Oregon Caves Chateau
Oregon Caves National Monument
Cave Junction, Oregon

Chateau Accessibility and Safety Study

Prepared by
Architectural Resources Group

June 2006

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CHAPTER 1: EXECUTIVE SUMMARY

The Chateau at Oregon Caves National Monument was constructed in 1934 in the rustic style. It is a National Historic Landmark, and although it has experienced some remodeling in the past, it still possesses a very high level of design integrity.

The structure provides visitor food services and overnight accommodations to guests visiting Oregon Caves National Monument.

The structure is six stories high, approximately 32,400 square feet. The upper five stories are constructed of heavy timber frame with wood frame walls and floors above a concrete wall and concrete slab at the lowest level.

Exterior surfaces are sheathed in Port Oreford cedar bark, with a roof of cedar shake.

Interior features include log posts with heavy timber beams and wall finishes of Nu-wood (fiberboard) panels.

The building, constructed of combustible materials on an isolated site, presents significant fire safety concerns from both the perspectives of wildland fire and internally-generated fire.

In addition to life-safety considerations, the Chateau is not accessible to persons with disabilities.

The scope of this study is to assess the building's condition and explore options for reducing life-safety hazards and improving levels of accessibility, while retaining the building's architectural character.

The outlined scope of improvements for the structure include:

- Disabled access improvements including parking and an accessible walkway to the main entry, provision for an elevator, development of new accessible bathrooms, and remodeling of two guest rooms to provide accessible guest room facilities.
- Fire life-safety improvements including proposed alterations for improved fire-rated wall construction, improved fire alarm/smoke detection systems, sprinkler system upgrades, exterior fire suppression system improvements, and a new egress stair from the third to second floors.
- Architectural improvements including reconstruction of the west façade porch and heavy timber exterior fire-stairs from the north and south wings. These improvements, while returning original features to the building, also serve as egress improvements to the building.

The conceptual estimated construction cost for the improvements is $3,323,000, exclusive of any soft cost or owner-generated project costs.

Subsequent to the preparation of this report, a Value Analysis workshop was held in the Park to review alternatives described here, and to make recommendations for selected options. The final Value Analysis Report, dated February 26, 2006, documents that process and identifies a recommended scope of work for the building.

CHAPTER 2: INTRODUCTION

The Chateau at Oregon Caves is a National Historic Landmark (NHL). This historic hotel became the property of the National Park Service in 2003. The building is presently equipped with both fire detection and fire suppression systems, but it is constructed of flammable materials that provide very little fire resistance. The means of egress from the building do not meet current life-safety requirements. Furthermore, in this building where food service and public accommodations are available to the visiting public, even the public spaces are not accessible to individuals with mobility impairments.

The heating, plumbing, and wiring systems running throughout the building are mostly original and have exceeded their service lives. In addition to its vulnerability to damage from failures in these existing systems (i.e. burst plumbing or heating pipes, electrical fires, etcetera), the structure is susceptible to impacts from landslides and its ability to resist the forces of an earthquake are presently unknown.

Based on the PMIS issued for this project, the goal of this study is as follows:

> "Now that this NHL is owned by the American people, it is vital that the National Park Service proceed promptly to analyze the facility's needs and deficiencies and formulate and diligently pursue a plan to correct these shortcomings in a timely fashion so that a safe environment can be provided for all visitors and employees while ensuring the preservation of this National Historic Landmark unimpaired for future generations."

2A. PROJECT TEAM

To that end, in September of 2004, the National Park Service contracted with Architectural Resources Group to lead a team of architects, historical architects, fire safety, structural, mechanical and electrical engineers, cost estimators, and an infrared imaging company to conduct a study of the Chateau.

The Project Team includes:

NPS – PACIFIC WEST REGION
Laurin Huffman, Regional Historical Architect

OREGON CAVES NATIONAL MONUMENT
Craig Ackerman - Superintendent
John Cavin - Maintenance Supervisor

Joe Dean - General Manager, Oregon Caves Outfitters (concessionaire)

DESIGN TEAM
Architectural Resources Group - Stephen Farneth, FAIA & Kate Johnson, AIA, Lead Historical Architect
Fredrick L. Walters, Historical Architect
Heritage Protection Group - Nick Artim, Fire Protection Engineer
Degenkolb Engineers - Loring Wylie, Structural Engineer
Tres West Engineers - Bruce Gustafson, Mechanical Electrical Engineer

Colbert Infrared Services - Infrared Thermographic Surveyors
Langdon Davis - John Bales, Cost Estimator
Kirk and Associates - Stephen Kirk, FAIA, CVS, Value Analysis Facilitator

2B. PROCESS

Report

The analysis was conducted in two parts. The first part was an in depth survey of the existing building conditions, performed on site in November 2004. Based on the survey, the following report was developed to document existing conditions and observations made during the survey, to formulate recommendations to address deficiencies, and to establish costs for those recommendations.

Value Analysis

The second part of the study was a facilitated Value Analysis (VA) workshop to review the finding and recommendations of the study. The goal of the VA session was to review all options and make further recommendations. The product of the VA was a VA Report which identified recommended alternatives for the building.

CHAPTER 3: BUILDING DESCRIPTION

This chapter will provide a description of the construction of the Oregon Caves Chateau, including a short history and a physical description of the building. It will also establish a hierarchy of the historical significance for each space within the building; because the Chateau is a National Historic Landmark (NHL) it is important to understand the historical significance of each space as well as of the building as a whole. Finally this chapter will cover the code requirements governing this facility. A thorough understanding of each of these issues is critical to making informed decisions as to how to address safety and disabled access upgrades to the Chateau without adversely impacting its historic character.

3A. BUILDING DESCRIPTION

3A.1. History

Note: Much of the information in this section comes from Alex McMurry's *Oregon Caves Chateau Historic Structures Report* prepared as A Terminal Project for the Historic Preservation Program, School of Architecture and Allied Arts, University of Oregon, June 1999.

Visitors began to make the long trek to the Oregon Caves soon after their discovery in 1874. The caves were made a National Monument in 1909 and came under protection of the National Forest Service as part of the Siskiyou National Forest. While the Forest Service was able to protect the caves against vandalism, there was minimal development in the area for the next decade. The Term Occupancy Act of 1915 allowed concessionaires to build and operate hotels, concessions and other recreational uses on federally owned land and set the stage for development of overnight accommodations at Oregon Caves.

Once a road was constructed to the site in the 1922, visitation began to increase – jumping from 1900 visitors in 1921 to 10,000 in 1922. At that time a tent camp with food services was in operation at the Caves, but it was clear that additional accommodations were needed. With an eye for protecting the rustic nature of the area, the Forest Service stipulated as part of a special use permit in 1922 that: "All buildings and structures shall be of the same general style and of an accepted type of rustic architecture."

The Oregon Caves Company (OCC) was formed by a group of businessmen from Grants Pass, Oregon, in 1922. In 1923 they applied for a special use permit to operate a guide service at the Caves and to construct a permanent guide headquarters housing offices, registry room, rest and dressing rooms, employee and guest accommodations, and food services. This building - the Chalet – was constructed in 1923. Following recommendations from Arthur Peck (a professor in landscape architecture at what would become Oregon State University in Corvalis), who assisted the Forest Service with an early development plan for the site, the Chalet was sited on a natural terrace above the ravine formed by Caves Creek. Peck had also suggested that the Chalet and any other building constructed on the site be designed in a rustic "Alpine" style to respond to the local climate and landscape.

The OCC also built a series of seven rustic cabins adjacent to the Chalet in 1926. However, as early as 1924 plans were underway to build a larger hotel at the Monument. In the summer of 1930 the OCC applied for a permit to build the new hotel, the Forest Service approved at 20-year Term Permit for the facility in June of 1931.

Again, with Arthur Peck's input, the hotel - named the Chateau - was sited in the Caves Creek ravine. Set close to the top of the ravine, the hotel and ravine walls formed a forecourt to the building and minimized the appearance of the six-story structure. Gust Lium of Grants Pass, who designed and built the Chalet, was also the designer/contractor for the Chateau. Completed in 1934, the Chateau was lauded for its sensitivity to the site.

The Chateau circa 1934.

The Oregon Caves Company continued as the concessionaire at the Monument, managing the Chateau until 2002. At that time, Oregon Caves Outfitters, a group based in nearby Cave Junction, took over the management of the Chateau.

Few significant changes have been made to the Chateau over the last 70 years. The following is a brief chronology of alterations to the building:

1934 Roof top sprinkler system installed to wet roof down before nightly bonfire program.

1937 South Wing of the First Basement was modified as a Coffee Shop to provide a more casual atmosphere than the Dining Room.

