Section 5 : Systems Narratives

Systems Narratives

Overview

Included in this section are narratives on site and building systems:

- Site Utilities
- Architectural Systems
- Structural Systems
- Mechanical, Electrical, and Plumbing Systems

5.1 Site Systems

Zoning

The existing zone districts are Public and Planned Unit Development [PUD] as shown on the attached figure. The current zoning and development requirements are outline in the City of Cheyenne's Unified Development Code [UDC] as currently amended and the attached PUD Ordinance 3886 for Block 140 Refinement A. The UDC is a complex and sometimes-convoluted development code encompassing standard subdivision and zoning requirements but also includes aspects related to site and building architecture. Implications for development are outlined as follows:

1. Site alterations are covered under a 'Site Plan' development process. A Site Plan is an administrative process generally requiring mapping of existing and proposed site changes and landscaping. Other requirements include impact reports [if major changes are anticipated] for traffic [pedestrian and vehicular] and stormwater management facilities.
2. Zoning for Lot 1 Block 140, Refinement A [old St. Mary's Catholic School], is largely defined by Ordinance 3886 which we have attached for your review. Allowable usage by right included: commercial and private parking establishments; educational facilities; and food service facilities not exceeding 3,000 s.f.; and offices. This ordinance outlined a zero setback for buildings and allowable site coverage up to 95% with the remaining 5% required to be landscaped. Parking requirements within the ordinance define one parking space for every 400 s.f. of office space.
3. For the remaining parcel under the Public zone district, the standard setbacks and coverage for large 'civic' facilities is shown with *Figure 1 [from UDC 5.6]*.

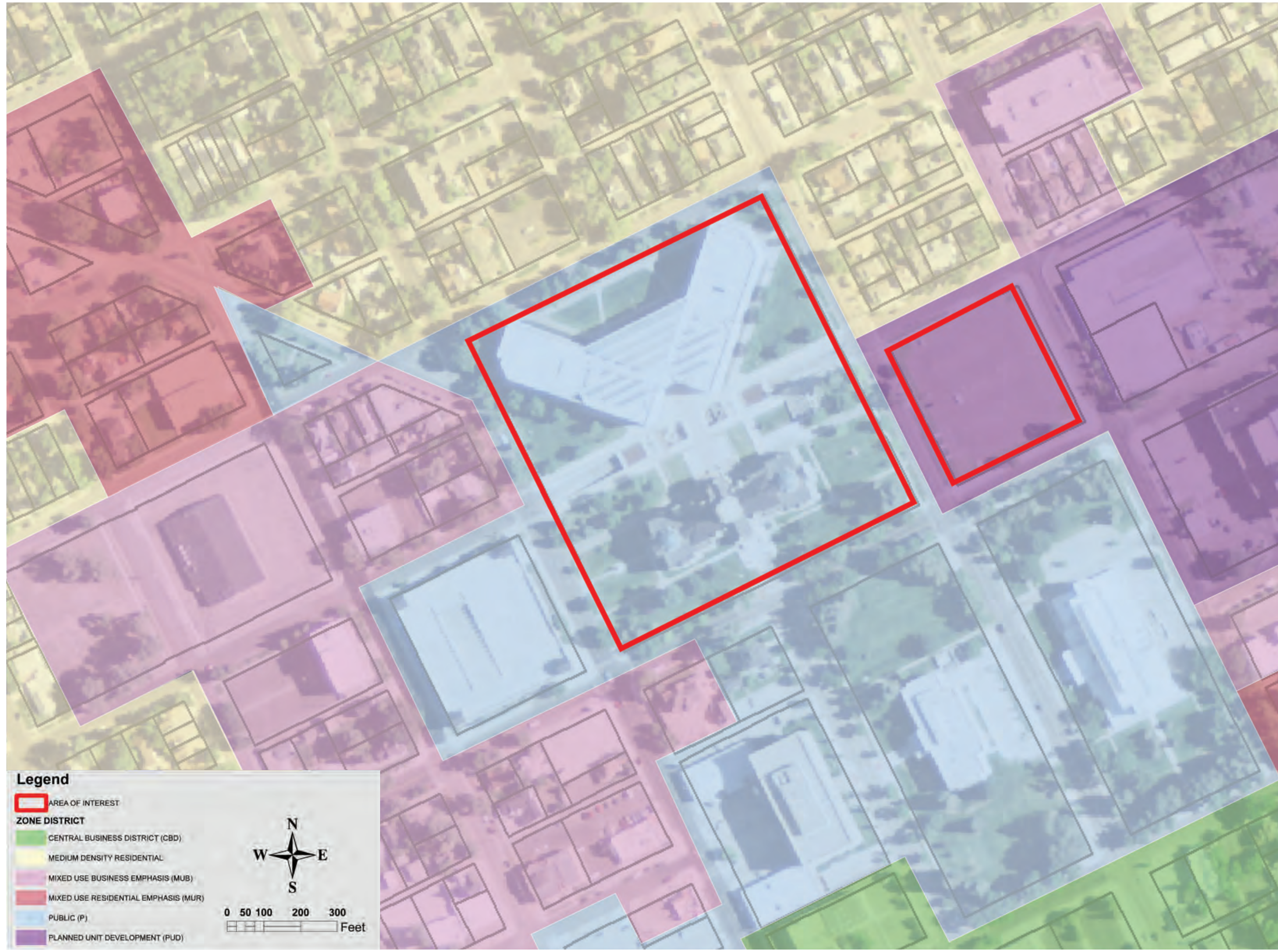
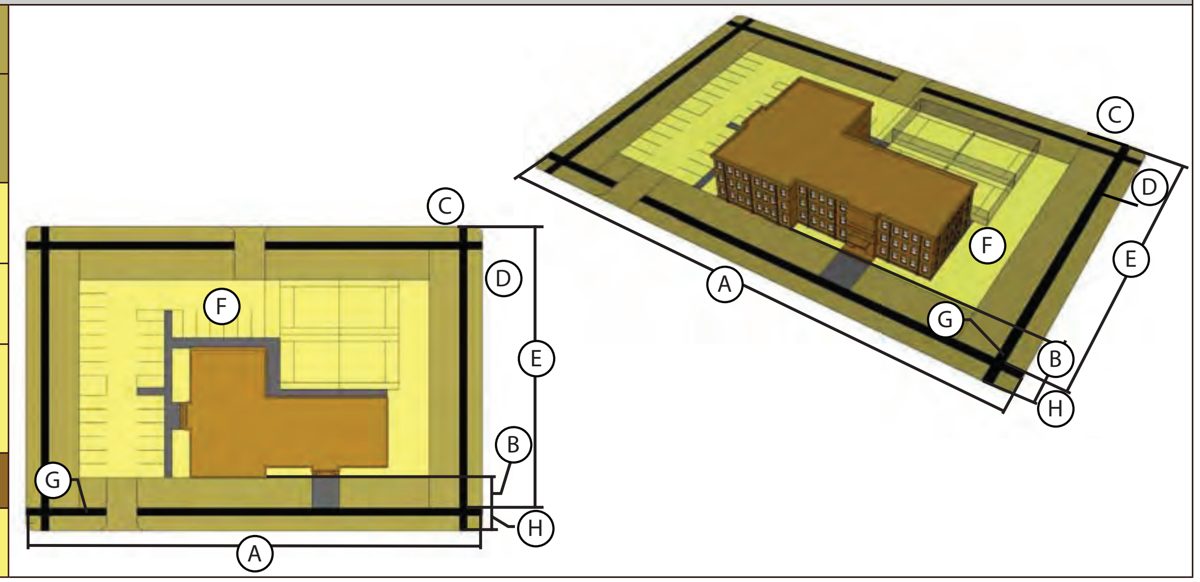


Figure 5.1.01: Herschler and Capitol Complex Zoning Map

Type P-CV3: Prominent Civic Building		
Lot Area		80,000 s.f. minimum
Lot Frontage		200' minimum 600' maximum [b]
Setbacks:	*Front*	50'; or 20' [a]
	Side	50'; or 20' [a]
	Rear	50' 20' if abutting alley
Building Height		3 story
Total Lot Coverage (max.)		50%



[a] Reduced minimum setback only permitted for front or street-side setbacks with frontage along Boulevard, Avenue, or Pedestrian Street types according to Section 4.3 of these regulations.

[b] Lot frontages larger than 600' are only permitted for Civic buildings that include a campus layout with mid-block pedestrian connections allowing permeability of the oversized block

(A) Frontage	(D) Rear Setback	(G) Public Sidewalk
(B) Front Setback	(E) Depth	(H) Public Right-of-way
(C) Side Setback	(F) Buildable Lot Area	

Figure 5.1.02: Type P-CV3: Prominent Civic Building Zoning Requirements

Table 4-15: Required Civic Open Space		
Context / Development Pattern*	***Applicable Zoning Districts****	***Amount***
Agricultural and Rural	AG, AR, RR	No requirement; EXCEPT that Open Space Subdivisions shall meet the open space policies of *PlanCheyenne*.
Urban Transition Residential *Urban Residential* *Mixed-Use Residential*	LR-1, LR-2, MR-1, MR-2, HR-1, HR-2, NR-1, NR-2, NR-3, MUR	750 s.f. per dwelling unit or 8% of the gross area of the proposed development parcel, including lands to be platted as rights-or-way, whichever is less.
Mixed-Use Commercial *Mixed Use Employment* *Neighborhood Activity Centers* *Mixed-use Commercial Activity Centers* *Community / Regional Activity Center* *Central Business District* *Community Business*	MUB, MUE, NB, CB, CDB, PUD, P	2% of the building footprint for lots 2,500 square feet or less. 5% of building footprint for lots over 2,500 square feet and under 40,000 square feet. 8% of the building footprint for lots 40,000 square feet or more.

* Per *PlanCheyenne*. In cases where this table is used in association with site plan review, the applicable zoning district will control.

Figure 5.1.03: Required Open Space

4. [UDC 5.6.1] All sites for the Small, Medium and Large Civic Buildings [Types P-CV1, P-CV2, and P-CV3] shall incorporate Civic Open Space meeting the standards of section 4.4 of the Unified Development Code. At this time it has not been clarified if City Staff may or may not push to require civic open space on Block 140. Interpretation of zoning requirements on PUDs has been largely subjective since the adoption of the UDC.
5. Specific requirements for building height is outlined in the State Capital Height Restrictive Overlay District.
6. Screen and buffering requirements are defined for zone districts across adjoining property lines and across alleys. This was found not applicable for the properties in the area of study.
7. Parking requirements for new construction are outlined in UDC 6.2. Typical parking for new construction requires one space per 300 s.f. for buildings less than 50,000 s.f. and one space per 400 s.f. for larger facilities. Shared parking is allowed for consideration to meet the general parking requirements. The State of Wyoming does have dedicated parking in the new parking facility located southeast of the intersection of 25th Street and Warren Avenue.
8. General site landscaping requirements include street right-of-way trees and internal landscaping requirements are based on a point system. Automatic irrigation is currently required for new construction.
9. Construction improvements for work in the public right-of-way are submitted for review and approval through the City of Cheyenne or Wyoming Department of Transportation [Central and Warrant Avenue]. Improvements for water and sewer are submitted to the Cheyenne Board of Public Utilities and Wyoming Department of Environmental Quality [water and sewer mains only].

5.1 Site Systems

Stormwater Management

The area between Carey Avenue and Warren Avenue between 22nd Street and 26th Street is outside of any official FEMA special flood hazard area [i.e. FEMA floodplain]. The properties are part of the Capital Drainage Basin, which has an extensive hydrological model used to assess localized flooding and for design on long-term drainage improvements. Recent refinements of the hydrological model were completed by BenchMark Engineers, PC with the Cheyenne Regional Medical Center campus expansion. The anticipated flood flow street depth and flow rates from the refined hydrological modelling for this area are shown with the *Figures 2 and 3.*

Properties downstream are subject to flooding and it should be anticipated that stormwater detention is required for new construction. Current requirements are requiring runoff to be detained to historic rates for new construction. Preliminary sizing should anticipate a volumetric equivalent of 1.25" of detention storage for conversion of landscaped areas to impervious areas.

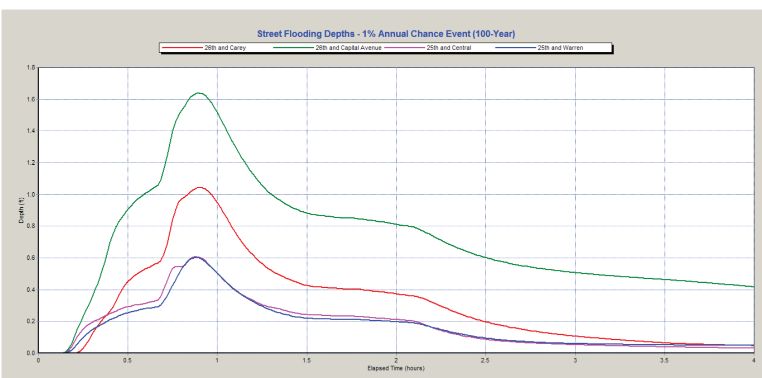


Figure 5.1.04: Street Flooding Depths - 1% Annual Chance Event [100-Year]

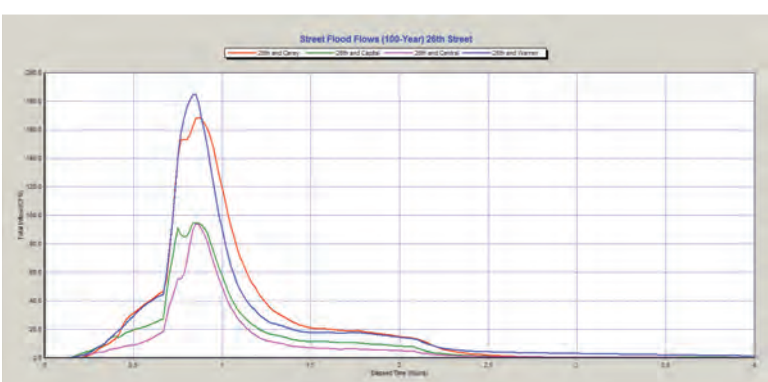


Figure 5.1.05: Street Flood Flows [100-Year] 26th Street

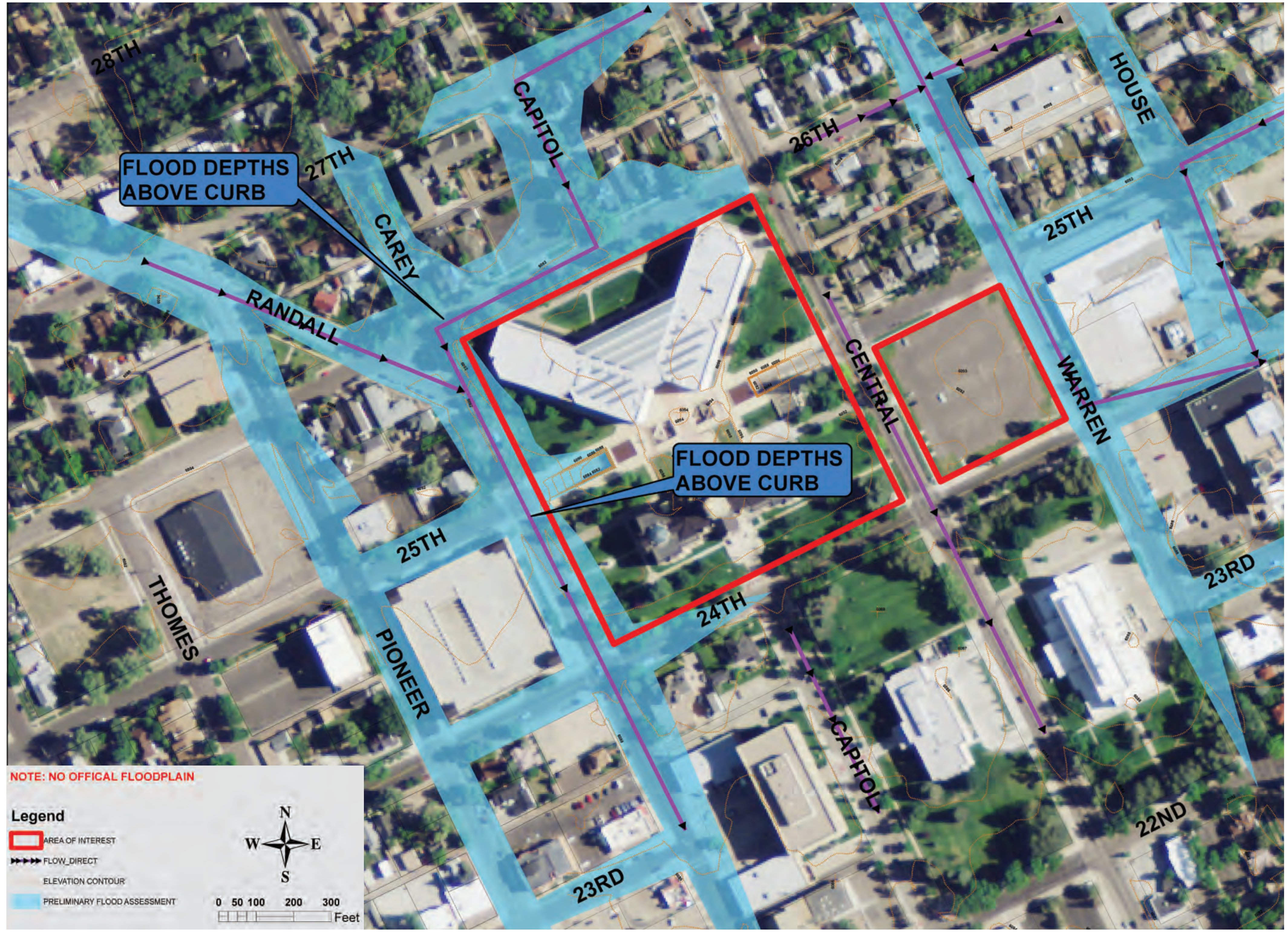


Figure 5.1.06: Herschler and Capitol Complex Floodplain Map

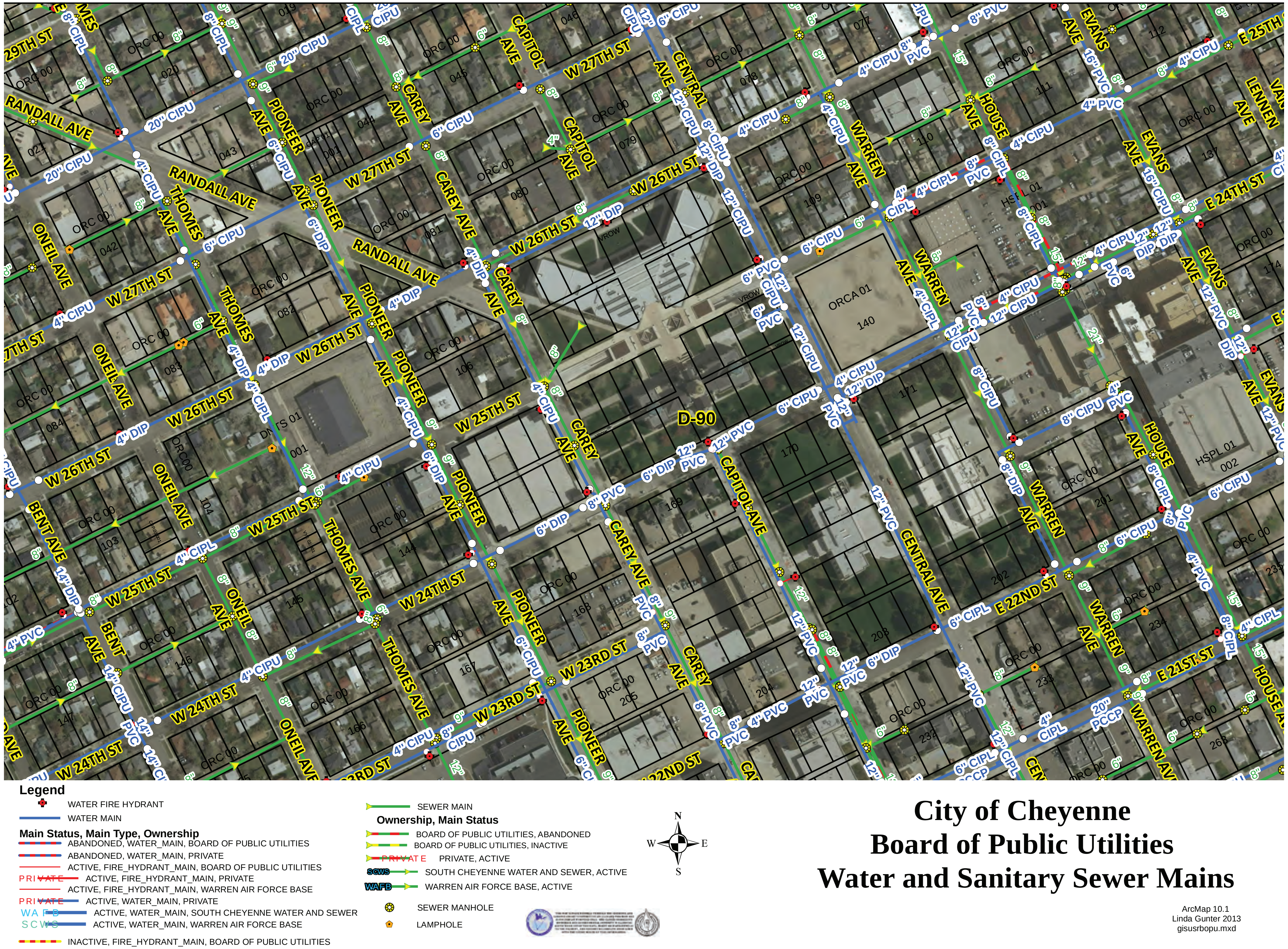


Figure 5.1.07: Downtown Sanitary Sewer Locations

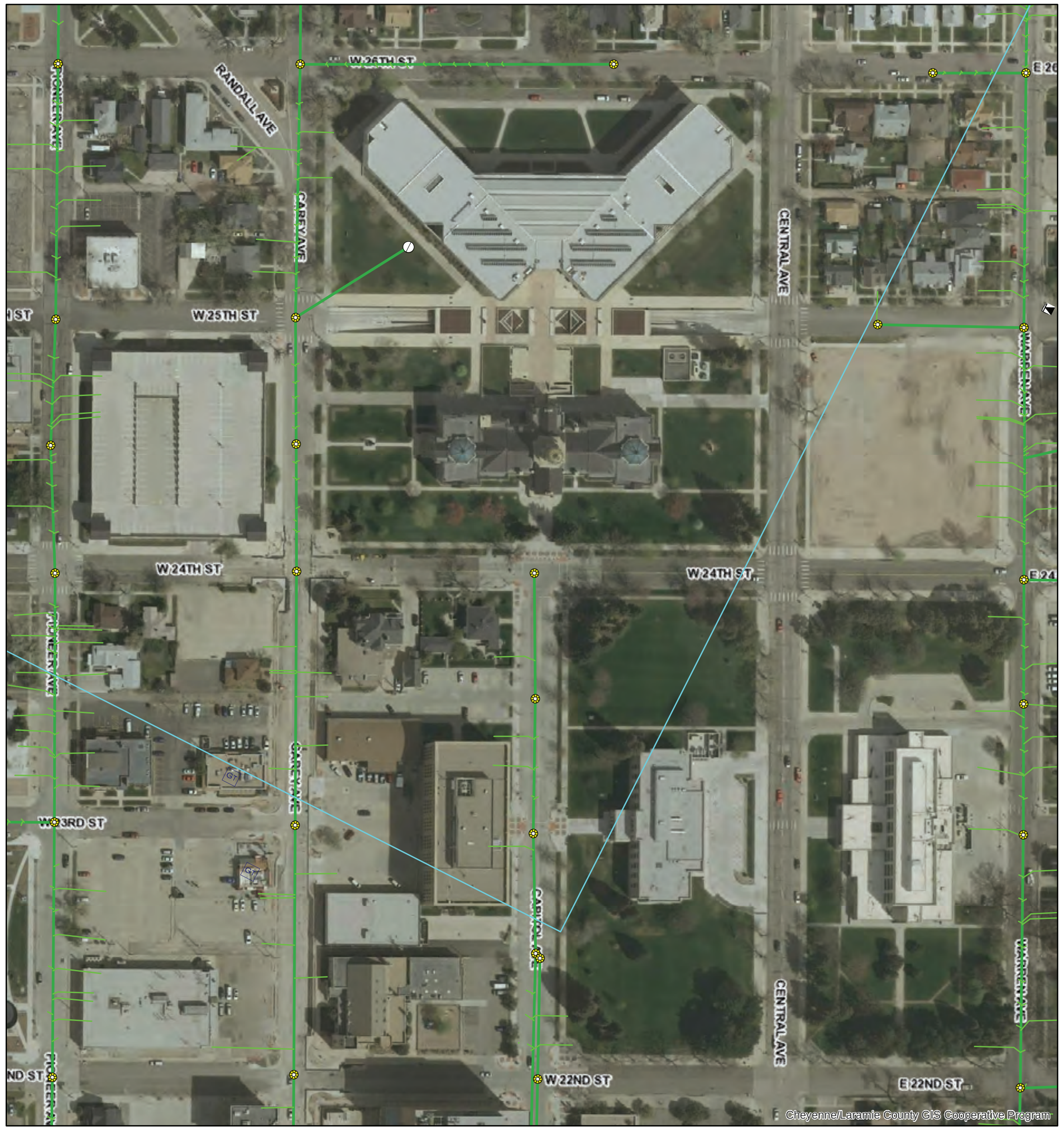
Site Utilities

The City of Cheyenne, which includes the Cheyenne Board of Public Utilities [BOPU], and the Wyoming Department of Environmental Quality [DEQ] has jurisdiction over the water and sanitary sewer mains.

Potable water mains are available in all of the adjacent streets. Main service to the Herschler is along Central Avenue.

Other utilities services [gas, electric, communications, etc.] should be coordinated with the respective franchise owner and the design team. Modifications to existing facilities may be required due to the relocation of building services and additional loads.

Depending on any additional or relocated taps for this project, the BOPU will have sanitary sewer and water tap fees, system development fees, construction plan review fees, as well as a as-constructed plan bond/fee.



Sewer Manhole

Sewer Junction

<all other values>

Junction Type

COUPLING

LIFT STATION

OUTLET

PLUG

REDUCER

TEE

Sewer Service

Sewer Main

Sewer Pipe Over

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Coordinate System: NAD 1983 StatePlane Wyoming East FIPS 4901 Feet
Projection: Transverse Mercator
Datum: North American 1983
False Easting: 656,166.6667
False Northing: 0.0000
Central Meridian: -105.1667
Scale Factor: 0.9999
Latitude Of Origin: 40.5000
Units: Foot US

Date Saved: 8/2/2013 11:26:09 AM

Figure 5.1.08: Capitol Block Sewer Assets

Water Fire Hydrant Gallon Per Minute

0.00 - 499.00

499.01 - 999.00

999.01 - 1499.00

1499.01 - 1999.00

Water Service

Water Main

Water Main Valve

Water Shutoff

<all other values>

Shutoff Valve Type

CURBSTOP BALL VALVE

CURBSTOP GLOB VALVE

GATE VALVE

POST INDICATOR VALVE

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Scale Factor: 0.9999
Latitude Of Origin: 40.5000
Units: Foot US

Date Saved: 8/2/2013 11:26:09 AM

Figure 5.1.09: Capitol Block Water Assets

Traffic

The City of Cheyenne has jurisdiction over the adjacent roadways, storm sewer systems, and traffic issues. The City establishes traffic study requirements on a case by case basis. The design team intends to engage the City Engineer's office to prepare a traffic study during the Level III as early as possible in the process. The traffic study may suggest work including revisions to improve traffic flow and intersection controls. Although this work is excluded from this study, allowances should be considered.

Revisions to the project site planning and building organization may also be affected to support traffic safety and flow. Such revisions are appropriately addressed during the design process at the beginning of the Level III Design phase.

Prior to preparing a traffic study, the City Engineering Department shall be consulted for direction on the elements required to be included in the traffic study [e.g., which roadways and intersections shall be analyzed, how far from the site needs to be analyzed, etc.]. It is noted that Carey and Central Avenues are arterial roadways.

Hardscape

Materials throughout the site will provide continuity between within the Capitol Core grounds and the new construction. They will be both durable and suggestive of the civic nature of the building. The main building entries to the south and north will be composed of a concrete paving system. Sidewalks, courtyards and service drives will use concrete paving with the potential for accents to provide richer detail. If there are budgetary restraints based on the high cost of the stone paving and concrete unit pavers, architectural grade concrete would provide a lower cost alternative.

Planting

Plantings for the site will reflect Cheyenne's weather, climate, soils and geography. Due to severe climate conditions in Cheyenne, consideration of long-term maintenance is very important. Each plant selected will be adaptable, hardy and require low water use as part of an overall xeric plant palette demonstrating sensitivity to the region's resources. The streetscape planting will consist of a turf grass tree lawn and 2" caliper deciduous trees spaced at 25'on center, as directed in the City of Cheyenne, Streetscape Design Standards. Plant types for the site will include deciduous, ornamental, and evergreen trees, shrubs, grasses, and perennials.

Efficient irrigation technologies will also play a role in resource management. The irrigation design for the site and right-of-way will meet or exceed the standards set forth in the current edition of the City of Cheyenne, Parks and Recreation Standards and Specifications.

Furnishings and Site Lighting

Site furnishings will be selected for both design and function, including tables, chairs, benches, trash receptacles, and bicycle racks. These furnishings will be located to accommodate the site users and programmed spaces on the site.

Site lighting, including roadway lights and pedestrian lights will be provided along the perimeter of the site to illuminate pedestrian and vehicular pathways. Accent lighting along the building's perimeter will further enhance specific features and building moments such as main entries. Accent lighting may be comprised of in-grade uplights, wall lights, and lighted bollards, as demanded by programmatic needs. All light fixtures being proposed will be LED sources to contribute to the sustainable design approach.

Sustainability

All exterior site systems will be chosen with sustainability qualities in mind. The project will consciously include responsible "green" practices and materials throughout the site design, with the potential to follow official frameworks such as LEED.

5.2 Architectural Systems

Overview

The City of Cheyenne have adopted the 2012 Edition of the International Building Code, including applicable Appendices, and will be applied to Level III, and therefore this project shall comply with this code, as well as any Local Codes as adopted by the City.

Exterior Wall Enclosures

The exterior wall enclosure of the building will be selected from systems and materials that will provide for low maintenance, durability, economy, and appropriate appearance. It is also important that these components are resistant to the extremes of climate that this site is subject to at times.

