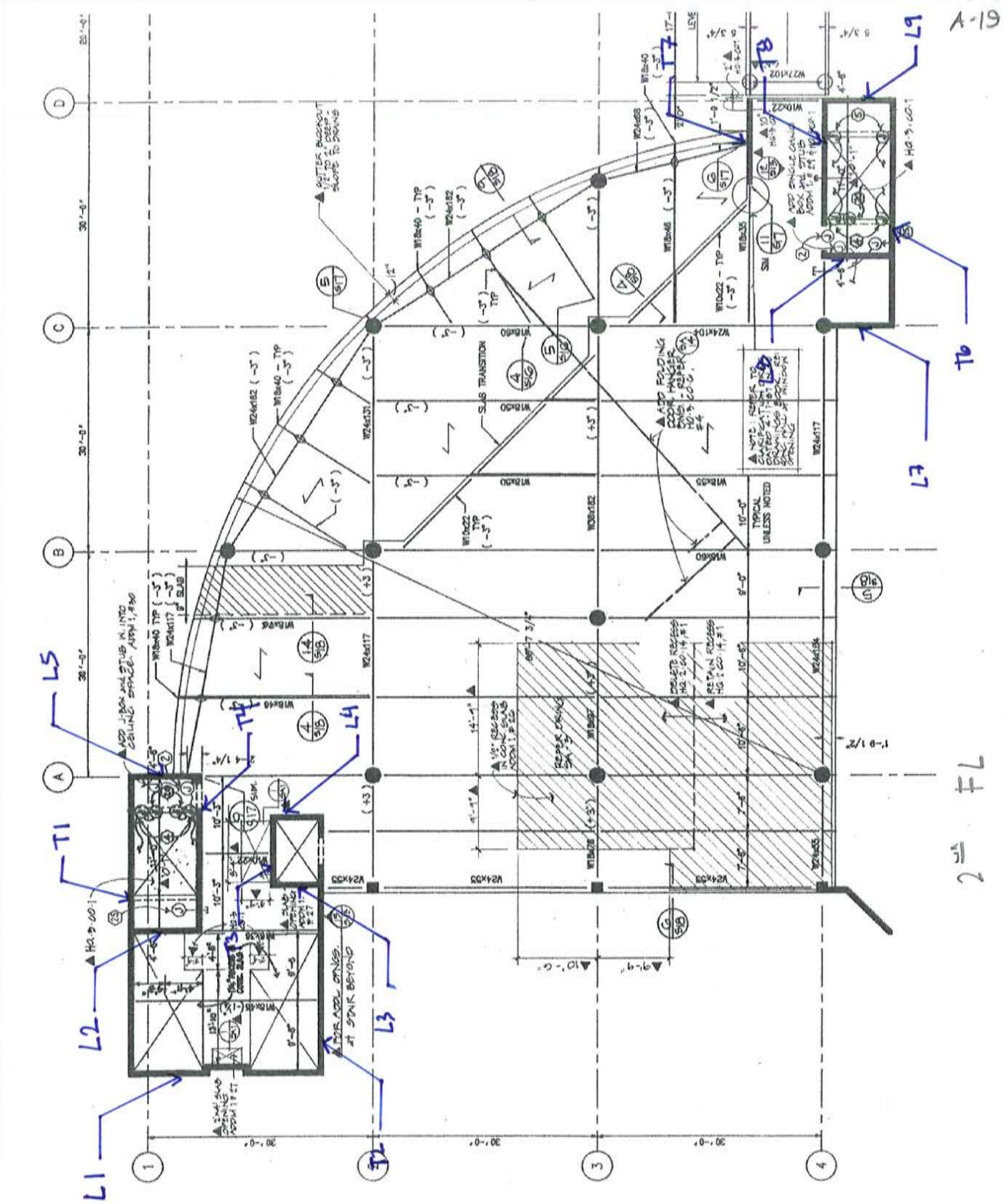
$X_{CR} = 36.5^{FT.}$

$Y_{CR} = 53.4^{FT.}$

$\Delta X = 31.4'$ $> 26'\text{-}0''$ $\therefore$ N.C.

$\Delta Y = -14.8'$ $< 18.4'$ $\therefore$ C.


A-18
1st FL
T1
T2
T3
T4
T5
T6
T7
T8
T9
L1
L2
L3
L4
L5
L6
L7
L8
L9
SLAB EDGE
TYP U.N.O.
TYP AT BRIDGE COLUMNS
10'-7 1/2"
78'-1 3/4"
30'-0"
30'-0"
30'-0"
38'-10"
23'-2"
2'-2"
15'-0"
7'-5"
Y
X


A-19
L1
L2
L3
L4
L5
L6
L7
L8
L9
T1
T2
T3
T4
T7
T8
2nd FL

NORTH BUILDING: RELATIVE STIFFNESS

1-2 FL

ID	L (ft)	h (ft)	Delta	K
T1	35	15	1.60	0.62
T2	35	15	1.60	0.62
T3	10	15	18.00	0.06
T4	20	15	3.94	0.25
T6	30	15	2.00	0.50
T7	10.5	15	15.95	0.06
T8	17	15	5.39	0.19
L1	23	15	3.07	0.33
L2	9	15	23.52	0.04
L3	7	15	45.79	0.02
L4	7	15	45.79	0.02
L5	9	15	23.52	0.04
L7	9	15	23.52	0.04
L8	9	15	23.52	0.04
L9	9	15	23.52	0.04

2-3 FL

ID	L (ft)	h (ft)	Delta	K
T1	35	13.5	1.39	0.72
T2	35	13.5	1.39	0.72
T3	10	13.5	13.89	0.07
T4	20	13.5	3.26	0.31
T6	30	13.5	1.71	0.58
T7	10.5	13.5	12.36	0.08
T8	17	13.5	4.39	0.23
L1	23	13.5	2.57	0.39
L2	9	13.5	18.00	0.06
L3	7	13.5	34.48	0.03
L4	7	13.5	34.48	0.03
L5	9	13.5	18.00	0.06
L7	9	13.5	18.00	0.06
L8	9	13.5	18.00	0.06
L9	9	13.5	18.00	0.06

A-21

NORTH BUILDING: RELATIVE STIFFNESS

2nd FL

ID	Rkx	Rky	Xk	Xy	Rky*Xk	Rkx*Yk
T1	0.62	0	17.5	92	0.0	57.5
T2	0.62	0	17.5	67	0.0	41.9
T3	0.06	0	30	74	0.0	4.1
T4	0.25	0	15	92	0.0	23.4
T6	0.50	0	115	-7	0.0	-3.5
T7	0.06	0	124.75	10	0.0	0.6
T8	0.19	0	121.5	0	0.0	0.0
L1	0	0.33	0	80.5	0.0	0.0
L2	0	0.04	20	85.5	0.9	0.0
L3	0	0.02	40	70.5	0.9	0.0
L4	0	0.02	50	70.5	1.1	0.0
L5	0	0.04	40	85.5	1.7	0.0
L7	0	0.04	100	-4.5	4.3	0.0
L8	0	0.04	109	-4.5	4.6	0.0
L9	0	0.04	160	-4.5	6.8	0.0
SUM	2.3	0.6			20.2	123.9

Xcr = 34.693658 ft

Ycr = 53.721185 ft

3rd FL

ID	Rkx	Rky	Xk	Xy	Rky*Xk	Rkx*Yk
T1	0.72	0	17.5	92	0.0	66.3
T2	0.72	0	17.5	67	0.0	48.3
T3	0.07	0	30	74	0.0	5.3
T4	0.31	0	15	92	0.0	28.3
T6	0.58	0	115	-7	0.0	-4.1
T7	0.08	0	124.75	10	0.0	0.8
T8	0.23	0	121.5	0	0.0	0.0
L1	0	0.39	0	80.5	0.0	0.0
L2	0	0.06	20	85.5	1.1	0.0
L3	0	0.03	40	70.5	1.2	0.0
L4	0	0.03	50	70.5	1.5	0.0
L5	0	0.06	40	85.5	2.2	0.0
L7	0	0.06	100	-4.5	5.6	0.0
L8	0	0.06	109	-4.5	6.1	0.0
L9	0	0.06	160	-4.5	8.9	0.0
SUM	2.7	0.7			26.4	145.0

Xcr = 36.477552 ft

Ycr = 53.424912 ft

A-22

NORTH BUILDING: CENTER OF MASS

2nd FL

ID	A (ft*ft)	x (ft)	A*x	y	A*y
A1	1000	20	20000	80.5	80500
A2	1005	32.5	32662.5	33.5	33667.5
A3	4901	73.5	360223.5	33.5	164183.5
A4	270	115	31050	-4.5	-1215
	7176				

x = 61.9 ft

y = 38.6 ft

3rd FL/Roof

ID	A (ft*ft)	x (ft)	A*x	y	A*y
A1	1000	20	20000	80.5	80500
A2	1005	32.5	32662.5	33.5	33667.5
A3	4901	73.5	360223.5	33.5	164183.5
A6	270	115	31050	-4.5	-1215
	7176				

x = 61.9 ft

y = 38.6 ft

A223

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT:
PROJECT NO: 11766
DATE: 11/3/2016
BY: MC

TORSION: SOUTH BUILDING

2ND FLOOR

$\bar{X}_{cm} = 96.4$ FT.

$\bar{Y}_{cm} = 72.4$ FT.

$X_{cr} = 115.1$ FT.

$Y_{cr} = 46.0$ FT.

20% $X_{PLAN\text{-}DIR} = 0.2\,(200') = 40'$

20% $Y_{PLAN\ DIR} = 0.2\,(150') = 30'$

$\Delta X = 18.7$ FT. $< 40'$ $\therefore$ C

$\Delta Y = 26.4$ FT. $< 30'$ $\therefore$ C.