Emergency power generator was added in the Mechanical Room at the Third Basement

1946 New oil boiler added to the Mechanical Room at the Third Basement and 3000 gallon below grade oil tank added approximately 10 feet west of the building. This plant also served the Chalet.

1950 Dry pipe, automatic sprinkler system and fire doors installed to close off guest room corridors from open stairwells.

1954 Coffee Shop enlarged from 23 seats to 45 seats. The service stair to the Second Basement was relocated from the Coffee Shop to the Dining Room and a restroom was removed to accomplish this work.

Exterior ramp constructed from the Kitchen at the First Basement to the storage areas at the Second Basement.

1958 Balconies on the west elevation of the building at the First and Second Basements and at the First Floor removed due to structural failure from being overloaded with snow. They were replaced with a series of metal catwalks for window washing and maintenance purposes.

1961 Automatic sprinkler system upgraded.

1962 Wood-framed exit balconies on the west end of the North and South Wings replaced with steel fire escapes. Modifications to the Third Floor room layout to access fire escapes and replacement of fiberboard wall panels with gypsum wallboard in these areas may have occurred at that time as well.

1964 On December 22 a mudslide damaged the North Wing and center portion of the First Basement. Maple dance floor in the North Wing and portions of the flooring in the center of the building replaced with a plywood sub-floor over new 2x joists. Original timber beams below replaced with new glu-lams. The madrone wood baluster at the main stair replaced and a 12-inch high baseboard installed at the Coffee Shop to cover water damage at the base of the wood paneling.

1989 Intumescent coating applied to the fiberboard wall panels throughout the building.

1999 Heads at fire sprinklers changed to conform to current code requirements.

2004 New oil-fired boiler installed.

Additional alterations have been made over time; however the dates for these changes are unknown. They include:

- Propane-fired water heater(s) installed in the Mechanical Room at the Third Basement and a propane tank installed approximately 25 feet west of the building.
- Upgrades of guest bathrooms.
- Upgrade of electrical system and installation of grounded outlets in guest rooms.
- Installation of electric heaters in some guest rooms.

3A.2. Construction

Note: The following information is based on the original design drawings, prepared by G. A. Lium in 1931 (six floor plans only), HABS drawings prepared in 1989 (six floor plans and two elevations) and AutoCadd Existing Conditions drawings (six floor plans) prepared by Architectural Resources Group in November, 2004 for this study. See Appendix A for HABS Drawings and Appendix B for Existing Conditions Drawings.

The Oregon Caves Chateau is a 32,400 square foot, roughly "U" shaped building constructed at the head of the ravine formed by Caves Creek after it exits the caves. It is set back approximately 50 feet from the head of the ravine, creating a forecourt on the east side of the building, where Caves Creek spills down from the road level (approximately 20 feet) into a large trout pond. Three stories of the structure sit below the level of the road and three stories rise above the road, making the building appear much smaller than it really is. The walls of the ravine are steeply sloped at the east side of the building adding drama to the building's forecourt. On the west side of the building the natural grades of the ravine are gentler as it slopes downhill. The south side of the ravine has been terraced to allow for delivery access to the lower floors of the building and a service road accesses the lowest level through the ravine.

Just as the building steps down below grade into the ravine, it steps back steeply in a series of cascading roofs and dormers above the road level – again making the building appear smaller. True to its rustic style, the exterior walls of the Chateau are sheathed in Port Orford cedar bark and the roof is cedar shake. While the bark is in amazingly good condition after 70 years, the shake roof is badly in need of replacement. Multi-lite wood windows of varying sizes and styles complete the rustic composition.

A note about the nomenclature of floor levels: For the purposes of this report the floor levels follow the format of the original design drawings in that all levels below the road are referred to as Basements with the Third Basement being the lowest and First Basement being the floor just below the road level. All levels above the road are referred to as Floors with conventional numbering.

The following is an overview of each level of the building describing the use/occupancy (based on 2003 International Building Code [IBC]), construction, finish and fire protection and exiting provisions:

Third Basement

The Third Basement is the lowest level of the building. Only the center portion of this level is finished; the areas under the North and South Wings are unfinished crawl spaces.

Use/Occupancy:	Mechanical Room and Shop. Occupancy = Incidental to other building occupancies, requires 1-hour separation or sprinklers.
Construction:	Floors, all walls (both retaining walls against the hillside and those exposed on a portion of the west elevation) and ceiling are concrete. The exposed exterior concrete walls are painted in an effort to match the bark siding above.
Finishes:	Exposed concrete.
Fire Protection:	Fire-rated walls and ceiling, except at stairs to Second Basement; dry-pipe automatic sprinkler system; one fire alarm pull station.
Exits:	Two exits – one to exterior at grade; one is unprotected stair to Second Basement.

West Elevation ARG 2004

West Elevation / North Wing ARG 2004

Second Basement

The Second Basement is also below grade except for most of the west elevation, which allows for deliveries to be made by vehicle to this level.

Use/Occupancy: Back-of-house functions for the facility – laundry, restaurant storage, etc. This level also formerly housed employee accommodations - sleeping areas and a dining room/kitchen. Due to changes in how the facility is managed, these employee accommodations are no longer necessary and the concessionaire would like to develop at least a portion of this area as public meeting room(s). Occupancy = S-1 (moderate hazard storage due to presence of cardboard and paper products) /A-3 (proposed). Laundry Room is incidental to other occupancies of the building and requires 1-hour separation or sprinklers.

Construction: **Walls**: Concrete retaining walls at the north, south and east sides of the building; the west wall is a combination of exposed concrete and wood-frame, clad in bark on the exterior– again the concrete is painted to match the bark.

Floor: Concrete

Additional Structure: Combination of the heavy timber (log) posts supporting beams above.

Finishes: Exposed concrete and gypsum board at walls; exposed framing at ceiling with piping and conduit surface-mounted.

Fire Protection: Exposed, dry-pipe automatic sprinkler system; stair to Dining Room at First Basement above is unprotected; no separation from floor above; one fire alarm pull station not adjacent to an exit.

Exits: Two exits – all are on West side of building - one exit on grade through Laundry Room; one exit from employee Dining Room/Kitchen to catwalk. Employee Sleeping Area has only one exit.

First Basement

The First Basement is the lowest public floor of the building. It houses the Gift Shop, the Restaurant Dining Room, the Coffee Shop, and the Kitchen. A portion of the Dining Room has been given over to the Gift Shop, which has an office in the northwest corner of the space. The public Men's Restroom is also located on this level between the Dining Room and the Coffee Shop. The Kitchen opens to a service porch on the west side of the building with access from the road above and the loading dock at the floor below via steep, asphalt-paved ramps. The exhaust fan from the range hood in the Kitchen is mounted on the exterior wall of the west elevation at this level and covered with a shed roof.

Use/Occupancy: The Gift Shop (because it is part of the Dining Room), the Restaurant Dining Room and Coffee Shop = A-2 Occupancy. The Restaurant Kitchen is incidental to the main occupancy and should have a 1-hour separation or sprinklers.

Construction: **Floors**: The floors are a combination of heavy timber and conventional wood framing with diagonal board sheathing and a wood finished floor. Areas of the North Wing and center portion framing were replaced after the mudslide in 1964 with dimensional lumber framing and plywood sheathing.

Walls: The north and south walls are still concrete retaining walls below grade at this point; the east wall opens on grade to the forecourt and is wood frame; and the west side is wood frame. The exposed exterior walls are clad in bark.

Additional Structure: Log posts supporting heavy timber beams above.

Finishes: **Walls/Ceiling**: Dining Room and Gift Shop walls and ceilings, like almost all public spaces within the

building, are covered with fiberboard panels (Nu-wood). The panels are approximately 1'-6" wide and vary in length to form a pattern reminiscent of ashlar laid stone. The beveled edges of the tongue and groove panels reinforce this similarity. The panels were not meant to be painted – that was one of their selling points – and originally were light beige with a matte finish. When an intumescent coating was applied to the panels in 1989 to improve their fire resistance, the appearance of the panels changed. The color is darker than the original and the finish is glossier. The somewhat mottled appearance of the surface further reinforces their similarity to stone.

Coffee Shop walls are knotty pine and the ceiling finish is Nu-wood panels.

Kitchen walls and ceilings are painted gypsum board.

Floors: The floors in the North Wing were originally maple, but were replaced after the 1964 mudslide with plywood overlaid with a dark linoleum or asphalt tile. The floors in the Dining Room and Gift Shop are currently carpeted.

Coffee Shop floor is carpet.

Kitchen floor is vinyl tile.