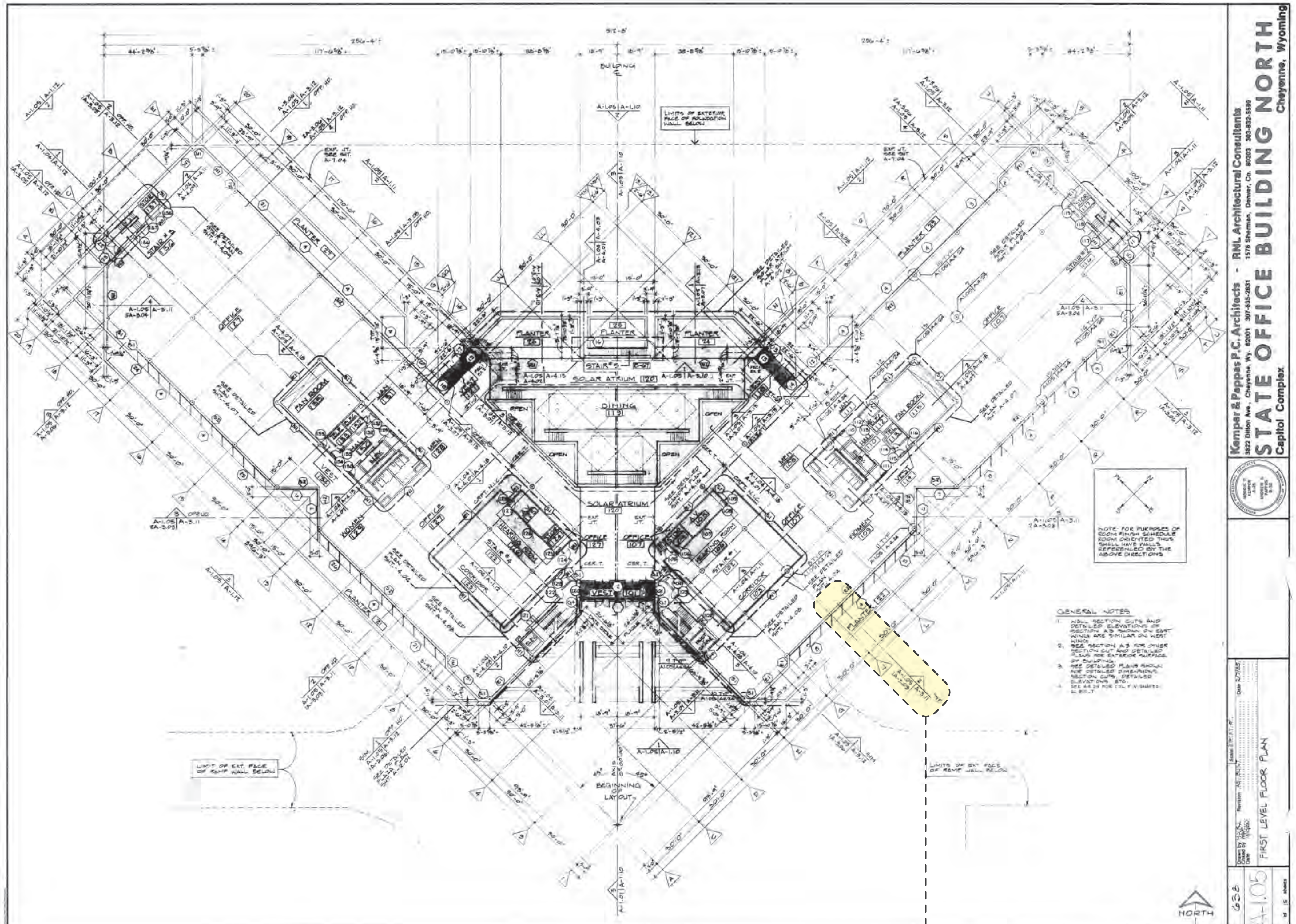


Figure 5.2.01: Existing Herschler Building - First Level Floor Plan

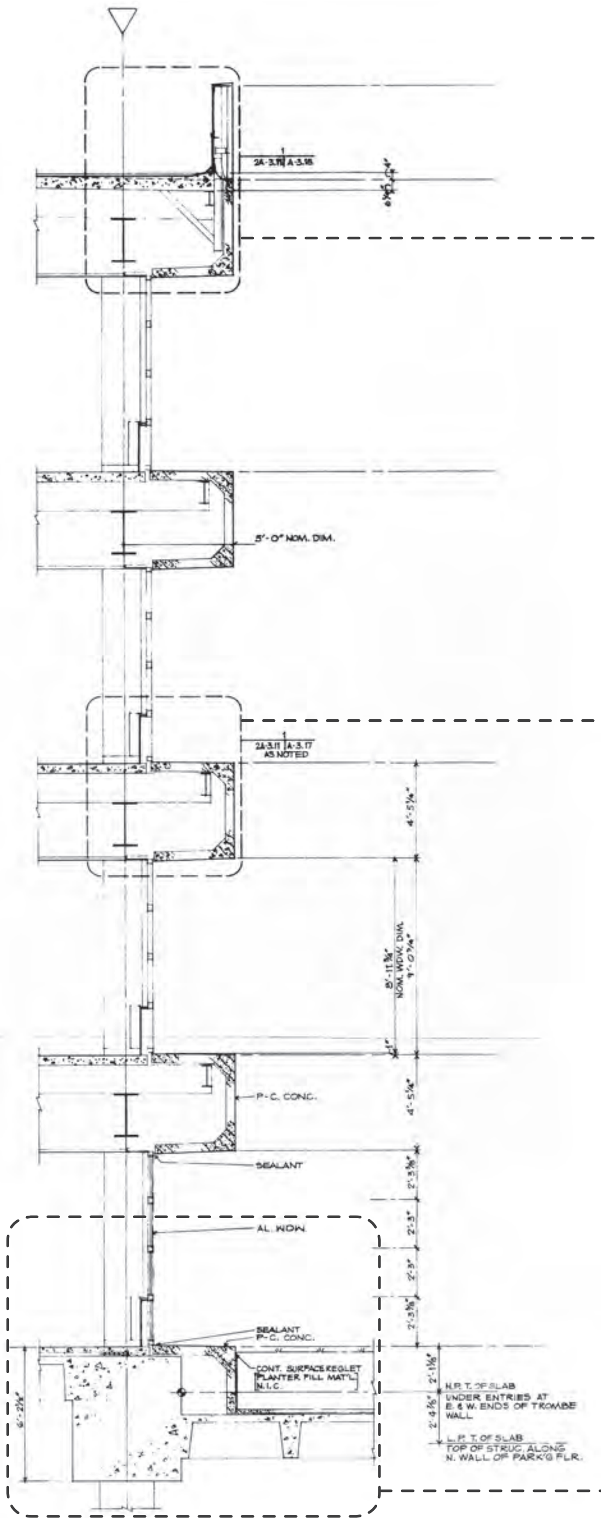


Figure 5.2.02: Wall Section Excerpt

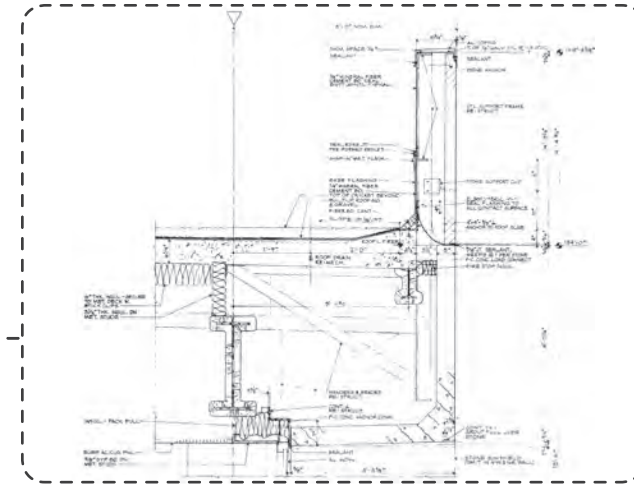


Figure 5.2.03: Existing Detail at Parapet

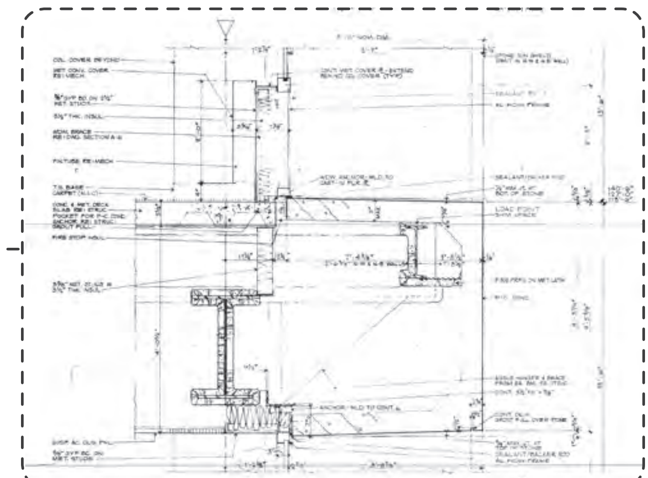


Figure 5.2.04: Existing Detail at Precast Soffit

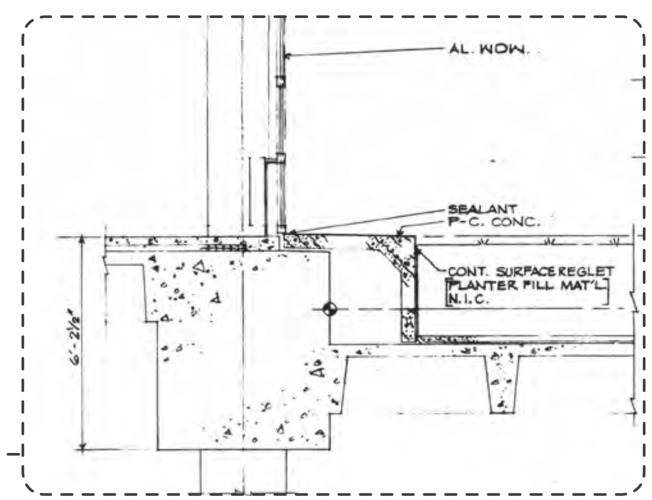


Figure 5.2.05: Existing Detail at Planter

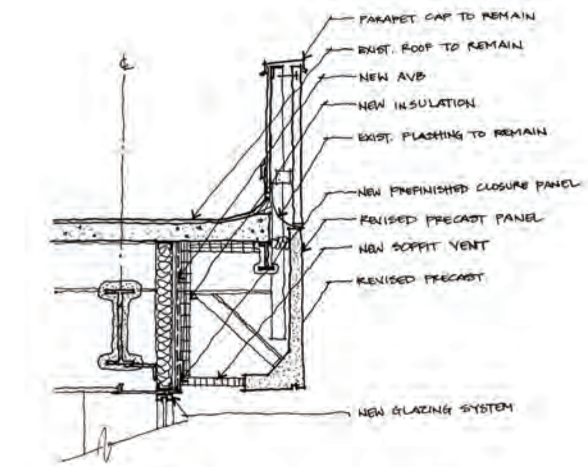


Figure 5.2.06: Proposed Detail at Parapet

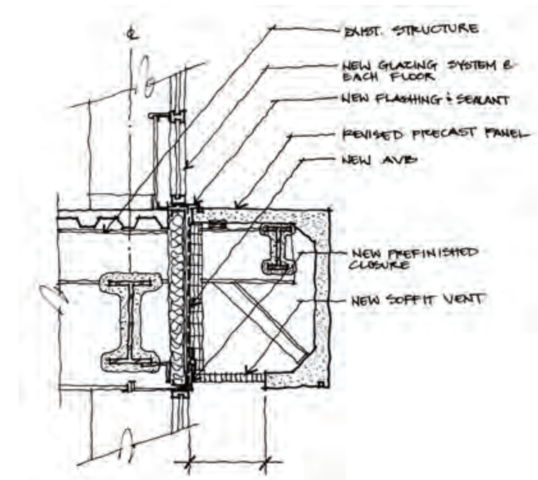


Figure 5.2.07: Proposed Detail at Precast Soffit

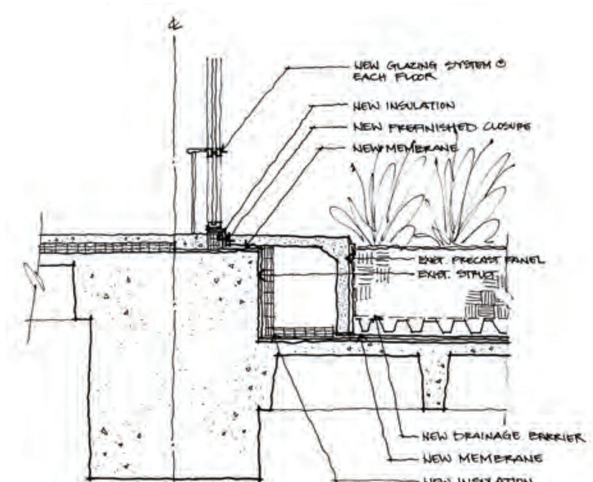


Figure 5.2.08: Proposed Detail at Planter

Herschler Building

Existing

The existing exterior wall enclosure of the Herschler building uses four main external wall surfaces. The opaque materials consist of a limestone and precast wall system. The glazed systems are currently storefront ribbon windows along the east and west wings of the building and a curtain wall system at the main entrance. Existing drawings provided to HDR raise some concerns about the weather-tightness of the existing wall systems. Additional probes and explorations are being performed to further understand the as-built state of the exterior – *See Figures 5.2.02 - 5.2.05.*

Recommendations:

The intent for upgrades to the existing exterior wall enclosures are to ensure a watertight and well insulated high performance building enclosure. The current glazing system will be removed and replaced with a new state of the art glazing system providing a superior vision, insulation and watertight product. The existing precast soffit elements appear to have no ventilation / insulation. The intent is to provide proper ventilation and insulation to those elements. Additionally, the recommendation envisions the removal of the existing vertical precast sunshades to provide increased daylight. It is anticipated that the existing roof of the Herschler building will remain in place due to its current quality - *See Figures 5.2.06 - 5.2.08.*

HDR PDP

5.2 Architectural Systems

Herschler North, South and Stair Tower Additions

Exterior wall surfaces will be composed of opaque materials with large glazed applications, such as curtain wall.

Fenestration Systems

The curtain wall systems are larger expanses of aluminum framed elements constructed of thermally broken aluminum extrusions, and provided with an insulated window glass. Where possible, this system is to be 'unitized' to facilitate larger shop-assembled sections, and to allow for a methodology of quicker installation relying on less manual labor which translates to a reduced construction cost.

Glass in the curtain wall application will be insulating, with high performance coatings and/or ceramic frit in order to control solar heat gain. Typically, the glazing will provide a 'U-Value' as required by ANSI/ASHRAE/IESNA Standard 90.1-2007, and the International Energy Code for Cheyenne WY.

Exterior Façade Cladding Systems

Exterior façade materials are comprised of a selection of opaque materials.

The level of detail regarding material finishes and colors will be addressed as part of Level III. Additional detail and review will occur as the design progresses through the various phases of the project.

Roofing

Roofing will be selected for both its integrity and control of rainwater as well as energy efficiency. The recommendation is to provide a 'protected membrane roofing system' that maintains a complete separation from the existing roof system. Sometimes referred to as an 'inverted roof system', it provides for a hot-applied liquid waterproofing membrane to be directly applied to a concrete roof deck which is sloped to drains. The rigid roof insulation is installed over the membrane. Finally, the roof assembly utilizes a paver system for both ballast and protection.

Shading Devices

The exterior design will also explore the integral use of solar control design features throughout, including such strategies as canopies, shades and overhangs. These shading devices will reduce solar heat gain resulting in lower energy consumption and minimize glare. Window washing methodologies will be provided and coordinated with each specific shading device type.

Figure 5.2.09: Herschler Building - North Façade

Figure 5.2.10: Herschler Building - South Façade

Figure 5.2.11: Herschler Building - East Façade

Figure 5.2.12: Herschler Building - Connector Underneath the Capitol Building

Figure 5.2.13: Herschler Building - Connector Underneath the Plaza

Figure 5.2.14: Herschler Building - Connector Outside Room B63

Figure 5.2.15: Herschler Building - Connector Inside Room B63

Connector

The existing below grade connector between the Capitol and Herschler building is intended to be removed in its entirety down to the top of the existing foundation. The new connector walls will be constructed per structural and geotechnical recommendations as indicated in separate sections contained within this report.

The exterior of the below grade walls will be a complete waterproofed, insulated wall system. Further geotechnical investigation will provide additional information regarding the needs of further below grade drainage systems.

The design intent of the connector roof will be a plaza deck roof system. A monolithic waterproofing membrane will be placed on a sloped structural roof slab. Above that, different layers such as insulation, drainage board and pavers on pedestals will be installed. Since the layers above the waterproofing membrane act as a shield against UV rays and harsh weather, the roof structure is well protected. Further development of the roof system will be completed during Level III.

The design recommendation envisions two recessed plazas adjacent to the connector link. Access to the recessed plazas is from both the connector link and the grade above. Natural finishes and materials are anticipated as part of these design elements.

Glazing systems will be placed along selected perimeter walls and will follow the same design and product quality as proposed in the Herschler exterior skin section of this report.

Skylights or other glazing options are recommended to bring daylight to these important basement rooms. Skylights will require special care to address leaks, condensation, and glare.

Central Utility Plant

The new Central Utility Plant [CUP] will be designed to contain the primary mechanical, electrical utility service systems for the distribution to the Capitol and Herschler buildings, as well as the Barrett, Supreme Court, and Hathaway Buildings, through a new underground service tunnel that connects to the existing underground system. The CUP is located in close proximity to the Capitol and adjacent to the Herschler building. The new underground design is provided to allow for increased security to the related equipment and its distribution.

The existing below grade CUP is intended to be constructed per structural and geotechnical recommendations as indicated in separate sections contained within this report.

The exterior of the below grade walls will be a complete waterproofed, insulated wall system. Further review of the geotechnical report will provide additional information regarding the needs of further below grade drainage systems if required.

The design intent of the connector roof will be a green roof system. Similar to the plaza deck roof system, the green roof receives a fluid applied rubberized asphaltic membrane directly onto the structural roof slab. Above that, different layers such as insulation and drainage boards will be installed. The top layer of this system will differ from the plaza deck roof. Instead of a paver system, a grow media will be placed. Further development of the roof system will be completed during Level III.

The CUP will replace all existing system; existing systems will remain in operation during construction of the new CUP to allow patrons of the Herschler Building to continually occupy the building during construction.

Figure 5.2.16: Central Utility Plant [CUP] - Interior 1

Figure 5.2.17: Central Utility Plant [CUP] - Interior 2

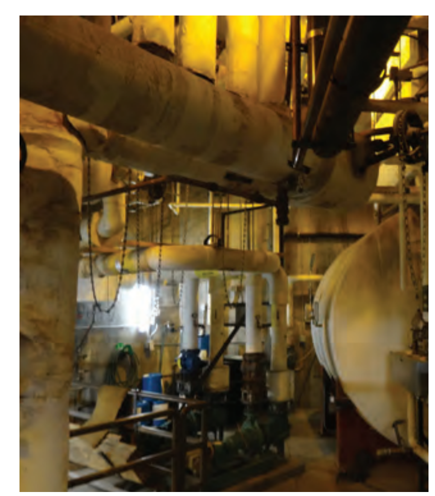


Figure 5.2.18: Central Utility Plant [CUP] - Interior 3

Figure 5.2.19: Central Utility Plant [CUP] - Interior 4

Figure 5.2.20: Central Utility Plant [CUP] - Interior 5

Figure 5.2.21: Central Utility Plant [CUP] - Cooling Towers [Exterior]

Figure 5.2.22: Herschler Building - Atrium

Figure 5.2.23: Herschler Building - Break/ Lunch Room

Figure 5.2.24: Herschler Building - Interior Character

Interior Construction & Equipment

It is anticipated that the following interior construction systems and finishes will be utilized throughout the entire Herschler renovation and addition project. The existing interior partitions and finishes are planned to be demolished per the new scope of work.

Interior partition will be gypsum board on metal stud construction, with a level 5 finish at walls greater than 20' in length. Interior partitions will be filled with sound attenuation blankets for sound control where appropriate. Hollow metal frames will be used for interior lights and solid wood doors.

Ceilings will typically use a pronounced edge acoustical lay-in tile ceiling system. Some gypsum board soffit construction will be utilized in selected areas and should be anticipated for large committee rooms, conference rooms, rest rooms, and other similar areas.

Floor finishes will be carpet tile for typical assignable areas, resilient tile in service areas, and natural floor systems at the lobbies and primary circulation areas. Toilet rooms will use tile for floors and walls with epoxy grout.

Machine room-less traction Elevators are anticipated for the project. Elevators will be sized and located for the building configuration and expected demand. Standard Cab configurations will be utilized. We would anticipate a new bank of elevators, distribution in the building will be located to accommodate occupants.

Construction Costs are expected to cover equipment costs including walk-off mats, built-in casework, venetian blinds, room signage, projection screens, white boards, toilet accessories and dock accessories. Excluded from construction costs, but included in the Project Costs, are furnishings, moveable partition systems, and filing and storage systems.

Office Interiors Classification

Overview

In order to understand the level and quality of anticipated spaces within the Herschler building and their respect to interior finishes, colors, attention to detail, and materials, the design team conducted a review of interior development opportunities.

The Building Owner's and Managers Association [BOMA] classifies office space into three categories as listed below. The intent of including the Class A, B, and C definitions below as part of the Level I / Level II report is to establish a basic understanding of the finishes and amenities anticipated to be developed within Level III.

Three areas of interior work space were considered as part of an office interiors classification category for the Herschler renovation and addition project.

The first was a leadership office suite. An elevated level of scrutiny will be provided to the design, materials, and finishes reflecting the hierarchy of this office. See the definition for Class A below.

The next tier of office interior classification was a typical state agency office suite. The consideration for this space will be to provide an average finish range. See the definition for Class B below.

Office suites are anticipated to include open workstations where appropriate. These workstations include the use of systems furniture featuring demountable components. These spaces are designed and built with the intent to be replicated throughout a large space, without utilizing full height walls.

There would be no Class C office space categories, as defined below, for the renovation or addition of the Herschler building.

Class A

The classification for buildings designed for tenants in these spaces are considered to contain amenities and finishes above the average market space. Shown to the right are five aesthetic examples of a Class A office space.

Class B

The classification for buildings designed for tenants in these spaces are considered to contain standard amenities and finishes equal to an average market space.

Class C

The classification for buildings designed for tenants in these spaces are based on functional space below the average amenities and finishes of Class B.

Figure 5.2.25: Class A Office Space

Figure 5.2.26: Class A Office Space

Figure 5.2.27: Class A Office Space

Figure 5.2.28 Class A Office Space

Figure 5.2.29: Class A Office Space

Section 5.3 : Structural Systems

Introduction

As a part of the Wyoming State Capital Hershler Building Evaluation, Robert Silman Associates (RSA) was retained by HDR Architecture in association with Preservation Design Partnership, LLC to provide structural engineering services for the Level I/ Level II Study. The study includes evaluating structural options for renovation of the Hershler Building and the connector link to the State Capital Building. Original Architectural and Structural Construction Documents were provided to RSA. RSA visited the site to observe the general condition of the exposed structural elements.

5.3 Structural Systems

Documents Used for this Report

Design sketches by HDR Architecture.

Structural and Architectural drawings of the set "State Office Building North - State of Wyoming - 1980" dated 13 November 1980, by Kemper & Pappas P.C. Architects, RNL Architectural Consultants. Registered Professional Engineers A.C. Volk, Jr. and W.H. Harrison, Jr.

Geotechnical report "Proposed State of Wyoming Office Building" by Empire Laboratories dated 18 April 1980, prepared for Morris Kemper & Associates.

Geotechnical report "3-Story, Capitol Complex Parking Structure Northeast Corner of Pioneer Avenue and 24th Street" by Terracon dated 8 August 2001, prepared for Tobin & Associates.

Geotechnical report "State Office Building and Parking Garage - Thomes Avenue & 25th Street" by Terracon dated 2 November 2011.

Geotechnical report "Geotechnical Exploration Summary – Capitol Building Renovations" by Terracon dated 2 December 2013.

Applicable codes: 2012 International Building Code and 2012 International Existing Building Code, per Wyoming State Fire Marshal. 1976 Uniform Building Code for reference on existing building standard.

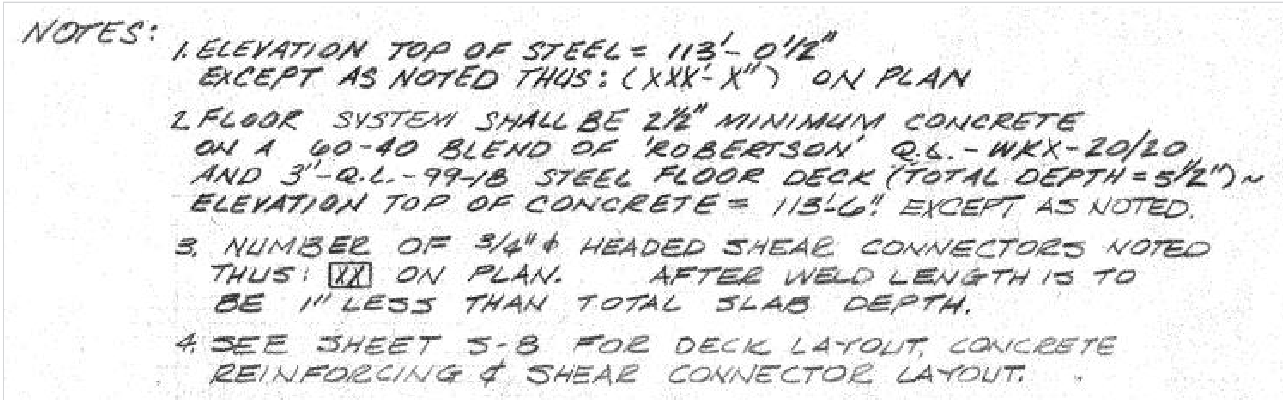

NOTES: 1. ELEVATION TOP OF STEEL = 113'-0½"
EXCEPT AS NOTED THUS: (XXX'-X") ON PLAN
2. FLOOR SYSTEM SHALL BE 2½" MINIMUM CONCRETE
ON A 60-40 BLEND OF 'ROBERTSON' Q.L.-WKX-20/20
AND 3"-Q.L.-99-18 STEEL FLOOR DECK (TOTAL DEPTH = 5½")~
ELEVATION TOP OF CONCRETE = 113'-6". EXCEPT AS NOTED.
3. NUMBER OF ¾"ϕ HEADED SHEAR CONNECTORS NOTED
THUS: XX ON PLAN. AFTER WELD LENGTH IS TO
BE 1" LESS THAN TOTAL SLAB DEPTH.
4. SEE SHEET S-8 FOR DECK LAYOUT, CONCRETE
REINFORCING & SHEAR CONNECTOR LAYOUT.

Figure 5.3.01: Original structural drawing note for 2-1/2" concrete slab on 3" steel deck (5-1/2" total thickness).

Herschler Building Structural Systems

The Herschler building is framed with a steel superstructure above the first floor, a concrete joist system at the first floor where the framing combines with the plaza level, and a system of concrete foundation walls and raft slab at the basement. The superstructure lateral system is provided by concrete shear walls and steel braced frames. The façade of precast concrete panels is typically supported off the perimeter steel framing at each floor level. The steel framing typically utilizes floor slab on deck spanning to the beams: It is not immediately clear from the original drawings if the slab on deck is light-weight or normal-weight concrete. Further investigation on that is recommended.

Lateral System

The existing building lateral system consists of concrete shear walls in a square plan formation at the center of each wing, and a line of steel braced frames at the far ends of each wing. Per the original drawings, the shear walls and braced frames are transferred at the first floor / plaza level framing, to allow for open space at the parking level.

The robust concrete framing at the first floor/plaza level acts as a diaphragm to deliver lateral forces to the other foundation walls. It is strongly recommended to retain the existing shear walls and braced frames as much as possible: Modification to these systems is possible, but would likely require a significant structural reinforcement solution.

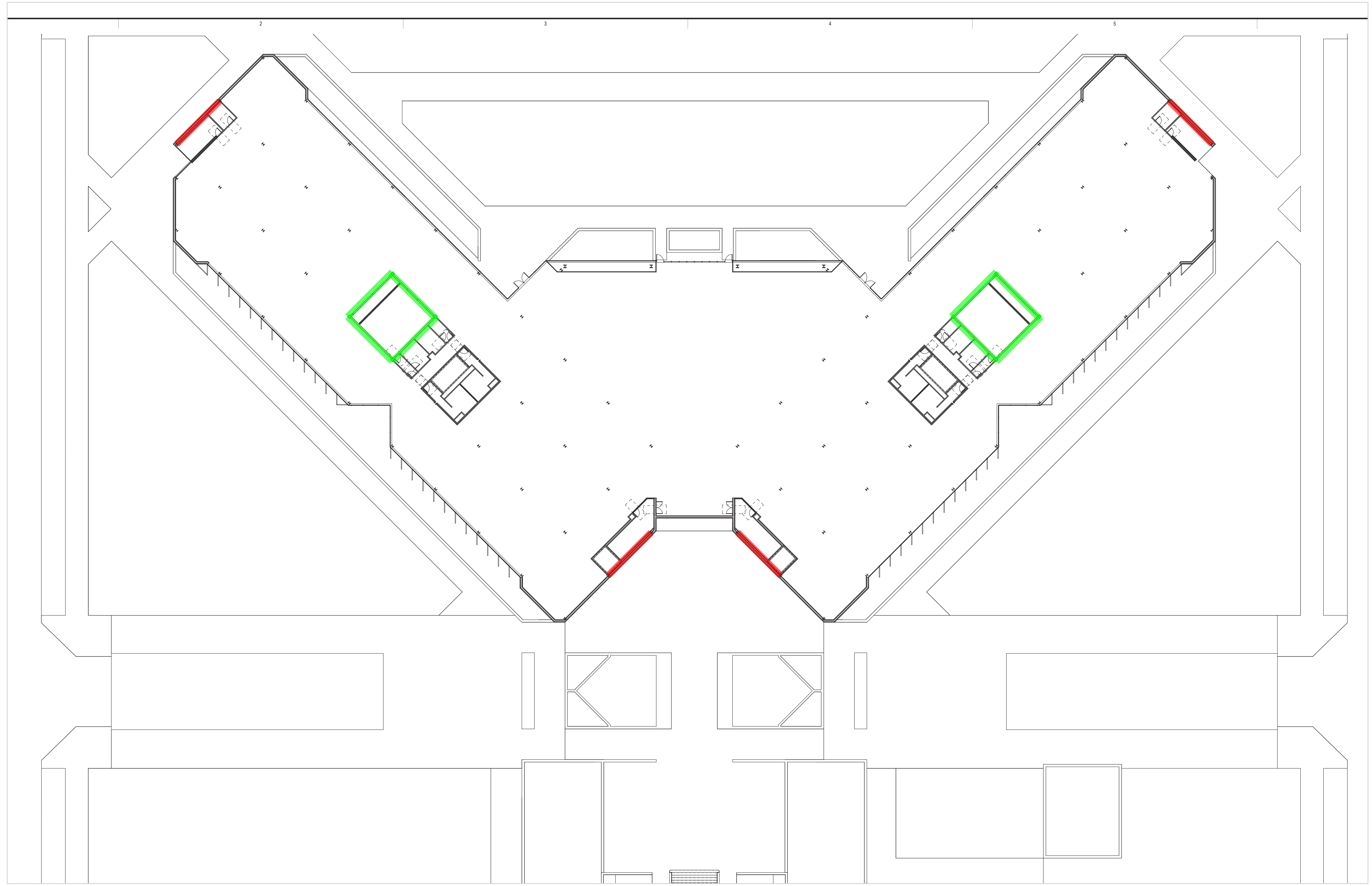


Figure 5.3.02: Existing building lateral system elements at first floor and above. Green indicates concrete shear walls, red indicates steel braced frames.

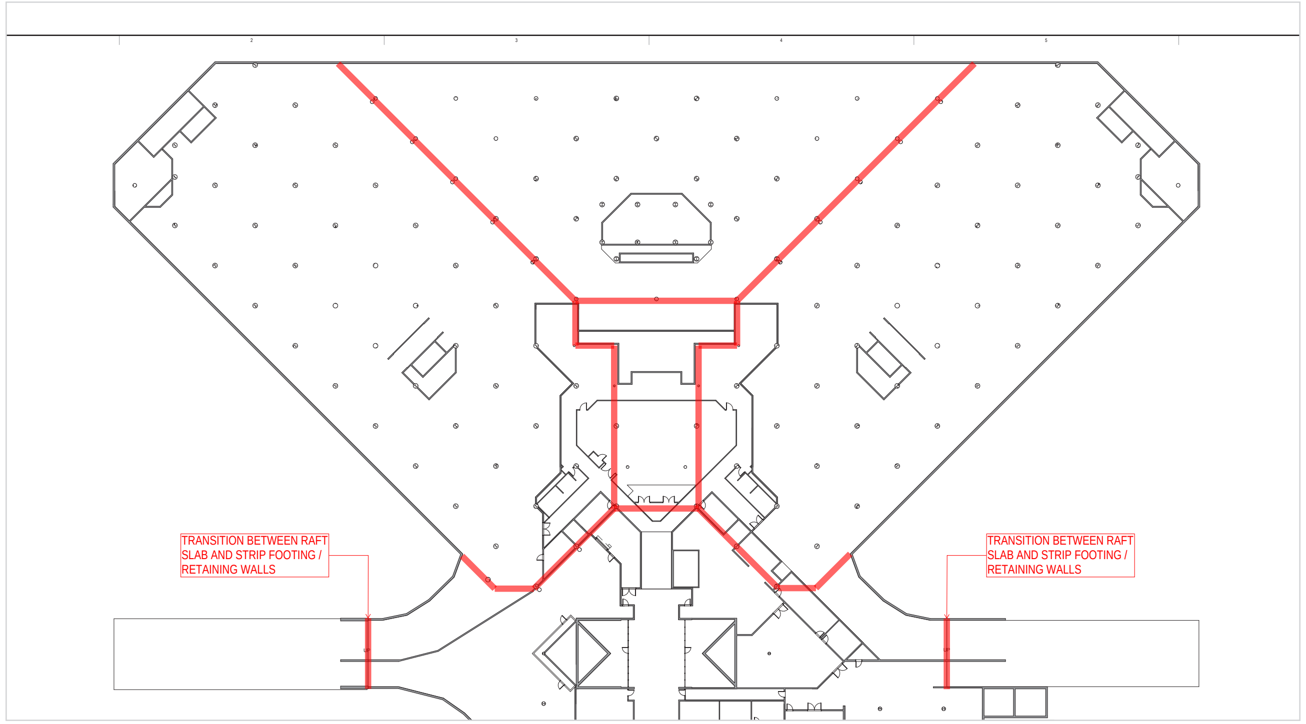


Figure 5.3.03: First floor expansion joint locations overlaid on basement ceiling (shown in red).