3RD FLOOR

$\Delta X = 18.7$ FT. $< 40'$ $\therefore$ C

$\Delta Y = 27.4$ FT. $< 30'$ $\therefore$ C.

A-24

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT:
PROJECT NO: 11766
DATE: 11/3/2016
BY: MC

TORSION: SOUTH BUILDING

4th FL

$\Delta x = 17.2^{F.T.} < 40'$ ∴ C

$\Delta y = 24.2^{F.T.} < 30'$ ∴ C

3rd FL

$\Delta x = 28.9^{F.T.} < 40'$ ∴ C.

$\Delta y = 26.3^{F.T.} < 30'$ ∴ C.

SOUTH BUILDING: RELATIVE STIFFNESS

1-2 FL

ID	L (ft)	h (ft)	Delta	K
T1	30	15	2.0	0.5
T2	30	15	2.0	0.5
T3	18	15	4.8	0.2
T4	13	15	9.6	0.1
T5	30	15	2.0	0.5
T6	69	15	0.7	1.4
T7	10	15	18.0	0.1
T8	39	15	1.4	0.7
T9	10	15	18.0	0.1
L1	30	15	2.0	0.5
L2	25	15	2.7	0.4
L3	18	15	4.8	0.2
L4	30	15	2.0	0.5
L5	20	15	3.9	0.3
L6	30	15	2.0	0.5
L7	30	15	2.0	0.5
L8	10	15	18.0	0.1

2-3 FL AND 3-4 FL

ID	L (ft)	h (ft)	Delta	K
T1	30	13.5	1.7	0.6
T2	30	13.5	1.7	0.6
T3	17	13.5	4.4	0.2
T4	13	13.5	7.6	0.1
T5	30	13.5	1.7	0.6
T6	69	13.5	0.6	1.6
T7	10	13.5	13.9	0.1
T8	35	13.5	1.4	0.7
T9	10	13.5	13.9	0.1
L1	30	13.5	1.7	0.6
L2	25	13.5	2.2	0.4
L3	18	13.5	3.9	0.3
L4	30	13.5	1.7	0.6
L5	30	13.5	1.7	0.6
L6	32	13.5	1.6	0.6
L7	32	13.5	1.6	0.6
L8	10	13.5	13.9	0.1

A-26

SOUTH BUILDING: CENTER OF RIGIDITY

2nd FL

ID	Rkx	Rky	Xk	Xy	Rky*Xk	Rkx*Yk
T1	0.5	0	15	60	0.0	30.0
T2	0.5	0	15	50	0.0	25.0
T3	0.2	0	111	30	0.0	6.2
T4	0.1	0	113.5	0	0.0	0.0
T5	0.5	0	145	20	0.0	10.0
T6	1.4	0	164.5	0	0.0	0.0
T7	0.1	0	135	129	0.0	7.2
T8	0.7	0	179.5	150	0.0	108.6
T9	0.1	0	115	18	0.0	1.0
L1	0	0.5	60	15	30.0	0.0
L2	0	0.4	102	17.5	38.3	0.0
L3	0	0.2	110	9	22.8	0.0
L4	0	0.5	130	15	65.0	0.0
L5	0	0.3	160	15	40.6	0.0
L6	0	0.5	130	135	65.0	0.0
L7	0	0.5	140	135	70.0	0.0
L8	0	0.1	21	55	1.2	0.0
SUM	4.1	2.9			332.9	188.0

Xcr = 115.0996 ft

Ycr = 45.96966 ft

3rd FL - 4th FL

ID	Rkx	Rky	Xk	Xy	Rky*Xk	Rkx*Yk
T1	0.6	0	15	60	0.0	35.0
T2	0.6	0	15	50	0.0	29.2
T3	0.2	0	111	30	0.0	6.8
T4	0.1	0	113.5	0	0.0	0.0
T5	0.6	0	145	20	0.0	11.7
T6	1.6	0	164.5	0	0.0	0.0
T7	0.1	0	135	129	0.0	9.3
T8	0.7	0	179.5	150	0.0	108.2
T9	0.1	0	115	18	0.0	1.3
L1	0	0.6	60	15	35.0	0.0
L2	0	0.4	102	17.5	45.3	0.0
L3	0	0.3	110	9	27.9	0.0
L4	0	0.6	130	15	75.8	0.0
L5	0	0.6	160	15	93.3	0.0
L6	0	0.6	130	135	83.0	0.0
L7	0	0.6	140	135	89.4	0.0
L8	0	0.1	21	55	1.5	0.0
SUM	4.6	3.8			451.3	201.4

Xcr = 118.8566 ft

Ycr = 43.82891 ft

A-3

SOUTH BUILDING: CENTER OF MASS

2nd FL

ID	A (ft*ft)	x (ft)	A*x	y	A*y
A1	5400	45	243000	30	162000
A2	6361	52	330772	98.2	624650.2
A3	16350	129.5	2117325	75	1226250
A4	-900	75	-67500	75	-67500
A5	-1530	105	-160650	65	-99450
A6	-600	75	-45000	50	-30000
	25081				

x = 96.4 ft

y = 72.4 ft

3rd FL

ID	A (ft*ft)	x (ft)	A*x	y	A*y
A1	5400	45	243000	30	162000
A2	6361	52	330772	98.2	624650.2
A3	16350	129.5	2117325	75	1226250
A4	-900	75	-67500	75	-67500
A5	-2400	105	-252000	80	-192000
A6	-600	75	-45000	50	-30000
	24211				

x = 96.1 ft

y = 71.2 ft

4th FL

ID	A (ft*ft)	x (ft)	A*x	y	A*y
A1	6300	45	283500	35	220500
A2	16350	128.5	2100975	75	1226250
A3	1638	60	98280	90	147420
A4	1080	90	97200	120	129600
	25368				