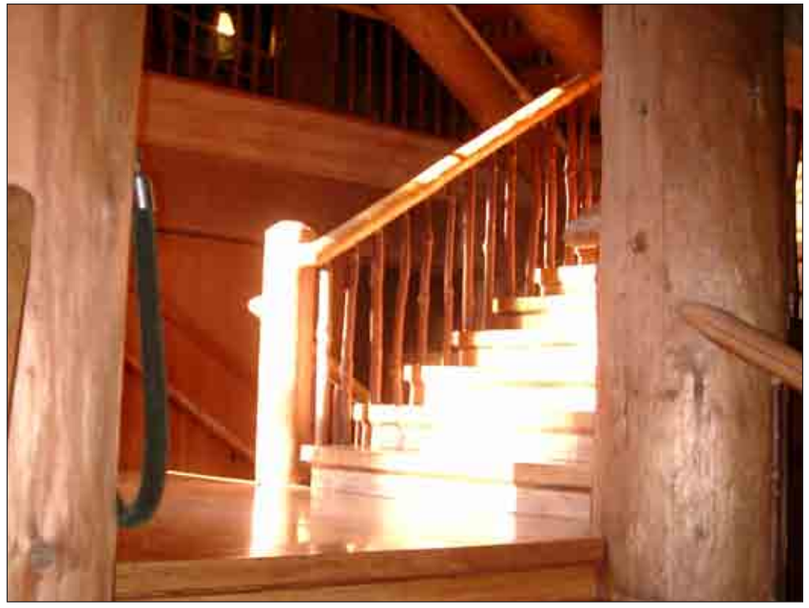
Stairs: A large open stair with madrone wood balusters, heavy timber stringers, and open risers connects to the Lobby on the First Floor above and is one of the focal points of the Dining Room.

The service stair to the Second Basement below was relocated under the main stair in the 1950s. Although enclosed, the service stair is not rated and the visual appearance distracts for the character-defining main stair.

Stream: Another focal point of the Dining Room is the faux stream – the conceit being that Caves Creek falls into the trout pond outside and then continues down the ravine through the Dining Room. The streambed is supported on concrete beams and columns below; the bed is finished in river rock and two small wooden bridges span the rill.

Fire Protection: Exposed, dry-pipe automatic sprinkler system; stair to Second Basement below is enclosed, but enclosure is not rated construction; stair to Lobby above is unprotected; Nu-wood panels do not provide separation from floor above; one fire alarm pull station in Coffee Shop is not adjacent to an exit.

Exits: There are three exits from the Gift Shop/Dining Room – one is directly to the exterior on grade at the east side of the building; the other two exits are through another space - one of which is up the stairs and out through the Lobby on the First Floor above and the other is through the Coffee Shop. The Coffee Shop has two exits – one directly to the exterior, the other through the Dining Room.



Main Central Stair at Landing ARG 2004

First Floor

The First Floor is the entry level of the building. The entry door is on the south wall of the South Wing and enters into a handsome lobby with a large field stone fireplace at its center. The reception desk is located on this level in the South Wing. A sitting area takes up the center portion of the building at this level, and the North Wing, which is raised approximately 2 feet above the rest of this level, houses the first level of Guest Rooms. The public Women's Restroom is also located in the North Wing.

Use/Occupancy: The Lobby most closely approximates an A-3 Occupancy as it is a waiting area and a space where scattered groups of people might congregate. The five guest rooms in the North Wing are an R-1 Occupancy.

Construction: **Floors**: The floors are a combination of heavy timber and conventional wood framing, sheathed in diagonal boards with a wood finished floor (since covered).

Main Entrance into Lobby ARG 2004

Walls: All walls are above grade on this level and are wood frame; the exterior is clad in bark. The walls are considerably out of plumb at the east end of the guest room corridor in the North Wing.

Additional Structure: Log posts supporting heavy timber beams above.

Finishes:

Walls/Ceiling: The wall and ceiling in the Lobby, corridors, and guest rooms are finished with Nu-wood fiberboard panels. The guest bathroom walls and ceilings are painted gypsum board.

Floors: The floors are currently carpeted throughout this level, except at guest bathrooms, which are finished with sheet vinyl.

Stairs: A large open stair with madrone balusters, heavy timber stringers and open risers connects to the guest room corridor on the Second Floor above and the Dining Room at the First Basement below. A short run of stairs (4 risers) connects the upper level of the First Floor (North Wing) to the Lobby level.

Fire Protection: Exposed, dry-pipe automatic sprinkler system; stair to First Basement below is unprotected; stair to Second Floor above is unprotected; Nu-wood panels do not provide separation from floor above; Nu-wood panels do not provide separation between guest rooms. Fire doors have been added between the Lobby and the Guest Room corridor; however the walls they are installed in are not rated construction. Fire alarm panel is located in Office on this level, one fire alarm pull station is not adjacent to an exit.

Exits: There are three exits from this level – one opens directly to the exterior two steps up from grade at the south side of the building; the second is at the west end of the corridor in the North Wing to an exterior fire escape with access to the road on the north side of the building, and the third is down the stairs and out through the Gift Shop in the First Basement below.

Balconies

Originally the First Floor and the First and Second Basements had large wood-framed balconies off of the west elevation overlooking the ravine. These balconies were removed in the 1950s, due to structural failure. Narrow steel and wood catwalks were installed when the balconies were removed. The removal of the balconies significantly affected the historic appearance of the west elevation of the building.

Second Floor

The Second Floor houses fourteen guest rooms. Each guest room includes a bath and small closet. There is also a large linen closet/ store room on this level, as well as several concealed spaces, the largest enclosing the large masonry chimney in the South Wing.

Use/Occupancy: This level houses guest rooms and their accessory spaces, and is an R-1 Occupancy.

Construction:

Floors: The Floors are conventional wood framing, sheathed in diagonal boards with a wood finished floor (since covered).

Walls: All walls are wood frame; the exterior is clad in bark.

Finishes:

Walls/Ceiling: The wall and ceilings in the guest rooms, corridors and closets are finished with Nu-wood fiberboard panels. The guest bathroom walls and ceilings are painted gypsum board.

Floors: The floors are currently carpeted throughout this level, except at Guest Bathrooms, which are finished with sheet vinyl.

Stairs: A large stair with madrone wood balusters and heavy timber stringers and open risers connects this level to the Lobby on the First Floor below.

Fire Protection: Exposed, dry-pipe automatic sprinkler system; stair to First Floor below is unprotected; Nu-wood panels do not provide separation from floor above; Nu-wood panels do not provide separation between guest rooms. Fire doors have been added between the main stair and the guest room corridor; however the walls into which they were installed are not rated construction; one fire alarm pull station is adjacent to an exit.

Exits: There are three exits from the this floor – one is down the open stairs and out through the Lobby on the First Floor below, and there are exits at the west end of the guest room corridors in both the North and South Wings to exterior fire escapes with access to the road on the north and south sides of the building.

Third Floor

The Third Floor houses eight guest rooms. All guest rooms include a bath and small closet, with the exception of two suites of two rooms each, which share a bathroom. There is also a linen closet/store room on this level, as well as a number concealed spaces due to the geometry of this level. The westernmost rooms in both the North and South Wings have been given over to exiting.

Use/Occupancy: This level houses guest rooms and their accessory spaces, and is an R-1 Occupancy.

Construction: **Floors**: The floors are conventional wood framing, sheathed in diagonal boards with a wood finished floor (since covered).

Walls: All walls are wood frame; exterior vertical walls are clad in bark, but much of this floor is open to the exterior only as dormers within the roof structure.

Finishes: **Walls/Ceiling**: The wall and ceilings in the guest rooms, corridors and closets are finished with Nu-wood fiberboard panels, except at the two guest rooms that have been changed to exits, where the walls are finished with painted gypsum board. The guest bathroom walls and ceilings are painted gypsum board.

Floors: The floors are currently carpeted throughout this level, except in guest bathrooms, which are finished with sheet vinyl.

Fire Protection: Exposed, dry-pipe automatic sprinkler system; stair to Second Floor below is unprotected; Nu-wood panels do not provide separation from attic spaces; Nu-wood panels do not provide separation between guest rooms; one fire alarm pull station is adjacent to an exit.

Exits: There are three exits from this floor – one is down two flights of open stairs and out through the Lobby on the First Floor below; and there are exits at the west end of both the North and South Wings to exterior fire escapes with access to the road on the north and south sides of the building.

Main Entrance into Lobby ARG 2004

3B. HISTORIC SIGNIFICANCE

The Oregon Caves Chateau was listed on the National Register of Historic Places in 1987 due to the significance of the style of architectural, engineering and construction of the building. The Period of Significance for the building is listed as 1925 to 1949, which covers the period from its original construction date until the first alterations were made. The Chateau was also designated a National Historic Landmark (NHL) in 1987. The NHL website offers the following statement of significance:

> "Completed in 1934, the structure is significant for the creative use of an extremely limited site spanning a gorge, its style and shaggy bark finish, and the high integrity the building, its furnishings, and site have been retained. The site also features stone retaining walls, fishponds, waterfalls, and walkways, all of which add to its rustic intimacy."