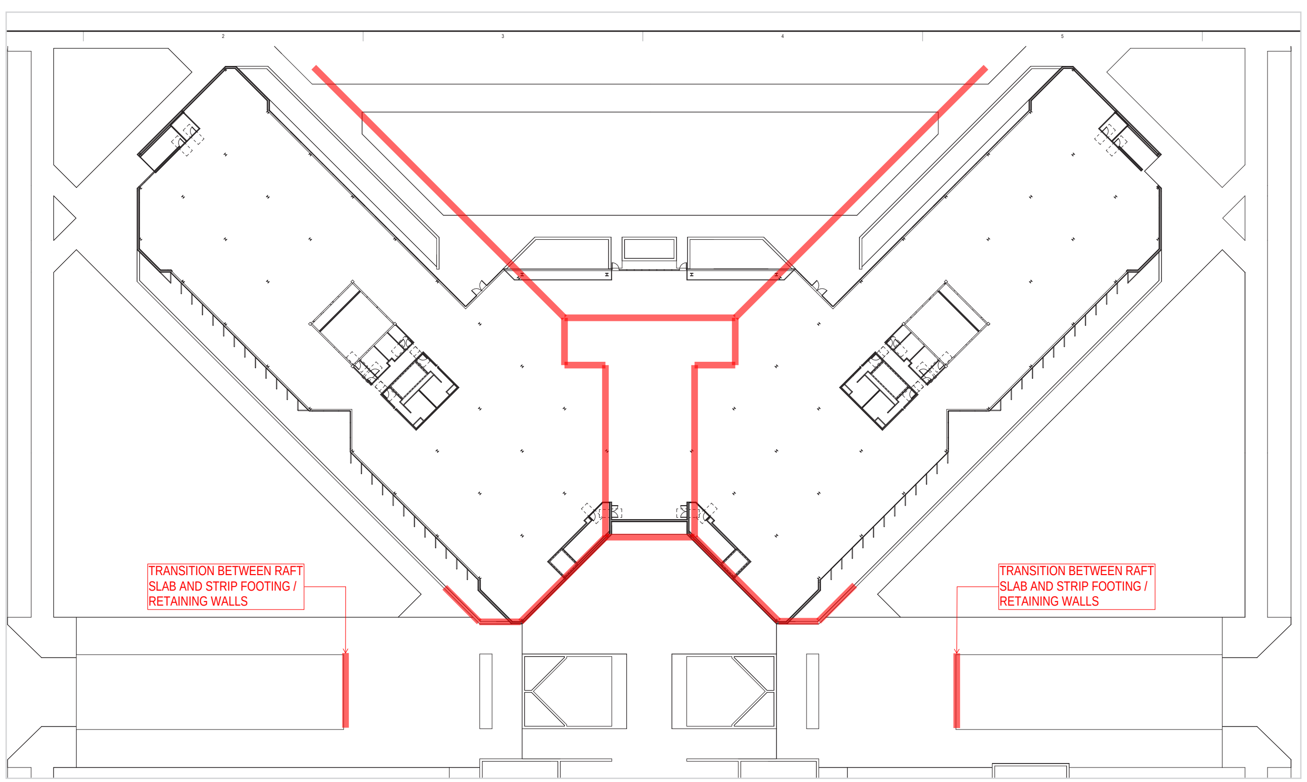


Figure 5.3.04: First floor expansion joint locations overlaid on first floor/plaza level (shown in red).

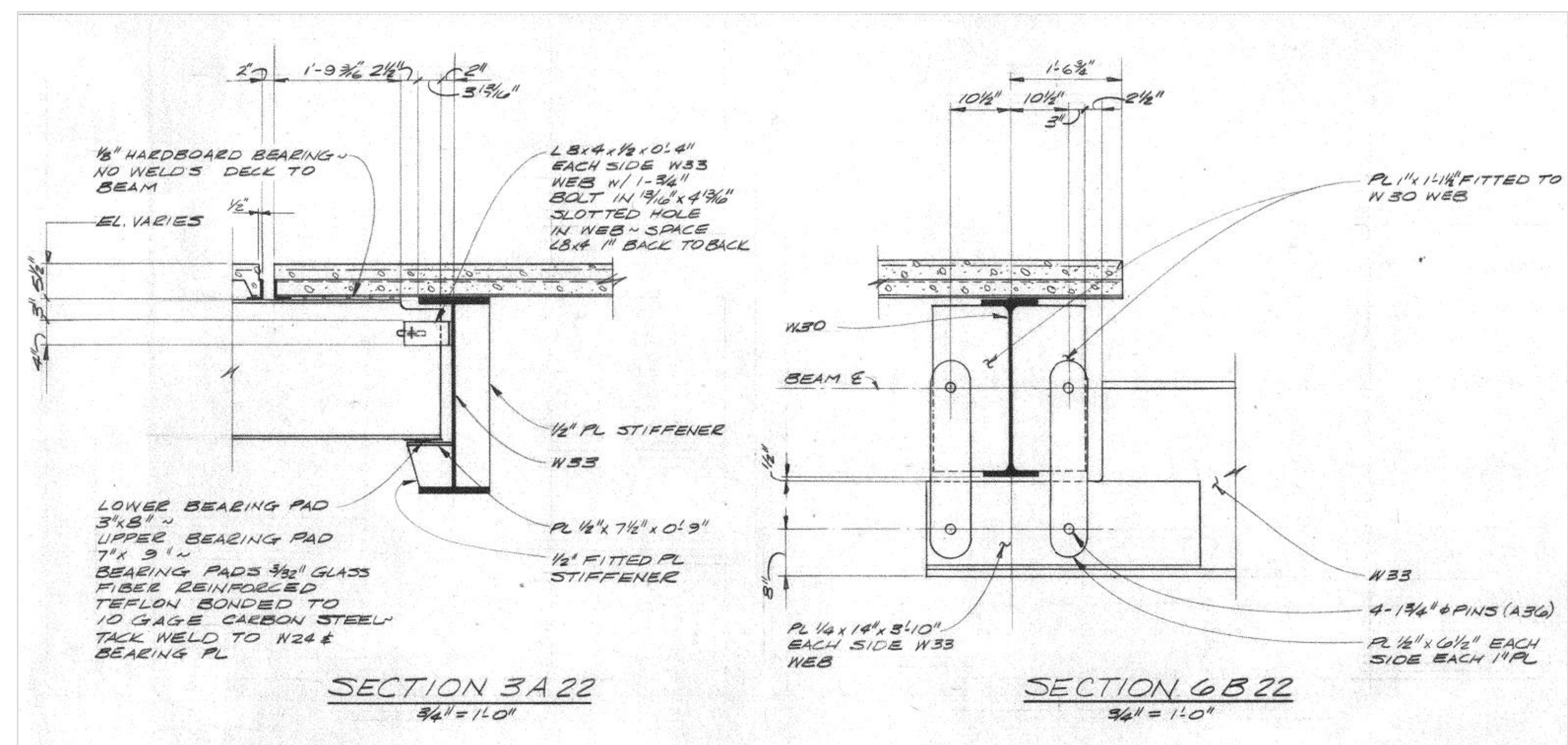


Figure 5.3.05: Original structural drawing details at superstructure expansion joints

Expansion Joints

The existing building's two wings expand and contract independently with thermal variations: An expansion joint detail isolates the two superstructures at the upper floors, per the original details. At the first floor/plaza level, expansion joints isolate various areas from each other for thermal expansion and contraction. It is strongly recommended to retain the existing expansion joint lines as much as possible: Modification to these elements is possible, but would likely require a significant structural reinforcement solution along with architectural alterations.

Note: These assumed locations should be verified with probes in future design phases.

5.3 Structural Systems

Addition (PHASE II) Column Capacities

The original design documents imply that a portion of the foundation, to the north of the existing building, was designed for a future addition. The original column schedule notes twenty-seven basement column locations that have been designed for an additional amount of axial load, varying from 507 to 2071 kips each. The total amount of addition axial load per the original drawing is 33,249 kips, but note that this is likely not the total permissible weight of the addition because lateral loads (i.e. wind and seismic) will induce additional load into the columns.

Since framing layouts and lateral system design for the possible addition are beyond the scope of this phase, very schematic assumptions were made to approximate the tributary areas for these addition column locations. With a very rough assumption of 100 psf dead load and 100 psf live load per floor level, and a very rough assumption of 50% column load allowance for lateral-induced forces (i.e. wind and seismic), we estimate at this preliminary stage that a proposed 4-story addition at these column locations is feasible. The 1980 geotechnical report by Empire Laboratories actually alludes to a 7-story addition, on page 9 of that report, and in fact our preliminary feasibility estimates confirm that a 7-story addition is very possibly achievable in this context of the addition column capacities.

This information about the additional column capacities is derived only from the original design documents: A thorough investigation should be conducted in future design phases to confirm feasibility, including a geotechnical investigation, probes of the existing structure to confirm construction, and structural analysis of the raft foundation.

It is also well worth noting that even if the existing foundation is structurally adequate for the addition loads, differential settlement may very well occur when the loads are applied, as described in the 1980 geotechnical report by Empire Laboratories, on page 9 of that report. Specifically, the report estimates settlement of the mat foundation under the maximum soil bearing pressure would be approximately 1-1/2" to 2-1/2", with settlement on the perimeter of the structure at approximately 50% to 75% of those values. This geotechnical report recommended that the two portions of the building be structurally separated, and while expansion joints are present at the first floor level in certain areas, there do not appear to be expansion joints in the raft slab itself around the addition area: It is very curious that the original design would have deviated on this point from the geotechnical recommendations, therefore this issue should be further investigated in future design phases.

For this and any issue involving new foundations or the use of existing foundations for different loads from the existing condition, it is strongly recommended that a geotechnical engineer be engaged as soon as possible for investigation and opinion on the proposed work, including expected settlement.

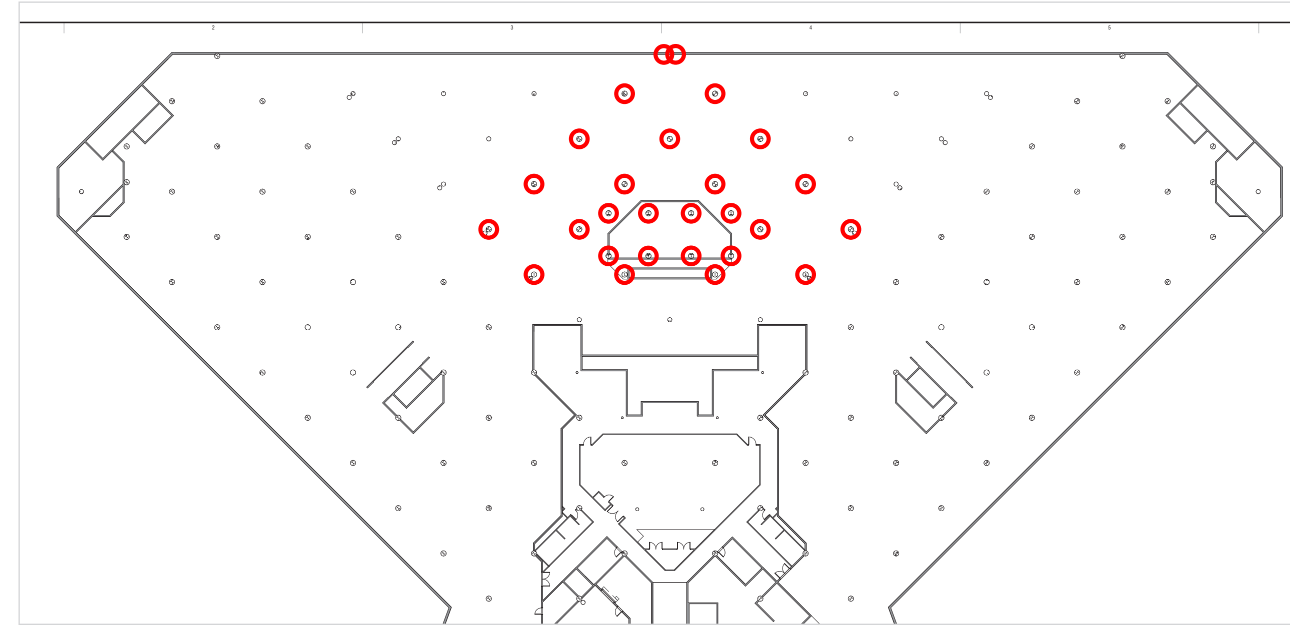


Figure 5.3.06: Locations of columns designed for the potential addition that are depicted on the original drawings as having additional load capacity (shown in red).

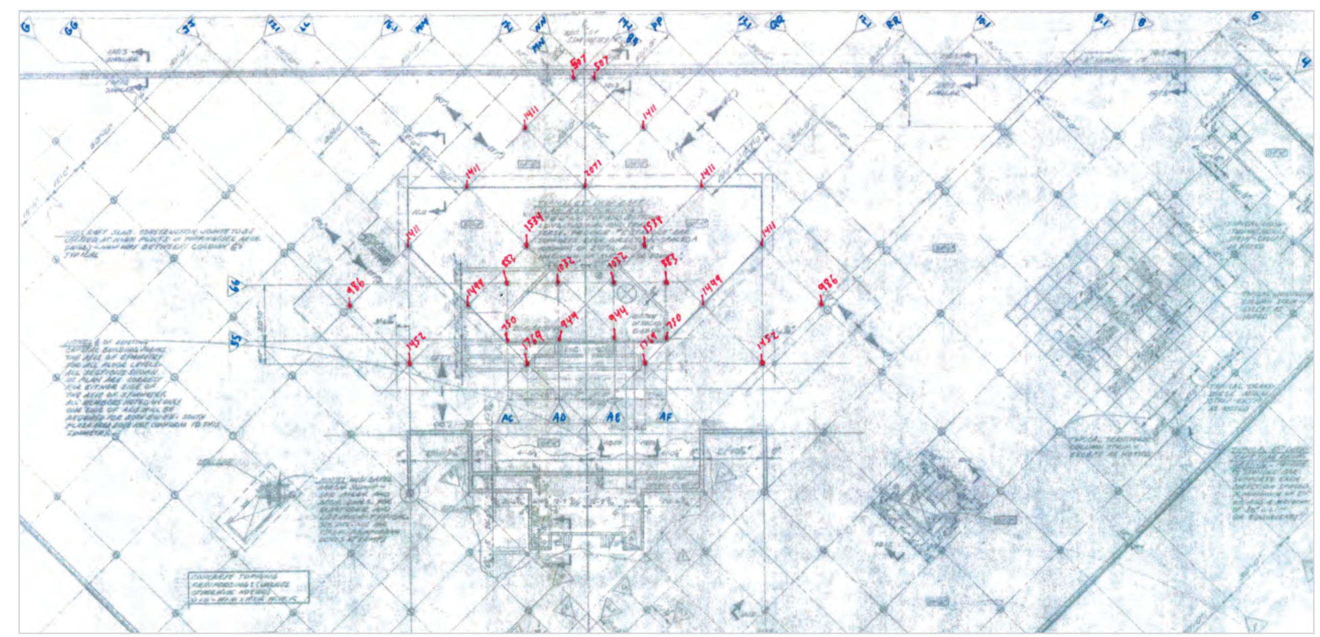


Figure 5.3.07: Potential addition column loads (in kips) and grids, as depicted on the original drawings.

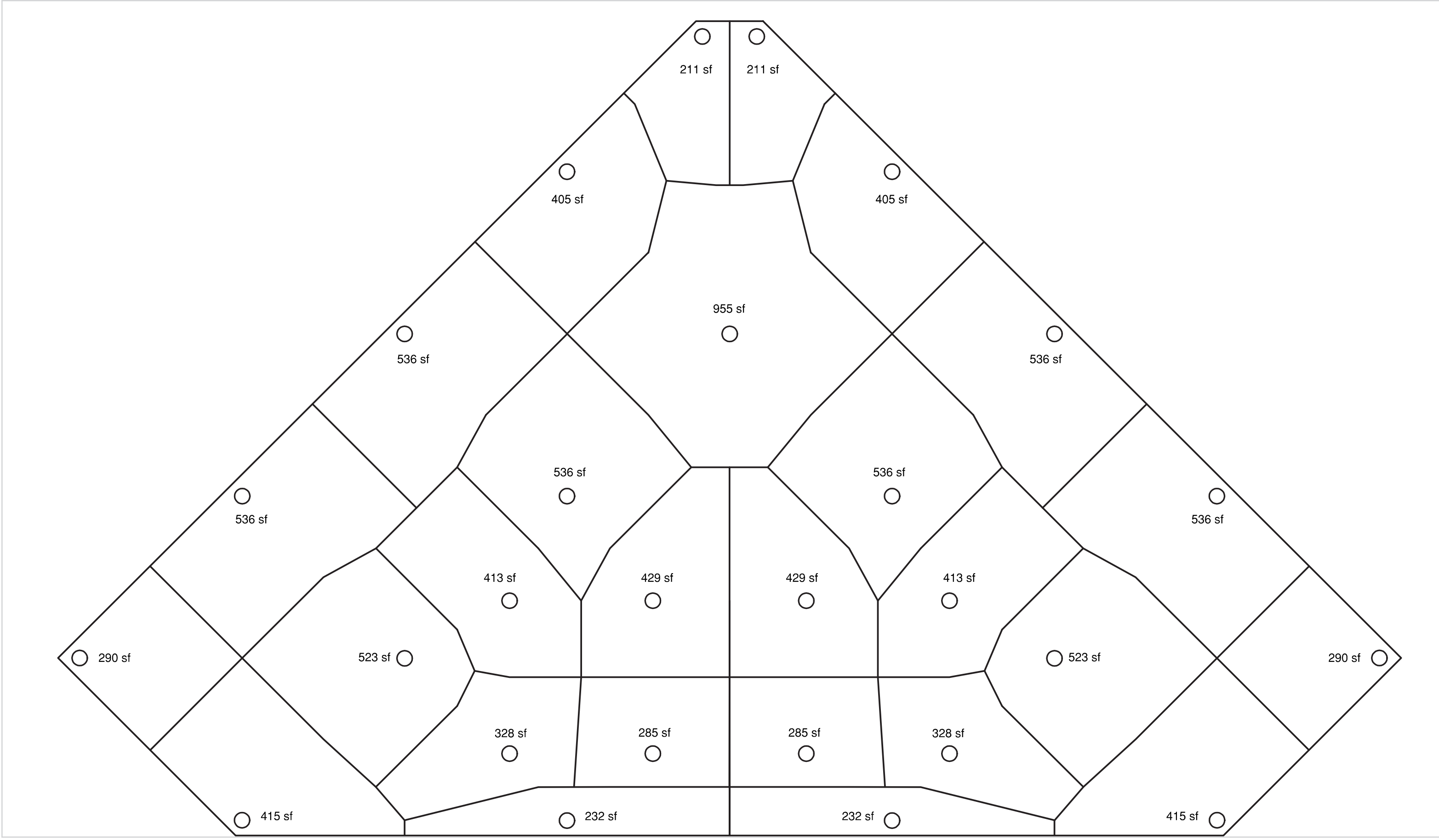


Figure 5.3.08: Estimated approximate tributary areas per floor, if all columns of the potential addition extend the same height for the addition structure.

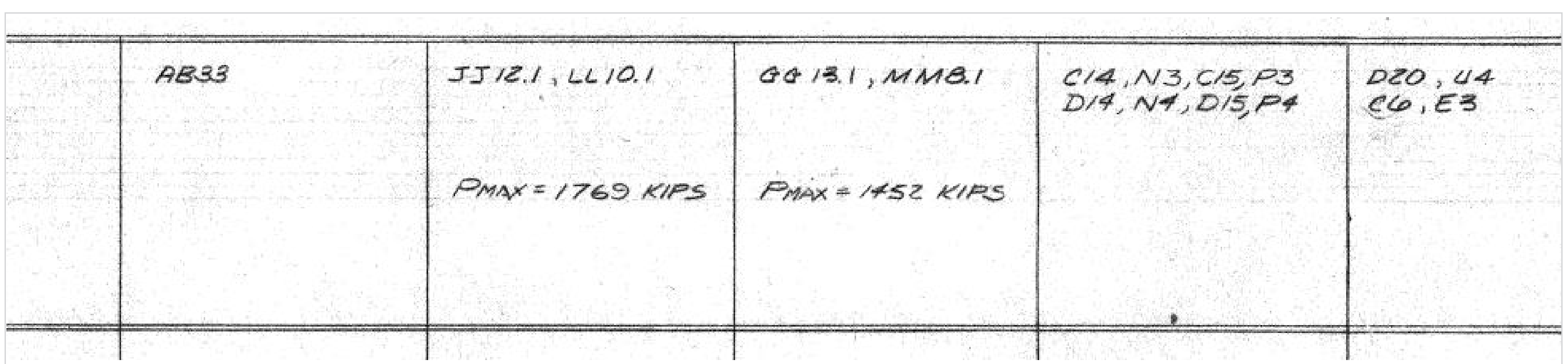
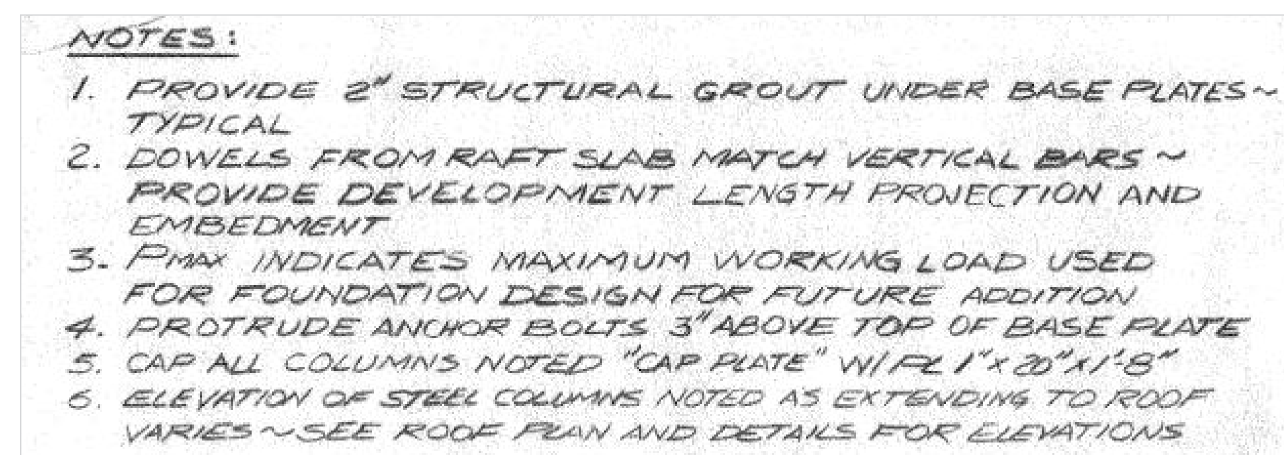


Figure 5.3.09: Original structural drawing snapshot of column schedule showing potential addition column loads (as distinguished from other columns without such assumed additional load).

15482 2013-11-07 additiona column estimate - RSA / ems						
Column #	"Pmax" (kips)	Tributary area (sf)	Total load per new floor (psf)	Overstrength factor: lateral, etc.	Number of feasible addition floors…	…rounded down
AC66	883	413	200	1.5	7.126715093	7
AF66	883	413	200	1.5	7.126715093	7
JJ12.1	1769	232	200	1.5	25.41666667	25
LL10.1	1769	232	200	1.5	25.41666667	25
GG13.1	1452	415	200	1.5	11.6626506	11
MM8.1	1452	415	200	1.5	11.6626506	11
LL13.1	1534	536	200	1.5	9.539800995	9
MM12.1	1534	536	200	1.5	9.539800995	9
GG14.1	986	290	200	1.5	11.33333333	11
NN8.1	986	290	200	1.5	11.33333333	11
MM14.1	1411	405	200	1.5	11.61316872	11
LL14.1	1411	536	200	1.5	8.774875622	8
JJ14.1	1411	536	200	1.5	8.774875622	8
NN12.1	1411	536	200	1.5	8.774875622	8
NN13.1	1411	405	200	1.5	11.61316872	11
NN10.1	1411	536	200	1.5	8.774875622	8
MM13.1	2071	955	200	1.5	7.228621291	7
NN8.9*	507	211	200	1.5	8.009478673	8
MN14.1	507	211	200	1.5	8.009478673	8
JJ13.1	1499	523	200	1.5	9.553855959	9
MM10.1	1499	523	200	1.5	9.553855959	9
AC55	750	328	200	1.5	7.62195122	7
AF55	750	328	200	1.5	7.62195122	7
AD66	1032	429	200	1.5	8.018648019	8
AE66	1032	429	200	1.5	8.018648019	8
AD55	944	285	200	1.5	11.04093567	11
AE55	944	285	200	1.5	11.04093567	11
*original dwg says NN13.1 but it is believed this was a typo						
Totals	33249	11233				

Figure 5.3.10: Summary table of addition column loads, tributary areas, estimated total load per addition floor, overstrength factor, and deduction of fesaible additional floors.


NOTES:

1. PROVIDE 2" STRUCTURAL GROUT UNDER BASE PLATES ~ TYPICAL
2. DOWELS FROM RAFT SLAB MATCH VERTICAL BARS ~ PROVIDE DEVELOPMENT LENGTH PROJECTION AND EMBEDMENT
3. PMAX INDICATES MAXIMUM WORKING LOAD USED FOR FOUNDATION DESIGN FOR FUTURE ADDITION
4. PROTRUDE ANCHOR BOLTS 3" ABOVE TOP OF BASE PLATE
5. CAP ALL COLUMNS NOTED "CAP PLATE" W/ PL 1"x 20"x 1'-8"
6. ELEVATION OF STEEL COLUMNS NOTED AS EXTENDING TO ROOF VARIES ~ SEE ROOF PLAN AND DETAILS FOR ELEVATIONS

Figure 5.3.11: Original structural drawing note explaining the addition column assumed loads.

Raft Slab Thickness & Perimeter Footing Elevations

The existing raft slab foundation varies in thickness and elevation. In various design options there are proposals to excavate new foundations adjacent to the existing raft slab perimeter. For such excavation it is recommended to avoid extending below the existing bottom of raft slab, in order to avoid underpinning or other foundation remediation efforts.

Note: The raft slab thicknesses and elevations should be verified with probes in future design phases.

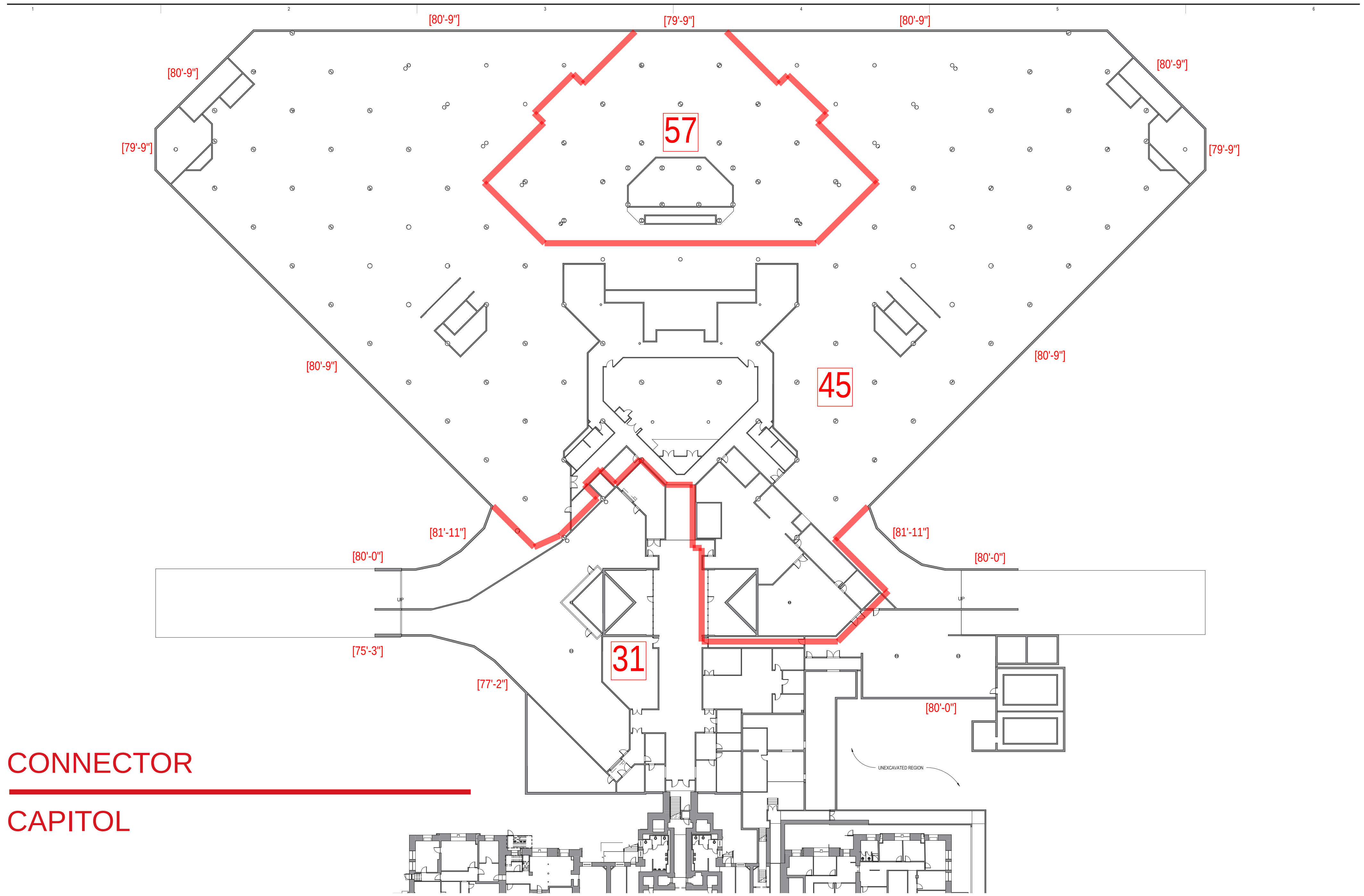


Figure 5.3.12: Raft slab thicknesses (in inches 57, 45, and 31) and perimeter bottom of foundation elevations (shown as [xx'xx"]).

Connector Link Bearing Walls

At the existing connector link basement area some of the walls are utilized as structural bearing walls. New openings through these structural walls is possible but would likely require reinforcement. Such reinforcement would typically involve installing new lintel beam and post elements to carry the load of the wall and floor above the opening.

Note: These assumed locations should be verified with probes in future design phases.

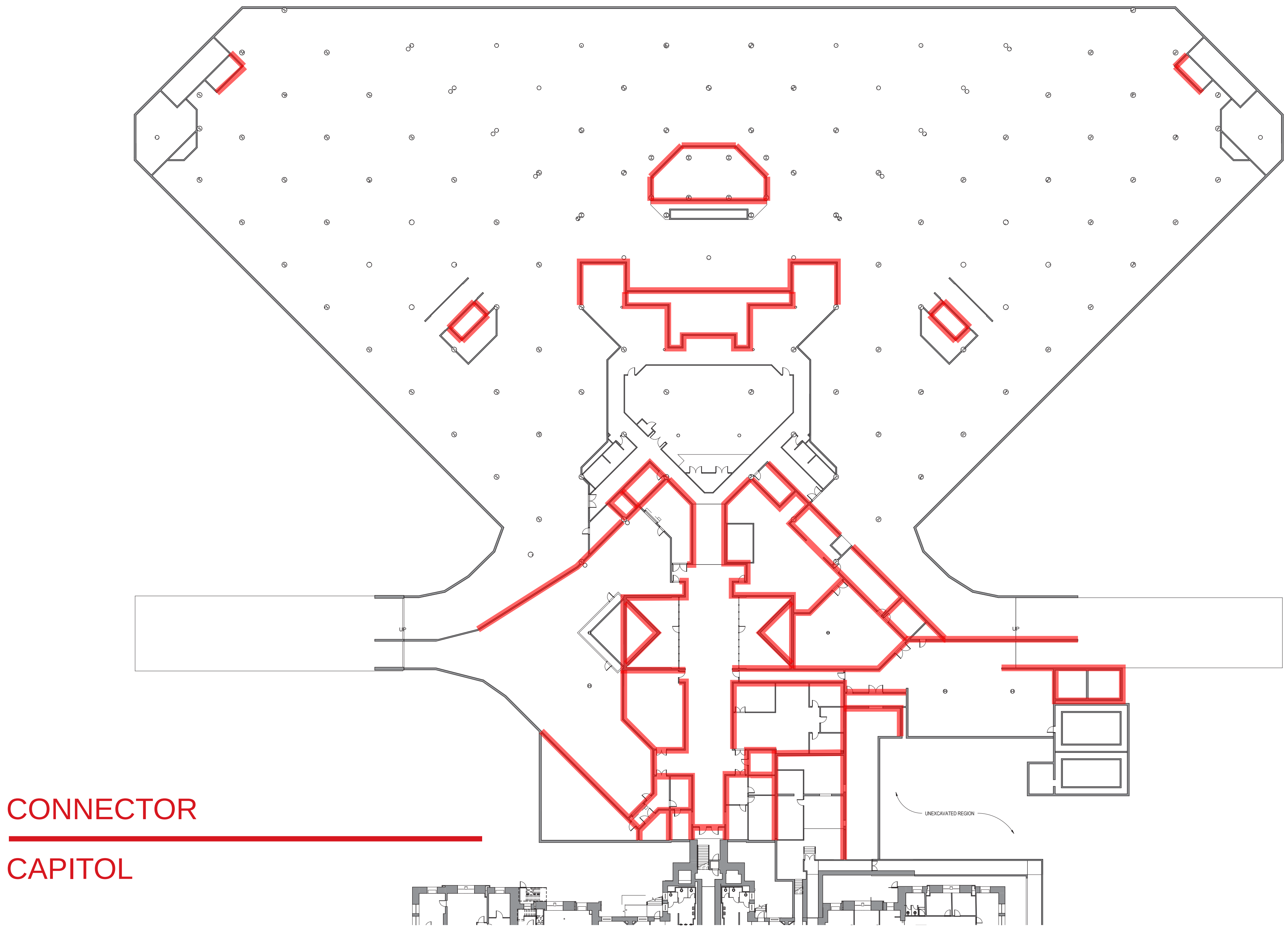


Figure 5.3.13: Locations of interior basement structural walls (shown in red).