x = 101.7 ft

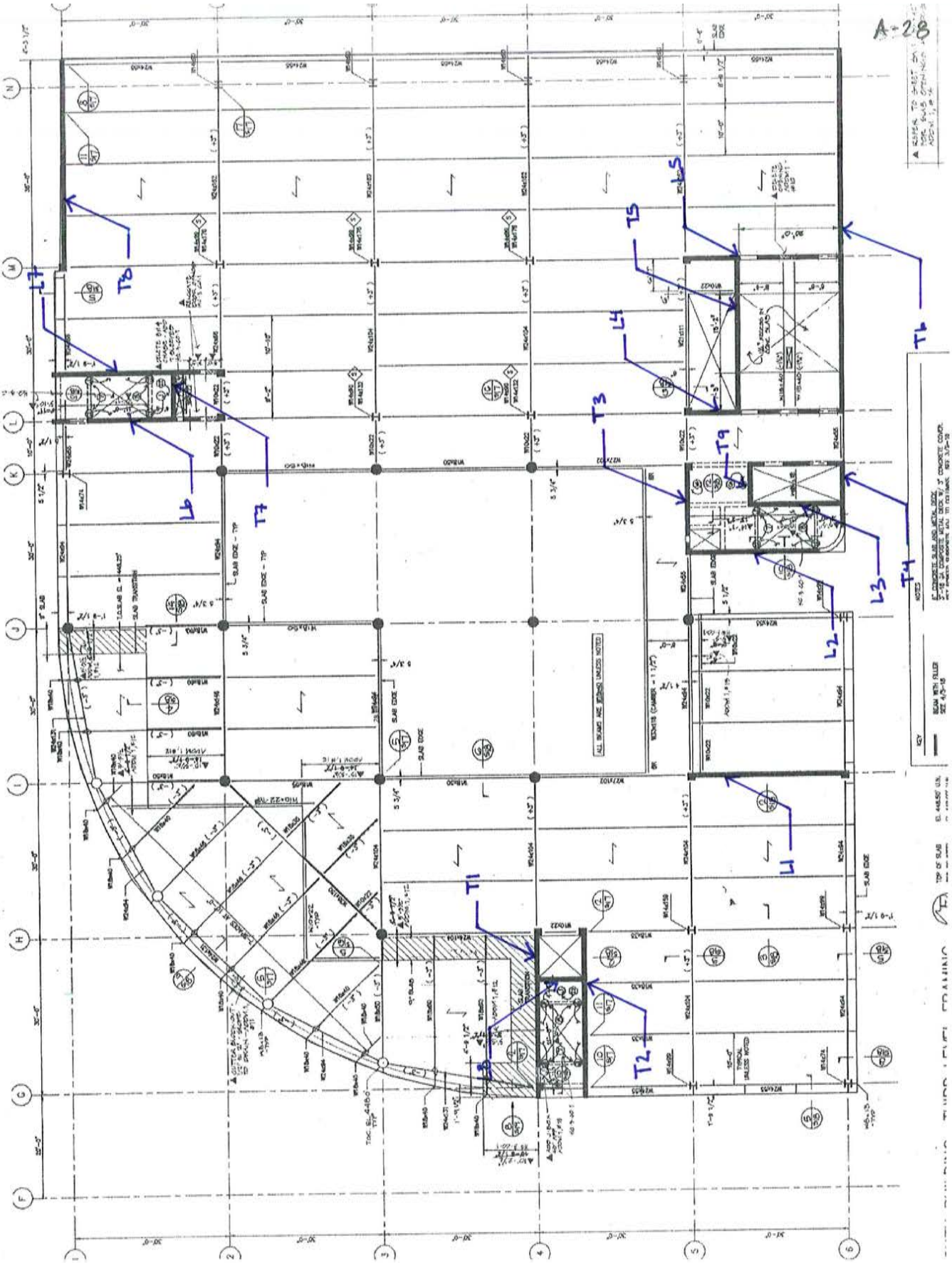
y = 68.0 ft

5th FL

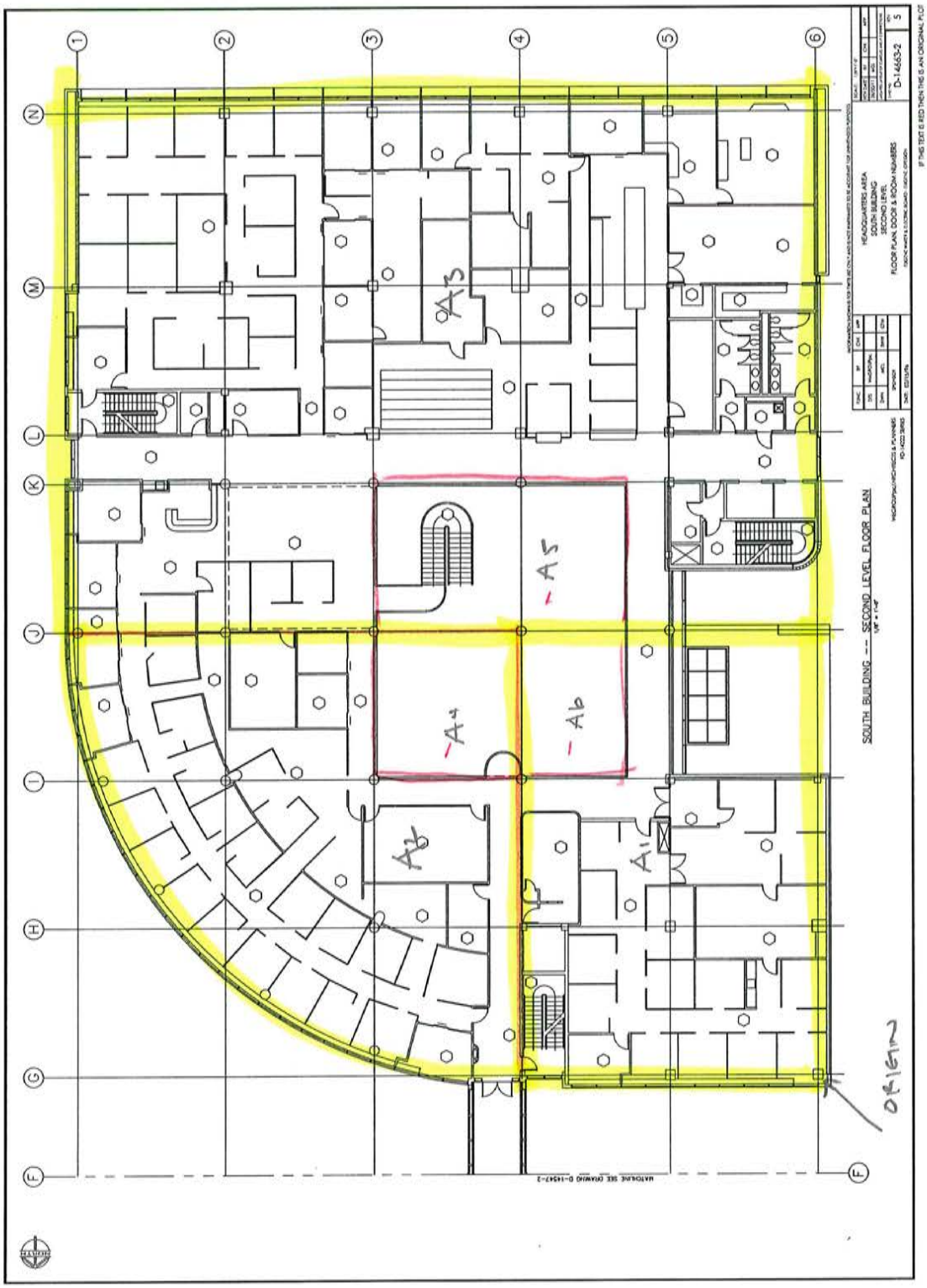
ID	A (ft*ft)	x (ft)	A*x	y	A*y
A1	810	118	95580	15	12150
A2	1270	30	38100	40	50800
A2	10350	164.5	1702575	75	776250
	12430				

x = 147.7 ft

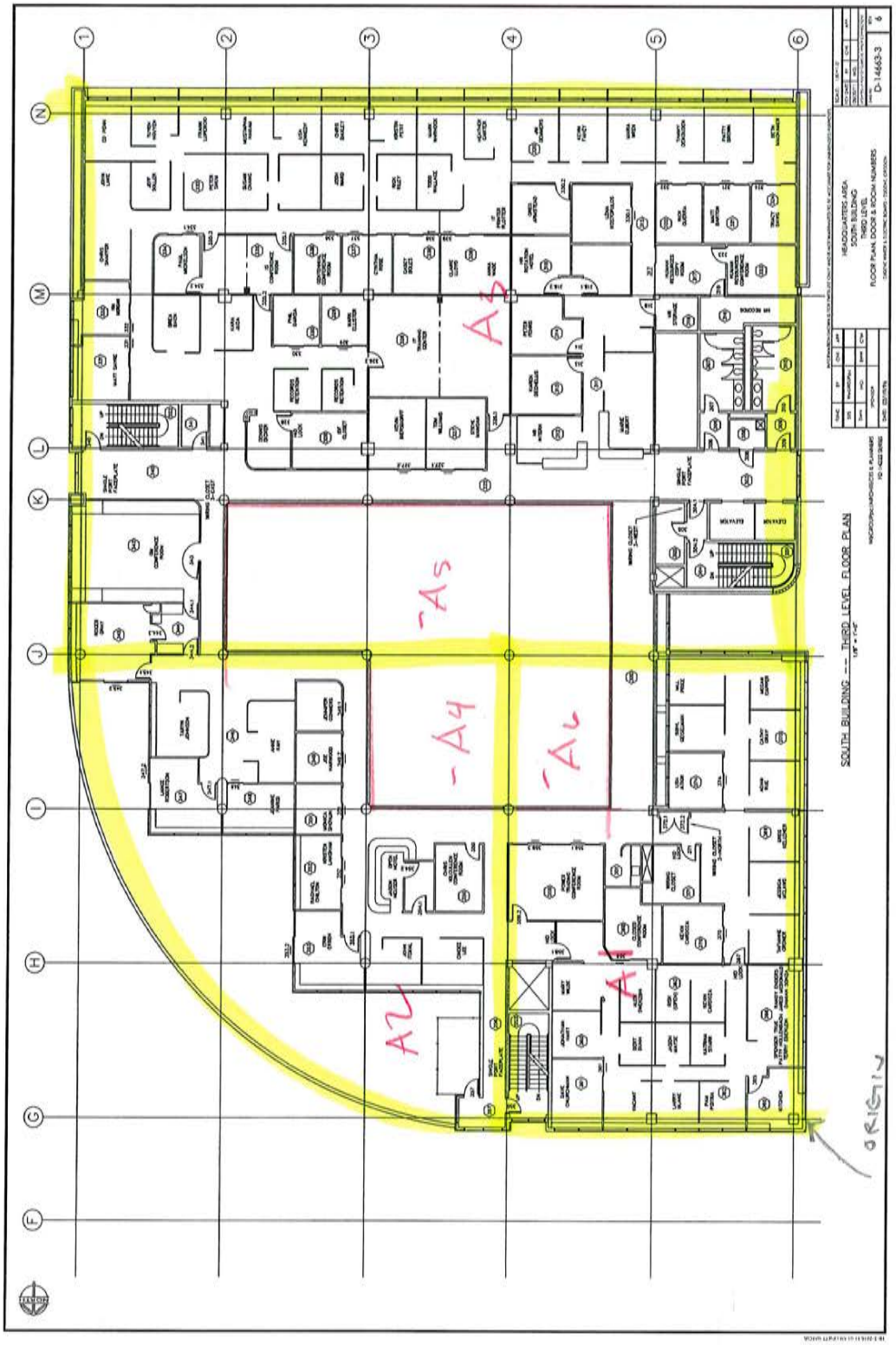
y = 67.5 ft


A-28
T1
T2
T3
T4
T5
T6
T7
T8
T9
L1
L2
L3
L4
L5
L6
L7

A-29


SOUTH BUILDING --- SECOND LEVEL FLOOR PLAN
HEADQUARTERS AREA
SOUTH BUILDING
SECOND LEVEL
FLOOR PLAN, DOOR & ROOM NUMBERS
D-14663-2
A3
A5
A4
A6
A2
A1
original