In the life of every working historic building there comes a time when intervention is necessary to ensure the continued preservation of the structure. Over time historic building components are affected by cataclysmic events such as mudslides, weather, use, and the need to upgrade operating systems so that the building remains viable as the world changes around it. The key to successfully making these required interventions in historical buildings is to find a balance between required repairs and modernization and preserving the historic character that makes these buildings so special. In order to do this successfully, a clear understanding of the building's physical repair, restoration and rehabilitation needs; the users' needs; and the significant historic features of the building is necessary.

Determination of significance is critical to the successful rehabilitation of historic buildings. By understanding both what makes them significant and which spaces and elements within them are character-defining features, one can plan improvements to minimize impact on the important historic elements. As part of this study, each space within the Chateau was ranked for its historic significance.

The significance of individual rooms, spaces or elements of the building are divided into three categories:

Primary Significance

Describes spaces that are the most historically important spaces. They are often the public spaces of the building – the restaurant, lobby, and exterior balconies. Typically, the designer used high-grade materials in these spaces and may have increased the size and scale of the space and/or decorative features of the spaces to accent their importance. These spaces have not been significantly changed from their original design.

These are the most significant character-defining elements of the building and should be maintained in their current condition to the greatest extent possible. Necessary modifications to address life-safety and disabled access requirements should be carried out in a way that will minimize the disturbance of the character-defining features of the space. Deteriorated character-defining features of these spaces should be restored or, if restoration is not possible, they should be stabilized and protected. All modifications to these areas should be designed to meet the highest preservation standards based on the *Secretary for the Interior's Standards for the Treatment of Historic Properties* and current preservation philosophy.

Secondary Significance

This designation is usually applied to less public spaces that have retained their historic features for the most part. These spaces may have been changed for new uses or some historic features may have been modified or replaced. The construction materials may not be as fine or well made as those found in more important rooms.

More leeway is allowed in modifying these spaces than spaces of Primary Significance; however modifications of these spaces should still be restricted to minor changes as required to meet life-safety, disabled access, and important programmatic needs. It is essential to understand the remaining character-defining features of these spaces prior to undertaking modifications. The protection of those features is highly recommended. The less historic fabric remains the more important it is to preserve it.

Least Significance

These spaces have retained little of their historic integrity. These spaces were either constructed as support spaces or were unoccupied. They house very few character-defining features and were constructed and finished using serviceable building materials. This designation might also apply to a space that has been so modified that no character-defining features remain.

The lack of character defining features makes these spaces the most logical place to undertake significant modifications to the building. The following drawings delineate the historical significance of each space within the Chateau.