5.3 Structural Systems

Atrium Structure

The existing atrium structure in the "crook" of the Herschler building is structured with steel framing, notably deep plate girders spanning north-south at the roof, and a column line along the atrium's north side. It appears that the atrium frame relies on the main structure of the Herschler building for lateral resistance, and that the atrium frame does not provide significant lateral resistance of its own.

Therefore, removal of the atrium structure would not significantly impact the lateral system of the Herschler building. Removal of the atrium structure would likely require some local reframing at its west and east connections to the main structure, depending on the exact details. At the atrium structure's south connection to the main structure, the roof girders frame directly into columns that presumably would remain after the atrium's removal, therefore the girders would simply be cut from the columns, and these columns would continue to be braced by the main structure to remain.

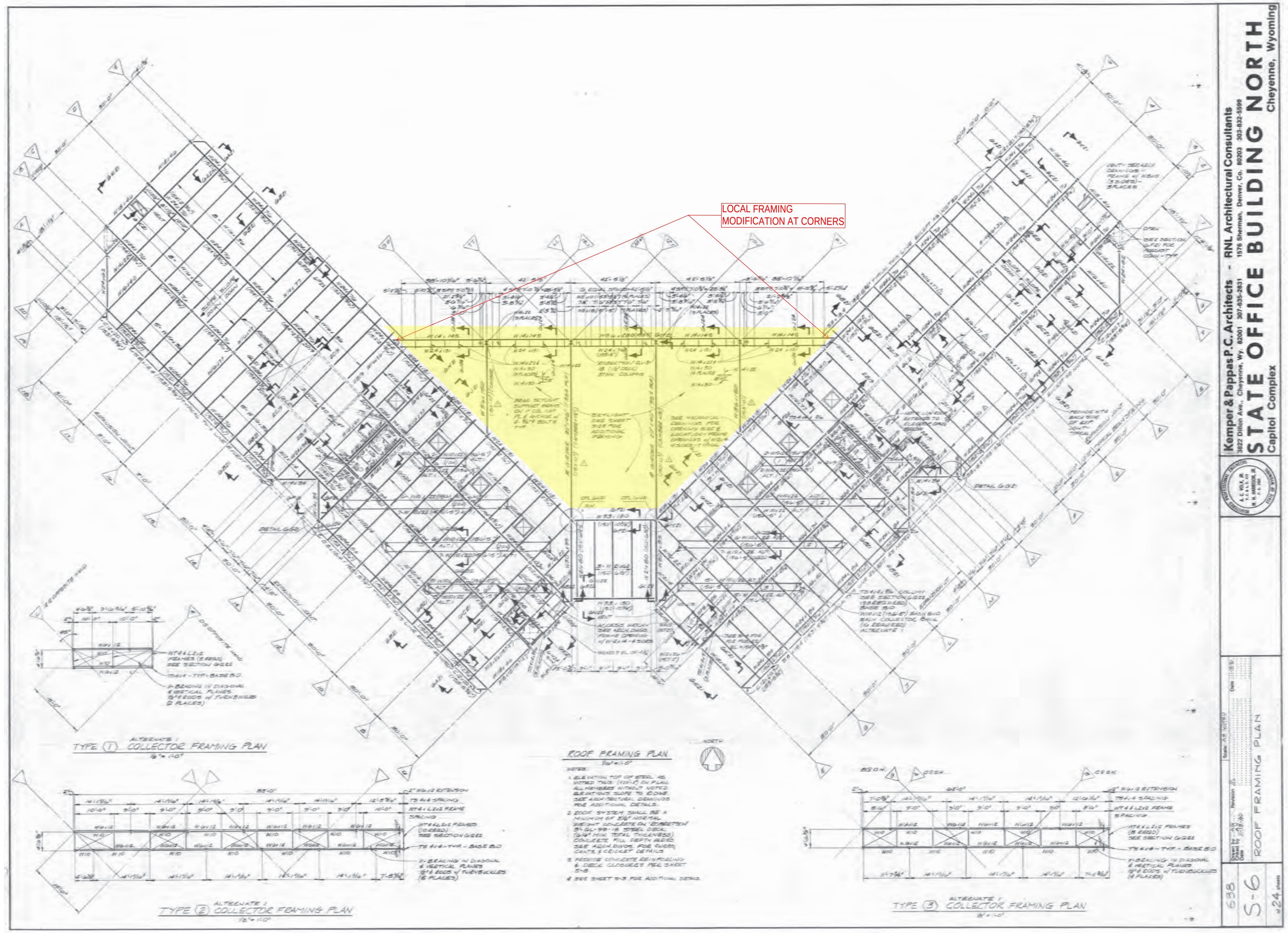


Figure 5.3.14.

Existing Conditions

On October 21 and 22, 2013, Robert Silman Associates visited the Hershler Building to observe the general condition of the structure and façade. No probes were completed. The building is fully occupied with finishes intact so the superstructure was not fully visible. The interior survey focused on the basement where the structure is exposed. Exterior observations were from the ground and supplemented with binoculars. The following are observations of general conditions not a detailed survey of very square foot.

Existing Conditions

Façade

Observations

The façade is a combination of stone and precast concrete panels. The stones are set in mortar with horizontal caulk relieving joints. There is caulk on all edges of the precast panels. Generally the façades are in good condition. The following conditions were observed:

A. Spalling: Minimal local spalls were noted in both the stone and precast, approximately 1 to 10 per façade. Typically the spalls are at panel edges and may have occurred during installation. *(Figure 5.3.15)* Several spalls were noted at the intersection of the precast panel and the stone panels (corresponding to failures in the caulk). The telltale hairline crescent cracks of insipient spalls observed only in a few locations. On the southwest façade of the west wing at the north end there is a crack repair that is still intact indicating that crack is stable.

B. Caulk: Failures of the caulk were noted globally throughout the building. The caulk is important to keeping the building water tight and it appears that the local failure of the caulk is causing local damage to the precast and stone.

1. The caulk is both debonding from the pre-cast/stone and tearing within the caulk joint. At the South Entry wall there is a location where the caulk failure has resulted in wasps building a nest inside the panel. *(Figure 5.3.16, Figure 5.3.17, Figure 5.3.18)*
2. At the intersection of the precast panel and the stone panels, the caulk is often discolored, probably due to biological staining from retaining moisture. 1806 Lift access would be required to verify this condition up close. The spalling sometimes noted at these locations probably relate to the failure of the caulk in these areas allowing water in the joints. *(Figure 5.3.19)*
3. The caulk was also noted as failing at the joint between the top of the window fins and the soffits. These do not relate to water infiltration.

C. Stone Mortar: Generally the mortar appeared to be in good condition. Mortar loss was only noted in a few local areas on the North Atrium wall and on the parapet of the West Wing directly adjacent to the South Entrance wall.

D. Precast Panels: Typically the windows have bands of precast panels above and below. The soffits are also precast panels.

1. Corrosion: Local areas of corrosion were noted around the building. *(Figure 5.3.20)* In only a few locations was corroding rebar observed. *(Figure 5.3.21)* There were rust dots in various locations. *(Figure 5.3.22)* On the East Wing, dots of corrosion in a regular pattern were noted along the bottom of the soffit.
2. Staining at Mullions: At the North Atrium and South Entry walls there are signs of long term moisture (condensation and rain) running down the mullions and staining the precast. Also the run off has resulted in the minimal loss of the ultra-fines of the surface of the precast causing additional discoloration due to changing the texture of the panel finish.
3. Drip Edge and soffit: In various locations the drip edge at the bottom of the panel is stained and there is minimal loss of the ultra-fines. This discoloration also appears in some locations at the panel joints of the soffits. *(Figure 5.3.23)*
4. Cracking of the panel was observed at the intersection of the West Wing northeast façade and the North Atrium wall.

E. Planters: Except for a few locations, the planter walls were in fair to good condition. They are often stained from the water from the splash back off the sidewalk. At the North Atrium wall there is a local area of deteriorated curb wall. *(Figure 5.3.24)* Failure of the caulk at the edge of the planter and the sidewalk was noted in many locations.

Recommendations

It is recommended that the caulk be replaced. Local repairs will be required to the spalling stone and precast around the failed caulk.

As there are signs of corrosion in the precast panels, they should be inspected up close from a lift. While the lift is on site, the stone panel connections should also be observed for signs of spalling.

Any repairs to the precast panels will require special material and methods to match the concrete. There is not a coating so repairs will be visible.

Figure 5.3.15: Spall at top of panel

Figure 5.3.16: Caulk seperation

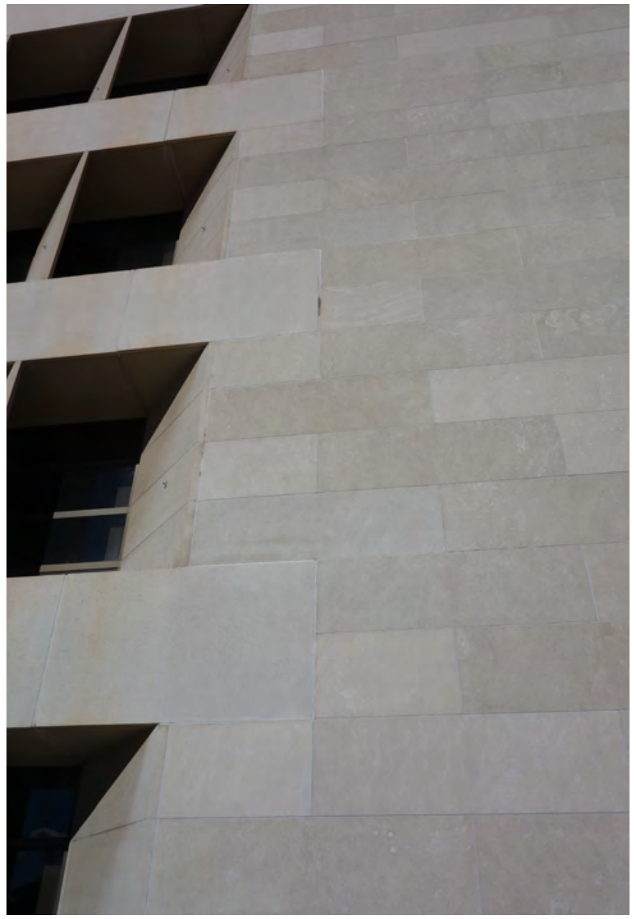


Figure 5.3.17: Caulk failure between stone and precast

Figure 5.3.18: Caulk failure with insect nest inside

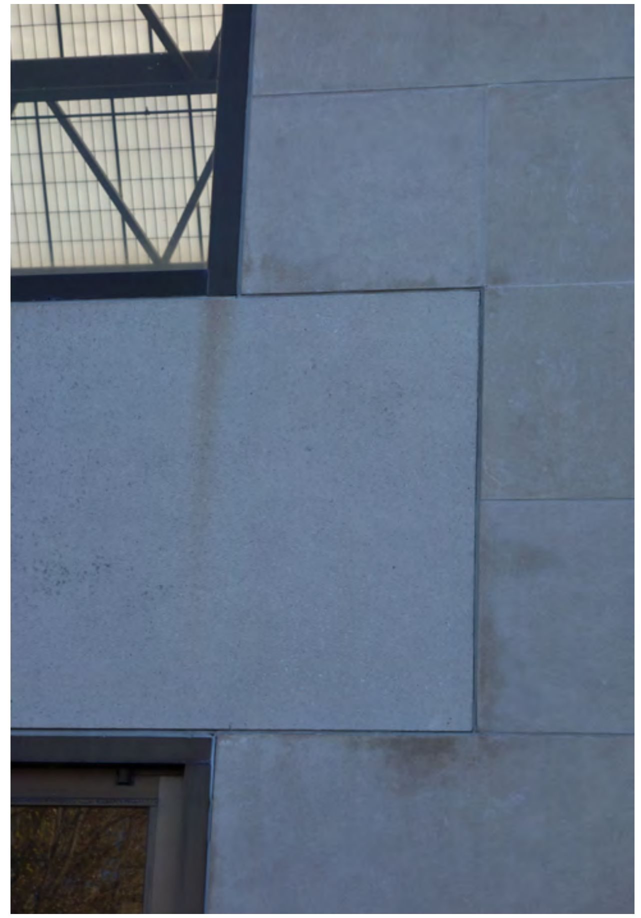


Figure 5.3.19: Caulk deterioration between stone and precast

Figure 5.3.20: Corrosion staining

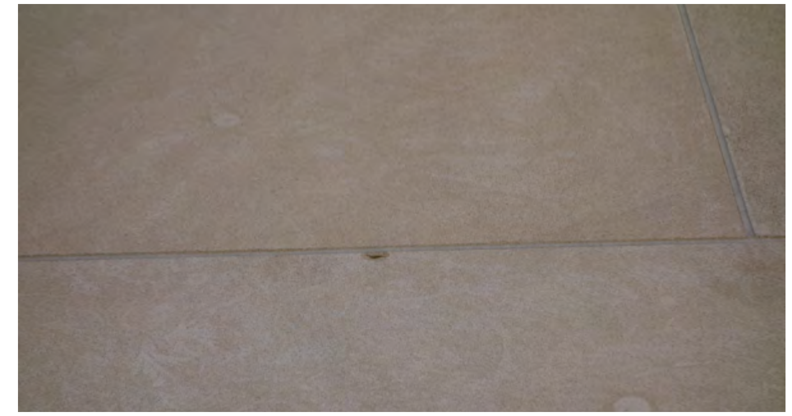


Figure 5.3.21: Corroded reinforcing

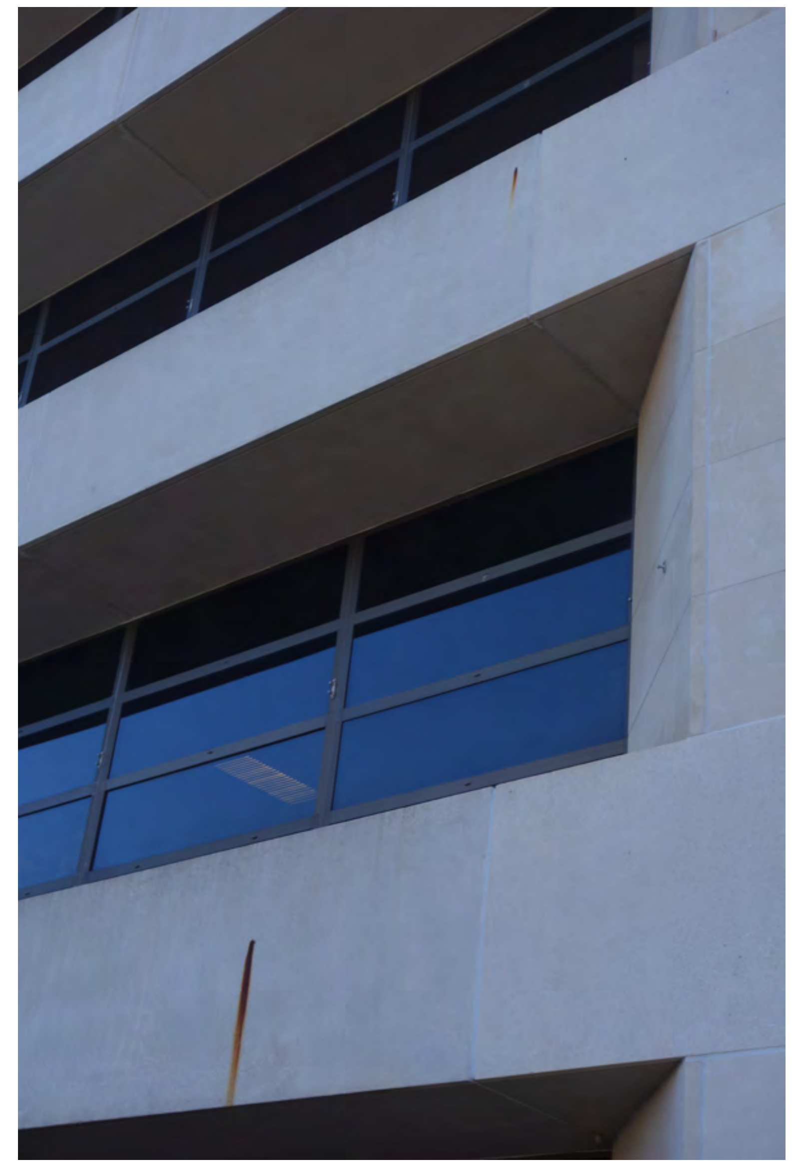


Figure 5.3.22: Corrosion staining and rust dots

Figure 5.3.23: Drip edge and soffit deterioration

Figure 5.3.24: Deteriorated curb wall

Existing Conditions

Parking Garage

Observations

The first floor structure is exposed from the parking garage. The cast in place concrete is generally in good condition with water infiltration at the expansion joints, the entrance drive and the north wall.

A. Expansion Joints: The location of expansion joints generally agree with the structural drawings. At the joint a drainage gutter has been created by adhering half of a PVC pipe to the concrete. *(Figure 5.3.25)* At the termination of the pipes, there is typically water staining at north wall and puddle of water at south termination. *(Figure 5.3.26)* Water was also noted at several of the pipe transitions and bends. *(Figure 5.3.27)*

B. North Wall: Along the south wall there is ongoing water infiltration. Several cracks in the concrete wall were observed to have effloresce and staining. This may be from the draining of the plaza above. There are no signs of structural damage to the concrete and rebar but it is apparent that the waterproofing is damaged. *(Figure 5.3.28, Figure 5.3.29)*

C. Garage Entrance: At both the east and west entrances to the parking garage there is significant water infiltration at the roof. *(Figure 5.3.30)* There is also some cracking and water infiltration on the walls. *(Figure 5.3.31)* The damage is worse at the west entrance. There is cracking along the concrete beam encasements.

D. Columns: There are typically double columns at expansion joints on the north side of the building. The columns are different size and the columns that would correspond to future addition are larger. This corresponds to the excess calculated capacity in the column schedule of the original drawings.

Recommendations

The water collection at the expansion joint should be improved to keep the moisture out of the structure.

Along the north wall, the waterproofing shall be replaced/ repaired. Cracks shall be adhesive injected to stop water infiltration. Draining of the plaza above should be reviewed.

Once the source of water infiltration is stopped at the garage entrances, any loose concrete encasement shall be removed, the steel beams shall be scraped and painted, and the casements shall be replaced.

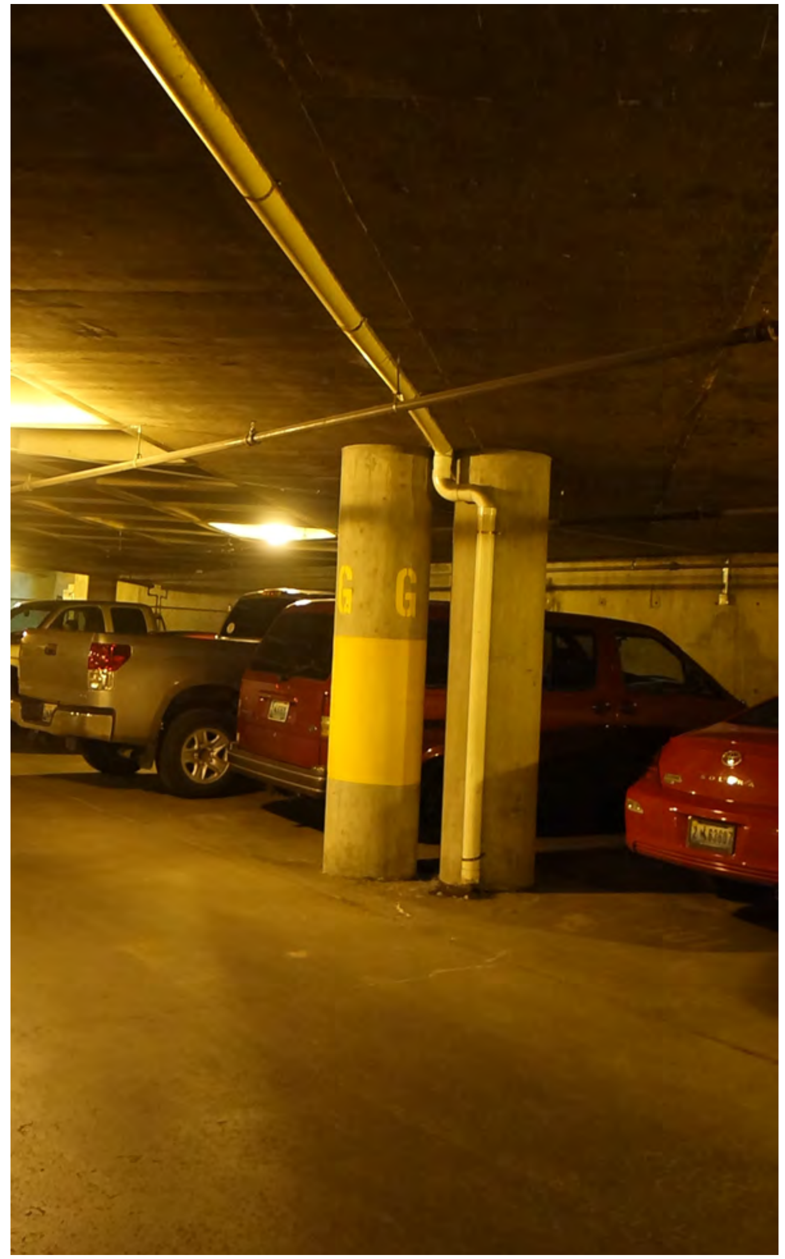


Figure 5.3.25: Drainage at expansion joint

Figure 5.3.26: Water damage at termination of expansion joint

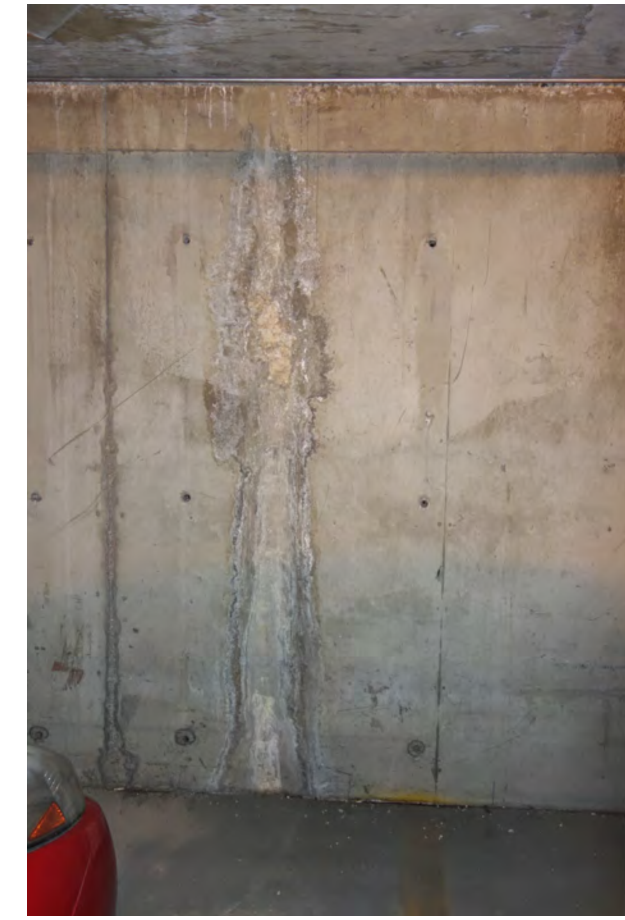


Figure 5.3.28: Water infiltration on north wall

Figure 5.3.27: Water damage at transition of expansion joint

Figure 5.3.29: Water infiltration on north wall

Figure 5.3.31: Water infiltration at garage entrance

Figure 5.3.30: Water infiltration at garage entrance

Existing Conditions

Link

Observations

The below grade link between the Capital Building and the Herschler Building, contains both finished spaces and mechanical spaces where the structure could be observed. There are several areas of ongoing water infiltration. A member of the facilities group took us to problematic areas where the water infiltration is ongoing and has continued since recent repair work at the plaza.

A. Water Infiltration

1. In a conference room just to the east of the entrance to the Capital Building, the water infiltration is so significant they have built a sheet metal drainage trough above the acoustical ceiling. *(Figure 5.3.32)*
2. Staining of the ceiling finishes was observed at the hallway expansion joint at the entrance to the Capital Building. *(Figure 5.3.33)*
3. On the east side of the link in the maintenance area, there is a crack at the intersection of the wall and the slab. There is water staining along the crack. *(Figure 5.3.34, Figure 5.3.35)* Also there are cracks in the roof slab where water is dripping and damaging the pipe insulation. *(Figure 5.3.36)* In one location there is a bucket for collection of water. *(Figure 5.3.37)*
4. In the link corridor there is water staining at the soffit around one of the beams. This is ongoing infiltration. *(Figure 5.3.38)*
5. In the east hallway leading toward the VIP parking, there is a crack in the wall and the roof slab. Water infiltration is reportedly ongoing. *(Figure 5.3.39, Figure 5.3.40)*
6. At the east wall of the chiller room B23 there is ongoing water infiltration at the intersection of the wall and the slab. *(Figure 5.3.41)*
7. Cracks were observed in the concrete paving of the plaza above. *(Figure 5.3.42, Figure 5.3.43)*

Recommendations

Identifying the source of water infiltration is critical to developing repairs if the link structure is to remain. It is recommended that spray testing with thermal imaging be conducted targeting the sources of water infiltration. The thermal imaging will allow tracking of the path of water.

Crack injection and crack repair is recommended to stop the path of water infiltration.

Figure 5.3.32: Sheet metal drainage trough

Figure 5.3.33: Water staining at expansion joint at Capital

Figure 5.3.34: Water infiltration at top of wall

Figure 5.3.37: Bucket for water collection

Figure 5.3.35: Crack at top of wall

Figure 5.3.38: Water staining on interior link finishes

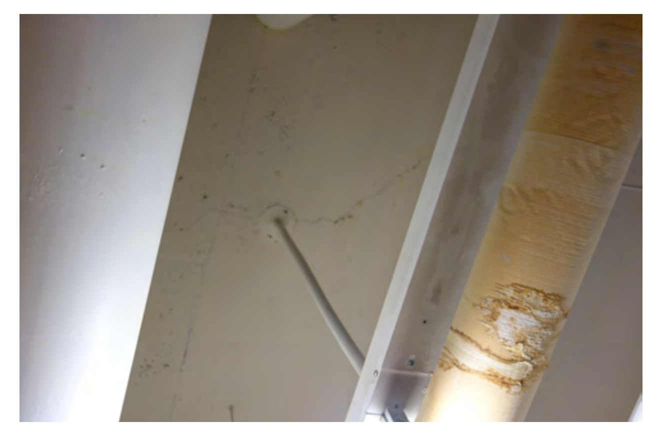


Figure 5.3.36: Water infiltration through crack in slab

Figure 5.3.39: East link hallway water infiltration at slab

Figure 5.3.40: East link hallway crack at wall

Figure 5.3.41: Water infiltration at chiller roof

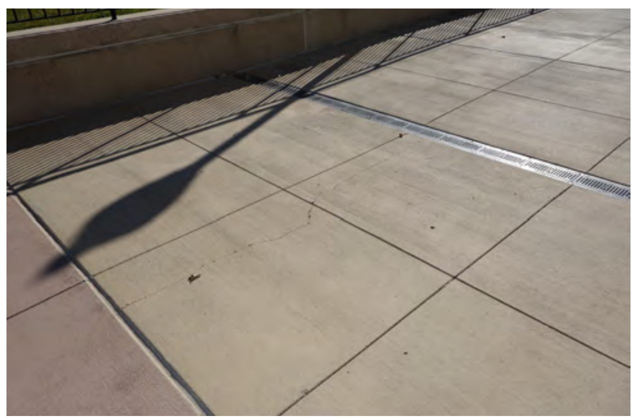


Figure 5.3.42: Crack in plaza paving

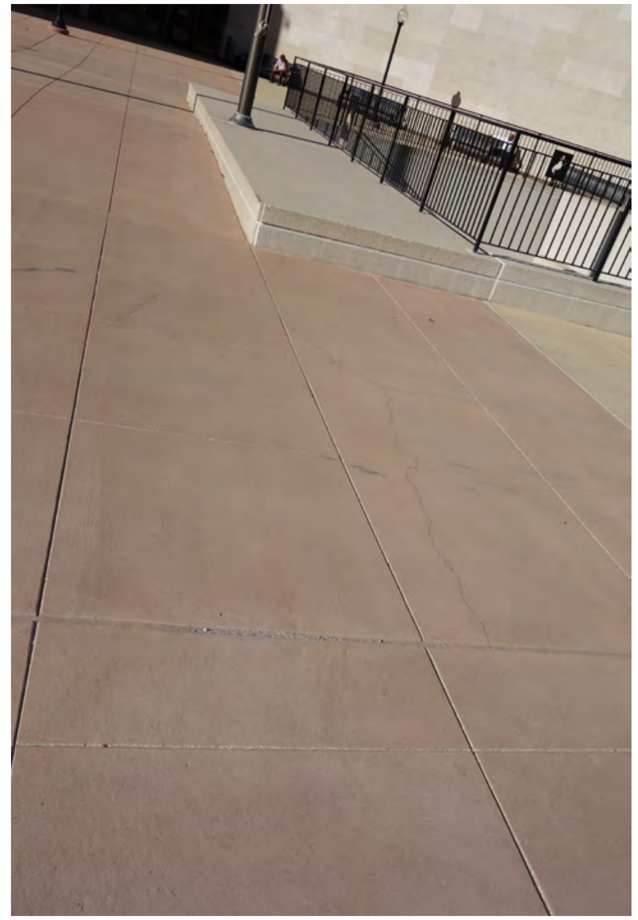


Figure 5.3.43: Crack in plaza paving

5.3 Structural Systems

Original Building Loads

The original design drawings contain a table of design loads including live loads used for various program areas. 150 psf is cited on the drawings as the office area live load, which is much higher than typical office live load of 50 psf, or even corridors at 100 psf. One typical beam and one typical girder at the 2nd floor framing were spot-checked and indeed confirmed to be capable of the 150 psf live load. Further design confirmation studies should be pursued in future design phases, as well as probes and testing to confirm that the actual construction match the design drawings. Given the building's relatively recent construction, it is also recommended that the structural shop drawings be sought, as they may contain even further information and detail.

GENERAL NOTES

I. LIVE LOADS USED IN DESIGN:

A.	ROOF	30 PSF
B.	FLOORS	150 PSF
C.	STAIRS, PLAZAS, & SOLAR COURT DINING FLOORS	100 PSF
D.	MECHANICAL EQUIPMENT ROOMS	125 PSF
E.	WIND	30 PSF BASIC
F.	SEISMIC	ZONE 1

Figure 5.3.44: Original structural drawing notes about design loads.

2311-2312 UNIFORM BUILDING CODE

(i) **Moment of Stability.** The overturning moment calculated from the wind pressure shall in no case exceed two-thirds of the dead load resisting moment.

The weight of earth superimposed over footings may be used to calculate the dead load resisting moment.

(j) **Combined Wind and Live Loads.** For the purpose of determining stresses all vertical design loads except the roof live load and crane loads shall be considered as acting simultaneously with the wind pressure.

EXCEPTION: Where snow loading is required in the design of roofs, at least 50 percent of such snow load shall be considered acting in combination with the wind load. The Building Official may require that a greater percentage of snow load be considered due to local conditions.

Earthquake Regulations

Sec. 2312. (a) **General.** Every building or structure and every portion thereof shall be designed and constructed to resist stresses produced by lateral forces as provided in this Section. Stresses shall be calculated as the effect of a force applied horizontally at each floor or roof level above the base. The force shall be assumed to come from any horizontal direction.

Structural concepts other than set forth in this Section may be approved by the Building Official when evidence is submitted showing that equivalent ductility and energy absorption are provided.

Where prescribed wind loads produce higher stresses, such loads shall be used in lieu of the loads resulting from earthquake forces.