A-3P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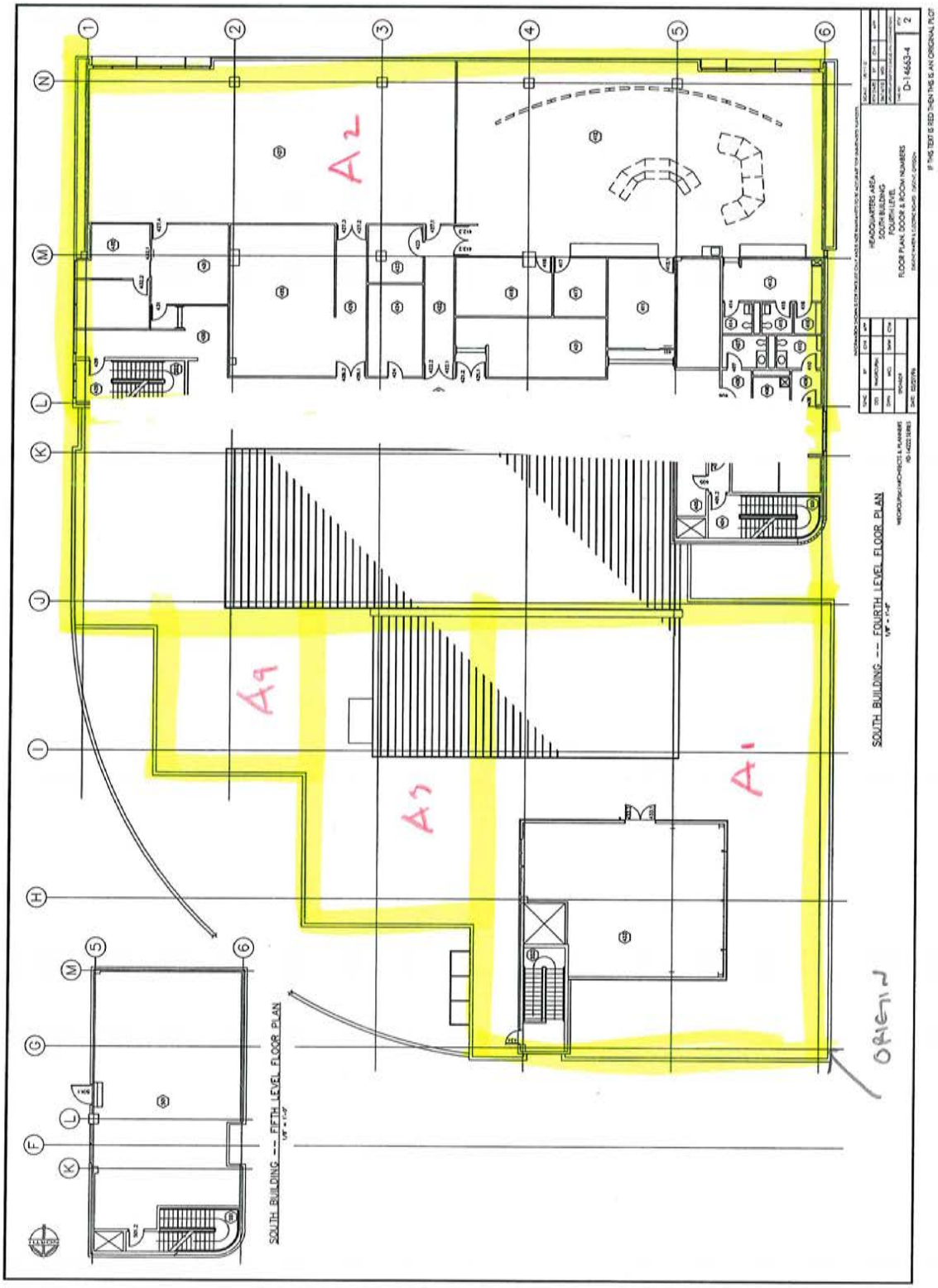
HEADQUARTERS AREA
SOUTH BUILDING
THIRD LEVEL
FLOOR PLAN, DOOR & ROOM NUMBERS
D-14663-3
A3
A5
A4
A6
A2
A1
ORIGIN

A-31


SOUTH BUILDING -- FOURTH LEVEL FLOOR PLAN
SOUTH BUILDING -- FIFTH LEVEL FLOOR PLAN
A2
A9
A7
A1
ORIGINAL

A-32

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT:
PROJECT NO: 117666
DATE: 11/2016
BY: JBL

QUICK SHEAR CHECK (NORTH BLDG)

$V = 1813^k$

N/S DIRECTION ("T" WALLS)

$L_w \cong 135'$

$t_w = 10''$

$v = \dfrac{1813^k}{(135')(10'')} = 111$ psi OK

E/W DIRECTION ("L" WALLS)

$L_w \cong 82'$

$t_w = 10''$

$v = \dfrac{1813^k}{(82')(10'')} = 184$ psi OK

A-33

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT:
PROJECT NO: 117666
DATE: 11/2016
BY: JBL

QUICK SHEAR CHECK (SOUTH BLDG)

$V = 5842^k$

N/S DIRECTION ("T" WALLS)

$L_w = 227$

$t_w = 10''$

$v = \frac{5842^k}{(227')(10'')} = \underline{214 \text{ psi OK.}}$

E/W DIRECTION ("L" WALLS)

$L_w = 139'$

$t_w = 10''$

$v = \frac{5842^k}{(139')(10'')} = \underline{350 \text{ psi OK}}$

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

PAGE:
PROJECT NO: 11766
DATE: 11/08/2016
BY: MC

SUBJECT: EWEB HQ

COLUMN AXIAL STRESS CHECK (BRIDGE)

$$P_{D+L} = 44'(5')(94\,psf) + 44'(5')(40\,psf) = 29.4^{k}$$

$$f'_c = \frac{29.4^{k}}{452^{in^2}} = 64\,psi < 0.2f'_c \quad \therefore \text{ O.K.}$$

COLUMN SHEAR STRESS (BRIDGE)

$$v_j^{AVG} = \frac{1}{\Pi_s}\left(\frac{n_c}{n_c - n_f}\right)\left(\frac{V_i}{A_c}\right) \qquad (4\text{-}8)$$

$$= \frac{1}{2}\left(\frac{8}{8-4}\right)\left(\frac{104^{k}}{3619^{in^2}}\right)$$

$$= 29\,psi < 2\sqrt{f'_c} \quad \therefore \text{ O.K.}$$

A-35

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: EWEB HQ

SUBJECT:
PROJECT NO: 117606
DATE: 11/2016
BY: JSL

CONC. COL DEF'L COMPATIBILITY CHECK

- APPLICABLE TO BOTH BLDGS ; SOUTH BLDG USES B/C LARGER DL => LARGER M_n
- COLUMNS ARE 24" ϕ
- LONG REINF = 12 - #8 OR 16 - #10
- SPAN = 13' AT GROUND FLOOR
- ASSUME $f'_c = 3000$ psi $f_y = 60$ ksi
- ½" ϕ SPIRAL AT 3" PITCH, TYP.

$$V_{CE} = 2\sqrt{3000}\,(0.8)(450\,in^2) + \frac{(2)(0.19\,in^2)(60\,ksi)(22")}{3"}$$

$$V_{CE} = 156^k \quad (\text{LIMITED TO } 8\sqrt{f'_c})$$

- $P_D = 3(30')^2(95\,psf) = 256^k$

  $P_L = 3(30')^2(48\,psf) = 130^k$

  $P_u = P_D + 0.5P_L = 320^k$

- $M_n = 498^{k'}$ (12 - #8)

  $M_n = 784^{k'}$ (16 - #10)

HOHBACH-LEWIN, INC.
STRUCTURAL ENGINEERS

SUBJECT: A-36

PROJECT NO: 11766

DATE: 11/7/2016

BY: MC

SUBJECT:

CHECK SHEAR CAPACITY

12 - #8 BARS

$V_E = \frac{2M_n}{13'} = 76^k < 156^k \quad \therefore \quad O.K.$

16 - #10 BARS.

$V_E = \frac{2M_n}{13'} = 120^k < 156^k \quad \therefore \quad O.K.$

```
General Information:
====================
  File Name: T:\11766\(F) Calculations\11766_12-No 8 Bars.col
  Project:  EWB HQ
  Column:   12-#8                          Engineer: MC
  Code:     ACI 318-14                     Units: English

  Run Option: Investigation                Slenderness: Not considered
  Run Axis:   X-axis                       Column Type: Structural

Material Properties:
====================
  Concrete: Standard                       Steel: Standard
  f'c    = 3 ksi                           fy     = 75 ksi
  Ec     = 3122.02 ksi                     Es     = 29000 ksi
  fc     = 2.55 ksi                        Eps_yt = 0.00258621 in/in
  Eps_u = 0.003 in/in
  Beta1 = 0.85

Section:
========
  Circular:    Diameter = 24 in

  Gross section area, Ag =  452.389 in^2
  Ix =  16286 in^4                         Iy =  16286 in^4
  rx =  6 in                               ry =  6 in
  Xo =  0 in                               Yo =  0 in

Reinforcement:
==============
  Bar Set: ASTM A615
  Size Diam (in) Area (in^2)   Size Diam (in) Area (in^2)   Size Diam (in) Area (in^2)
  ---- --------- -----------   ---- --------- -----------   ---- --------- -----------
  #  3      0.38        0.11   #  4      0.50        0.20   #  5      0.63        0.31
  #  6      0.75        0.44   #  7      0.88        0.60   #  8      1.00        0.79
  #  9      1.13        1.00   # 10      1.27        1.27   # 11      1.41        1.56
  # 14      1.69        2.25   # 18      2.26        4.00

  Confinement: Other; #4 ties with #10 bars,  #4 with larger bars.
  phi(a) = 1,  phi(b) = 1,  phi(c) = 1

  Layout: Circular
  Pattern: All Sides Equal  (Cover to transverse reinforcement)
  Total steel area: As = 9.48 in^2 at rho = 2.10%
  Minimum clear spacing = 3.92 in

  12 #8   Cover = 1.5 in

Factored Loads and Moments with Corresponding Capacities:
=========================================================
                 Pu          Mux        PhiMnx PhiMn/Mu NA depth Dt depth    eps_t     Phi
  No.          kip         k-ft          k-ft                 in       in
  --- ------------ ------------ ------------ -------- -------- -------- -------- ------
    1       320.00         0.00       498.65  999.999    10.86    21.50  0.00294  1.000

  *** End of output ***
```