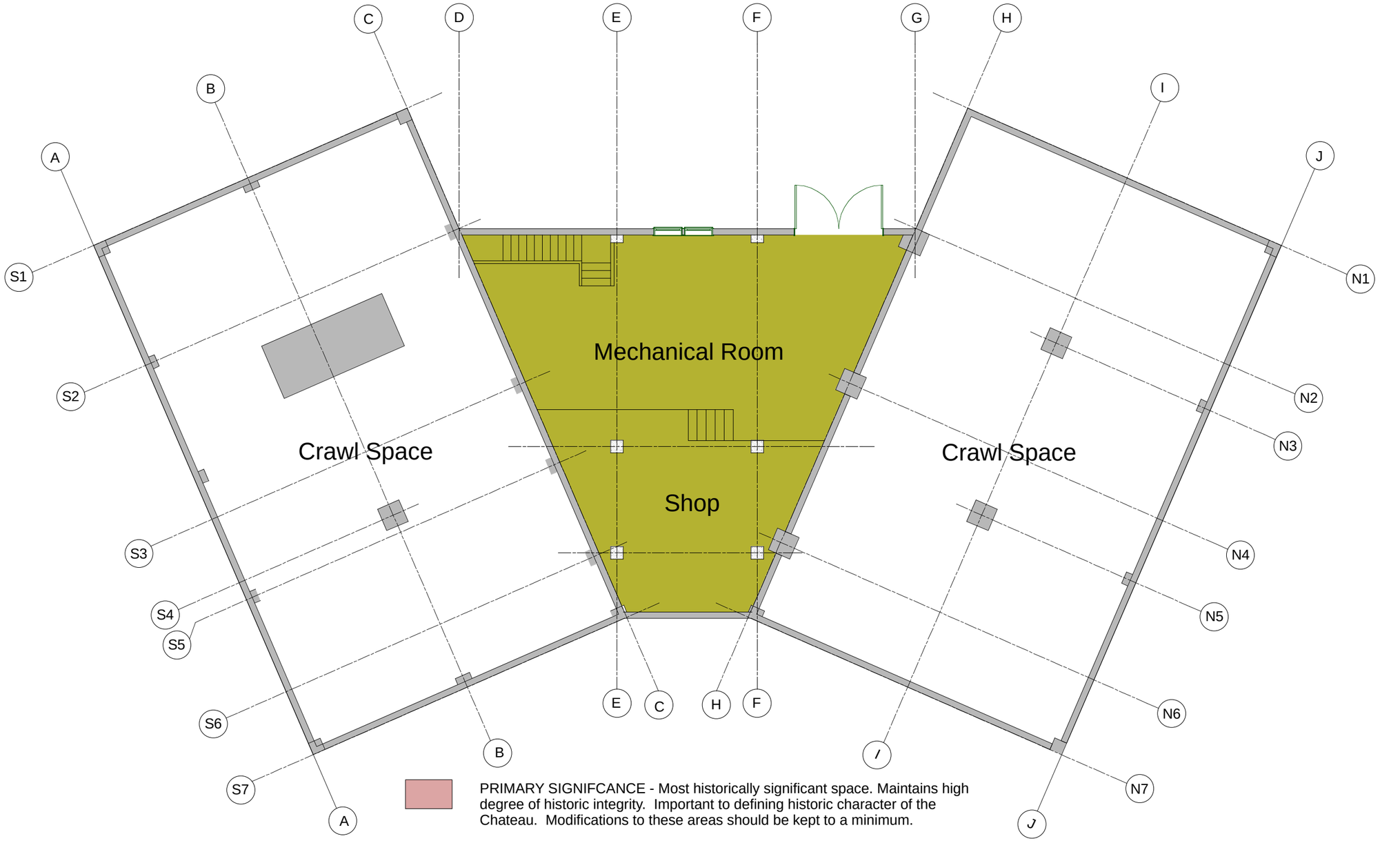


FIGURE 3.1 - THIRD BASEMENT HISTORICAL SIGNIFICANCE

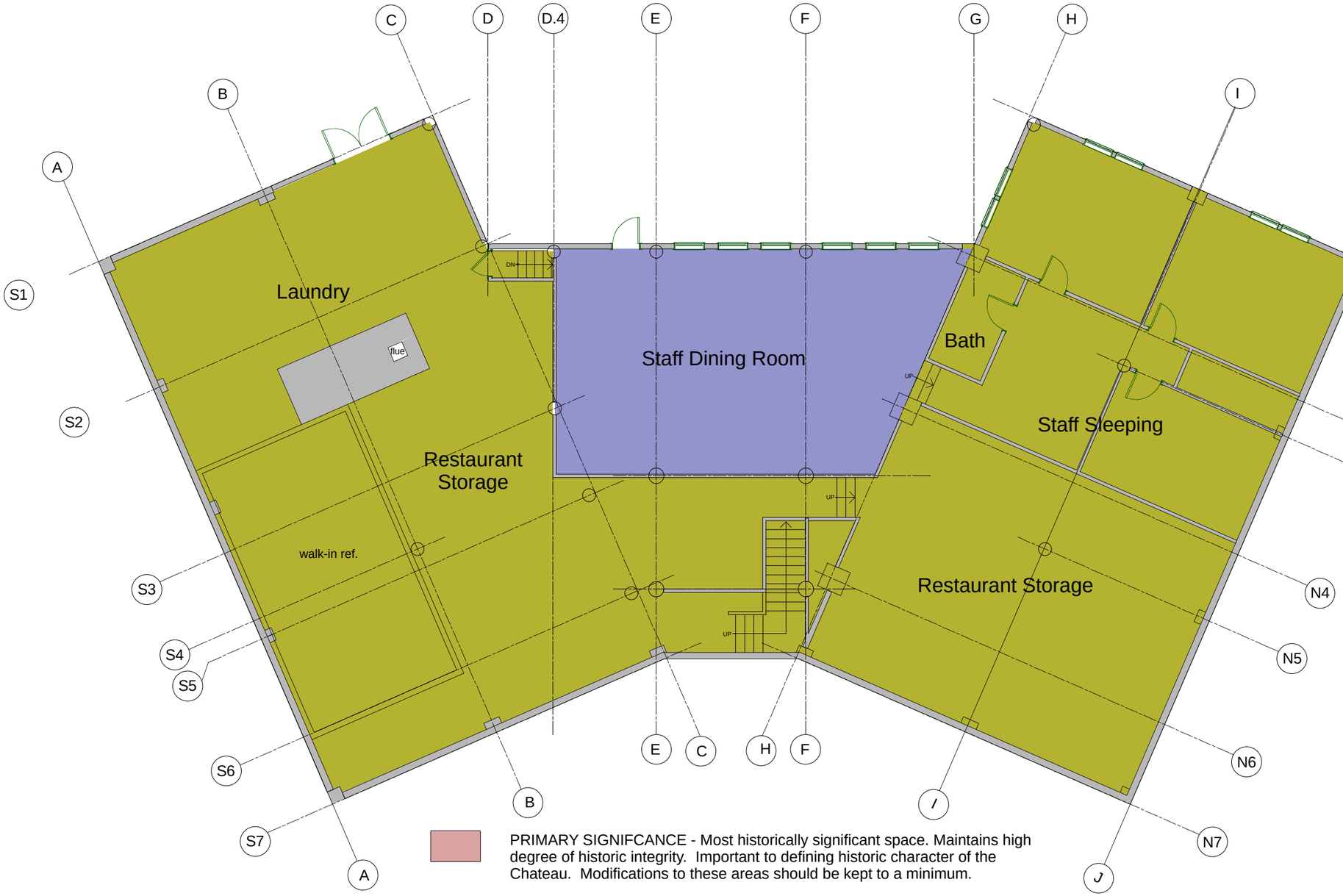


FIGURE 3.2 - SECOND BASEMENT HISTORICAL SIGNIFICANCE

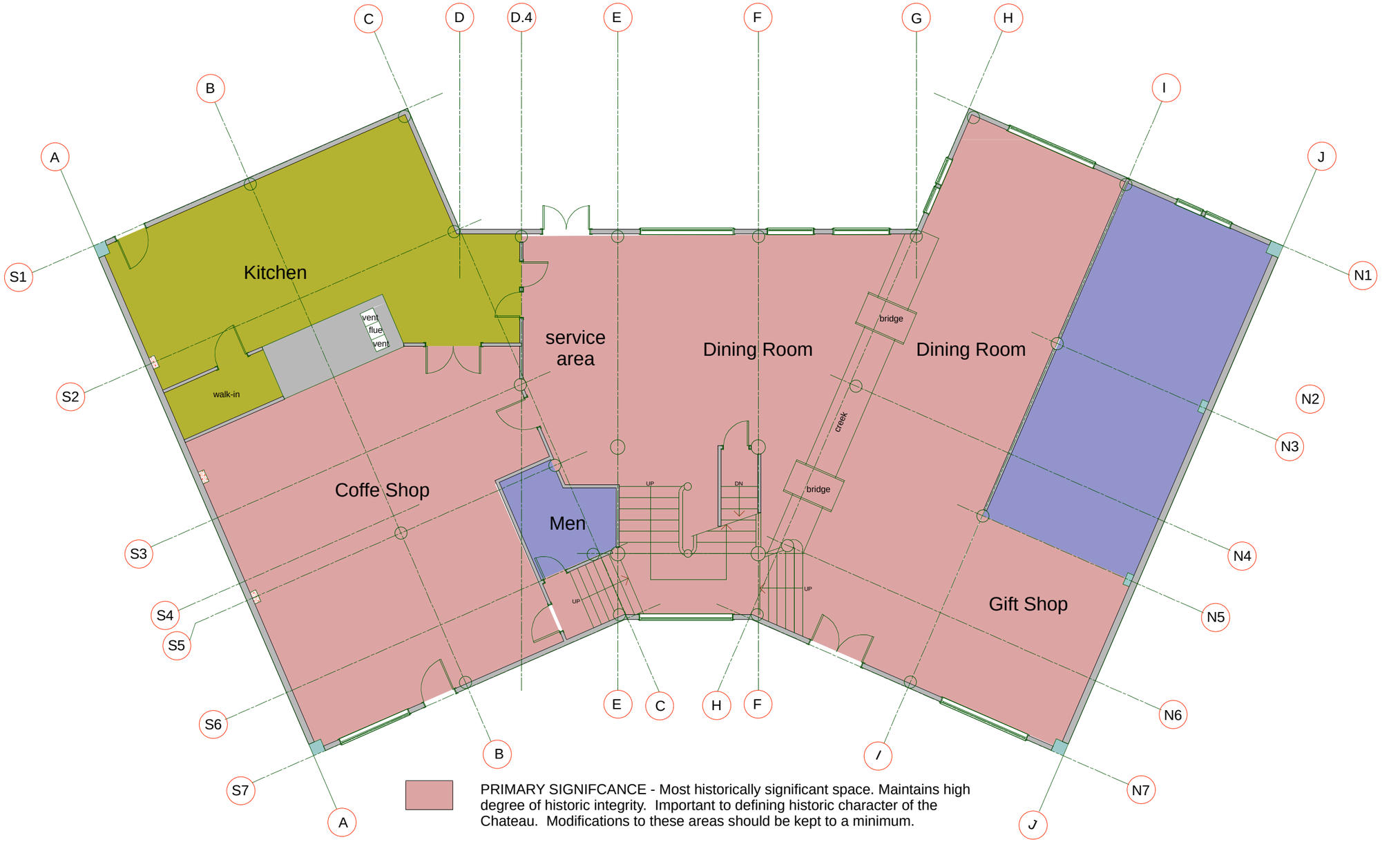


FIGURE 3.3 - FIRST BASEMENT HISTORICAL SIGNIFICANCE

FIGURE 3.4 - FIRST FLOOR HISTORICAL SIGNIFICANCE

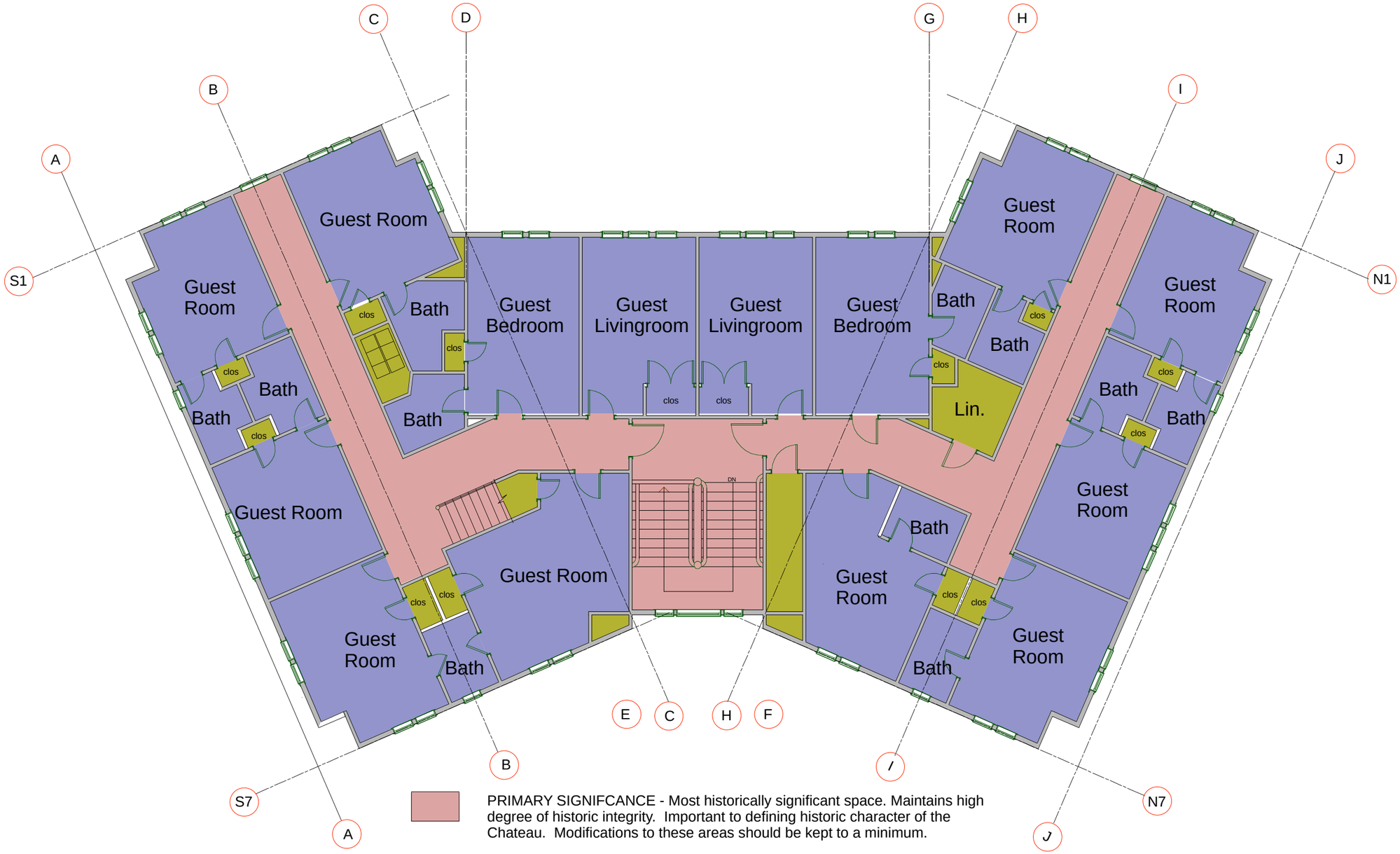


FIGURE 3.5 - SECOND FLOOR HISTORICAL SIGNIFICANCE

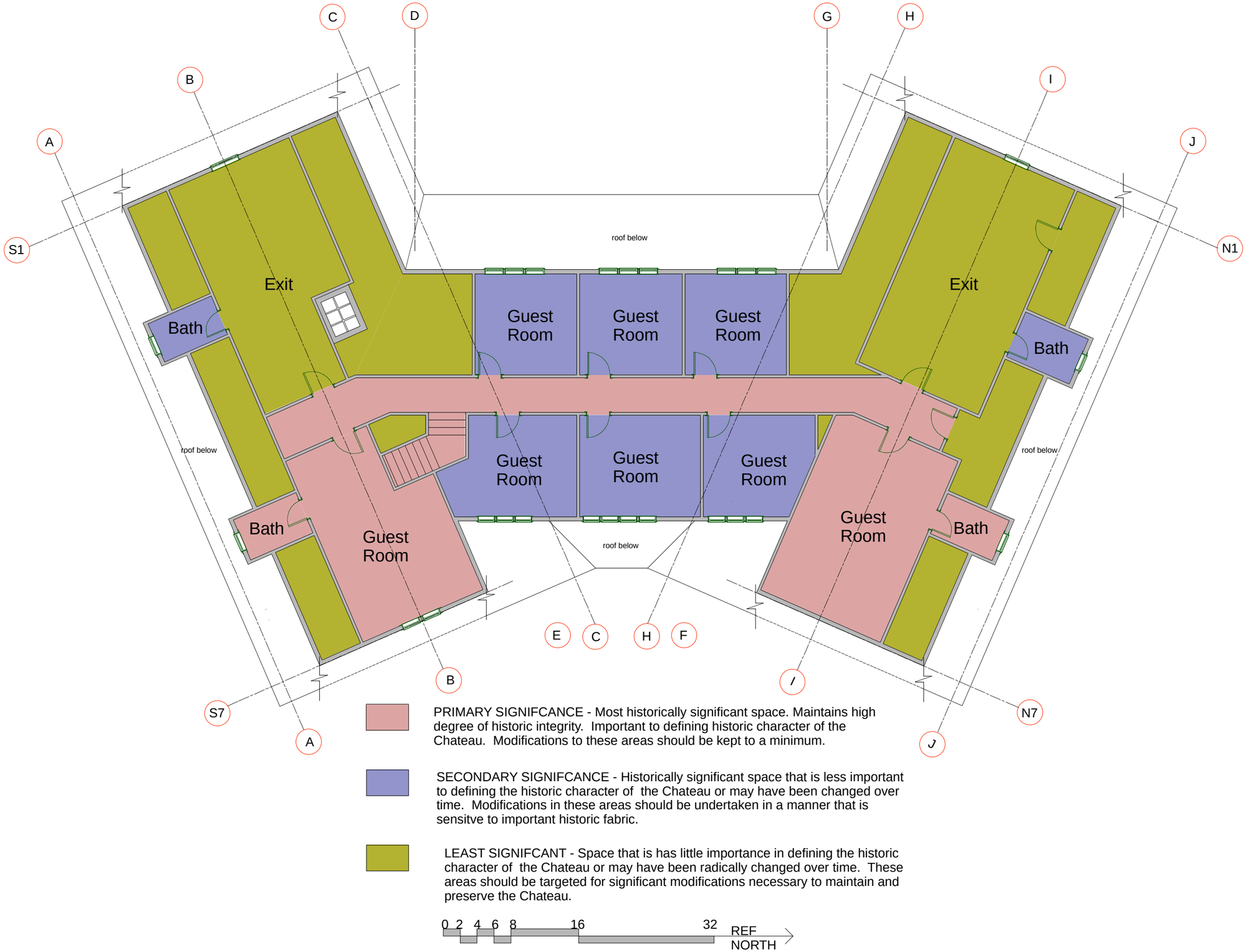


FIGURE 3.6 - THIRD FLOOR HISTORICAL SIGNIFICANCE

3C. BUILDING CODE ANALYSIS

The purpose of this study is to develop an understanding of life-safety and disabled access deficiencies at the Chateau and to provide recommendations for how to address them, without creating an adverse affect on the historic character of the facility. A recognized and approved standard must be used as the basis for any such study.

Building Code

The governing body for this facility is the National Park Service (NPS). The governing codes for NPS facilities are the codes typically used by the local jurisdiction(s); in this case the state of Oregon adopted the 2003 International Building Code in its entirety in October 2004. However, for many facilities, NPS also relies on the provisions of the National Fire Protection Association (NFPA) codes. NFPA 914, the Code for Fire Protection of Historic Structures, 2001 Edition was used for the life-safety portion of this study.

The purpose of NFPA 914 is "to provide fire protection and life-safety systems in historic buildings while protecting the elements, spaces, and features that make these structures historically and architecturally significant" by identifying "the minimum fire safety criteria to permit prompt escape of the building occupants to a safe area and to minimize the impact of fire and fire protection on the structure contents or features associated with the historic character." Given that the Chateau is a NHL, this approach is appropriate.

In addition to the standard construction requirements, NFPA 914 recognizes that proactive building management is a vital component of the protection and safety of building occupants, as well as the building itself. The code requires that building owners and managers develop a comprehensive Fire Safety Plan. Chapter 11 of NFPA 914 outlines the requirements for development of Management Operational Systems and a Management Plan as follows:

- Development of a Fire Emergency Response Plan
- Training of a Fire Safety Manager, staff and volunteers
- Record keeping for the Fire Safety Plan.
- Compliance Audits