(b) **Definitions.** The following definitions apply only to the provisions of this Section:

BASE is the level at which the earthquake motions are considered to be imparted to the structure or the level at which the structure as a dynamic vibrator is supported.

BOX SYSTEM is a structural system without a complete vertical load-carrying space frame. In this system the required lateral forces are resisted by shear walls or braced frames as hereinafter defined.

BRACED FRAME is a truss system or its equivalent which is provided to resist lateral forces in the frame system and in which the members are subjected primarily to axial stresses.

DUCTILE MOMENT RESISTING SPACE FRAME is a moment resisting space frame complying with the requirements for a ductile moment resisting space frame as given in Section 2312 (j).

ESSENTIAL FACILITIES—See Section 2312 (k).

LATERAL FORCE RESISTING SYSTEM is that part of the structural system assigned to resist the lateral forces prescribed in Section 2312 (d) 1.

MOMENT RESISTING SPACE FRAME is a vertical load carrying space frame in which the members and joints are capable of resisting forces primarily by flexure.

SHEAR WALL is a wall designed to resist lateral forces parallel to the wall.

2312 UNIFORM BUILDING CODE

snow load is 30 psf or less, no part need be included in the value of "W." Where the snow load is greater than 30 psf, the snow load shall be included; however, where the snow load duration warrants, the Building Official may allow the snow load to be reduced up to 75 percent.

$w_i w_x$ = That portion of W which is located at or is assigned to level i or x respectively.

W_p = The weight of a portion of a structure.

Z = Numerical coefficient dependent upon the zone as determined by Figures No. 1, No. 2 and No. 3 in this Chapter. For locations in Zone No. 1, $Z = 3/16$. For locations in Zone No. 2, $Z = 3/8$. For locations in Zone No. 3, $Z = 3/4$. For locations in Zone No. 4, $Z = 1$.

(d) **Minimum Earthquake Forces for Structures.** Except as provided in Section 2312 (g) and (i), every structure shall be designed and constructed to resist minimum total lateral seismic forces assumed to act nonconcurrently in the direction of each of the main axes of the structure in accordance with the following formula:

$$V = ZIKCSW \quad \text{(12-1)}$$

The value of K shall be not less than that set forth in Table No. 23-I. The value of C and S are as indicated hereafter except that the product of CS need not exceed 0.14.

The value of C shall be determined in accordance with the following formula:

$$C = \frac{1}{15\sqrt{T}} \quad \text{(12-2)}$$

The value of C need not exceed 0.12.

The period T shall be established using the structural properties and deformational characteristics of the resisting elements in a properly substantiated analysis such as the following formula:

$$T = 2\pi\sqrt{\left(\sum_{i=1}^{n} w_i\delta_i^2\right) \div g\left[\sum_{i=1}^{n-1} F_i\delta_i + (F_t + F_n)\delta_n\right]} \quad \text{(12-3)}$$

where the values of F_i, F_t, δ_i and δ_n shall be determined from the base shear V, distributed approximately in accordance with the principles of Formulas (12-5), (12-6) and (12-7) or any arbitrary base shear with a rational distribution.

In the absence of a determination as indicated above, the value of T for buildings may be determined by the following formula:

$$T = \frac{0.05h_n}{\sqrt{D}} \quad \text{(12-3A)}$$

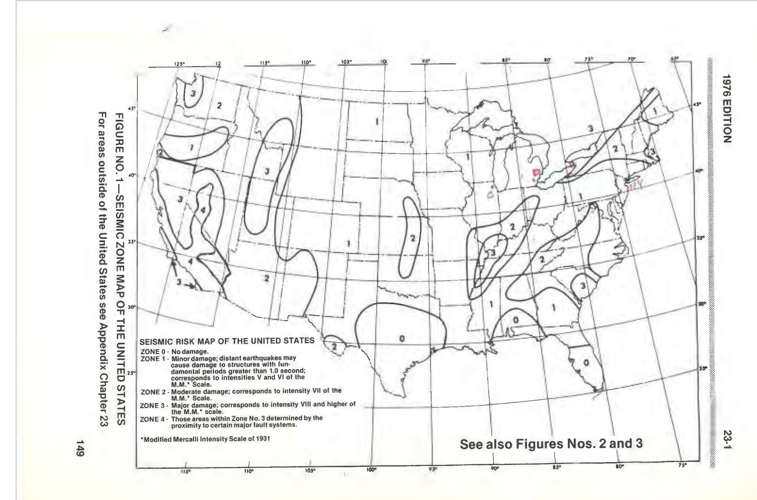


Figure 5.3.45: UBC 1976 included seismic provisions.

We recommend that the mat be designed for a maximum allowable soil bearing pressure of three thousand (3000) pounds per square foot under dead plus reduced live loads in accordance with the Uniform Building Code. Our analyses indicate that settlement of the mat foundation under the maximum soil bearing pressure will be approximately one and one-half (1-1/2) to two and one-half (2-1/2) inches. Settlement of the mat on the perimeter of the structure would be approximately fifty percent

Figure 5.3.46: Original geotechnical report references Uniform Building Code.

Preliminary Seismic Discussion

Seismic design is an important and sometimes complex discussion with existing buildings. This is especially true for older buildings designed before explicit seismic codes. The original drawings and geotechnical report of the Herschler building, though, suggest that the building was in fact designed for seismic loads as well as a wind load of 30 psf.

While the exact code and edition have not been located on the original structural or architectural drawings, the original geotechnical report makes reference to the Uniform Building Code (UBC), which was a model code replaced in 2000 by IBC. The original structural drawing general notes cite loads for "seismic - zone 1". Given the 1980 design, it is hypothesized that the original building code reference was UBC 1976 or 1979. For this report, UBC 1976 was consulted and in fact there were seismic design requirements (see included snapshots), however a thorough seismic load comparison was beyond the scope of this study phase.

The modern code (IBC 2012 or IEBC 2012) may have stricter provisions than what was used for the original design, especially in the absence of a geotechnical report to understand the subgrade classifications in the context of the current code. Per IBC 2012 section 1613.3.2, if there is no geotechnical report then one is typically directed to assume soil site class D, which may be overly conservative for our site. (The 1980 geotechnical report uses the different UBC soil classifications.) Assuming site class D (stiff soil) and risk category IV (essential facility), then per USGS and IBC 2012 results in seismic design category C, which may have overly conservative (i.e., overly expensive) detailing requirements. These assumptions are critical to verify with the input of a geotechnical engineer and the larger design team. It is very possible that with a geotechnical engineer's report the site class definition may be improved, changing the seismic design category to B, which has less restrictive requirements.

Broadly speaking, minimal changes to the existing building may not trigger large seismic retrofit. Major changes would have to be investigated more in depth for the effect on the seismic capacity of the building. In this context, it will be important to avoid modification of the existing building's lateral load resisting system, i.e., the concrete shear walls and steel braced frames.

The new addition structure will share the existing raft slab with the existing building. A geotechnical engineer's opinion will be necessary for understanding seismic implications.

Groundwater, Flood Zone, Frost Depth

The 1980 geotechnical report warned that: "The primary geotechnical problem at the site is the shallow depth to the groundwater table." Careful consideration should be given on this issue, both for temporary dewatering systems during construction, any permanent dewatering and drainage systems, and any special foundation and/or slab on grade details (e.g., to deal with potential loads for hydrostatic pressure).

Per 2007 FEMA FIRM maps the site is outside of flood zones and therefore explicit flood loads do not apply.

The 1980 geotechnical report recommended a minimum dimension of 36" be provided from bottom of footing to top of adjacent finished grade for frost protection. (The 2001 geotechnical report from a nearby site noted this dimension as 30".)

These issues, and others, would be confirmed for our project by a new geotechnical report.

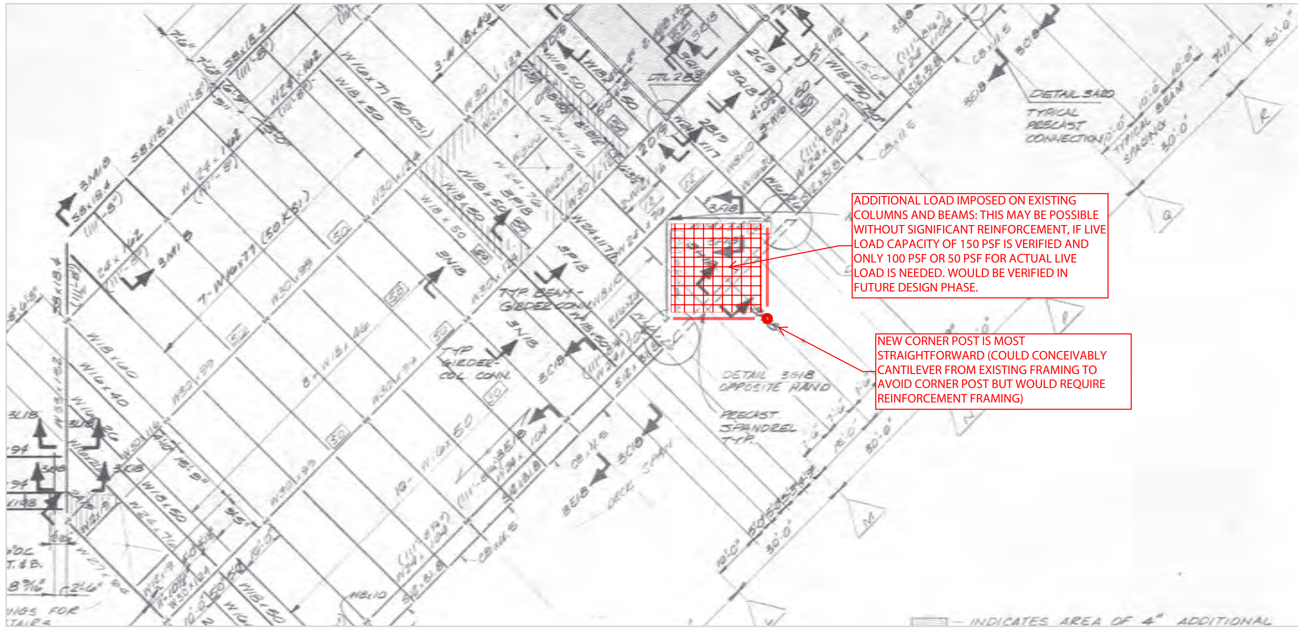


Figure 5.3.47: Potential framing for outboard circulation element superstructure.

Figure 5.3.48: Potential foundation implications for outboard circulation element.

Outboard Circulation Element

One feature of the proposed project that appears in several of the design options is the addition of a circulation element (i.e. stair) building out from the small plan recess in the long sides of the Herschler wings. Framing for this element would be assisted by the introduction of a new corner post, which appears would come down and sit on top of the existing foundation wall. (Or, if the corner post were not architecturally desired, the framing could be achieved by cantilevering at each floor level, but this would likely be significantly more expensive and require more complicated structural elements.) Existing columns and beams used to support the new outboard element would need to be reviewed for the proposed increased load. Increasing loads on the existing structural elements may be justifiable especially if those members were indeed designed for the high 150 psf live load: See our previous discussion on this per above. The new framing here would likely be steel to minimize the added weight.

5.3 Structural Systems

Design Options

The architectural team has provided a pallette of design options with accompanying explanatory sketches: Please see the architectural package for those materials. Below are structural implications for each of the options.

5.3.05.1 Connector Link - Minor

This option proposes new tenant infill at the existing connector structure within the confines of the existing perimeter walls. As noted above, there are many existing structural walls in the connector area and north area, the modification of which would require reinforcement. Therefore, the connector link work may range from maintaining the existing structure to remain with only local minor modifications, replacement of the structural walls and plaza level framing with a new structure to bear on the existing raft foundation (which would require in-depth analysis of the existing raft foundation, in a future design phase), to complete replacement of the connector link structure with new structure on new foundations. It is presumed that the `minor' design option would entail either the existing structure to remain with only local minor modifications, or replacement of the structural walls and plaza level framing with a new structure to bear on the existing raft foundation.

5.3.05.2 Connector Link - Major

This option proposes new tenant infill at the existing connector structure (see above for general implications). The intent is to use as much of the existing foundation and superstructure as possible. It is presumed that this 'major' design option would entail some replacement of the structural walls and plaza level framing with new structure to bear on the existing raft foundation.

5.3.05.3 Parking - Minor

As noted above, there are many existing structural walls in the connector area and north area of Herschler, the modification of which would require reinforcement. It is presumed that this 'minor' design option would entail maintaining the existing structure with only local minor modifications.

5.3.05.4 Parking - Major

There are many existing structural walls in the connector area and north area of Herschler. Major modifications of these walls would require signifcant reinforcement. In this 'major' design option, large openings in the north wall of the parking garage are desired. As this is a structural wall, the new opening would require a beam to support the plaza level framing. The required depth of the beam will be a function of the permissible column element locations.

The excavation and recessing for a dock leveler should take care to avoid undermining the existing raft slab foundation and frost depth. This could be addressed with local remediation as required. If an in-board roll-up door is used requiring a 'shade pocket' cut into the existing plaza level waffle slab, then local reframing would be required.

The mass removal of soil from the building perimeter may also have some effect on the flow of lateral forces from the building to the ground: This issue could be tracked with the detailing for the new drive slab and retaining wall connection to the existing building wall. The drive slab wall would likely be of concrete construction.

5.3.05.5 Central Utility Plant - Minor

This option proposes locating the new Central Utility Plant (CUP) in the existing connector link area. As noted above, there are many existing structural walls in the connector area and north area. Making these modifications would require structural reinforcement. It is presumed that this 'minor' design option would entail maintaining the existing structure with only local minor modifications.

5.3.05.6 Central Utility Plant - Major 1

This option proposes locating the new CUP to the east of the existing east foundation wall of the north area of Herschler. The new CUP would therefore be new construction on new foundations with a roof and landscaping above. A concrete structure is likely reasonable given the location below grade. If at all possible, the depth of excavation for the new structure should be planned so as not to undermine the existing foundation: See the existing foundationraft structural map in Section 3.4 of this report.

5.3.05.7 Central Utility Plant - Major 2

Assuming loads can be reasonably distributed, then it appears possible that this CUP could be placed within the existing structure to remain. Local structural modifications may be required.

5.3.05.8 Herschler Renovation - Minor

This option proposes relatively minimal new structure, with some new circulation and program at the existing basement and upper floors. New local openings through the existing steel and concrete structure should be able to be reasonably achieved with local reframing of beams at and within each floor level. It is strongly recommended to retain the existing column grids and the existing lateral systems of the existing building.

5.3.05.9 Herschler Renovation - Major 1

This option proposes new 'outboard' circulation elements at the center of the outer long faces of the Herschler wings, new circulation and program area in the crook between the Herschler wings, and new circulation and program at the existing floors. The new outboard circulation elements are believed at this early stage to be of light enough load to be able to bear on the existing raft foundation. This assumption will have to be verified by more in-depth analysis in a future design phase.

The new circulation and program area in the crook is not located at the area of extra column capacity per the original design. It is quite possible that this structure would require new foundations. The existing raft foundation would have to be verified by more in-depth analysis in a future design phase. Also, please see section 3.6 for discussion of removal of the existing atrium structure.

Steel framing is a reasonable assumption for the new structure given it is typically of a lighter weight compared to concrete framing. This is important given the concerns about foundation capacities and details.

New local openings through the existing steel and concrete structure should be reasonably achieved with local reframing of beams at and within each floor level. It is strongly recommended to retain the existing column grids and the existing lateral systems of the existing building.

Design Options (cont.)

5.3.05.10 Herschler Renovation - Major 2

This option is very similar to the 'major 1' option in terms of the general structural implications discussion Therefore the reader is referred to the description above in Section 5.9. Also, please see section 3.6 for discussion of removal of the existing atrium structure.

5.11 Herschler Addition - Minor

The 'minor' addition option entails structural implications similar to the renovation options. Therefore the reader is referred to the description above in Section 5.9. Also, please see section 3.6 for discussion of removal of the existing atrium structure.

5.12 Herschler Addition - Major

The 'major' addition option includes elements of the minor addition, and the installation of new structure on top of the area of extra column capacity per the design on the original drawings: Please see the above discussion and information in Section 3.3 of this report. Also, please see section 3.6 for discussion of removal of the existing atrium structure.

5.3 Structural Systems

Recommendation Scheme

The design team's leading "recommendation" scheme for the project is illustrated in the plans below, with annotation markups of significant structural implications. The structural annotations typically provide reference to the above report sections for notable further information.

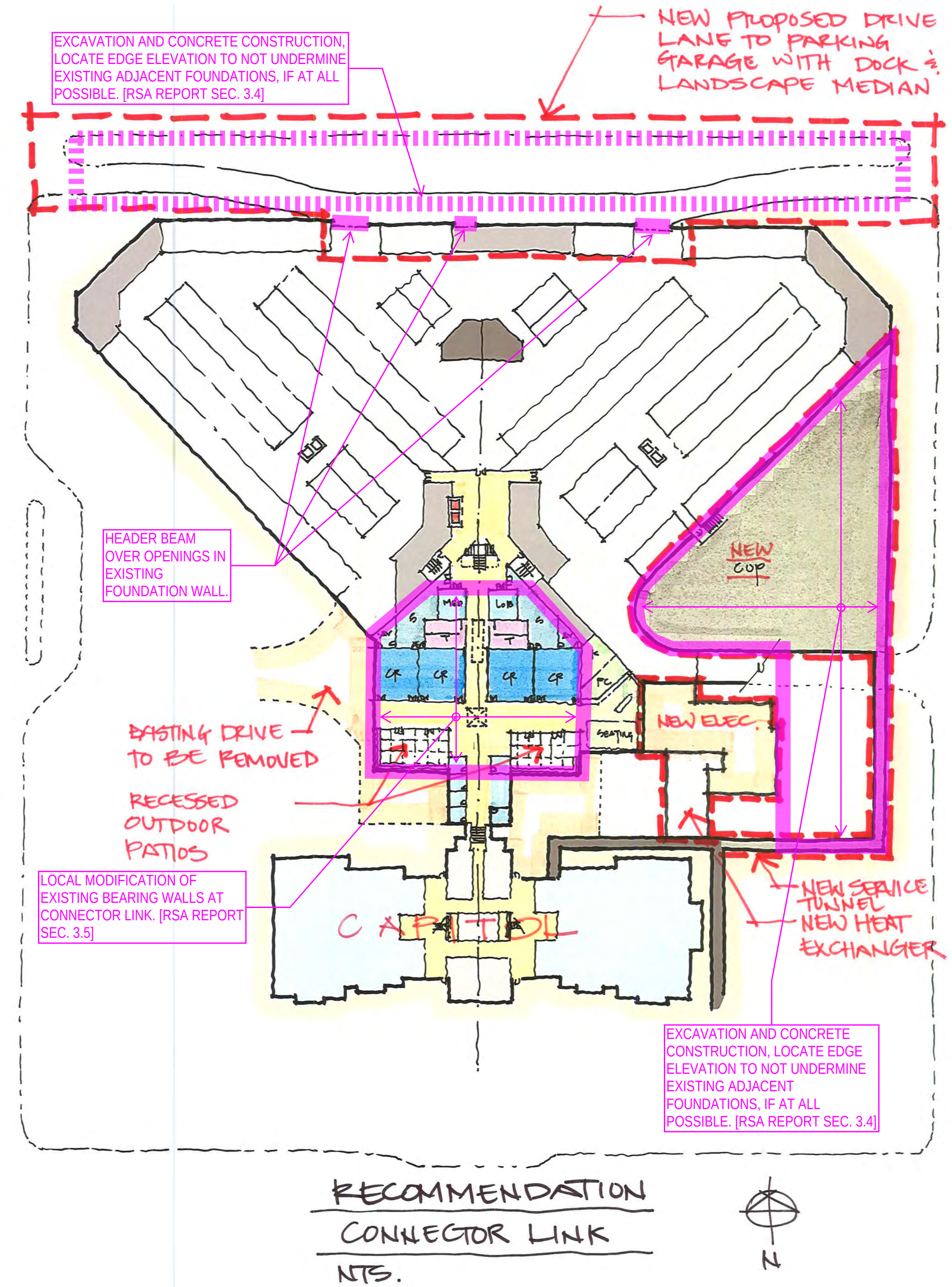


Figure 5.3.49: Recommendation Scheme Structural Markups – Basement Floor Plan

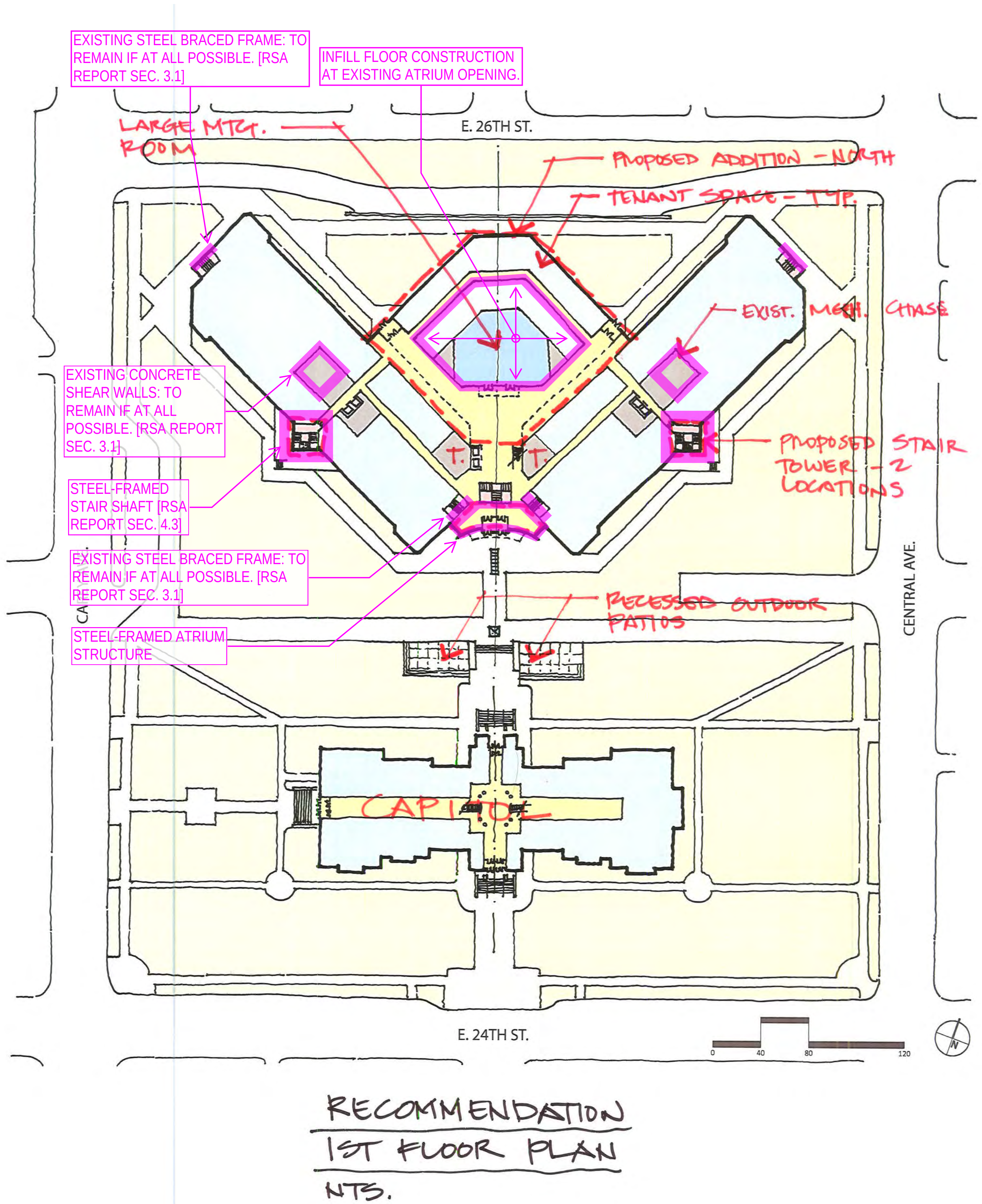


Figure 5.3.50: Recommendation Scheme Structural Markups – 1st Floor Plan

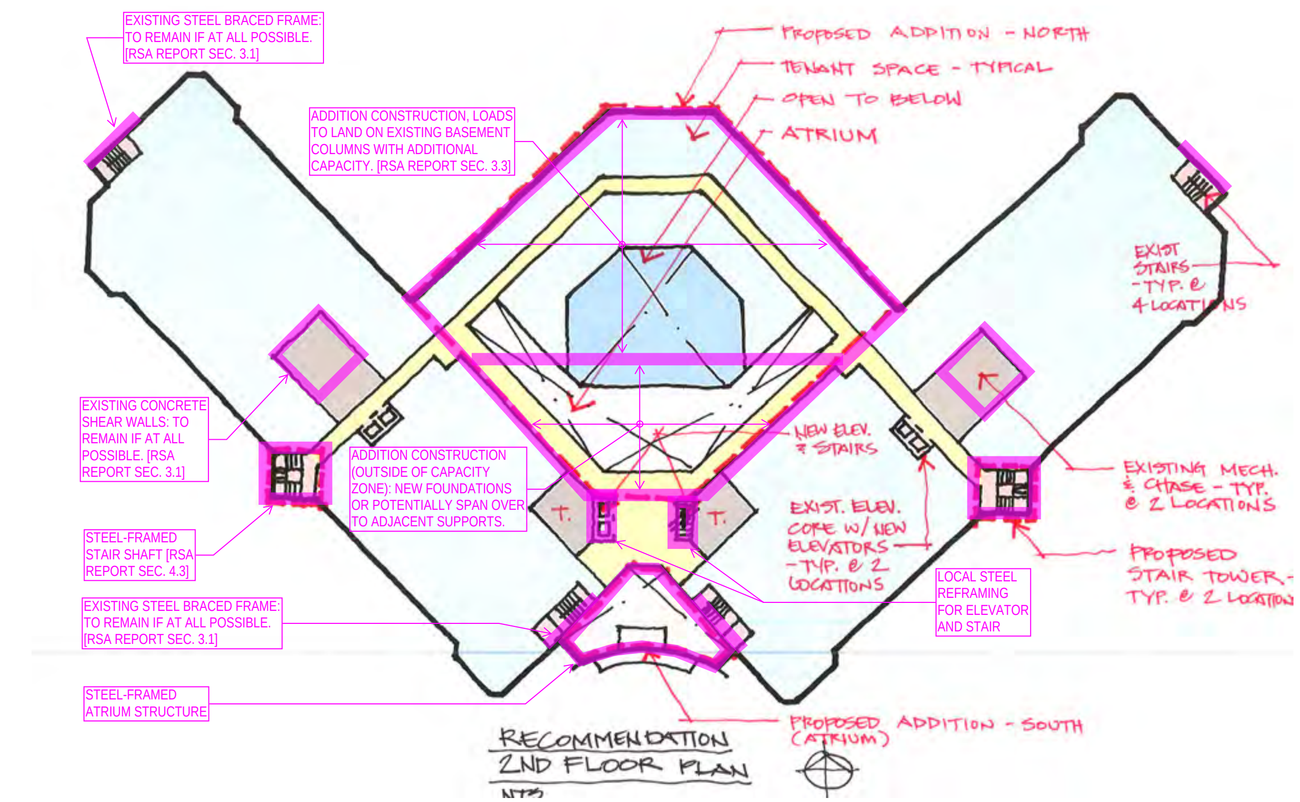


Figure 5.3.51: Recommendation Scheme Structural Markups – 2nd Floor Plan

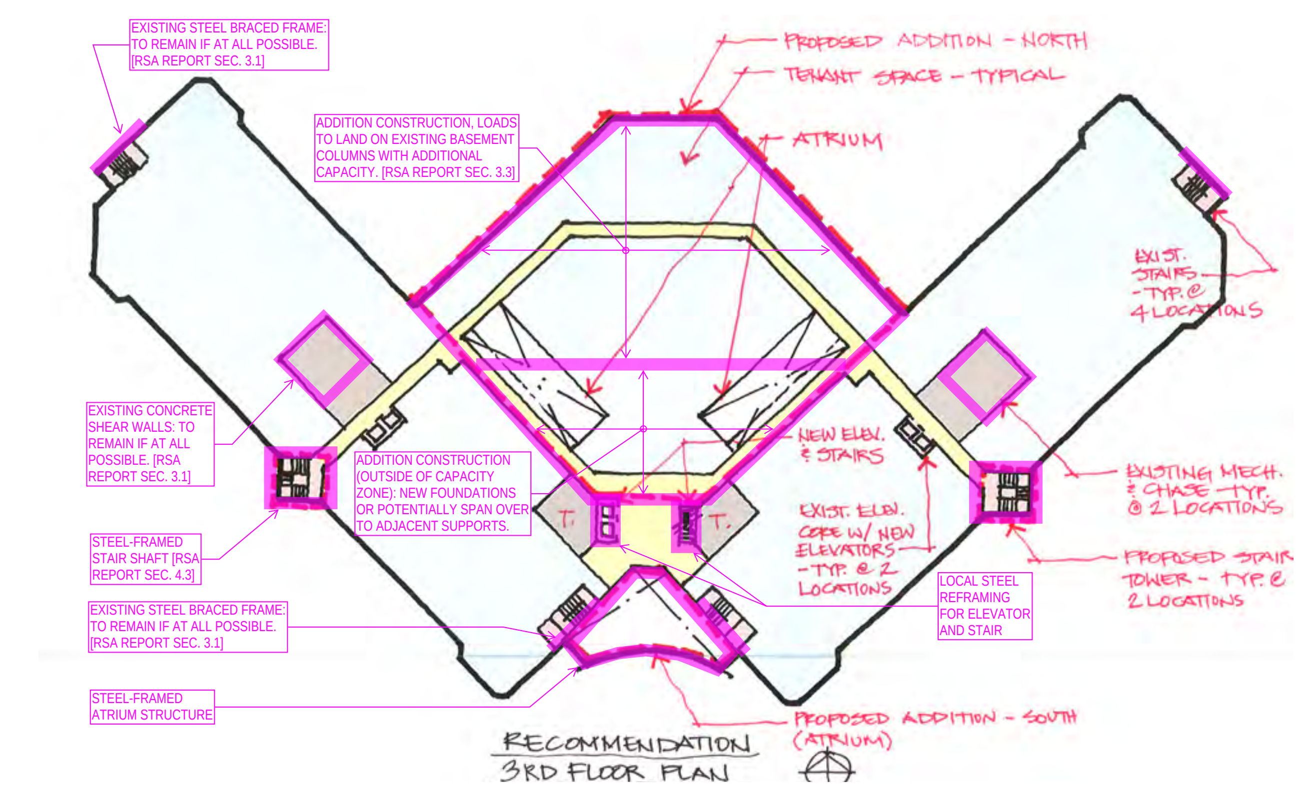


Figure 5.3.52: Recommendation Scheme Structural Markups – 3rd Floor Plan

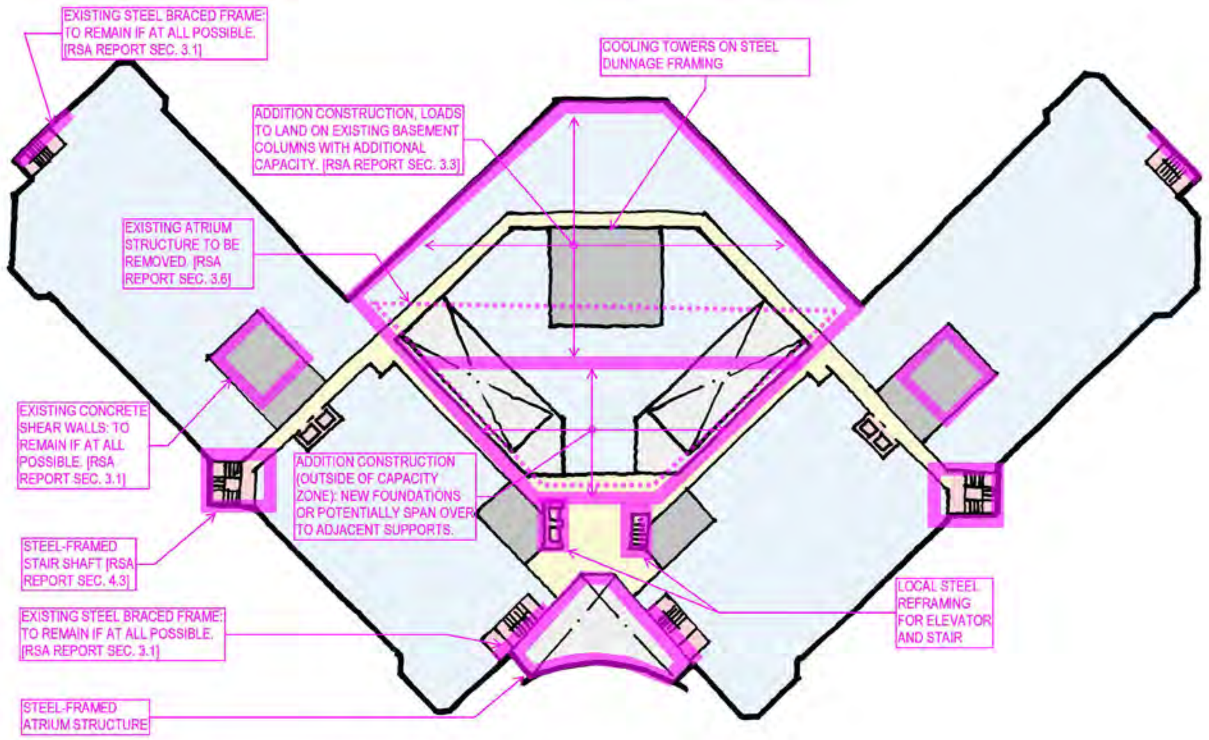


Figure 5.3.53: Recommendation Scheme Structural Markups – 4th Floor Plan

Next Steps

Besides general design collaboration and coordination, the following items will be important to address as soon as possible as the project moves forward:

- Site investigation and report by a geotechnical engineer. Report shall include but not be limited to:

  -Soil classifications and any issues with excavation of or bearing on such soils.