A-38

```
General Information:
====================
  File Name: T:\11766\(F) Calculations\11766_16-No 10 bars.col
  Project:  EWB HQ
  Column:   16-#10                        Engineer: MC
  Code:     ACI 318-14                    Units: English

  Run Option: Investigation               Slenderness: Not considered
  Run Axis:   X-axis                      Column Type: Structural

Material Properties:
====================
  Concrete: Standard                      Steel: Standard
  f'c    = 3 ksi                          fy     = 75 ksi
  Ec     = 3122.02 ksi                    Es     = 29000 ksi
  fc     = 2.55 ksi                       Eps_yt = 0.00258621 in/in
  Eps_u = 0.003 in/in
  Beta1 = 0.85

Section:
========
  Circular:    Diameter = 24 in

  Gross section area, Ag =  452.389 in^2
  Ix =  16286 in^4                        Iy =  16286 in^4
  rx =  6 in                              ry =  6 in
  Xo =  0 in                              Yo =  0 in

Reinforcement:
==============
  Bar Set: ASTM A615
  Size Diam (in) Area (in^2)   Size Diam (in) Area (in^2)   Size Diam (in) Area (in^2)
  ---- --------- -----------   ---- --------- -----------   ---- --------- -----------
  #  3      0.38        0.11   #  4      0.50        0.20   #  5      0.63        0.31
  #  6      0.75        0.44   #  7      0.88        0.60   #  8      1.00        0.79
  #  9      1.13        1.00   # 10      1.27        1.27   # 11      1.41        1.56
  # 14      1.69        2.25   # 18      2.26        4.00

  Confinement: Other; #4 ties with #10 bars,  #4 with larger bars.
  phi(a) = 1,  phi(b) = 1,  phi(c) = 1

  Layout: Circular
  Pattern: All Sides Equal  (Cover to transverse reinforcement)
  Total steel area: As = 20.32 in^2 at rho = 4.49%
  Minimum clear spacing = 2.38 in

  16 #10   Cover = 1.5 in

Factored Loads and Moments with Corresponding Capacities:
=========================================================
                 Pu          Mux        PhiMnx PhiMn/Mu NA depth Dt depth    eps_t    Phi
  No.          kip         k-ft          k-ft                 in       in
  --- ------------ ------------ ------------ -------- -------- -------- -------- ------
    1       320.00         0.00       784.51  999.999    11.39    21.36  0.00263  1.000

  *** End of output ***
```

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APPENDIX C: SYSTEMS WEST ENGINEERS, INC MECHANICAL AND ELECTRICAL EVALUATION

1. INTRODUCTION

In general, the goal of this analysis is to identify upgrades to the existing EWEB headquarters building needed to provide building performance that approaches targets set for the new city hall building. Targets were described in the Owner's Project Requirements (OPR) document prepared for the city hall project. Of primary importance is the facilities energy use index (EUI) goal of approximately 30 KBtu/square foot/year.

2. EXISTING SYSTEM DESCRIPTIONS

General Discussion

The facility was constructed in 1988, making a majority of the mechanical and electrical equipment 28 years old. In our experience, major mechanical and electrical components have a useful life of approximately 25 to 30 years. As a result, with the exception of some equipment that has been added or replaced since initial construction, most equipment has reached or will soon reach the end of its life. In addition, while the building was considered to be energy efficient at the time of construction, much of the equipment and most system types cannot approach target efficiencies.

Based on energy data supplied for the building, the apparent EUI for the facility is 155 KBtu/square foot/year. Based on various sources for typical building energy consumption, a facility with this use type constructed at the same time should have an EUI of around 70. The reason facility energy consumption is so high is not immediately evident although some contributing factors include:

- The facility includes a three-story atrium, which contains a very large volume but relatively little actual floor space. For comparisons sake, if the area of the upper levels of the atrium were built out as useable space and energy consumption remained the same, the building EUI would be significantly lower at around 119 KBtu/square foot/year. In reality, some additional energy would be consumed in the new interior spaces, and the actual EUI would be closer to 125.
- The south building includes the majority of building area and is operated 24 hours a day, seven days a week to accommodate occupancy in the third-floor energy trading center.
- The fourth-floor data center is a very high EUI space not typically found in an office-type building.
- Building control systems are somewhat limited and may not be optimized to minimize energy use.

Of these factors, all would be eliminated with the exception of the atrium, if the building was recommissioned and converted to a city hall use. Since the impact of the atrium on EUI would still remain, we expect the actual EUI to be somewhat higher than a typical facility, likely around 73 KBtu/square foot/year.

Following is a detailed description of existing mechanical and electrical utilities.

Heating, Ventilating, and Air Conditioning Systems

Heating water and chilled water is delivered to the building HVAC equipment as a source for heating and cooling. Originally, heating water was produced by steam from a district steam system maintained by EWEB that served much of downtown Eugene. The steam system connection has been eliminated, and new high efficiency condensing boilers were installed in its place.

Chilled water is produced by a standard chiller and a heat recovery chiller. The standard chiller was installed at the time of construction. The heat recovery chiller was replaced, and the new unit is approximately eight years old. Originally, well water discharged to the Willamette River was used to reject heat produced by the chillers. The well was abandoned due to high maintenance requirements associated with use of untreated water and to eliminate the discharge of heated water into the Willamette River. In place of the well, a single large cooling tower was recently installed on the roof. A third roof-mounted chiller was originally provided as a back up to the heat recovery chiller.

A large majority of the building, including virtually all standard office space, is served by variable-volume reheat systems. The systems include central air handling units that deliver cooled air to terminal units located at individual zones. In zones where cooling is required, the terminal units regulate the volume of air delivered to meet demand. Where heating is required, air flow is reduced to a minimum, and the air is reheated at the terminal unit heating coil. The need to reheat air is inherently wasteful, and this type of system is not used in newer, high performance buildings because of efficiency limitations.

The fourth floor of the south building includes a data center, the power dispatch control room, UPS room, and related spaces. This floor is served by independent equipment including a variable volume reheat system that serves all spaces except the data center which is served by three computer room air conditioning units. All equipment serving the fourth floor is cooled by the heat recovery chiller. The energy captured by cooling the fourth floor is rejected from the chiller at a temperature high enough that it can be used to meet simultaneous building heating loads. Since the data center requires continuous cooling, the potential for energy recovery is significant.

Approximately eight years ago, an additional roof-mounted fan system with direct expansion cooling was installed to serve the data center. Reportedly, the roof-mounted fan system is currently being used as the primary source of cooling for the data center, and the heat recovery system is not used.

The south building's three-story atrium is equipped with a dedicated smoke exhaust system. Presently, two large exhaust fans are located at the top of the atrium to remove smoke in the event of a fire. Makeup air is provided by central fan systems plus a smaller dedicated atrium makeup unit. The fans are served by the building's emergency power system, and the fans and all related equipment are controlled by a standalone smoke control system dedicated for the application. The system appears to be largely original.

The building was originally controlled by a pneumatic system. To improve operation, an Automated Logic direct digital control system was installed and connected to major mechanical equipment. The system is somewhat limited since it was not connected to local terminal units.

As previously discussed, most equipment has reached the end of its service life, and replacement is needed to provide the efficiency and reliability expected for the city hall building. Equipment that can potentially be reused, because it is relatively new, includes the heat recovery chiller, cooling tower, condensing boilers, and some of the central plant pumps.

Plumbing

The north and south portions of the existing building currently have separate domestic water service, both equipped with reduced pressure principal backflow preventers located in the respective fire riser rooms. The services appear to be adequate for the current building configuration.

Domestic water piping is copper with soldered fittings. Plumbing fixtures are generally commercial grade and in good condition, with a mix of automatic and manual controls for faucets and flushometers. Restroom fixtures in a few locations are ADA compliant, but most fixtures are not mounted at ADA-compliant heights.

In the south building, hot water is supplied by a pair of gas-fired high-efficiency condensing storage tank water heaters with a single domestic hot water recirculation pump. The water heaters were installed in 2008 and have an expected remaining service life of nine years. In the north building, hot water is supplied by a single electric storage tank water heater with associated recirculation pump. The water heater was installed in 2000 and is at the end of its expected service life.

Fire Suppression Systems

The north and south portions of the existing building are currently protected by separate wet pipe sprinkler systems with separate fire water services, backflow preventers, and fire department connections. The south building is also equipped with standpipe risers in the stairwells, FM-200 clean agent dry chemical fire suppression systems for the first-floor inverter room and two data rooms on the fourth floor, and a double-interlock dry pipe suppression system for the main data room on the fourth floor. Sprinkler heads generally appear to be fusible link standard response type. The fire sprinkler systems appear to be appropriate for the applications and have significant remaining life. Sprinkler heads should be updated to a more modern quick response type.

Electrical Distribution

South Building

The existing electrical distribution system consists of three services fed from a single utility transformer at 480Y/277 volt. The existing utility transformer is sized at 1000kVA and located near the southwest corner of the south building. The three main electrical services serve switchboards located on the first-floor main electrical room and UPS room, and are separated as follows:

- Normal Power: Served from 1200A switchboard.
- Emergency Power: Served from 800A switchboard.
- Fourth Floor Data Center/Power Dispatch: Served from 800A switchboard.

The normal power is metered separately from other services, and feeds transformers and sub-distribution and branch panelboards in electrical closets located on each of the floors above. Two

electrical closets are located on each floor. This distribution equipment is still serviceable and would not require replacement. Circuit space in the existing panelboards is limited and additional panelboards will be required on each floor to accommodate renovations. The normal switchboard also serves an existing motor control center located in the first-floor mechanical room.

The emergency power switchboard feeds branch panelboards located in electrical closets throughout the building as well as motor control centers located on the first and fourth floor and in the penthouse. This service is metered separately from the other services. This system has its own automatic transfer switch and is backed up by an existing 750kW diesel generator on site.

The data center/power dispatch switchboard is metered separately and serves equipment associated with the fourth-floor data center/power dispatch center and the corresponding UPS cabinets located on the first floor. This system has two automatic transfer switches and is backed up by the same existing 750kW diesel generator on site.

North Building

The existing electrical service consists of a single utility transformer feeding an 800A main distribution assembly (MDA), at 208Y/120 volt, located on the second floor. This service is separately metered. The utility transformer is located on the north side of the building. The distribution equipment is still serviceable and would not require replacement.