NFPA 914 provides two methods of compliance – one is a prescriptive method based, to a great extent, on other governing code requirements; the other is a performance-based method. For the purposes of this study the prescriptive method was used. Chapter 4 looks in depth at the most important elements of the fire and life safety system of the building: exiting, fire separation, fire protection and notification. Chapter 5 makes recommendations for how to address deficiencies.

ADA

The Americans with Disabilities Act (ADA) and the ADA Design Standards were used as the basis for the disabled access portion of the study.

Chapter 4 also identifies areas where the building is not in compliance with the requirements of the ADA, while Chapter 5 makes recommendations based on the ADAAG for correcting those deficiencies.

The Secretary's Standards

All proposed building modifications should meet the *Secretary of the Interior's Standards for the Preservation of Historic Properties* to ensure against an adverse affect to this National Historic Landmark property.

CHAPTER 4: EXISTING CONDITIONS OBSERVATIONS

While Chapter 3 of this study describes the construction and the historic significance of the building, this chapter will describe the existing building systems, particularly as they allow for the use of the building by the disabled and relate to the life safety of building occupants. As noted in the previous chapter the original construction does not meet current building code requirements in a number of areas. The following chapter looks in depth at these conditions. Chapter 5 will look at recommendations for addressing the problems identified in this chapter.

4A. DISABLED ACCESS

4A.1. Introduction

As a public accommodation, owned by the federal government, the Oregon Caves Chateau is required to be accessible to the disabled by the Americans with Disabilities Act (ADA). In historic buildings the disabled accessibility goal is to ensure that all public spaces and programs are accessible to the greatest extent possible without the total loss of significant historic fabric. Furthermore the route(s) to get to those areas within the building must be accessible from the entrance to the site - this is called the path (or route) of travel.

While the Oregon Caves National Monument provides a number of interpretive programs, the Chateau's function, for the purposes of this report, is to provide food service and lodging. Although meeting facilities may eventually be provided in the Chateau, this program is not currently functioning and has not been included in the disabled access survey of the building.