  -Allowable bearing pressures at the existing and proposed structures.

  -Recommendations on potential differential settlement due to the proposed work.

  -Seismic information, factors, and implications of the proposed work.

  -Confirmation of groundwater elevation, flood implications, and frost depth.
- Probes and testing to confirm existing construction assemblies and conditions.
- Strength and petrochemical testing of the existing concrete structure, especially at the garage structure where there may be infiltration by de-icing salts.
- Closer investigation of expansion joint locations.
- Closer investigation of the facade panels and anchorage.
- Investigation of the actual as-built capacity of the building, especially with regard to the the high existing live load noted on the original design drawings.
- Investigation of the upper floors' slab on deck to determine if light-weight or normal-weight.

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Section 5.4 : Mechanical, Electrical and Plumbing Systems

5.4 Mechanical, Electrical and Plumbing Systems

Introduction

Loring Consulting Engineers (LORING) visited the Wyoming State Capitol Complex in April 2013 and October 2013 to observe the existing HVAC, Plumbing and Electrical systems in preparation for this report. Interior and exterior areas of the Capitol Complex were observed as well as the main mechanical and electric rooms in the Herschler and Capitol Buildings and the Connector Link. Observations noted are based upon readily visible systems and equipment and existing documentation that was available. LORING toured the buildings with personnel from the Capitol's General Services staff, and during these tours the staff shared their hands-on knowledge of the existing HVAC, Plumbing and Electrical systems with LORING.

Existing Systems

The existing HVAC, Plumbing and Electrical systems at the Herschler Building are well-maintained and in working order but many of the mechanical systems and equipment are beyond their expected useful service lives, which will result in on-going increased maintenance and reductions in operating efficiencies.

Proposed Systems

This report presents options for four (4) design packages plus a recommended design package that address mechanical and electrical systems provisions for various levels of work for the Connector Link, Herschler Buidling Parking, Central Plant, Herschler Building Renovation and a Herschler Building Addition.

The primary objective of the new systems selection process is the generation of basic design concepts for this facility which will blend into the architectural design of the structure and function in harmony with the programmatic aspects of the facility and are consistent with the operational intent of the Owner. The major mechanical equipment centers, including the central equipment, electrical rooms, pump rooms and fan rooms will be located to permit ease of access for building personnel for the purpose of maintenance of equipment while limiting impacts on public spaces. Equipment and materials will be selected for long-term service life and to minimize maintenance. Equipment requiring regular maintenance will be located in accessible mechanical rooms.

Systems will be designed for flexibility and reliability with standardization of system sizes and configurations; use of factory fabricated systems to facilitate rapid installation; use of materials, systems and equipment which have long term records of satisfactory operation. Use of systems which are basically energy conserving during all seasons of the year with provisions for free cooling and specifically designed for the dry climate in Cheyenne.

All systems will be designed to conform to the latest referenced International Building Codes, NFPA Codes, applicable Local Codes and regulations of the Authorities Having Jurisdiction. All systems will meet recognized standards for energy efficiency, maintenance and long term service life.

This report provides details on all of the above items and will be the basis of design for the Level III Scope of Work.

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Existing Conditions – Capitol Complex Infrastructure

Capitol Complex Existing HVAC Infrastructure

The Capitol Complex is served by multiple chillers located in the Herschler Building and the Connector Link between the Herschler and Capitol Buildings. Currently there are four (4) chillers totaling 1,330 tons of installed cooling capacity, which serve the following Buildings via an underground distributed chilled water network:

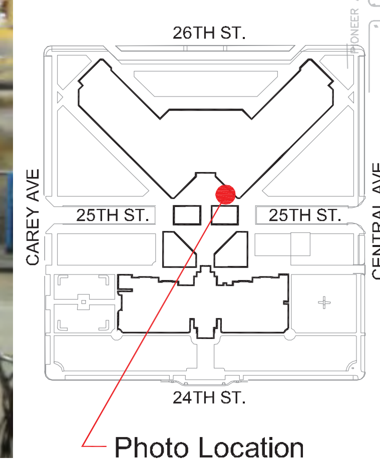
1. Capitol Building
2. Herschler Building
3. Supreme Court Building
4. Barrett Building
5. Hathaway Building

The capacity and the location of the chillers are as noted below:

Chiller Name	Location	Capacity
Herschler -1	Herschler Basement	500 tons
Herschler – 2	Herschler Basement	250 tons
Herschler – IT	Herschler Basement	80 tons
Capitol	Connector between Herschler and the Capitol Building	500 tons

These chillers reject their heat via induced draft cooling towers located in the Plaza between the Capitol and Herschler Buildings. There are two (2) sets of towers: one (1) for the Herschler chillers and one (1) for the Capitol chiller. Each cooling tower is rated for 1,400 tons of cooling. The Capitol cooling towers are winterized and incorporate a 300 ton plate and frame heat exchanger for free cooling. Facilities personnel reported that the total block load on the entire chiller plant is roughly 1,000 tons on a 90 degree F day. The 500-ton Herschler-1 chiller is approx. 6 years old (2007); the 250-ton Herschler-2 chiller is over 30 years old (1980 original installation; R-11 refrigerant); the 80-ton Herschler-IT and 500-ton Capitol chillers are approx. 17 years old (1997 design drawings). The service life expectancy for chillers is 20 - 25 years per ASHRAE standards.

Figure 5.4.01: Existing Herschler Chiller



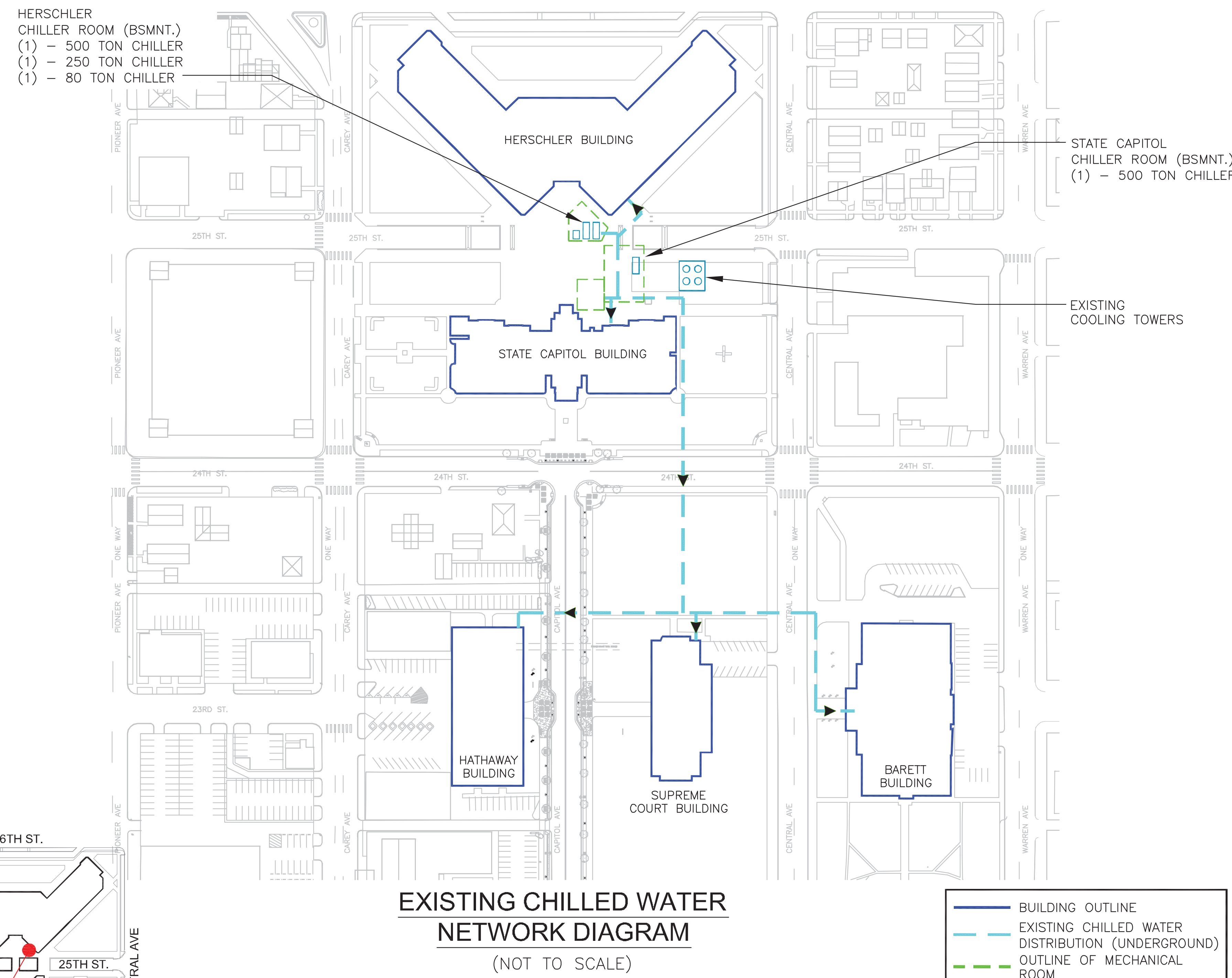


Figure 5.4.02: Existing Chilled Water Network

5.4 Mechanical, Electrical and Plumbing Systems

The Capitol Complex is served by multiple high pressure steam boilers located in the Barrett and Herschler Buildings. These boilers produce approximately 75 PSIG steam and are interconnected via a piping network located in tunnels. Local pressure reducing stations lower the steam pressure to 5 PSIG for each building. Boilers are dual fuel - gas and oil fired. Currently there are five (5) boilers totaling 1,150 boiler horsepower (BHP), which serve the following Buildings:

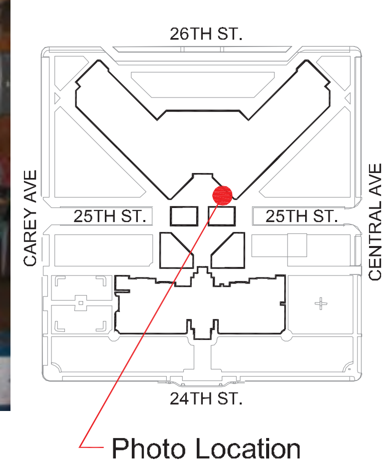
1. Capitol Building
2. Herschler Building
3. Supreme Court Building
4. Barrett Building
5. Hathaway Building

The capacity, location and usage of the boilers are as noted below:

Boiler Name	Equipment Location	Capacity	Usage
Barrett – 1	Barrett Building	250 BHP	Winter
Barrett – 2	Barrett Building	250 BHP	Winter
Barrett – 3	Barrett Building	250 BHP	Winter
Herschler – 1	Herschler Building	200 BHP	Summer
Herschler – 2	Herschler Building	200 BHP	Summer

We understand that the three (3) Barrett boilers can accommodate heating loads down to -10 degree F outdoor temperature and that below this threshold, the Herschler boilers are brought on line to serve the Herschler and Capitol Buildings and the two (2) systems are isolated, with the Barrett boilers serving the Supreme Court, Barrett and Hathaway Buildings. An existing 12,000 gallon (size is from 1980 Herschler Building design drawings) fuel-oil storage tank is located in the grassy area east of the Herschler Building. The tank serves the Herschler Building's existing boilers and emergency generator. The existing Herschler Building boilers are over 30 years old (1980 orginal installation), the boilers were damaged in a flood and have corrosion issues; one of the boilers may have been re-tubed. The service life expectancy for boilers is 25 - 30 years per ASHRAE standards.

Figure 5.4.03: Existing Herschler Boilers



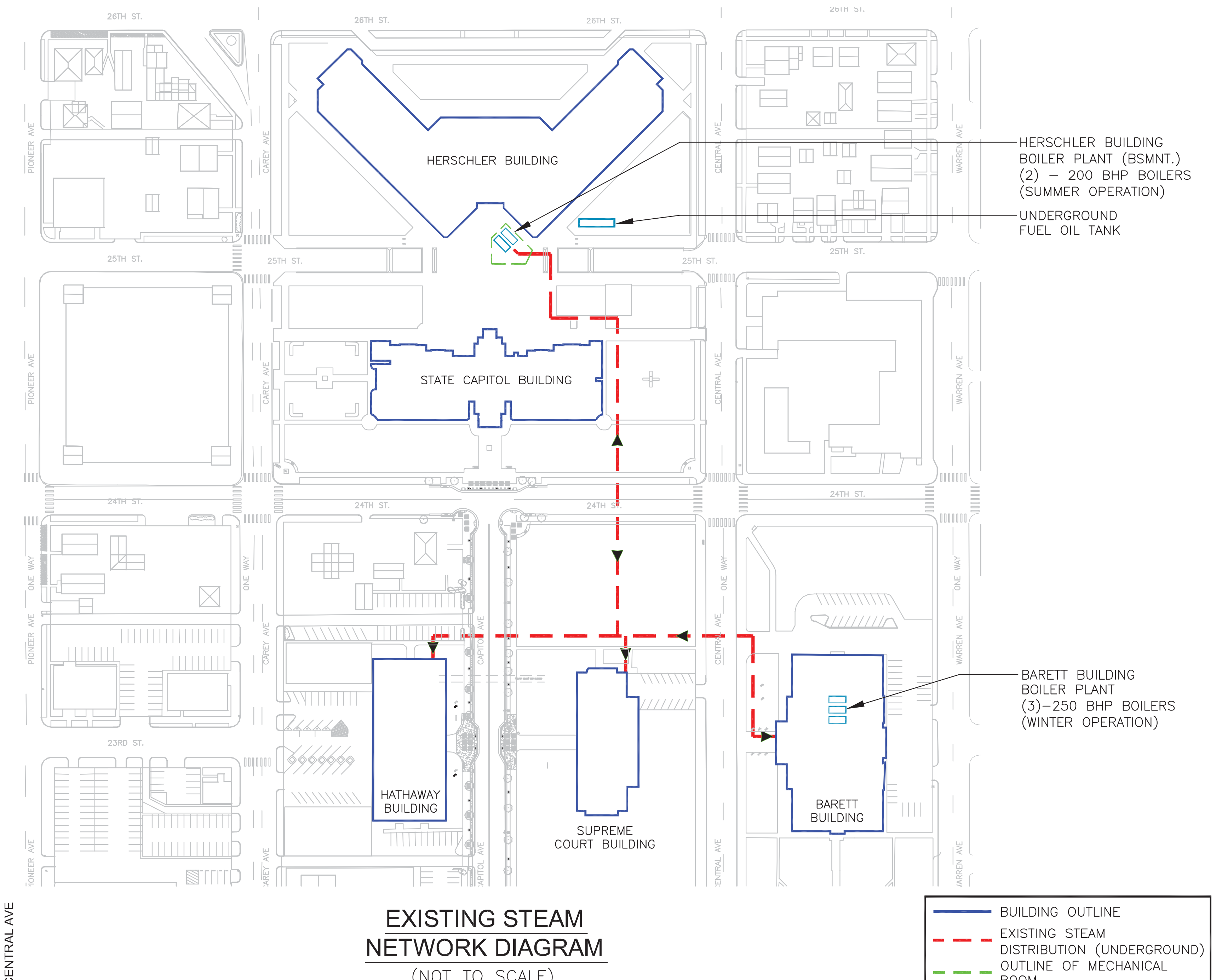


Figure 5.4.04: Existing Steam Network

The existing Plaza between the Capitol and Herschler Buildings is served by a snow melting system. The system consists of three (3) gas fired boilers located in the underground Parking Garage on the west side of the Plaza.

The snow melting system only serves portions of the Plaza between the Capitol and Herschler Buildings and the west and east Parking Garage ramps.

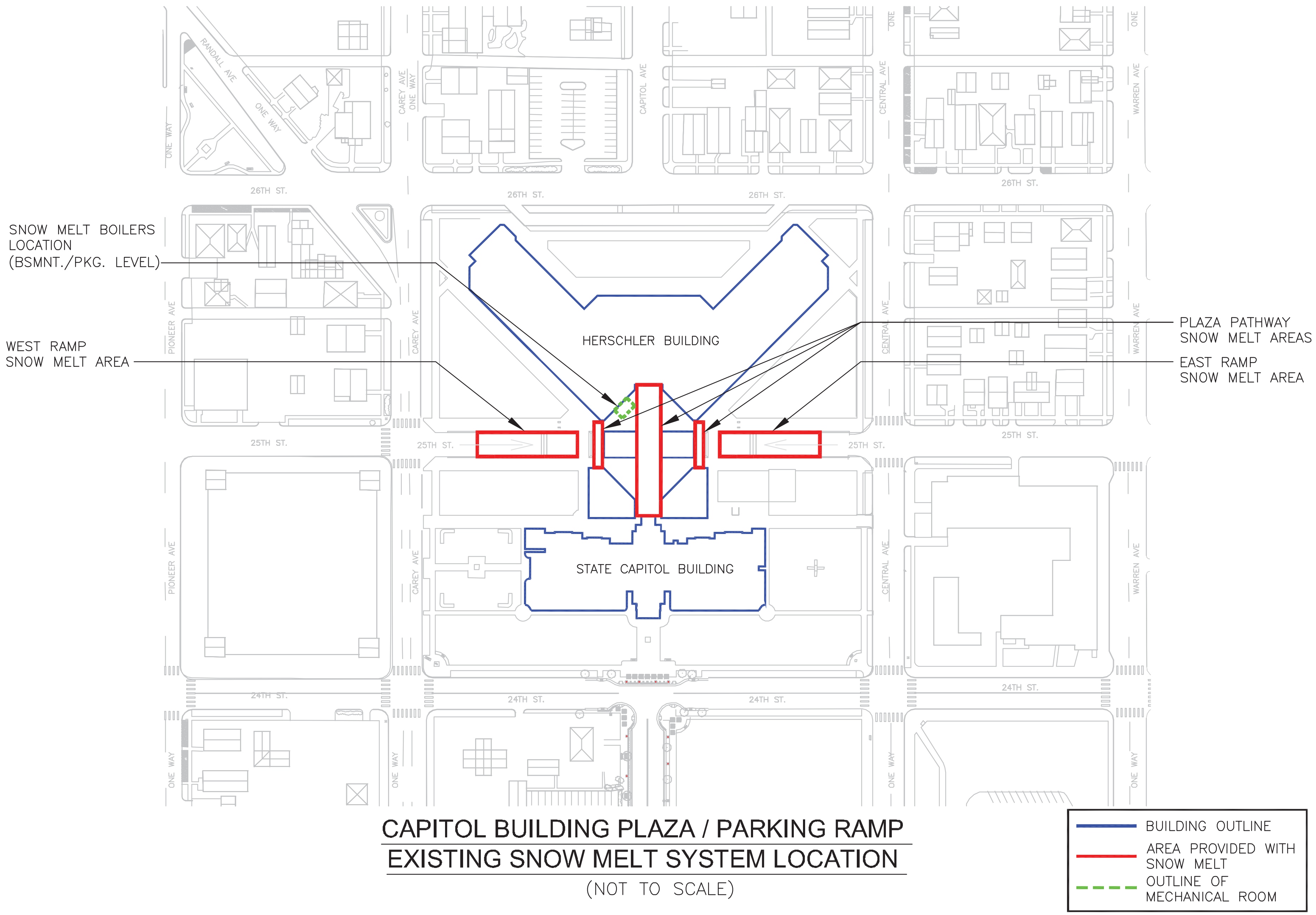


Figure 5.4.05: Existing Snow Melt Sysems

Capitol Complex Existing Plumbing Infrastructure

A single 6" domestic cold water service enters the Connector Link between the Herschler and Capitol Buildings where it is protected by a backflow preventer and then splits into five (5) main branches, each with backflow prevention and pressure reducing valves. Incoming pressure was observed to be 125 psi. Reduced pressure to the Capitol Building was observed to be 75 psi.

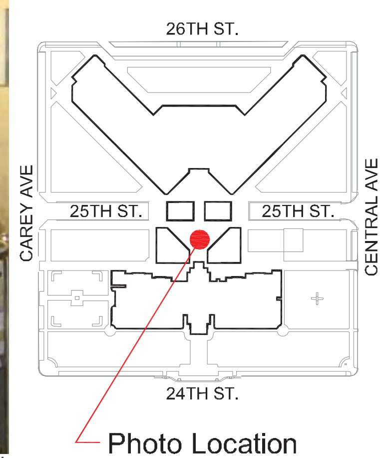
The five main branches serve the following systems:

1. Herschler Building
2. Herschler Building cooling tower make-up water
3. Herschler Building irrigation
4. Capitol Building
5. 6" main routed in the Capitol Complex utility tunnel which serve the following:
   a. Capitol Building irrigation system
   b. Supreme Court Building and associated systems
   c. Barrett Building and associated systems
   d. Hathaway Building and associated systems.

Additional domestic water services and water meters in the Supreme Court, Barrett and Hathaway Buildings back feed into this system.

An existing reserve well and pump system is currently disconnected, but we understand that it is maintained as an emergency back-up for times of drought. The well is located beneath the underground Connector Link in Mechanical Room B7 and the associated well pump and buffer tanks located in the main water service room.

Figure 5.4.06: Existing 6" Domestic Water Service, BFP & Pressure Reducing Station, Underground Connector Bldg



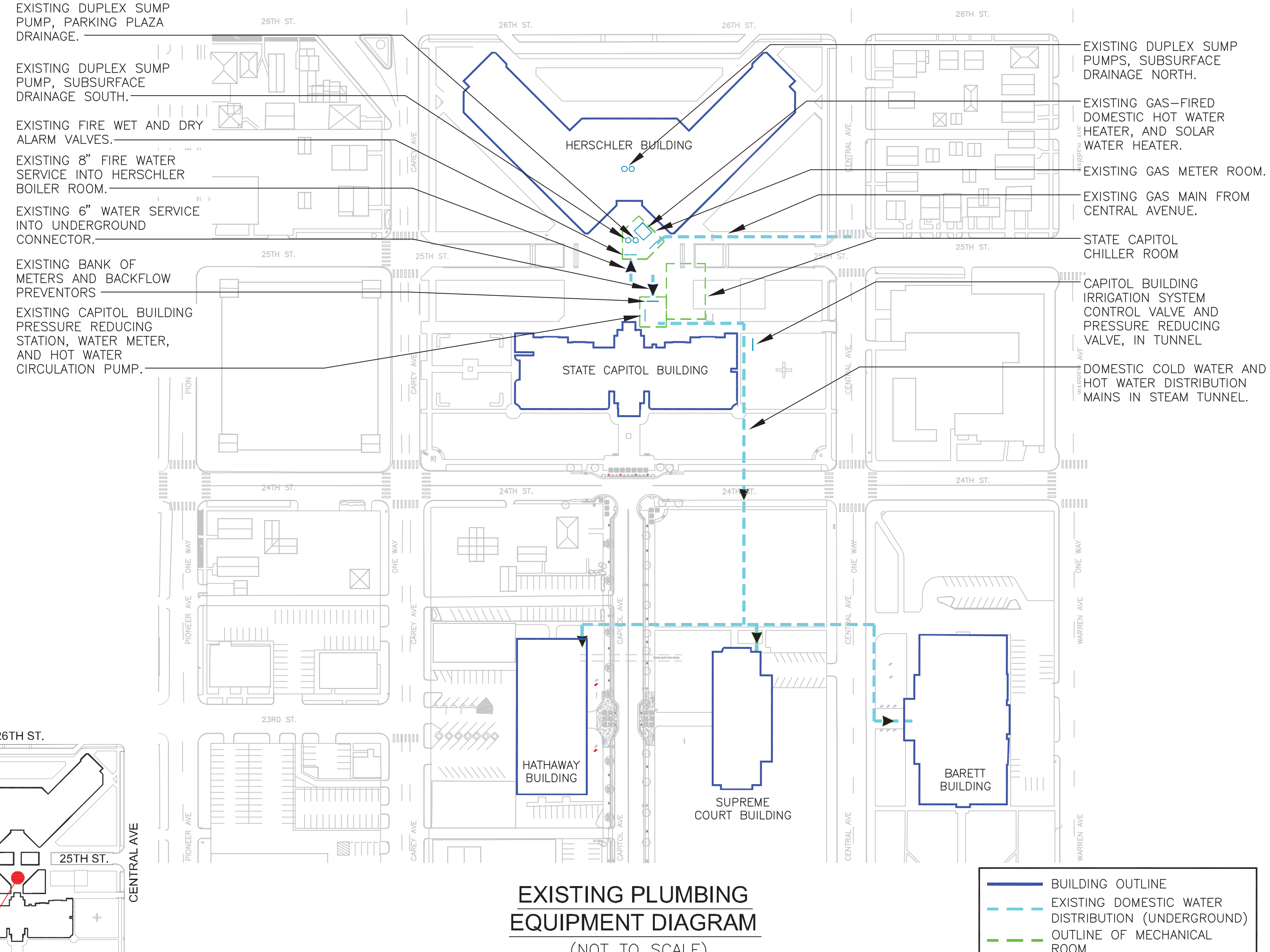


Figure 5.4.07: Existing Plumbing Equipment

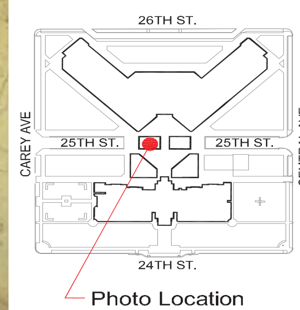


Figure 5.4.08: Existing Watertight Cover over Interior Well, Room B7

Figure 5.4.09: Existing Well Pump & Buffer Tanks, Water Svc Rm, Central Utility Plant

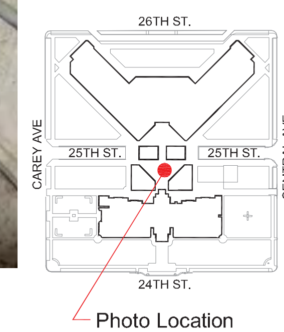


Figure 5.4.10: Existing Gas-Fired Domestic Hot Water Heater, Herschler Basement MER

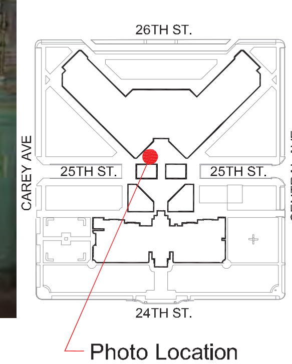
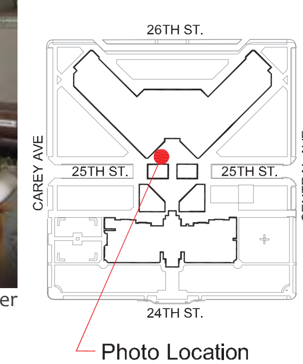


Figure 5.4.11: 10,000 Gal Solar Domestic Water Storage Tank, Herschler Basement MER



The Capitol Complex is served by two (2) hot water heaters located in the Herschler Building Boiler Room. The first is a gas-fired hot water heater with 500 gallons of storage, 919,400 Btuh input, 914 gal/hr recover; the second is a solar hot water heater with 10,000 gallons of storage. The gas-fired heater is dated to 1998, or approximately 15 years old, which is well within its typical life expectancy of 20 years when maintained. The solar water heater is original to the building and is in working condition, however we understand that replacement parts are becoming difficult to find. These heaters also serve the following Buildings via a distributed domestic hot water network in the existing tunnel system:

1. Supreme Court Building
2. Hathaway Building

The Barrett Building is served by a separate hot water heater.

A common hot water circulation main brings hot water back to the Herschler Building; hot water circulation pumps at each building provide local circulation into this common system. Main recirculation pumps are located at Herschler; individual building pumps are located at each building; the Capitol Building circulator is located in the Main Water Service Room.

Twelve (12) storm mains exit the Capitol Building, each serving a single roof drain, as well as local area drains. Six (6) storm mains exit the building to the south, and are routed across the Capitol lawn to 24th Street at two (2) locations. These were replaced in approximately 1994 from the street connections back to the building. Six (6) storm mains exit the building to the north, and were replaced and combined with the Herschler Building storm water systems during the Herschler Building construction. Of these, three (3) are routed west to Carey Avenue, and three (3) are routed east to Central Avenue. For all of these systems, only those portions of the pipe outside of the footprint of the Capitol Building were replaced. Storm leader base elbows inside of the building and penetrations of the foundation walls were not replaced.

There is an indication of a subsurface / footing drainage system around the Capitol Building foundation on the Herschler Building construction drawings, but the extent and condition of this system is unknown. Plaza surface drains installed during the Herschler Building project are routed into the Capitol Building storm water system below grade to the north-east and north-west. Herschler subsurface / footing drainage is routed to two (northern and southern zones) duplex sump pumps in the Herschler Basement mechanical room. Parking Garage and garage ramp drains are routed to another pair of duplex sump pumps (northern and southern zones) in the Herschler Basement boiler room.

The Capitol Complex is served by a single, high pressure gas service (reported to be between 120 psi and 125 psi). This service enters the underground Connector Link at the existing VIP Parking Garage in a dedicated, vented gas meter room. A pair of regulators in series reduces the incoming gas pressure to (reportedly) 2 psi. Following the pressure regulators, the service splits into two mains with separate gas meters. One main serves the Complex boilers, domestic hot water heaters and the snow melt boilers. The other main exits the gas meter room as a 6" main and is routed into the Capitol chiller room.

5.4 Mechanical, Electrical and Plumbing Systems

Capitol Complex Existing Electrical Infrastructure

The existing electric services for the Capitol Complex includes separate utility services for the Herschler Building and for the Capitol Building that are fed from exterior utility transformers located on grade in the Plaza area between the two Buildings.

The Capitol Building's electric service includes one (1) 500 kVA transformer located northwest of the Capitol Building. The transformer's secondary is rated 208/120V, 3-phase, 4-wire and feeds the Capitol Building's electrical loads via one (1) service switchboard located in a Basement room on the west side of the Connector Link. Utility metering at 208/120V is provided at the service switchboard.

The Capitol Building is not served by an emergency power source or generator.

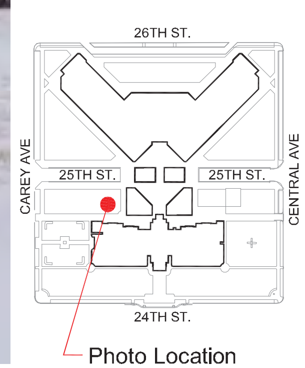
A utility company primary feeder is routed east-to-west between the Capitol and Herschler Buildings. This feeder allows the utility company manually change the source of the Capitol and Herschler Buildings to two separate utility feeders.

The Herschler Buidling's electric service includes two (2) 2000 kVA transformers located in the southeast of the Plaza. The transformers' secondaries are rated 480/277V, 3-phase, 4-wire and feed the Herschler Building, including the Connector Link and Central Plant loads via two (2) service switchboards located in the existing VIP Parking Garage. Utility metering at 480/277V is provided at each of the two service switchboards.

A 750 kW diesel-fired emergency generator located in the Herschler Building's Basement Central Plant area provides back-up power to the Herschler Building's emergency loads.

A 500 kW diesel-fired standby generator with its own dedicated fuel oil tank is mounted at grade adjacent to the Herschler Building transformers in the southeast Plaza and provides back-up power to the Herschler Building's Datacenter's power and equipment loads.