The MDA feeds distribution panelboards located on the first and second floors of the building. Circuit space in the existing panelboards is limited, and a new panelboard will be required on each floor to accommodate renovations.

Site and Internal Lighting

Existing building interior lighting remains largely unchanged from the original installation. Existing lighting is a mix of fluorescent with both T8 and T12 lamps, incandescent, and metal halide fixtures. General lighting fixtures consist of 2x4 recessed fluorescent 3-lamp troffers. Some fixtures are fitted with parabolic louvers, while others have acrylic lenses. During the walkthrough, many fixtures had lamps that were either turned off or were no longer functional. Existing light levels range from 10 foot-candles to 50 foot-candles throughout the open office areas and a have a max-to-min ratio greater than 5:1.

Select fixtures are equipped with integral battery ballasts to provide emergency lighting. The state of these battery ballasts is unknown. Exit signs consist of a mixture of LED type and fluorescent. The existing fluorescent-type exit signs will likely not conform to the current energy Code standard.

Exterior site and building lighting consists mainly of HID fixtures that are pole-mounted or building-mounted. Fixture HID lamps sources have a high lamp-lumen depreciation over the life of the lamps.

Existing lighting control panels are used to control lighting in the corridors, stairways, the atrium, the exterior of the building, and large open office areas. Manual controls for lighting are used in private offices and other enclosed spaces. Apart from select spaces, there is little to no occupancy-based lighting control system within the building.

It was noted during the walkthrough that pole-mounted exterior lighting serving the parking area at the Midgley Building is controlled from the south EWEB building.

The existing systems are nearing the end of their service life and will likely not conform to current energy code standards.

Low Voltage Systems

Existing incoming data service enters the building and is routed to the fourth-floor main data center. From this location, fiber cabling is routed down through the building to the IDF rooms, two located on each floor. Horizontal distribution cables are routed from these IDF rooms to data outlets located throughout their respective areas.

The existing fourth floor main data center serves the EWEB operations in the power dispatch room, UPS room, and related spaces. This service will need to remain in operation until EWEB vacates this space.

The existing location and sizes of IDF rooms on each floor is adequate to provide distribution throughout the building.

Fire Alarm Systems

The existing main fire alarm panel consists of an automatic fire alarm located on the fourth floor that activates the notification appliances upon fire sprinkler flow. In addition to the automatic system, the building is equipped with full area detection and manual pull stations. The smoke detectors are used for initiation of the dedicated smoke exhaust system in the three-story atrium.

A firefighter's smoke control panel is located at the main entrance lobby for manual control and override of the smoke exhaust system.

3. RECOMMENDED UPGRADES

To approach the OPR targets and provide a reliable and maintainable facility, a variety of modifications to improve performance and efficiency will be required. Following is a description of potential mechanical, electrical, and plumbing upgrades that will help meet the project goals.

Heating, Ventilating, and Air Conditioning Systems

The heating, ventilating, and air conditioning systems represent the single largest opportunity for energy reduction, and complete system replacement is required to approach target efficiency. A variety of system types may be applicable, but the most obviously suitable approach will be based around the use of chilled beams throughout.

Chilled beams are ceiling-mounted induction units equipped with integral heating/cooling coils. The units are able to deliver the same amount of heating and cooling as standard systems while using approximately 25% of standard airflow. The low airflow rate is close to the amount required for ventilation that must be supplied to meet Code regardless of the system type. While some space load is met by the central fan air, most is met by the integral heating/cooling coils connected to the

central heating water and chilled water distribution systems. The use of water to transport heating and cooling energy instead of air provides significant energy savings.

While some variation of airflow to the chilled beams can be made as load varies, airflow from air handling units is relatively constant, making it easy to provide the correct ventilation rate and optimum air quality in all spaces.

Chilled beams are not equipped with condensate drains, and space humidity must be maintained low enough that the beam coils do not condense and drip. Typically, humidity control is provided by controlling the air temperature supplied to the beams.

The central fans that supply air to the units are dedicated outside air systems (DOAS) equipped with heat recovery. The units will generally provide 100% outside air except during morning warmup. Internal heat recovery will capture as much as 70% of the energy normally wasted in the associated exhaust for use in preheating outside air.

Chilled water and heating water will be provided from a central plant. Ideally, geothermal wells will be incorporated in the central plant to provide the lowest possible energy consumption. When coupled with heat pump type chillers, the wells offer a source of energy when the building is in heating and a place to reject heat when the building is in cooling. The system also allows the energy produced by cooling one area to be used in another area that has a simultaneous heating load. Overall, this approach provides very high efficiency and shifts the building energy sources away from fossil fuel. A more detailed discussion of geothermal alternatives is included below.

Unfortunately, the current space included in the acquisition is limited, and the only area that appears practical for a significant well installation is proposed as the site for Phase 2 construction. For purposes of this evaluation, it is assumed that the space will be reserved for a Phase 2 project, although this should be recognized as a trade off against improved energy efficiency in the Phase 1 project.

Without the use of wells, the apparent best central system option will include high efficiency condensing boilers, a high-efficiency standard chiller, and a heat recovery chiller. The heat recovery chiller will allow recovery from internal building cooling loads that could be applied to simultaneous heating loads at the building exterior. The heat recovery approach will be conceptually similar to the recovery chiller currently installed for the fourth floor except it will include all building internal loads.

Both the standard chiller and the heat recovery chiller will be connected to the existing cooling tower, and the existing high efficiency boilers and most central plant pumps would be reused. The dedicated outside air units serving the chilled beams will be connected directly to the heating water and chilled water systems.

Most mechanical systems are controlled by an Automated Logic direct digital control (DDC) system which does not match Siemens, the City of Eugene standard. To match the standard, the DDC components will need to be completely replaced. Alternately, much of the existing equipment could be reused to save cost. In our opinion, the Automated Logic control system is of similar quality and has similar support. Accordingly, we recommend that the system be retained unless maintaining a single system serving all city facilities is considered an overriding factor.

While the general building control system appears adequate, the smoke control system is questionable given its age. The system appears to be almost completely original, and given that it serves a life/safety function, replacement is recommended.

Phase 1 Construction

The proposed phasing plan includes renovation of the entire existing facility with the exception of the fourth floor of the south building as part of Phase 1 construction. As a result, the fourth floor must remain operational and in its current arrangement until Phase 2. Fortunately, the fourth-floor HVAC systems can be isolated from the remainder of the building except for connection to the central heating water system. Since the boilers and related pumps are intended to be reused, keeping the heating system operational during Phase 1 construction to serve the fourth floor should be relatively simple. Cooling could be provided by the existing rooftop chiller that currently serves as backup for the heat recovery chiller. The recently installed rooftop air handling unit would serve as backup to the rooftop chiller.

Phase 2 Construction

Phase 2 will include a renovation of the fourth floor of the existing building plus construction of a new building. Fourth-floor construction will match the system types and equipment installed under Phase 1. The mechanical system installed in the new building will have fewer restrictions on acceptable system type, and it is difficult to predict what type would be appropriate, particularly since there may be changes in available technology by the time it is constructed.

Geothermal Alternatives

The general central plant approach can be made significantly more efficient by incorporating geothermal wells. A variety of variations could be implemented depending on the available space and the resulting number of wells that can be installed. For example, if the new building currently proposed as part of Phase 2 is located elsewhere, some space for wells appears to be available in the parking area immediately west of the south building. Preliminarily, it appears that around 50 to 60 wells could be installed. Each would be 300 feet deep, and the total would provide approximately 100 to 120 tons of capacity. The expected connected load for the dedicated outside air units would be approximately 110 tons which indicates that the DOAS units are a good match for this available capacity. Coupling the DOAS units directly with the geothermal wells suggests that the DOAS units could be equipped with direct-expansion compressors and act as heat pumps to maintain discharge temperature and humidity control. In addition, the units will be equipped with refrigerant reheat coils that provide free reheat if the units are in a dehumidification mode. This package of upgrades will provide a significant improvement in overall building efficiency.

An even larger improvement could be gained by adding more wells, although it would require acquisition of more property.

Plumbing

The existing domestic water distribution system is adequate for continued use, and could be extended as necessary to serve any new fixtures required by changes to space programming. The existing water heater serving the north building would be replaced.

Significant energy efficiency upgrades are not expected to be available, since the existing gas water heaters are already high efficiency type. However, to obtain a sustainability benefit, lavatory and sink faucets could have new aerators installed to reduce water use although achieving significant water savings would involve replacement of existing urinals and water closets with water efficient fixtures.

Fire Sprinkler System

Fire protection systems would be modified to meet any floor plan modifications. In addition, existing sprinkler heads would be replaced with new, quick response type. The existing inverter room FM-200 system would remain in service. Data room FM-200 and pre-action fire protection systems would remain in service as long as EWEB continues to occupy the fourth floor. It is expected that the wet-pipe system would be extended to provide coverage to all of the fourth-floor spaces after EWEB vacates the fourth floor.

Electrical Distribution

South Building

The work for the electrical distribution in the south building will be done in two phases:

Phase 1 Construction

Phase 1 includes renovation of the existing facility except for the fourth floor of the south building. Power for the fourth floor will need to remain operational. Fortunately, the service to the fourth floor can be isolated from the rest of the building with only minor changes to the existing distribution system serving the area.

The existing panelboards appear to have enough load capacity but do not have physical space for additional circuits. We anticipate that two additional 120/208V panelboards will be required per floor to meet the new branch circuit requirements. The new panelboards may be served from the existing stepdown transformers located on each floor. All motor control centers (MCCs), except the MCC feeding mechanical equipment to the fourth floor, will be replaced with new distribution boards to service new mechanical equipment. All wiring devices will be demolished and new devices and new branch circuit wiring will be provided.