4A.2. Path of Travel

The Oregon Caves Chateau is currently not accessible to the disabled. The Chateau is constructed on a very tight site at the head of a ravine. While this allows the building footprint to have a minimal impact on the site, it creates a six-story building, with only one on grade entry at the center level. The main floor (First Floor) of the building is approximately 1'-6" above grade at the entry; the Restaurant is on the level below (First Basement) and the closest guest wing is half of a level above this floor. While the entry could be made accessible fairly easily, since the building does not have an elevator, accessible travel among the different levels once inside the building is not possible at this time.

Although the entry to the Restaurant (First Basement) is on grade on the south side of the building, it is accessed from the road and parking lot level above only by a very narrow, steep asphalt ramp. Originally the First Basement, the First Floor above, and Second Basement below had large balconies on the north side of the building. Reconstruction of these historic balconies could provide a means for access to the public areas of the building without an elevator via sloped walkways between levels and the adjacent site. However, while technically feasible, this path of travel would be discriminatory because it would require the disabled to travel outside of the building, via ramp or elevator, to get from the Lobby to the Restaurant, while other patrons could take the interior stairs (see Chapter 5 for further recommendations).

Lobby

Once inside the First Floor, the Lobby, sitting areas, and reception desk are on the main level and accessible to the disabled. However, the counter at the reception desk exceeds the maximum height limit allowed for a wheelchair user. Additionally, the public Women's Room is located half a level above this floor and the Men's Room is in the Restaurant on the floor below.

Parking

Disabled accessible parking is provided approximately 100 feet north of the Chateau roughly on grade with the First Floor. The entry road from below loops around the Chateau (see Figure 1, Appendix A) and is relatively narrow. Therefore people coming from the parking area to the Chateau are very close to the moving traffic. All pedestrians are in the same position and the park has dealt with the problem by imposing a 10-mile an hour speed limit throughout the area surrounding the cave entrance and the Chateau.

Public Restrooms

Even if an accessible path of travel could be provided, the existing Men's and Women's Rooms are quite small and it would be difficult to create accessible fixtures within these multi-fixture spaces. They could be remodeled as single user and/or unisex toilet rooms, however this would cut back on the overall fixture count for the facility. (The fixture count required for the dining areas and public spaces is a minimum of two fixtures for each sex.)

Guest Rooms

As noted above, the guest rooms nearest the entry are located half a level above the First Floor. The guest rooms themselves are not accessible as the entry door width is 32", which, with hinges, impinges on the 32" clear required dimension for access. The guest bathrooms in each room are usually quite small and the entry doors are only 30" wide.

Signage and Notification

There is no Braille signage in the building to accommodate the sight impaired. The emergency notification system within the building is inadequate as noted in the section below, and notification systems within the building are only audible, which makes no accommodations made for the hearing impaired.

See Chapter 5 for recommendations of how to address these deficiencies.

4B. LIFE-SAFETY

4B.1. Introduction

The most overwhelming threat to the safety of occupants of the Chateau is fire. Buildings that house overnight guests present special life-safety concerns because of the fact that guests are in a strange environment and may not know what to do in an emergency. For this reason, and because of code and liability requirements, everything possible must be done to ensure that a fire does not have a chance to get started and grow in this building and that guests are not trapped in their rooms or lost in the hallways.

While fire is the greatest threat, other life-safety concerns were also studied as part of this report. Section 4C addresses observations regarding the structural system, both in terms of vertical (gravity) loads and the lateral loads that might be anticipated in case of severe winds or an earthquake. Section 4D looks at the existing mechanical system, including heating and plumbing components, and Section 4E studies the existing electrical system.

Oregon Caves Chateau contains many combustibles (fuels) such as furnishings, paper, cloth fabrics and the building's construction materials. Numerous potential ignition sources exist including heating and hot water equipment, aged electrical and lighting systems, food and beverage preparation appliances, commercial refrigeration and laundry equipment, and office devices (computers, photocopi-

ers, etc.). Arson and wildfires are also plausible threats. To reduce the fire threat for the safety of building occupants and to ensure the continued preservation of this historic building, a comprehensive fire safety effort that encompasses risk management (fire prevention), exiting, fire resistance, detection and alarm, and fire extinguishment is needed. This section of the building analysis focuses on existing exiting, fire resistance (barriers), fire detection and alarm, and fire suppression/extinguishment conditions at the Chateau.

North Wing West Facade - Metal Fire Escape ARG 2004

4B.2. Exiting Observations

Getting the occupants out of the building quickly and in an orderly manner, in the event of the fire or other life threatening event is a critical component to the safety of the occupants. The six-story Chateau is constructed with three stories built partially below grade and three stories above grade. The stories below grade, although called Basements, are not true basements from the standpoint of code and life-safety. (The 2003 IBC defines areas that are partially below grade as a story if some portion of wall at each level is exposed and grade is more than 12 feet below the floor above at any point.) This building's unique configuration facilitates exiting because it provides opportunities for occupants to exit directly from these levels to grade, without having to travel upstairs and/or through an intermediate space.

Due to the occupancy of the building, the building code typically requires a minimum of two exits from each level.

The following observations were made regarding exiting at the Chateau.

Third Basement

This is the lowest floor in the building, and because it houses a mechanical room with a boiler, code requires two exits. This level meets that requirement because it has a pair of doors opening on to grade and a stair to the Second Basement.

Deficiencies:

- See Second Basement Exiting Deficiencies below.
- The two exits from this level do not meet code because they are closer together than the required one-half the diagonal distance across the space.

Second Basement

This level is used for the back-of-house functions of the facility and is a warren of equipment, stored materials, piping, etc. There is one direct exit from this level to grade; however, although not specifically designated as a laundry room, the washers and dryers are open to and adjacent to this space. There is a second exit through the Employee Kitchen/ Dining Room onto the wood and metal catwalk and then to grade from there. The Employee Sleeping Area has only one exit which is into the Employee Kitchen/ Dining Room onto the wood and metal catwalk and then to grade from there. A third exit, well separated from the other two, is up the stairs to the First Basement and out through the Gift Shop or Coffee Shop.

Deficiencies:

- The laundry area is one of the possible ignition points for a fire, and, as an incidental use area, it is required to be separated from the main building occupancies by 1-hour construction, or to be sprinklered. The space is sprinklered, but the area is still considered an area of high hazard and should be separated from the exit path.
- Smoke control is still required in exit paths, but because of the open configuration of most of this floor smoke cannot be controlled.
- Deliveries and supplies are unloaded in this area and empty cardboard containers are stored along the exit path.

- Exit paths should not travel through kitchens as does the second exit out of this level (the only exit out of the Employee Sleeping Area).
- The exit path is not well defined within this space. The exit path must be clearly delineated from work areas.
- Metal catwalks and surrounding structures should be assessed for structural stability on a regular basis.

First Basement

This is the first public level of the building. While employees have some familiarity with the building, visitors to public spaces may be entirely unfamiliar with the building. Therefore clearly defined exit paths are imperative in public spaces. This level houses the Commercial Kitchen, which is a potential ignition point for a fire. There are two well defined exits from the public areas to grade at the east side of the building. There is a third exit up the open main stair to the First Floor above and exiting through the Lobby. There are two exits from the kitchen, one directly to the exterior and the other through the Coffee Shop.

Deficiencies:

- All of the public exits from this level are along the east side of the building and do not meet code because they are closer together than the one-half the diagonal distance across the space required. In effect this means that the only way out of this level if there is a fire along the east wall is through the Kitchen, which is not allowed by code.
- The exit paths that do not open directly on to grade are not protected.
- Smoke control is required in exit paths, but because of the open configuration of most of this floor smoke cannot be controlled.

First Floor

This is the first level of the building housing overnight accommodations. As noted above, employees are familiar with the building, and visitors to the restaurant are awake and, therefore, deemed to be more responsive in an emergency. Overnight guest are the most vulnerable to a life-threatening event, particularly in the middle of the night. Therefore, clearly defined exit paths are doubly important in guest room corridors. This level has two exits directly to the exterior - one on the south side that opens on grade, with a path through the Lobby. The other is at the west end of the guest room corridor and opens on to a metal fire escape that accesses grade at the road on the north side of the building.

Deficiencies:

- The exit paths are not protected. The walls of the guest room corridors are not rated construction, so that a fire in a guest room along this corridor could cut off the exit path.
- Smoke control is required in exit paths, but because of the open configuration of the south half of the building (Lobby), and the open stairway to the First Basement below, smoke cannot be controlled. There is a smoke door that can close the guest room corridor off from the Lobby and open stairway in the event of a fire, but the door was wedged open at the time of this survey.
- Metal fire escapes and surrounding structures should be assessed for structural stability on a regular basis.