Figure 5.4.12: Existing Capitol Bldg Utility Transformer



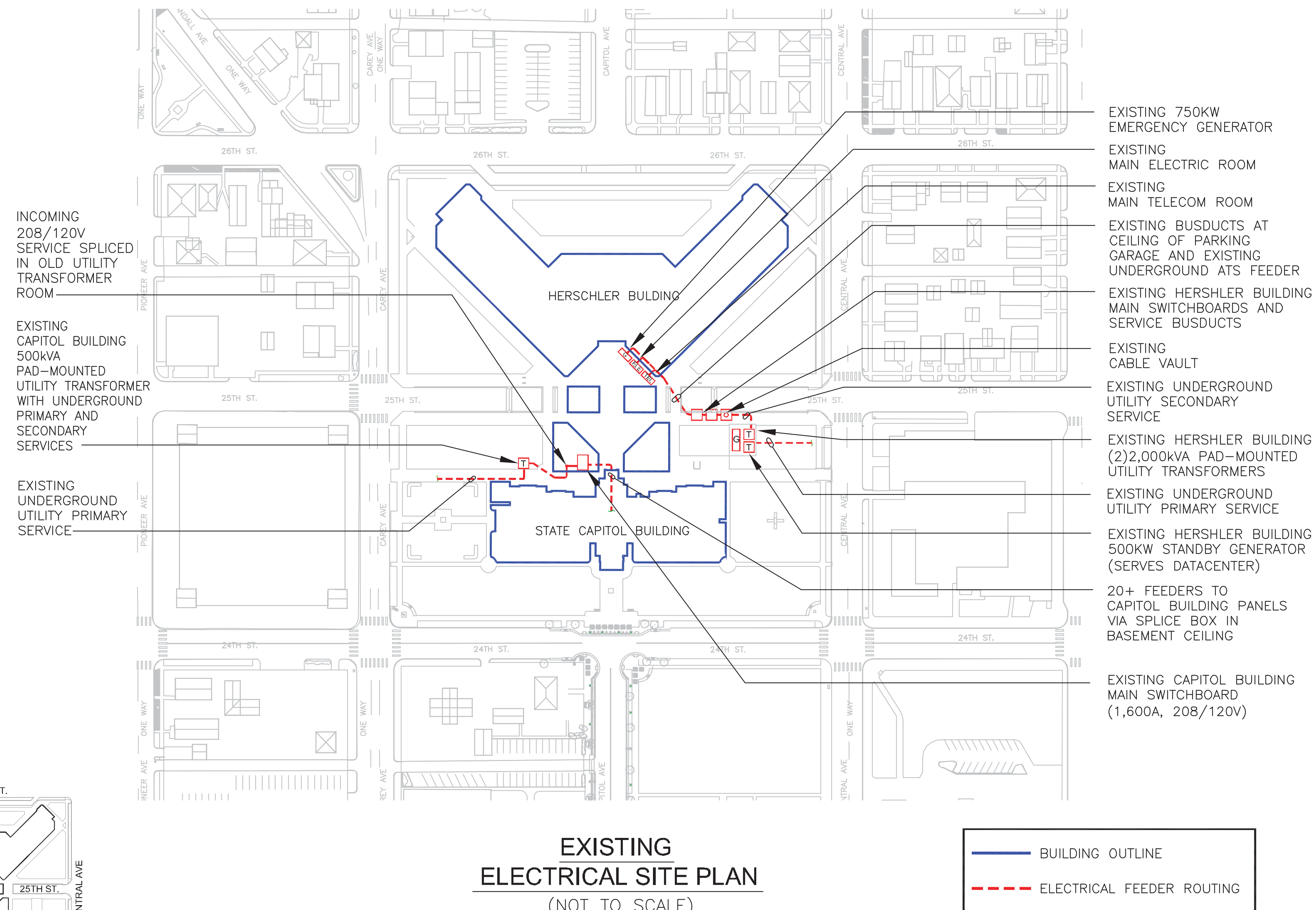


Figure 5.4.13: Existing Electrical Equipment

Existing Conditions – Herschler Building

Herschler Building Existing HVAC Systems

The HVAC systems for the Herschler Building consist principally of floor by floor fan rooms, two (2) fan rooms per floor, which are located in each wing of the building and a hot water perimeter fin tube radiation system. Each fan room has a floor mounted variable air volume (VAV) air handling unit (AHU) which distributes supply and return air to the spaces via ductwork. The spaces are zoned separately and provided with VAV terminal boxes. The return air and the outdoor air (OA) are not ducted to the AHU and the fan room is used as a mixing plenum. Each AHU consists of a supply fan, chilled water cooling coil, access section, hot water heating coil, and final filters. The outdoor air is provided to each fan room via an outdoor air chase that runs vertically in each wing to the roof.

The atrium exhaust system consists of roof top exhaust fans, four (4) exhaust fans for each wing, which exhaust air from the atrium at the 4th floor level. Make-up air is provided by the floor-by-floor fan rooms.

The atrium temperature is controlled via temperature sensors that energize exhaust fans located in the "Solar Atrium Fan Room". The fan room is located in the underground Parking Garage adjacent to the atrium. The exhaust fan system consists of three (3) exhaust fans that exhaust hot air from the atrium and spill it to the underground Parking Garage. The system is also a means to control the overall building pressure.

The Parking Garage exhaust system consists of exhaust fans, one (1) fan for each wing, that exhaust air from the underground Parking Garage. The IT Datacenter is served from a dedicated 80-ton chiller located in the Basement. The chiller provides chilled water to the three (3) floor-mounted cooling distribution units.

The limitations of the existing systems include the following:

- The HVAC systems are original to the building and past their useful life.
- The VAV AHUs fan airflow is presently varied by inlet guide vanes, which do not provide the energy savings that newer technology with VSD's (variable speed drives) could provide.
- The controls system is pneumatic based.
- The outdoor air is presently not pretreated.

The typical HVAC systems and equipment are over 30 years old (1980 original installation) and are at or have exceeded their life expectancy of 20 - 30 years per ASHRAE standards.

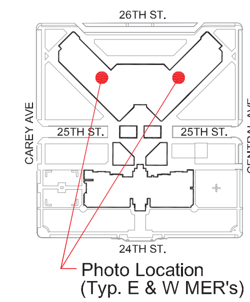


Figure 5.4.14: AHU Fan Section, Typ. MER, East & West, Floors 1-4

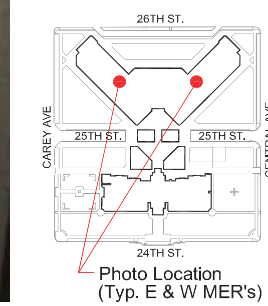


Figure 5.4.15: AHU Filter Bank, Typ. MER, East & West, Floor 1-4

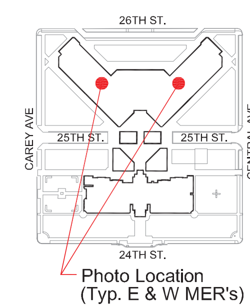


Figure 5.4.16: AHU Heating Coil Section, Typ. MER, East & West, Floor 1-4

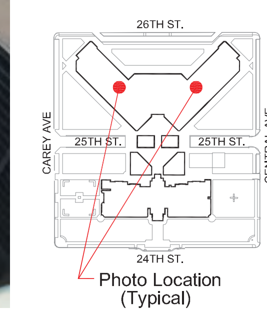


Figure 5.4.17: Outside Air Chase, Typ. East & West Roofs

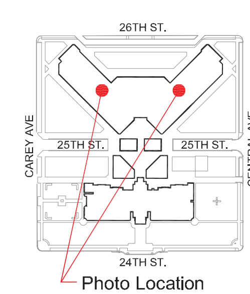


Figure 5.4.18: AHU Outside Air Connection to Main OA Chase, Typ. MER, East & West, Floors 1-4

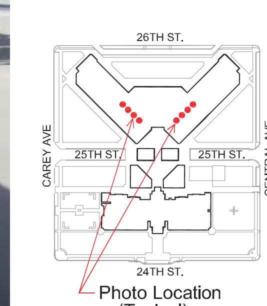


Figure 5.4.19: Atrium Exhaust Fan, Typ. for 8 on Roof (4 East, 4 West)

5.4 Mechanical, Electrical and Plumbing Systems

Herschler Building Existing Plumbing Systems

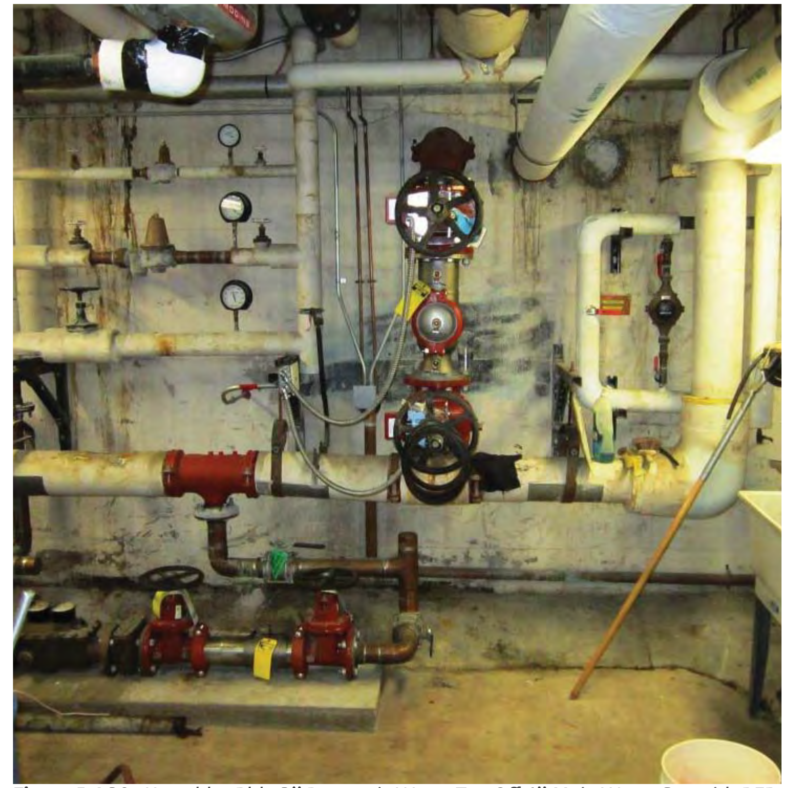
A 3" branch tees off from the 6" main water service at the underground Connector Link through a backflow preventer, water meter, and pressure reducing station. This service is routed through the wall into the Herschler Building. A secondary 2" branch off of this primary branch serves the Herschler Building cooling tower make-up water. A separate 4" branch from the main water service, with separate backflow preventer and water meter, serves the Herschler Building irrigation system.

A separate 8" water service enters the Herschler Building's boiler room below grade to serve the Herschler Building and Connector Link sprinkler system. This service splits into five (5) main systems: a single wet system to serve all sprinklers, and four (4) dry systems to serve Parking Garage sprinkler zones.

Storm outlets are routed from the Herschler Building to the west (Carey Avenue), the east (Central Avenue), and the north (26th Street). These three services also receive the discharge from Plaza sump pumps, Garage drainage sump pumps, and subsurface drainage sump pumps.

A 6" sanitary service serving the west wing of the Herschler Building exits the building to the west (to Carey Avenue). This service also receives the discharge from a parking level duplex sewage ejector pump. This ejector pump serves parking level toilet rooms, and once served a commercial kitchen that has been removed. There is an abandoned grease interceptor adjacent to the sewage ejector pump set that also once served the kitchen. A second 6" sanitary service serving the east wing of the Herschler Building exits the building to the north (26th Street).

The Herschler Building toilet facilities are stacked near the center of the west wing and the center of the east wing. Separate toilet facilities near the core of the Parking Garage level (east side and west side) are accessible to people entering the building, and are intended to serve lower level conference rooms. These toilet rooms are routed to the duplex sewage ejector noted above, located at the west side loading dock. All facilities have been provided with ADA toilets, but should be reviewed for current wheelchair access requirements. The plumbing fixture count should also be reviewed for current occupancy requirements.



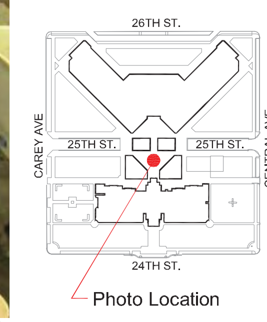


Figure 5.4.20: Herschler Bldg 3" Domestic Water Tap Off 6" Main Water Svc with BFP, Water Meter & Pressure Reducing Station

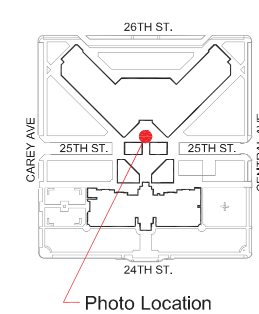


Figure 5.4.21: Herschler Bldg 8" Fire Protection Water Svc with 5 Control Rigs

Herschler Building Existing Electrical Systems

The two service switchboards serve the Herschler Building's electric loads, including the Connector Link and Central Plant, via three (3) main bolted-pressure type fused switches: (1) 2,500A at one switchboard, and (1) 1,600A and (1) 1,200A at the other switchboard. The 2,500A service feeds the building's general lighting and power loads via an overhead busduct routed through the Parking Garage to the Herschler Building's main electrical room located in the Basement; the 1,600A service feeds the building's mechanical equipment loads via an overhead busduct routed through the Parking Garage to the Herschler Buidling's main electrical room located in the Basement ; the 1,200A service feeds the building's emergency loads via an underground cable-in-conduit feeder routed under-slab to an automatic transfer switch located near the building's existing 750kW emergency generator located in the Basement Central Plant area. The original busducts in the Parking Garage were replaced with outdoor-rated busducts in 2001 (per labels) due to damage from leaks in the Parking Garage.

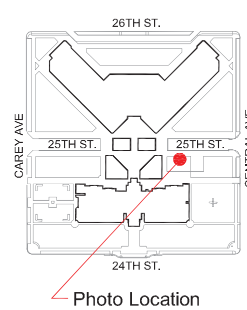


Figure 5.4.22: Main Electric Svc Switchboards, VIP Parking Area

Typical power distribution for the building is fed at 480/277V from the main electric room to panels located throughout the building. The building's main power and lighting distribution is from stacked electrical rooms located near the center of each of the west and east wings of the building. One (1) east and one (1) west 1,000A, 480/277V plug-in bus duct risers are routed through the stacked rooms to feed electrical panels on each floor. Lighting and mechanical equipment are fed at 480/277V; general power is fed at 208/120V via step-down transformers located in the typical electrical rooms. In addition to the lighting and power panels in the main east and west electrical rooms, 208/120V satellite power panels fed from the center electrical rooms are located at the north and south sides of the west and east wings on each floor.

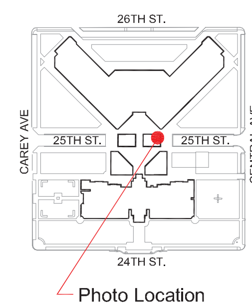


Figure 5.4.23: Main Elec Distribution Switchboards, Herschler Bldg Main Elec Rm (Basement)

The electrical power distribution system is typically original equipment, early 1980's installation, and appears to be in good working condition and is well within its expected service life of 50 - 60 years. Typical feeders and visible circuits are cable-in-conduit type. Although capacities at typical panels and equipment are adequate for current usage, the quantity of circuit breakers at typical 208/120V branch circuit panelboards has been inadequate to serve additional circuiting requirements installed in the past for computers and equipment requiring dedicated circuits. As a result, various panels have been upgraded over the years to provide more circuit breakers.

An in-floor, multi-compartment cellular distribution system is used on typical floors to distribute branch circuit wiring and telecom cabling to outlets and devices (there is a mix of standard receptacles and powered systems furniture). The in-floor system consists of a series of headers and branches and is accessible from the main electrical and telecom rooms on each floor as well as from the north and south satellite electric and telecom closets located at the north and south sides of the west and east wings on each floor. The typical service fittings on the in-floor system are small and typically contain only one duplex receptacle, which has resulted in the use of plug-strips throughout the building. In several locations, plug-strips plugged into plug-strips were observed. Telecom cabling distribution via the in-floor system is described below.

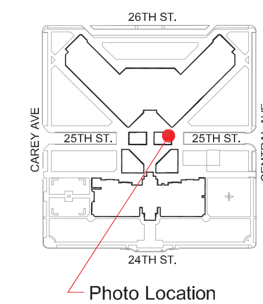


Figure 5.4.24: Main Motor Control Ctrs, Herschler Bldg Main Elec Rm, (Basement)

Emergency and Standby Power:

A diesel-fired 750kW emergency generator located in the Basement Central Plant area provides emergency power to the building's life-safety loads, including emergency egress lighting and exit signs, elevators, smoke exhaust fans and supply fans and heating equipment associated with the atrium exhaust system. The generator has a local fuel-oil day tank that is fed from the building's main underground fuel-oil tank that also serves the building's boilers. The generator's exhaust is routed up to the roof of the Herschler Building, and its remote radiator is located in a fenced-in area in the Parking Garage. The generator system is original to the early 1980's installation.

A second, newer exterior diesel-fired 500kW standby generator is located on-grade in the southeast Plaza and serves the Herschler Building's Datacenter's IT and HVAC equipment loads via two 400A automatic transfer switches located in the Basement. The generator is in a self-contained weather-rated enclosure and is served by a dedicated fuel-oil tank that is mounted on-grade adjacent to the generator.

Lighting:

In general, typical existing lighting fixtures throughout the building are recessed fluorescent fixtures. Typical original fixtures have dark colored parabolic louvers; selected fixtures have been retrofitted with drop-type prismatic lenses, apparently to achieve better light distribution. Lamping appears to be a mix of original type T-12 fluorescent lamps and newer T-8 lamps that were observed at typical 2x4 fixtures in open office areas. The major portion of the lighting system appears to be in a fair working condition. The exit signs are in poor condition with various types of lamping, including LED retrofit lamps; many exit signs were observed to be partially inoperative and/or have poor light output.

Typical lighting circuits throughout the building are fed through relays at low-voltage relay cabinets located at lighting panels in the typical Electrical Rooms. Local momentary-contact switches located throughout the Building are used to manually control lighting by zones.

Fire Alarm:

The building is provided with a stand-alone addressable fire alarm system that was upgraded to current standards and codes approximately five years ago. The fire alarm system comprises manual pull stations, audible horns, strobes and smoke detectors at open areas and corridors; beam-type smoke detection is provided in the atrium. The fire alarm system is interfaced with the building's BMS (Building Management System/ Building Control Interface Point) system that is UL listed for smoke control; the fire alarm dials out to an independent central station.

Auxiliary Systems:

The building's main telecom room is located in the Basement adjacent to the main electric room. Incoming telecom services and telecom links to the other Capitol Complex Buildings are routed in conduits via the Basement and utility tunnel. Telecom distribution throughout the building is from stacked telecom rooms located near the center of each of the west and east wings of the building, adjacent to the main stacked electrical closets. In addition to the main east and west telecom rooms, telecom cabling is also distributed via satellite telecom closets that are located at the north and south sides of the west and east wings on each floor. Horizontal cable distribution to telecom devices on typical floors is via the in-floor system described above that is accessible at the main telecom rooms and satellite telecom closets on each floor.

Figure 5.4.25: Step-Down Transformer, Typ. Electric Rm, East & West, Floors 1-4

Original coax telecom cabling throughout the building has been upgraded to Cat5. Typical cabling is routed through the in-floor distribution system and exits typical access fitting in exposed, unprotected bundles that terminate in plastic surface-mounted type boxes with jacks. The exposed cabling is draped on the floor and the surface-mounted type boxes are laying unsecured on the floor throughout the building. The cabling and boxes are tripping hazards, and the cabling is sharply bent, crushed and kinked at numerous locations, which has undoubtedly degraded its performance.

Security systems include CCTV cameras at selected areas and card access on exterior and selected doors.

Amplifiers for a building-wide white-noise system are located in alternating stacked electric rooms in each wing. Speakers and cabling for the white-noise system are located and routed above the existing hung ceilings.

Lightning Protection:

The existing building is not provided with an overall lightning protection system that would consist of numerous lightning rods at the roof with multiple down-conductors to grade. Consideration should be given to adding a full lightning protection to the existing building in coordination wit hthe proposed Level III scope of work.

Figure 5.4.26: Busduct Riser & Panels, Typ. Elec Rm, East & West, Floors 1-4

Figure 5.4.27: In-Floor System, Typical Service Fitting

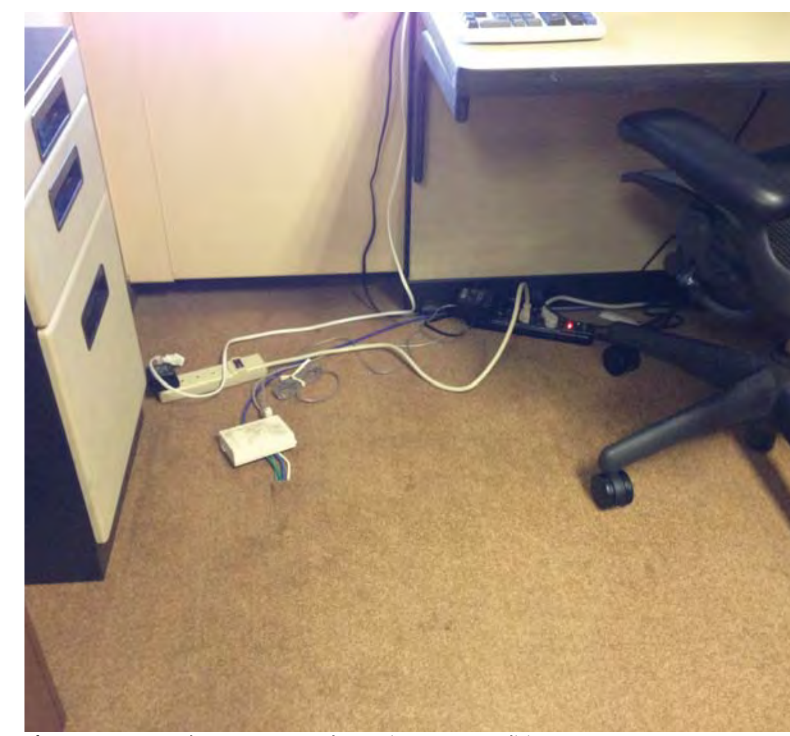


Figure 5.4.28: In-Floor System & Plug Strips, Typ. Condition

Figure 5.4.29: Herschler Bldg 750kW Emergency Generator, Basement MER

Figure 5.4.30: 500kW Generator & Fuel Tank (at right)

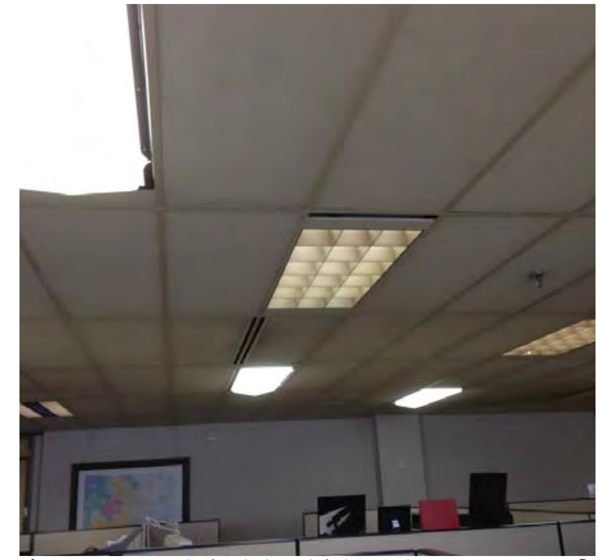
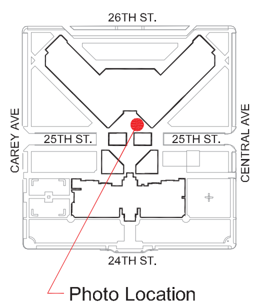
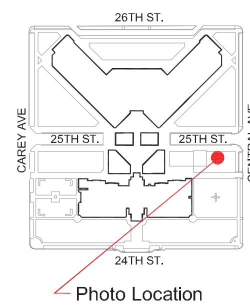
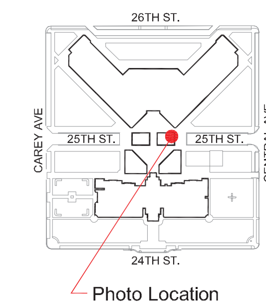


Figure 5.4.31: Typical Existing Lighting, Orig Louvers & Retrofit Prismatic Lenses

Figure 5.4.32: Main Telecom Room-Basement







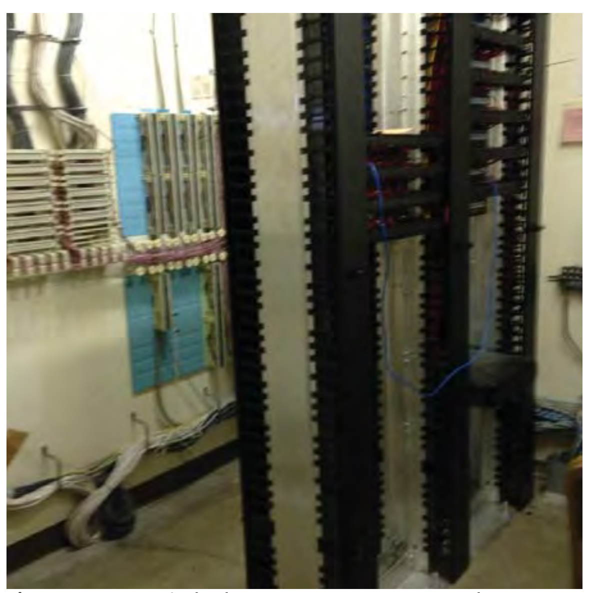
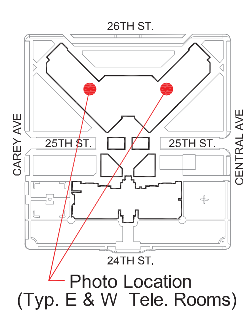


Figure 5.4.33: Typical Telecom Room, East & West, Floors 1-4



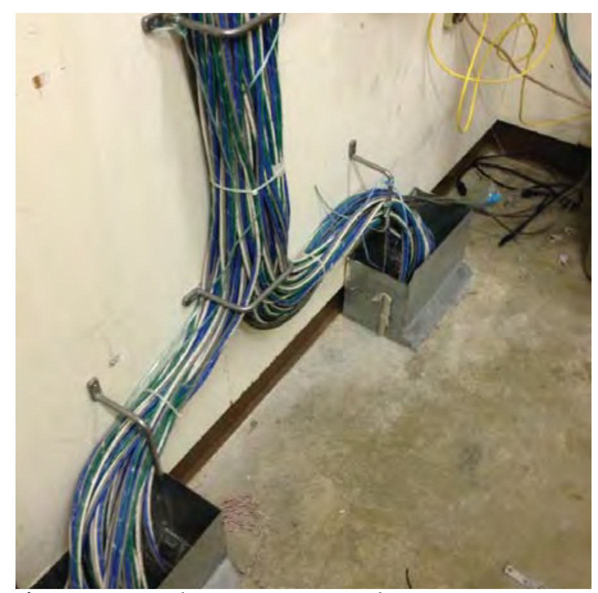
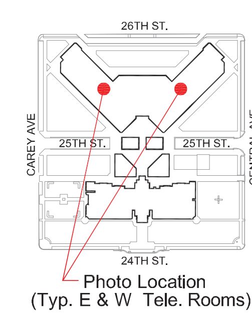


Figure 5.4.34: In-Floor System at Typ. Telecom Rm, East & West, Floors 1-4



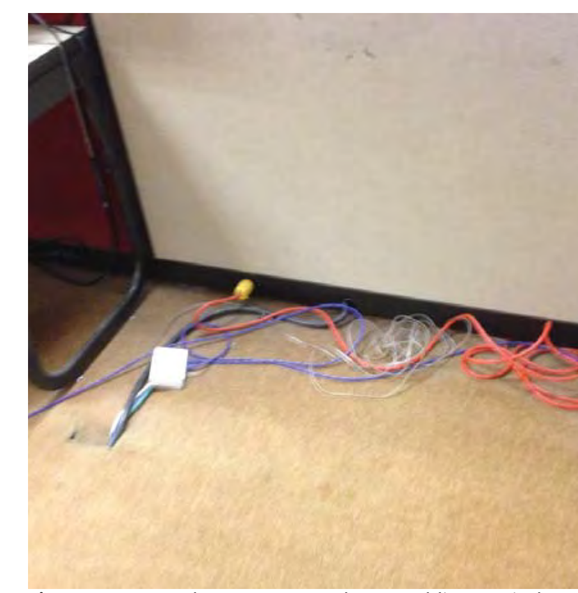


Figure 5.4.35: In-Floor System & Telecom Cabling, Typical Condition

Proposed Mechanical and Electrical Systems – Herschler Building, Connector Link, Central Utility Plant and Addition

Design Package 1

Connector Link (Minor)

HVAC:

The new tenant infill will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal VAV boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections. . Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

Plaza surface drains will be relocated to align with new surface architecture. All new piping will be routed to existing sump pumps in the Herschler boiler room.

Natural gas branch piping serving snow melt boilers will be relocated to the new location of snow melt boilers in the Central Utility Plant.

The duplex sewage ejector pit serving the Parking Garage toilet rooms will be demolished at the west loading dock and relocated. All sub-slab sanitary piping serving the existing toilet rooms will be rerouted to the new sewage ejector pit location. New sanitary piping from the new toilet rooms at the Connector Link will be routed to the relocated sewage ejector pit.

The abandoned grease interceptor trap at the west loading dock will be removed. Any abandoned kitchen piping below the slab in the area of work will be demolished.

The well and well cover serving as the Domestic water system back-up will be demolished in Room B7. Should the facility desire a well as back-up during times of drought, then a new well will need to be installed in an alternate location.

Electrical:

The new tenant infill will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building. Existing lighting and power panelboards will be reworked and/or relocated to serve associated areas; electric room locations and space requirements will be determined as part of the future Level III scope of work.

Parking (Minor)

HVAC: None

Plumbing: None

Electrical: None

Central Plant (Minor)

HVAC:

Due to its age and the use of R-11 Refrigerant, a new 500 ton chiller will be provided to replace the existing Herschler 250 ton chiller. A new chilled water pump with variable speed drive will be provided to support the increased flow requirements of the new chiller. A new 500 ton plate and frame heat exchanger and associated pumping and piping will be provided to increase the existing free cooling usage (existing 300 ton plate and frame heat exchanger) and increase the overall plant efficiency.

Due to the age of the two (2) existing boilers and existing corrosion conditions, the existing Herschler Boilers will need to be replaced in the near term. It is recommended that these boilers be increased in size from 200 Boiler Horsepower to 250 Boiler Horsepower to provide additional capacity associated with the increased loads associated with the Capitol and Connector Link renovations. New underground heat exchanger and pump room will be provided for the Capitol Building, connecting to the south of the existing VIP Parking Area and north of the existing service tunnel. The pump room will house pressure reducing valve stations, steam to hot water heat exchangers, clean steam generators and hot water distribution pumps with variable speed drives as hot water will be the heating medium in the building.

Plumbing:

Drainage will be added to new CUP spaces. A local duplex sump pump will be provided in the space, discharging to existing systems at the ceiling.

Electrical:

New electrical service and generator will be provided for the Capitol Building. Two (2) 15 kV primary utility services and a 1,500 kVA double-ended 480/277V substation will be provided along with a new 1,200 kW emergency / standby generator and associated emergency and standby transfer switches. The electric service equipment and generator will be located in the existing VIP Parking Garage near the east site ramp.

Herschler Renovation (Minor)

HVAC:

Existing HVAC systems serving the renovated tenant areas will be provided with new direct digital control (DDS) pressure independent terminals boxes, new medium pressure and low pressure ductwork based on the new space configurations. Where applicable, each space will be zoned separately via the use of pressure independent terminal boxes. Each existing AHU fan room, eight (8) in total, two (2) per floor, will be retrofitted as follows: removal of existing pneumatic controls and existing inlet guide vanes and providing new DDC-based controls and new variable frequency drives (VFDs).

Plumbing:

The existing toilet rooms will be removed and the new toilet rooms will be provided based on the space configuration. The quantity of fixtures and ADA fixtures will be reviewed. In order to minimize the plumbing infrastructure renovation the expansion of toilet rooms will need to occur at existing locations to utilize existing water/sanitary piping risers.

Electrical:

The new tenant infill will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building's existing systems. Existing power panelboards will be expanded with new sections where additional branch circuits are required to serve new loads.

Design Package 2

Connector Link (Major)

HVAC:

The new tenant infill will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections. . Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

The 6" domestic water service will be removed and relocated. New branch piping, backflow prevention, meters, and pressure reducing valves will be provided from the relocated service to the existing domestic water systems at the Herschler (3"), Capitol Building (3"), cold water make-up at new cooling towers (2"), and to existing irrigation systems at the Herschler and Capitol Buildings (3" each). A new 6" branch will be extended to the existing 6" Capitol Complex main located in the steam tunnel below the street. The new water meter room will be located near the incoming water service.

The 8" fire protection water service will be removed and relocated. A new backflow preventer will be provided in accordance with utility requirements. New 4" branch piping and wet fire protection control valve with all required alarms will be extended to the existing wet system at the Herschler Building and Connector Building.

Four (4) new 4" dry system control valves with associated air compressors, interlocks, and alarms will be provided for the Parking Garage. New 4" piping will be extended to the four existing dry zones in the Parking Garage. The new fire control valve room will be located at or adjacent to the incoming fire water service.

The 2" high pressure gas service will be removed and relocated. New regulators and meters will be provided in accordance with utility requirements. New branch mains will be extended to new HVAC equipment/boilers. The gas water meter room will be located near the incoming gas service.