The emergency system will remain intact during Phase 1. The only anticipated work will be to connect new egress lighting and fire smoke control equipment to the existing emergency panels.

Separate sub-metering for the existing distribution will need to be provided to break out lighting, mechanical, and general use receptacle loads from one another.

Phase 2 Construction

Phase 2 includes renovation of the fourth floor, replacement of the existing generator, and construction of a new building. The existing generator will be removed because it will be oversized, and a new generator will be installed to support the new smoke control system and to replace an

existing inverter used for egress lighting. The new generator will connect to an existing emergency distribution board.

The renovation of the fourth floor will require two additional 120/208V panelboards to support new branch circuits. The existing MCC servicing the mechanical equipment for this floor will be replaced with a new distribution board to support the new mechanical equipment. The renovation will require all wiring devices to be demolished, and new devices and new branch circuit wiring will be provided.

The new building will require a new service. It is assumed the new building will only require emergency power for egress lighting. The emergency power for the new building will be connected to a new generator provided for the building.

Separate sub-metering for existing distribution will need to be provided to break out lighting, mechanical, and general use receptacle loads from one another.

North Building

The existing service and electrical distribution system can be used. We anticipate one additional 120/208V panelboard will be installed at each floor to support the new branch circuit requirements. All wiring devices will be demolished and new devices and branch circuit wiring provided.

Emergency power for the building will be provided for egress only. It is assumed that no additional emergency power is required except for egress lighting. The branch circuit for the egress lighting will connect to the existing emergency panel in the south building.

Separate sub-metering for existing distribution will be provided to break out lighting, mechanical, and general use receptacle loads.

Site and Internal Lighting

A complete building-wide upgrade of existing lighting and lighting controls is recommended. This upgrade will include exterior building-mounted and pole-mounted fixtures. Existing fixtures would be replaced with high efficiency LED-type fixtures, and distribution types would be selected based upon the visual tasks being performed in each area. With the use of LED light fixtures throughout the building, we estimate the lighting system will achieve a 30% energy reduction over what is required by Code.

It is our assumption that a one-for-one replacement of light fixtures would occur, with minor variances to account for reconfigured floor plans within the building and modifications to site layout.

Existing centralized lighting control panels will be replaced with a digital-based system with networked devices utilizing CAT5 cabling between devices including relay packs, occupancy sensors, photocells, and switches. The lighting control devices will be connected to the building network through a bridge, and web-based software will be used to allow remote configuration and monitoring of the system. The lighting control system will accept inputs from the Building Automation System (BAS) for control of select areas within the building.

Occupancy-based detection would be provided throughout the building. This upgrade would include occupancy sensors located within the space that would turn off lighting during hours of low or no occupancy. Manual override would be installed to allow occupants to control lighting fixtures in their respective areas.

Daylight harvesting would be an integral function of the lighting control system and be used where sufficient natural light is available.

With the use of a digital-based distributed lighting control system and a combination of schedule and occupancy based detection, we would estimate an additional 15% energy savings.

Low Voltage Systems

A new main distribution frame (MDF) will need to be established within the building and new fiber will need to be pulled to the existing IDF rooms, located on each of the floors, back to the MDF. New data equipment will be required in the new MDF as well as the existing IDF rooms. This equipment will include floor standing racks, fiber panels, switches, etc.

While a limited portion of the horizontal CAT5 cabling can be reused, the large majority would be replaced to accommodate interior renovations and new furniture layouts. New wireless access points will need to be provided throughout the building and their associated cabling routed back to and terminated at the nearest IDF room.

Fire Alarm Systems

Complete replacement of the existing fire alarm system is recommended. This replacement would include a new main fire alarm panel, annunciator, fire-fighters smoke control panel, notification appliances, and detectors.

4. ESTIMATED BUILDING ENERGY USE AFTER UPGRADES

As previously discussed, we expect that the existing building in its current configuration should have an energy use index of 73 KBtu/square foot/year if it were converted to a city hall type use, and existing systems were recommissioned and optimized. To bring the building as close as possible to the target of 30, there are four major upgrades that could be made, including new lighting, a new mechanical system, window replacement, and the addition of wall insulation. The mechanical and electrical upgrades are described in preceding sections. Window upgrades would include installation of new triple-pane windows with improved frames. Upgrades to wall insulation would include adding 2-inches of polyisocyanurate insulation. The following table shows the effect of implementing each upgrade in the order shown.

TABLE 1	PROJECT ENERGY CONSUMPTION ESTIMATED
UPGRADE SENARIOS	**EUI/KBtu/sqft-yr**
Retro-Cx HVAC system and 8-5 occupancy	73
High-efficiency HVAC system (Boiler, heat recovery chiller, DOAS w/heat recovery)	52
LED lighting at 0.5 W/sq.ft.	50
Window replacement with triple-pane glazing; improved frames	48
Added 2" interior rigid wall insulation; achieve R-23 total	45

As can be seen, the facility does not closely approach the OPR target EUI of 30. However, the building would be relatively efficient compared to current energy code. If the facility was constructed at this time to meet minimum energy code requirements, the EUI would be about 54. With a projected EUI of 45, the building should be about 17% below code.

COST SUMMARY TABLE

A summary of mechanical, electrical, and plumbing costs by phase follows.

TABLE 2	COST SUMMARY
PHASE 1	**COST**
HVAC	$ 4,195,650
PLUMBING	67,400
FIRE PROTECTION	54,700
ELECTRICAL DISTRIBUTION	844,300
SITE AND INTERNAL LIGHTING	887,600
LOW VOLTAGE	497,900
FIRE ALARM	194,900
PHASE 2	
4th FLOOR HVAC	$ 328,000
4th FLOOR PLUMBING	6,600
4th FLOOR FIRE PROTECTION	5,300
4th FLOOR ELECTRICAL DISTRIBUTION	78,600
4th FLOOR LIGHTING	82,600
4th FLOOR LOW VOLTAGE	46,300
4th FLOOR FIRE ALARM	18,100
NEW BUILDING HVAC	$ 3,670,000
NEW BUILDING PLUMBING	335,000

NEW BUILDING FIRE PROTECTION	72,000
NEW BUILDING ELECTRICAL DISTRIBUTION	1,039,600
NEW BUILDING SITE AND INTERNAL LIGHTING	751,000
NEW BUILDING LOW VOLTAGE	421,300
NEW BUILDING FIRE ALARM	164,800
NEW BUILDING GENERATOR	100,000

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APPENDIX D: DETAILED COST INFORMATION

EWEB HEADQUARTERS BUILDING ASSESSMENT
CITY OF EUGENE
Draft Budget Summary
December 5, 2016

City of Eugene					Notes
City Hall Phase 1 - Occupy North Building and 1st, 2nd and 3rd Floors of South Building					
Selective Demolition	86,591	SF	$15.00	$1,298,865	All but 4th Floor, Excludes abatement
City Hall Phase 1 - Renovation - Architectural	86,591	SF	$90.00	$7,793,190	Renovate all but 4th Floor
Seismic Upgrades	99,914	SF	$30.00	$2,997,420	Entire Building
HVAC System Replacement	86,591	SF	$48.45	$4,195,650	All but 4th Floor
Plumbing / Fire Protection	86,591	SF	$1.41	$122,100	All but 4th Floor
Electrical / Lighting / Low Voltage Systems	86,591	SF	$28.00	$2,424,700	All but 4th Floor
Exterior Envelope Upgrades / New Windows					
- Window Replacement	19,025	SF	$130.00	$2,473,250	Includes Bridge Glazing
- Wall Thermal Improvements	54,578	SF	$12.00	$654,936	
- Sealant Joint Repairs	54,578	SF	$12.00	$654,936	
Parking Lot Improvements	43,872	SF	$20.00	$877,440	
Sitework Renovation	28,081	SF	$45.00	$1,263,645	
			Subtotal	$24,756,132	
Phasing & Temporary Work			0.0150	$371,342	
General Conditions			0.0650	$1,633,286	
Bonds & Insurance			0.0285	$762,682	
Overhead & Profit			0.0450	$1,238,555	
Design Contingency			0.0500	$1,438,100	
CM/GC Contingency			0.0300	$906,003	
Escalation to 2017			0.0500	$1,555,305	
Direct Construction			**Total**	**$32,661,404**	
Soft Costs at 35%				**$11,431,491**	
Project Budget - 2017			**Total**	**$44,092,895**	
Projected Project Budget - 2020			**Total**	**$48,649,279**	

City Hall Phase 2 - Renovate 4th Floor of South Building + Construct New Building					
Selective Demolition	13,323	SF	$15.00	$199,845	Renovation Area Only
City Hall Phase 2 - Renovation	13,323	SF	$90.00	$1,199,070	Renovate 4th Floor
HVAC System Replacement	13,323	SF	$24.62	$328,000	All but 4th Floor
Plumbing / Fire Protection	13,323	SF	$0.89	$11,900	All but 4th Floor
Electrical / Lighting / Low Voltage Systems	13,323	SF	$16.93	$225,600	All but 4th Floor
City Hall Phase 2 - New Building	67,086	SF	$320.00	$21,467,520	Area needed to meet full City Hall 2 Requirements
Sitework at New Building	34,100	SF	$45.00	$1,534,500	
			Subtotal	$24,966,435	
Phasing & Temporary Work			0.0150	$374,497	
General Conditions			0.0650	$1,647,161	
Bonds & Insurance			0.0285	$769,161	
Overhead & Profit			0.0450	$1,249,076	
Design Contingency			0.1500	$4,350,949	
CM/GC Contingency			0.0300	$1,000,718	
Escalation to 2017			0.0500	$1,717,900	
Direct Construction			**Total**	**$36,075,897**	
Soft Costs at 35%				**$12,626,564**	
Project Budget - 2017			**Total**	**$48,702,460**	
Projected Project Budget - 2027			**Total**	**$66,087,491**	