The 2" domestic hot water and the 1" hot water return mains serving other Buildings will be removed and relocated and reconnected with existing mains in the steam tunnel.

The existing subsurface drainage duplex sump pump (south half of the building) and existing Plaza drain/floor drain duplex sump pump will be removed and relocated. New pumps sized for existing subsurface drainage loads (approximately 1.5 HP) and Plaza drainage loads (approximately 1.0 HP) will be provided. The subsurface drainage piping and Plaza drainage piping will be reconfigured / rerouted to the new sump pumps.

Plaza surface drains will be relocated to align with new surface architecture. All new piping will be routed to existing sump pumps in the Herschler boiler room.

The duplex sewage ejector pit serving Parking Garage toilet rooms will be demolished at the west loading dock and relocated. All sub-slab sanitary piping serving existing toilet rooms will be rerouted to the new sewage ejector pit location. New sanitary piping from new toilet rooms at the Connector Link will be routed to the relocated sewage ejector pit.

The abandoned grease interceptor trap at the west loading dock will be removed. Any abandoned kitchen piping below the slab in the area of work will be demolished.

The well and well cover serving as the domestic water system back-up will be demolished at Room B7. Should the facility desire a well as back-up during times of drought, then a new well must be installed in an alternate location.

Electrical:

The new tenant infill will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building. New lighting and power panelboards will be provided locally to serve associated areas. Electric room locations and space requirements will be determined as part of the future Level III scope of work.

Parking (Major)

HVAC:

Revisions associated with new ramps, dock and VIP Parking Area; dedicated heating and cooling for VIP Parking Area.

The existing snow melt boiler system will be removed and relocated and piping replaced.

Plumbing:

The existing 8" storm main exiting the building to the north to 26th Street (serving the sump pump discharge for the subsurface and area drainage systems at the north half of the building) will be removed and relocated. New connections may be required at 26th Street at the new storm main location. All associated existing storm piping in the Parking Garage will be routed to the new storm main.

The existing 6" sanitary main exiting the building to the north to 26th Street (serving the eastern wing of the Herschler Building) will be removed and relocated. New connections may be required at 26th Street at the new sanitary main location. All existing sanitary piping at the ceiling of the north-east side of the Parking Garage will be evaluated and routed to the new sanitary main.

Subsurface drainage piping across the north face of the building will be cut back to accommodate new excavation. New subsurface/foundation drainage piping will be installed at new foundations. A new duplex sump pump will be provided in the vicinity of the new loading dock to discharge this water.

New entry ramp trench drains will be provided at the east and west entryways. A new duplex sump pump will be provided in the vicinity of the new loading dock to discharge this water.

Electrical:

Existing lighting and power will be revised at new ramp and VIP parking areas.

Central Utility Plant (Major 1)

HVAC:

A new central plant will be provided to serve the Capitol Complex including the Capitol, Herschler, Supreme Court, Barrett and Hathaway Buildings and associated renovations to the Connector Link and the Herschler Addition. Four (4) new 400 ton water cooled centrifugal chillers and one (1) 150 ton centrifugal chiller (for IT loads) with multiple compressors will be provided to serve the entire campus. Five (5) new 400 ton induced draft cooling towers will be provided for heat rejection purposes. Three (3) of the cooling towers will be provided with basin heaters, heat tracing and indoor sumps for winter operation. A new 800 ton plate and frame heat exchanger will be provided for free cooling via integrated economizer operation. The pumping arrangement will be a primary/secondary system with variable speed pumping capabilities and the secondary distribution system will tie into the existing tunnel piping network serving the Supreme Court, Barrett and Hathaway Buildings.

Three (3) new 300 boiler horsepower high pressure steam boilers will be provided in the new central plant for comfort heating purposes. The boilers will be dual fuel, gas and oil fired, with an indoor storage tank of roughly 35,000 gallons capacity. The boiler plant high pressure steam piping will be interconnected to the existing Barrett Boiler Plant via the existing tunnel network. New heat exchanger and pump rooms will be provided for the Capitol and Herschler Buildings. The pump rooms will house pressure reducing valve stations, steam to hot water heat exchangers, clean steam generators and hot water distribution pumps with variable speed drives as hot water will be the heating medium in both Buildings.

A new snow melting system consisting of multiple gas fired condensing type boilers will be provided to serve the Plaza walkways. New distribution pumps for the glycol hot water system will be provided.

Plumbing:

The gas-fired hot water heater and solar hot water heater will be removed and replaced. A new 1,000 MBH gas-fired hot water heater with approximately 1,000 gallons of storage will be provided. A new solar hot water heating system of similar capacity, with solar panels at the roof, 10,000 gallon water storage tank at the new mechanical equipment room, new heat exchanger, glycol/glycol pumps/glycol piping loop to the rooftop solar panels will be provided.

Gas piping will be routed from the gas meter room to gas-fired equipment at the relocated central plant.

Drainage will be provided throughout the relocated central plant. A local duplex sump pump and route the discharge to existing systems at the main building will be provided.

Electrical:

New electric service and generator plant will be provided to serve the entire Complex. Two (2) 15 kV utility primary services serving two sets of 2,500 kVA, 480/277V double-end substations (four (4) transformers) will be provided along with two (2) 1,500 kW diesel-fired emergency / standby generators and associated emergency and standby automatic transfer switches; new feeders will be provided to existing and new building and equipment loads. The electric service equipment and generators will be located in new Central Plant adjacent to the Herschler Building.

Herschler Renovation (Major 1)

HVAC:

The renovated tenant areas will be provided with new variable air volume (VAV) air handling units (AHUs) that will distribute air to the spaces via medium-pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections.

The existing solar atrium exhaust fan rooms will be removed due to the new tenant infill and vertical circulation program space in the Basement. A new exhaust fan room will be provided based on the configuration of the new tenant infill and vertical circulation program spaces on 1st- 4th floors.

New vertical circulation (elevators and stairs) will be provided with new HVAC provisions. Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

Basement Level – new elevator sump pumps at new elevator shafts will be provided.

Basement to Level 4: Toilet fixtures at existing toilet rooms will be removed and replaced. Requirements for fixture quantities and ADA access to be reviewed. Any required expansion of toilet rooms should occur at existing locations to utilize existing water/waste piping stacks.

Electrical:

The renovated tenant areas will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building's existing systems. Existing power panelboards will be expanded with new sections where additional branch circuit breakers are required.

Herschler Addition (Minor)

HVAC:

The new building addition will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections. Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

Floors 1-4: New toilet fixtures at new toilet rooms will be provided in accordance with new architectural layouts. Stack toilet rooms at each floor, and provide new vertical sanitary/water risers up through the new addition. Coordinate sanitary mains at the Parking Garage level with existing or relocated sanitary mains.

Roof drains at the new roof and route storm piping down to the Parking Garage level will be provided and combined with existing storm piping out to the street.

Electrical:

The new building addition will be provided with new power distribution, telecom and fire alarm systems, including new panelboards; electrical service will be fed from the new Central Utility Plant main electric equipment. Electric room locations and space requirements will be determined as part of the future Level III scope of work.

Design Package 3

Connector Link (Major)

HVAC:

The new tenant infill will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections. . Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

The 6" domestic water service will be removed and relocated. New branch piping, backflow prevention, meters, and pressure reducing valves will be provided from the relocated service to the existing domestic water systems at the Herschler (3"), Capitol Building (3"), cold water make-up at new cooling towers (2"), and to existing irrigation systems at the Herschler and Capitol Buildings (3" each). A new 6" branch will be extended to the existing 6" Capitol Complex main located in the steam tunnel below the street. The new water meter room will be located near the incoming water service.

The 8" fire protection water service will be removed and relocated. A new backflow preventer will be provided in accordance with utility requirements. New 4" branch piping and wet fire protection control valve with all required alarms will be extended to the existing wet system at the Herschler Building and Connector Building.

Four (4) new 4" dry system control valves with associated air compressors, interlocks, and alarms will be provided for the Parking Garage. New 4" piping will be extended to the four existing dry zones in the Parking Garage. The new fire control valve room will be located at or adjacent to the incoming fire water service.

The 2" high pressure gas service will be removed and relocated. Provide new regulators and meters in accordance with utility requirements. New branch mains will be extended to new HVAC equipment/boilers. The gas water meter room will be located near the incoming gas service.

Remove and relocate 2" Domestic hot water and 1" hot water return mains serving other Buildings. Reconnect with existing mains in the steam tunnel.

The existing subsurface drainage duplex sump pump (south half of the building) and existing Plaza drain/floor drain duplex sump pump will be removed and relocated. Provide new pumps sized for existing subsurface drainage loads (approximately 1.5 HP) and Plaza drainage loads (approximately 1.0 HP). Reconfigure subsurface drainage piping and Plaza drainage piping and reroute to new sump pumps.

Plaza surface drains will be relocated to align with new surface architecture. All new piping will be routed to existing sump pumps in the Herschler boiler room.

The duplex sewage ejector pit serving Parking Garage toilet rooms will be demolished at the west loading dock and relocated. All sub-slab sanitary piping serving existing toilet rooms will be rerouted to the new sewage ejector pit location. New sanitary piping from new toilet rooms at the Connector Link would be routed to the relocated sewage ejector pit.

The abandoned grease interceptor trap at the west loading dock would be removed. Any abandoned kitchen piping below the slab in the area of work would be demolished.

The well and well cover serving as the domestic water system back-up will be demolished at Room B7. Should the facility desire a well as back-up during times of drought, then a new well will be installed in an alternate location.

Electrical:

The new tenant infill will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building. New lighting and power panelboards will be provided locally to serve associated loads. Electric room locations and space requirements will be determined as part of the future Level III scope of work.

Parking (Major)

HVAC:

Revisions associated with new ramps and VIP parking area; dedicated heating and cooling for VIP parking area.

Plumbing:

The existing 8" storm main exiting the building to the north to 26th Street (serving the sump pump discharge for the subsurface and area drainage systems at the north half of the building) will be removed and relocated. New connections may be required at 26th Street at the new storm main location. All associated existing storm piping in the Parking Garage will be routed to the new storm main.

The existing 6" sanitary main exiting the building to the north to 26th Street (serving the eastern wing of the Herschler Building) will be removed and relocated. New connections may be required at 26th Street at the new sanitary main location. All existing sanitary piping at the ceiling of the north-east side of the Parking Garage will be evaluated and routed to the new sanitary main.

Subsurface drainage piping across the north face of the building will be cut back to accommodate new excavation. New subsurface/foundation drainage piping will be installed at new foundations. A new duplex sump pump will be provided in the vicinity of the new loading dock to discharge this water.

New entry ramp trench drains will be provided at the east and west entryways. A new duplex sump pump will be provided in the vicinity of the new loading dock to discharge this water.

Modify/remove existing Parking Garage drains in the area of new conditioned space

Electrical:

Existing lighting and power will be revised at new ramp and VIP parking areas.

Central Utility Plant (Major 1)

HVAC:

A new central plant will be provided to serve the Capitol Complex including the Capitol, Herschler, Supreme Court, Barrett and Hathaway Buildings and associated renovations to the Connector Link. Four (4) new 400 ton water cooled centrifugal chillers and one (1) 150 ton centrifugal chiller (for IT loads) with multiple compressors will be provided to serve the entire campus. Five (5) new 400 ton induced draft cooling towers will be provided for heat rejection purposes. Three (3) of the cooling towers will be provided with basin heaters, heat tracing and indoor sumps for winter operation. A new 800 ton plate and frame heat exchanger will be provided for free cooling via integrated economizer operation. The pumping arrangement will be a primary/secondary system with variable speed pumping capabilities and the secondary distribution system will tie into the existing tunnel piping network serving the Supreme Court, Barrett and Hathaway Buildings.

Three (3) new 350 boiler horsepower (350 BHP = 11.7 million BTUH) high pressure steam boilers will be provided in the new central plant for comfort heating purposes. The boilers will be dual fuel, gas and oil fired with an indoor storage tank of roughly 35,000 gallons capacity. The boiler plant high pressure steam piping will be interconnected to the existing Barrett Boiler Plant via the existing tunnel network. New heat exchanger and pump rooms will be provided for the Capitol and Herschler Buildings. The pump rooms will house pressure reducing valve stations, steam to hot water heat exchangers, clean steam generators and hot water distribution pumps with variable speed drives as hot water will be the heating medium in both Buildings.

A new snow melting system consisting of multiple gas fired condensing type boilers will be provided to serve the Plaza walkways. New distribution pumps for the glycol hot water system will be provided.

Plumbing:

The gas-fired hot water heater and solar hot water heater will be removed and replaced. Provide a new 1,000 MBH gas-fired hot water heater with approximately 1,000 gallons of storage. Provide a new solar hot water heating system of similar capacity, with solar panels at the roof, 10,000 gallon water storage tank at the new mechanical equipment room, new heat exchanger, glycol/glycol pumps/glycol piping loop to the rooftop solar panels.

Gas piping will be routed from the gas meter room to gas-fired equipment at the relocated central plant.

Drainage will be provided throughout the relocated central plant. Provide a local duplex sump pump and route the discharge to existing systems at the main building.

Electrical:

New electric service and generator plant will be provided to serve the entire Complex. Two (2) 15 kV utility primary services serving two sets of 2,500 kVA, 480/277V double-end substations (four (4) transformers) will be provided along with two (2) 1,500 kW diesel-fired emergency / standby generators and associated emergency and standby automatic transfer switches; new feeders will be provided to existing and new building and equipment loads. The electric service equipment and generators will be located in new Central Plant adjacent to the Herschler Building.

Herschler Renovation (Minor)

HVAC:

Existing HVAC systems serving the renovated tenant areas will be provided with new direct digital control (DDS) pressure independent terminals boxes, new medium pressure and low pressure ductwork based on the new space configurations. Where applicable, each space will be zoned separately via the use of pressure independent terminal boxes. Each existing AHU fan room, eight (8) in total, two (2) per floor, will be retrofitted as follows: removal of existing pneumatic controls and existing inlet guide vanes and providing new DDC-based controls and new variable frequency drives (VFDs).

Plumbing:

Basement-Level 4: Remove and replace toilet fixtures at existing toilet rooms. Review requirements for fixture quantities and ADA access. Any required expansion of toilet rooms should occur at existing locations to utilize existing water/waste piping stacks.

Electrical:

The new tenant areas will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building's existing systems. Existing power panelboards will be expanded with new sections where additional branch circuit breakers are required.

Design Package 4

Connector Link (Major)

HVAC:

The new tenant infill will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections. Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

The 6" domestic water service will be removed and relocated. New branch piping, backflow prevention, meters, and pressure reducing valves will be provided from the relocated service to the existing domestic water systems at the Herschler (3"), Capitol Building (3"), cold water make-up at new cooling towers (2"), and to existing irrigation systems at the Herschler and Capitol Buildings (3" each). A new 6" branch will be extended to the existing 6" Capitol Complex main located in the steam tunnel below the street. The new water meter room will be located near the incoming water service.

The 8" fire protection water service will be removed and relocated. A new backflow preventer will be provided in accordance with utility requirements. New 4" branch piping and wet fire protection control valve with all required alarms will be extended to the existing wet system at the Herschler Building and Connector Building.

Four (4) new 4" dry system control valves with associated air compressors, interlocks, and alarms will be provided for the Parking Garage. New 4" piping will be extended to the four existing dry zones in the Parking Garage. The new fire control valve room will be located at or adjacent to the incoming fire water service.

The 2" high pressure gas service will be removed and relocated. Provide new regulators and meters in accordance with utility requirements. New branch mains will be extended to new HVAC equipment/boilers. The gas water meter room must be located near the incoming gas service. In this package, the new central plant will be located on the roof. Reduce the pressure of the incoming gas sufficient to route the new gas mains up through the building.

Remove and relocate 2" domestic hot water and 1" hot water return mains serving other Buildings. Reconnect with existing mains in the steam tunnel.

The existing subsurface drainage duplex sump pump (south half of the building) and existing Plaza drain/floor drain duplex sump pump must be removed and relocated. Provide new pumps sized for existing subsurface drainage loads (approximately 1.5 HP) and Plaza drainage loads (approximately 1.0 HP). Reconfigure subsurface drainage piping and Plaza drainage piping and reroute to new sump pumps.

Plaza surface drains must be relocated to align with new surface architecture. All new piping will be routed to existing sump pumps in the Herschler boiler room.

The duplex sewage ejector pit serving Parking Garage toilet rooms must be demolished at the west loading dock and relocated. All sub-slab sanitary piping serving existing toilet rooms must be rerouted to the new sewage ejector pit location. New sanitary piping from new toilet rooms at the Connector Link would be routed to the relocated sewage ejector pit.

The abandoned grease interceptor trap at the west loading dock would be removed. Any abandoned kitchen piping below the slab in the area of work would be demolished.

The well and well cover serving as the domestic water system back-up must be demolished at Room B7. Should the facility desire a well as back-up during times of drought, then a new well must be installed in an alternate location.

Electric:

The new tenant infill will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building. New lighting and power panelboards will be provided locally to serve associated areas. Electric room locations and space requirements will be determined as part of the future Level III scope of work.

Parking (Major)

HVAC:

Revisions associated with new ramps and VIP parking area; dedicated heating and cooling for V.I.P parking area.

Plumbing:

The existing 8" storm main exiting the building to the north to 26th Street (serving the sump pump discharge for the subsurface and area drainage systems at the north half of the building) must be removed and relocated. New connections may be required at 26th Street at the new storm main location. All associated existing storm piping in the Parking Garage must be routed to the new storm main.

The existing 6" sanitary main exiting the building to the north to 26th Street (serving the eastern wing of the Herschler Building) must be removed and relocated. New connections may be required at 26th Street at the new sanitary main location. All existing sanitary piping at the ceiling of the north-east side of the Parking Garage must be evaluated and routed to the new sanitary main.

Subsurface drainage piping across the north face of the building must be cut back to accommodate new excavation. New subsurface/foundation drainage piping must be installed at new foundations. A new duplex sump pump must be provided in the vicinity of the new loading dock to discharge this water. New entry ramp trench drains must be provided at the east and west entryways.

A new duplex sump pump must be provided in the vicinity of the new loading dock to discharge this water.

Modify/remove existing Parking Garage drains in the area of new conditioned space.

Electrical:

Revisions to existing lighting and power at new ramp and VIP parking areas.

Central Utility Plant (Major 2)

HVAC:

A new central plant will be provided to serve the Capitol Complex including the Capitol, Herschler, Supreme Court, Barrett and Hathaway Buildings and associated renovations to the Connector Link. Four (4) new 500 ton water cooled centrifugal chillers and one (1) 150 ton centrifugal chiller (for IT loads) with multiple compressors will be provided to serve the entire campus. Five (5) new 500 ton induced draft cooling towers will be provided for heat rejection purposes located on the roof of the Addition. Three (3) of the cooling towers will be provided with basin heaters, heat tracing and indoor sumps for winter operation. A new 1,000 ton plate and frame heat exchanger will be provided for free cooling via integrated economizer operation. The pumping arrangement will be a primary/secondary system with variable speed pumping capabilities and the secondary distribution system will tie into the existing tunnel piping network serving the Supreme Court, Barrett and Hathaway Buildings.

Three (3) new 350 boiler horsepower high pressure steam boilers will be provided in the new central plant for comfort heating purposes. The boilers will be dual fuel, gas and oil fired with an indoor storage tank of roughly 40,000 gallons capacity. The boiler plant high pressure steam piping will be interconnected to the existing Barrett Boiler Plant via the existing tunnel network. New heat exchanger and pump rooms will be provided for the Capitol and Herschler Buildings. The pump rooms will house pressure reducing valve stations, steam to hot water heat exchangers, clean steam generators and hot water distribution pumps with variable speed drives as hot water will be the heating medium in both Buildings.

A new snow melting system consisting of multiple gas-fired condensing type boilers will be provided to serve the Plaza walkways. New distribution pumps for the glycol hot water system will be provided.

Plumbing:

The gas-fired hot water heater and solar hot water heater must be removed and replaced. Provide a new 1,000 MBH gas-fired hot water heater with approximately 1,000 gallons of storage. Provide a new solar hot water heating system of similar capacity, with solar panels at the roof, 10,000 gallon water storage tank at the new mechanical equipment room, new heat exchanger, glycol/glycol pumps/glycol piping loop to the rooftop solar panels.

Gas piping will be routed from the gas meter room to gas-fired equipment at the relocated central plant.

Electrical:

New electric service and generator plant will be provided to serve entire Complex will be located in new Central Plant adjacent to the Herschler Building. Two (2) 15 kV utility primary services serving two sets of 3,000 kVA, 480/277V double-end substations (four (4) transformers) will be provided along with two (2) 1,500 kW diesel-fired emergency / standby generators and associated emergency and standby automatic transfer switches, as well as new feeders to existing and new building and equipment loads. The electrical service equipment will be located in the existing VIP Parking Garage near the east site ramp; the generators will be located in a new Central Plant adjacent to the Herschler Building. Electric room locations and space requirements will be determined as part of the future Level III scope of work.

5.4 Mechanical, Electrical and Plumbing Systems

Herschler Renovation (Major 2)

HVAC:

The renovated tenant areas will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal VAV boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections.

The existing solar atrium exhaust fan rooms will be removed due to the new tenant infill and vertical circulation program space in the Basement. A new exhaust fan room will be provided based on the configuration of the new tenant infill and vertical circulation program spaces on 1st- 4th floors.

The existing atrium smoke control exhaust system will be modified/removed based on the configuration of the new tenant infill and vertical circulation program spaces on 1st- 4th floors.

New vertical circulation (elevators and stairs) will be provided with new HVAC provisions. Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

Basement to Level 4: Toilet fixtures at existing toilet rooms will be removed and replaced. Requirements for fixture quantities and ADA access to be reviewed. Any required expansion of toilet rooms should occur at existing locations to utilize existing water/waste piping stacks.

Electrical:

The renovated tenant areas will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building's existing systems. Existing power panelboards will be expanded with new sections where additional branch circuit breakers are required.

Herschler Addition (Major)

HVAC:

The new building addition will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal VAV boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections. Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

The existing subsurface drainage duplex sump pump (north half of the building) and existing north garage drain/floor drain duplex sump pump must be removed and relocated at the Parking Garage level below the area of new construction above. Provide new pumps sized for existing subsurface drainage loads (approximately 1.5 HP) and Plaza drainage loads (approximately 1.0 HP). Remove and replace subsurface drainage piping and garage drainage piping and reroute to new sump pump location.

Basement Level – provide new elevator sump pumps at new elevator shafts.

Basement-4: Remove and replace toilet fixtures at existing toilet rooms. Review requirements for fixture quantities and ADA access. Any required expansion of toilet rooms should occur at existing locations to utilize existing water/waste piping stacks.

Floors 1-4: Provide new toilet fixtures at new toilet rooms in accordance with new architectural layouts. Stack toilet rooms at each floor, and provide new vertical sanitary/water risers up through the new addition. Coordinate sanitary mains at the Parking Garage level with existing or relocated sanitary mains.

Provide roof drains at the new roof and route storm piping down to the Parking Garage level. Combine with existing storm piping out to the street.

Electrical:

The new building addition will be provided with new power distribution, telecom and fire alarm systems, including new panelboards; electrical service will be fed from the new Central Utility Plant main electric equipment. Electric room locations and space requirements will be determined as part of the future Level III scope of work.

Recommended Design Package

Connector Link (Major)

HVAC:

The new tenant infill will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure VAV independent terminal boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections. Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

The 6" domestic water service will be removed and relocated. New branch piping, backflow prevention, meters, and pressure reducing valves will be provided from the relocated service to the existing domestic water systems at the Herschler (3"), Capitol Building (3"), cold water make-up at new cooling towers (2"), and to existing irrigation systems at the Herschler and Capitol Buildings (3" each). A new 6" branch will be extended to the existing 6" Capitol Complex main located in the steam tunnel below the street. The new water meter room will be located near the incoming water service.

The 8" fire protection water service will be removed and relocated. A new backflow preventer will be provided in accordance with utility requirements. New 4" branch piping and wet fire protection control valve with all required alarms will be extended to the existing wet system at the Herschler Building and Connector Building.

Four (4) new 4" dry system control valves with associated air compressors, interlocks, and alarms will be provided for the Parking Garage. New 4" piping will be extended to the four existing dry zones in the Parking Garage. The new fire control valve room will be located at or adjacent to the incoming fire water service.

The 2" high pressure gas service must be removed and relocated. New regulators and meters will be provided in accordance with utility requirements. New branch mains will be extended to new HVAC equipment/boilers. The gas water meter room will be located near the incoming gas service.

The 2" domestic hot water and the 1" hot water return mains serving other Buildings will be removed and relocated and reconnected with existing mains in the steam tunnel.

The existing subsurface drainage duplex sump pump (south half of the building) and existing Plaza drain/floor drain duplex sump pump will be removed and relocated. New pumps sized for existing subsurface drainage loads (approximately 1.5 HP) and Plaza drainage loads (approximately 1.0 HP) will be provided. The subsurface drainage piping and Plaza drainage piping will be reconfigured / rerouted to the new sump pumps.

Plaza surface drains will be relocated to align with new surface architecture. All new piping will be routed to existing sump pumps in the Herschler boiler room.

The duplex sewage ejector pit serving Parking Garage toilet rooms will be demolished at the west loading dock and relocated. All sub-slab sanitary piping serving existing toilet rooms will be rerouted to the new sewage ejector pit location. New sanitary piping from new toilet rooms at the Connector Link will be routed to the relocated sewage ejector pit.

The abandoned grease interceptor trap at the west loading dock will be removed. Any abandoned kitchen piping below the slab in the area of work will be demolished.

The well and well cover serving as the domestic water system back-up must be demolished at Room B7. Should the facility desire a well as back-up during times of drought, then a new well must be installed in an alternate location.

Electrical:

The new tenant infill will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building. New lighting and power panelboards will be provided locally to serve associated areas. Electric room locations and space requirements will be determined as part of the future Level III scope of work.

Parking (Major)

HVAC:

Revisions associated with new ramps and VIP parking area; dedicated heating and cooling ventilator for VIP parking area.

The existing snow melt boiler system will be removed and relocated and piping replaced.

Plumbing:

The existing 8" storm main exiting the building to the north to 26th Street (serving the sump pump discharge for the subsurface and area drainage systems at the north half of the building) must be removed and relocated. New connections may be required at 26th Street at the new storm main location. All associated existing storm piping in the Parking Garage must be routed to the new storm main.

The existing 6" sanitary main exiting the building to the north to 26th Street (serving the eastern wing of the Herschler Building) must be removed and relocated. New connections may be required at 26th Street at the new sanitary main location. All existing sanitary piping at the ceiling of the north-east side of the Parking Garage must be evaluated and routed to the new sanitary main.

Subsurface drainage piping across the north face of the building must be cut back to accommodate new excavation. New subsurface/foundation drainage piping must be installed at new foundations. A new duplex sump pump must be provided in the vicinity of the new loading dock to discharge this water.

New entry ramp trench drains must be provided at the east and west entryways. A new duplex sump pump must be provided in the vicinity of the new loading dock to discharge this water.

Electrical:

Revisions to existing lighting and power at new ramp and V.I.P parking areas.

Central Utility Plant (Major)

HVAC:

A new central plant will be provided to serve the Capitol Complex including the Capitol, Herschler, Supreme Court, Barrett and Hathaway Buildings and associated renovations to the Connector Link. Four (4) new 500 ton water cooled centrifugal chillers and one (1) 150 ton centrifugal chiller (for IT loads) with multiple compressors will be provided to serve the entire campus. Five (5) new 500 ton induced draft cooling towers will be provided for heat rejection purposes located on the roof of the Addition. Three (3) of the cooling towers will be provided with basin heaters, heat tracing and indoor sumps for winter operation. A new 1,000 ton plate and frame heat exchanger will be provided for free cooling via integrated economizer operation. The pumping arrangement will be a primary/secondary system with variable speed pumping capabilities and the secondary distribution system will tie into the existing tunnel piping network serving the Supreme Court, Barrett and Hathaway Buildings.

Three (3) new 350 boiler horsepower (BHP) high pressure steam boilers will be provided in the new central plant for comfort heating purposes. The boilers will be dual fuel, gas and oil fired with an indoor storage tank of roughly 40,000 gallons capacity. The boiler plant high pressure steam piping will be interconnected to the existing Barrett Boiler Plant via the existing tunnel network. New heat exchanger and pump rooms will be provided for the Capitol and Herschler Buildings. The pump rooms will house pressure reducing valve stations, steam to hot water heat exchangers, clean steam generators and hot water distribution pumps with variable speed drives as hot water will be the heating medium in both Buildings. Phsing of the new central plant will have the new central plant being built and operational before change-over to the new services and decommissioning of the existing services.

A new snow melting system consisting of multiple gas-fired condensing type boilers will be provided to serve the Plaza walkways. New distribution pumps for the glycol hot water system will be provided.

Plumbing:

The gas-fired hot water heater and solar hot water heater will be removed and replaced. Provide a new 1,000 MBH gas-fired hot water heater with approximately 1,000 gallons of storage. Provide a new solar hot water heating system of similar capacity, with solar panels at the roof, 10,000 gallon water storage tank at the new mechanical equipment room, new heat exchanger, glycol/glycol pumps/glycol piping loop to the rooftop solar panels.

Gas piping will be routed from the gas meter room to gas-fired equipment at the relocated central plant.

Drainage will be provided throughout the relocated central plant. Provide a local duplex sump pump and route the discharge to existing systems at the main building.

Electrical:

New electric service and generator plant will be provided to serve the entire Complex. Two (2) 15 kV utility primary services serving two sets of 3,000 kVA, 480/277V double-end substations (four (4) transformers) will be provided along with two (2) 1,500 kW diesel-fired emergency / standby generators and associated emergency and standby automatic transfer switches; new feeders will be provided to existing and new building and equipment loads. The electric service equipment and generators will be located in new Central Plant adjacent to the Herschler Building. The electrical service equipment will be located in the existing VIP Parking Garage near the east site ramp; the generators will be located in a new Central Plant adjacent to the Herschler Building.

Herschler Renovation (Major)

HVAC:

The renovated areas will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections.

The existing solar atrium exhaust fan rooms will be removed due to the new tenant infill and vertical circulation program space in the Basement. A new exhaust fan room will be provided based on the configuration of the new tenant infill and vertical circulation program spaces on 1st- 4th floors.

The existing atrium smoke control exhaust system will be modified/removed based on the configuration of the new tenant infill and vertical circulation program spaces on 1st- 4th floors.

New vertical circulation (elevators and stairs) will be provided with new HVAC provisions. Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

The existing perimeter finned tube radiation system will be reworked and/or replaced to accommodate the proposed Facade scope of work.

Plumbing:

Basement to Level 4: Toilet fixtures at existing toilet rooms will be removed and replaced. Requirements for fixture quantities and ADA access to be reviewed. Any required expansion of toilet rooms should occur at existing locations to utilize existing water/waste piping stacks.

Electrical:

The renovated tenant areas will be provided with new lighting, power, telecom and fire alarm fed via the Herschler Building's existing systems. Existing power panelboards will be expanded with new sections where additional branch circuit breakers are required.

Herschler Addition (Major)

HVAC:

The new building addition will be provided with new variable air volume (VAV) air handling units (AHU) that will distribute air to the spaces via medium pressure and low pressure ductwork. Where applicable, each space will be zoned separately via the use of pressure independent terminal VAV boxes. Each AHU will consist of supply fan, cooling coil, access section, preheat coil, access section, humidifiers (where applicable), final filters, pre-filters. All AHUs will include external discharge attenuators on supply and return sections. Mechanical room locations and space requirements will be determined as part of the future Level III scope of work.

Plumbing:

The existing subsurface drainage duplex sump pump (north half of the building) and existing north garage drain/floor drain duplex sump pump will be removed and relocated at the Parking Garage level below the area of new construction above. Provide new pumps sized for existing subsurface drainage loads (approximately 1.5HP) and Plaza drainage loads (approximately 1.0 HP). Remove and replace subsurface drainage piping and garage drainage piping and reroute to new sump pump location.

Basement Level – provide new elevator sump pumps at new elevator shafts.

Basement-4: Remove and replace toilet fixtures at existing toilet rooms. Review requirements for fixture quantities and ADA access. Any required expansion of toilet rooms should occur at existing locations to utilize existing water/waste piping stacks.

Floors 1-4: Provide new toilet fixtures at new toilet rooms in accordance with new architectural layouts. Stack toilet rooms at each floor, and provide new vertical sanitary/water risers up through the new addition. Coordinate sanitary mains at the Parking Garage level with existing or relocated sanitary mains.

Provide roof drains at the new roof and route storm piping down to the Parking Garage level. Combine with existing storm piping out to the street.

Electrical:

The new building addition will be provided with new power distribution, telecom and fire alarm systems, including new panelboards; electrical service will be fed from the new Central Utility Plant main electric equipment. Electric room locations and space requirements will be determined as part of the future Level III scope of work.

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