EWEB HEADQUARTERS BUILDING ASSESSMENT
CITY OF EUGENE
Draft Budget Summary
December 5, 2016

City Hall Phase 2 - Underground Parking at New Building

Underground Parking	47	Spaces	$45,000.00	$2,115,000	47 Spaces at 400 SF Under New Building
			Subtotal	$2,115,000	
Phasing & Temporary Work			0.0150	$31,725	
General Conditions			0.0650	$139,537	
Bonds & Insurance			0.0285	$65,158	
Overhead & Profit			0.0450	$105,814	
Design Contingency			0.1500	$368,585	
CM/GC Contingency			0.0300	$84,775	
Escalation to 2017			0.0500	$145,530	
Direct Construction			**Total**	**$3,056,124**	
Soft Costs at 35%				**$1,069,643**	
Project Budget - 2017			**Total**	**$4,125,767**	
Projected Project Budget - 2027			**Total**	**$5,598,518**	

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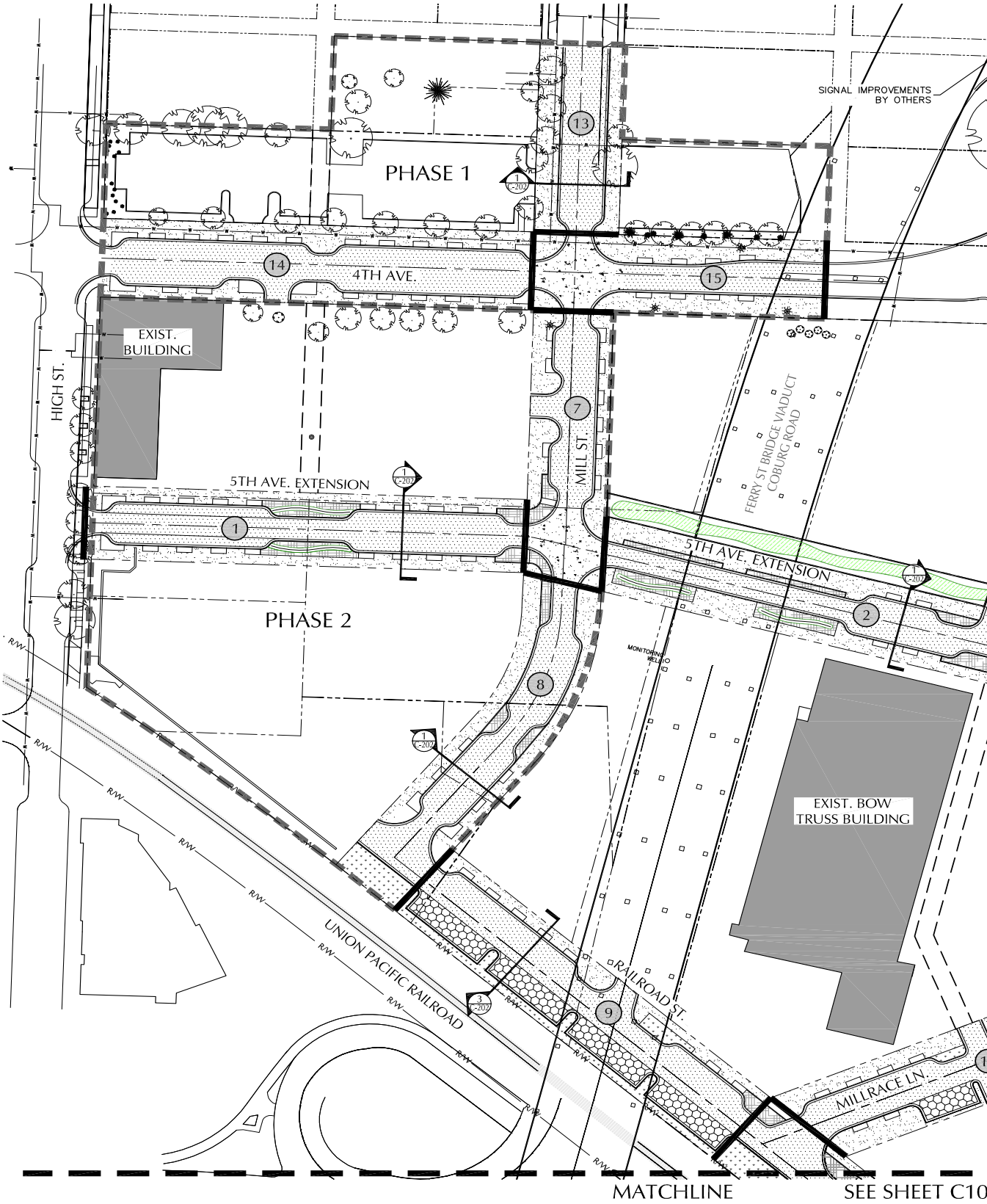
APPENDIX E: KPFF DUE DILIGENCE AND INFRASTRUCTURE MASTER PLAN



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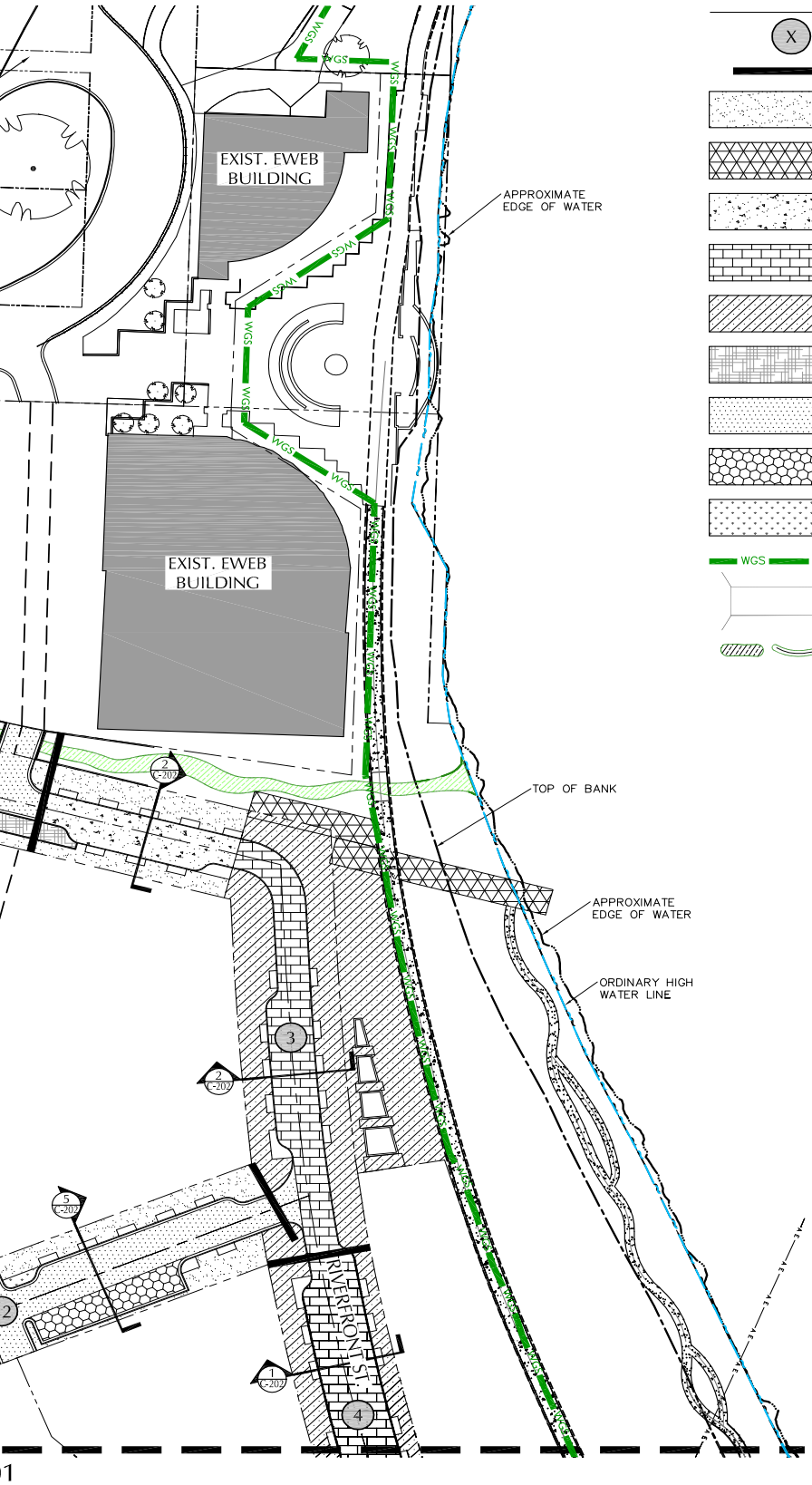

LEGEND

- COST ESTIMATE AREAS
- COST ESTIMATE MATCHLINES
- CONCRETE SIDEWALK
- BOARDWALK
- CONCRETE INTERSECTION
- SPECIALTY PAVING
- SPECIALTY WALKWAY
- STORMWATER PLANTER/BASIN
- AC PAVEMENT
- PERMEABLE PAVEMENT
- LANDSCAPING
- WILLAMETTE GREENWAY SETBACK
- BRIDGE
- GREEN STORMWATER FEATURE

kpff

FOUNDATION

EUGENE RIVER DISTRICT

DUE DILIGENCE AND INFRASTRUCTURE MASTER PLAN

SET ISSUE DATE

STREET LAYOUT

C100

Robertson Sherwood Architects pc
132 East Broadway, Suite 540
Eugene, Oregon 97401

www.robertsonsherwood.com
541.342.8077

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