Second Floor

This level of the building houses 14 guest rooms opening off of a 5’-0” +/- wide, U-shaped corridor. This level has two exits directly to the exterior - one at the west end of the corridor in the South Wing and the other at the west end of the corridor in the North Wing. Both open onto metal fire escapes that provide access to grade at the road on the east side of the building. A third exit goes down the open stair way to the Lobby and exits on the south side of the building.

Deficiencies:

- The exit paths are not protected. The walls of the guest room corridors are not rated construction, so that a fire in a guest room along this corridor could cut off the exit path.
- Smoke control is required in exit paths, but because of the open configuration of the south half of the building (Lobby), and the open stairway to the First Basement below, smoke cannot be controlled. There is a smoke door that can close the guest room corridor off from the Lobby and open stairway in the event of a fire, but the door was wedged open at the time of this survey.
- Emergency lighting and exit signs in the corridors are inadequate.
- Metal fire escapes and surrounding structures should be assessed for structural stability on a regular basis.

Third Floor

This level of the building houses eight guest rooms opening off of a 3'- 6" +/- wide corridor. This level has two exits to fire escapes at the west end of the building at the North and South Wings. The fire escapes are accessed through former guest rooms. These areas are no longer used as guest rooms, but the concessionaire would like to see them returned to use if an alternate exit path can be developed. A third exit goes down two flights of open stairs to the Lobby and exits on the south side of the building.

Deficiencies:

- The exit paths are not protected. The walls of the guest room corridors are not rated construction, so that a fire in a guest room along this corridor could cut off the exit path.
- Smoke control is required in exit paths, but because of the open configuration of the south half of the building (Lobby), and the open stairway to the First Basement below, smoke cannot be controlled. There is a smoke door that can close the guest room corridor off from the Lobby and open stairway in the event of a fire but the door was wedged open at the time of this survey.
- Emergency lighting and exit signs in the corridors are inadequate.
- Metal fire escapes and surrounding structures should be assessed for structural stability on regular basis.

4.B3. Fire Resistance Observations

Fire resistance is the ability of the building's walls, floors, ceilings and other key structural elements to prevent the passage of flames, heat, smoke and other combustible products. This is generally stated as a predetermined time period that should be comparable to the estimated burn time of the contents within the enclosure. Fire resistance often assumes that the fire will continue until all combustibles within its enclosure have been consumed, preventing fire spread to other portions of the building. If fire resistance is inadequate the fire can spread beyond its "fire zone," resulting in widespread or complete loss of the structure and its contents. When automatic fire suppression is provided the resistance may be reduced in recognition of the shorter probable burn times.

4.B3.1. Existing Fire Resistive System Description:

Within the Chateau two fire zones currently exist: the Third Basement mechanical room, and the rest of the structure. The specific main details of present fire resistance features are:

- The Third Basement houses the main boiler plant, hot water heaters, generator, and main electrical service panels. The building's designers recognized the potential fire danger posed by these services and enclosed the entire level in a fire resistant concrete enclosure. If properly sealed, the enclosure is expected to offer at least two hours of fire resistance, which is estimated to be longer than the burn time of the housed contents.
- The remainder of the building is effectively a single fire zone. If a fire originates in one part of this zone it will be free to spread

Figure 4.1: Third Basement Ceiling Penetrations

Figure 4.2: Third Basement Stairway Fire Separation Deficiencies

Figure 4.3: Close Proximity of Propane HW Heater and Boiler Burner

Figure 4.4: Non-Rated Second Basement Ceiling (Typical)

Figure 4.5: Non-Rated area under stair from Second Basement to First Basement

Figure 4.6: Non-Rated Enclosure to Second Basement

throughout the structure. An uncontrolled fire is expected to engulf the entire building within one hour.

- Interior walls and ceilings are constructed of wood framing and covered with fiberboard panels. These panels do not offer significant fire resistance and cannot be classified as a fire barrier. The panels have been coated with fire resistant paints in attempt to improve fire resistance but the level of effectiveness is expected to be minimal.

Table 4.1 presents the fire resistance requirements for existing hotels as prescribed in National Fire Protection Association (NFPA) #101, Life Safety Code(r).

Table 4.1: NFPA 101 Fire Separation Requirements

Area Description	Separation/Protection
Boiler and fuel fired heater rooms service more than a single guest room or suite	One-hour or sprinkler
Employee locker rooms	One-hour or sprinkler
Gift or retail shops greater than 100 ft²	One-hour or sprinkler
Bulk laundries	One-hour or sprinkler
Maintenance rooms	One-hour and sprinkler
Rooms used for the storage of combustible equipment and supplies	One-hour or sprinkler
Trash collection rooms	One-hour and sprinkler
Guest room corridors	Thirty-minute or sprinkler*
Guest room corridor doors	Twenty-minute or sprinkler**

* Where sprinklers are provided walls shall be designed to resist the passage of smoke.
** Where sprinklers are provided doors shall be smoke resistant and fitted with self-closing and positive latching hardware.

4.B3.2. Existing Fire Resistance Deficiencies

Key fire resistance deficiencies within the Chateau are:

Third Basement

- Fire resistance is deficient due to numerous pipe and electric service penetrations in the ceiling.
- Gaps exist in the door framing the wall and the ceiling of the access stair that leads from the Third to Second Basement.
- The propane fired water heater and emergency generator, oil-fired boiler, and electrical distribution panels are in close proximity to each other. If a leak occurs in the propane supply tube gas could migrate to one of the flame or spark producing sources where it can ignite and explode.

Second Basement

- The ceiling throughout the storage, laundry and refrigerator/freezer equipment area is exposed wood on wood joists. Numerous gaps in the ceiling would permit fire spread to the First Basement.
- The dumbwaiter from the Second to First Basement is an unprotected shaft.
- The Second Basement is effectively one area that would allow unrestricted horizontal fire spread.
- Cardboard and refuse storage is adjacent to the laundry and refrigeration equipment and is not fire separated.

- Employee residential areas are not fire separated from the remainder of the basement.
- The stairway from the Second Basement to the First Basement Dining Room is not fire resistant and would permit fire spread.
- Vertical framing at the perimeter walls is exposed and would allow a fire originating on this level to spread within concealed wall cavities to the upper floors.

First Basement

- The stairway from the First Basement Dining Room to the First Floor is open to permit unrestricted vertical fire migration.
- The main kitchen is not fire separated from the rest of the floor so that a kitchen fire (high probability scenario) can spread into the Dining Room and Coffee Shop. Once in the Dining Room it can migrate up to the Main Lobby.
- First Basement storage rooms are not fire-separated.
- Fiber ceiling tiles throughout the level (except the Kitchen) are not fire resistant and have numerous gaps and pipe/cable penetrations. The combination of gaps, penetrations, and a relatively early probable integrity failure will allow flames to spread into ceiling and wall voids.
- Fiber panels, similar to the ceilings, exist on the interior partition walls. The failure and fire spread potential is similar to the ceilings.

First Floor

- Fiber wall and ceiling panels similar to the First Basement exist throughout the First Floor. Consequently there is not any fire separation between the guest and public areas, or between guest rooms.
- The fire door between the Main Lobby and the guest room corridor can be propped open allowing smoke spread among the areas.
- Wall framing and panels around the fire door are the same fiber panels found throughout the building. If the fire door was closed, flames would be able to spread around the door frame defeating the door's purpose.
- Fire separation does not exist between office areas and reception desk.
- Guest room doors are not fire or smoke resistant.

Second Floor

- Fiber wall and ceiling panels exist throughout the Second Floor, and there is not fire separation between corridors and guest rooms, or between guest rooms.
- The stairway between the Second and Third Floors is not fire separated.
- The fire doors between the main stair and Second Floor guest room corridor is able to be propped open.
- The wall framing and panels around the door are fiber and would not prevent fire spread.
- The Second Floor utility and storage closets do not have fire separation.
- Non-rated guest room doors.

Third Floor

- Fiber wall and ceiling panels exist throughout the Third Floor. There is not any fire separation between corridors and guest rooms, or between guest rooms.
- The Third Floor corridor does not have fire separation. A single fire incident would be able to block the entire corridor.
- Third Floor utility and storage closets do not have any fire separation

Figure 4.7: Open Main Stairway from First Basement to First Floor and First Floor to Second Floor

Figure 4.8: Gaps at Ceiling Fiberboard Panels (Typical Throughout at First Basement through Third Floor)

Figure 4.9: Missing Ceiling Panels Exposing Framing at First Basement

Figure 4.10: Lack of Fire Separation between Kitchen and Coffee Shop at First Basement

Figure 4.11: Ceiling and Wall Gaps (Typical) Throughout

Figure 4.12: Fire Door to Guest Wing at First Floor held open, Non-fire rated wall

Figure 4.13: Non-fire rated fiberboard panel wall and ceiling finish throughout First Basement through Third Floor

Figure 4.14: Non-fire rated walls around Fire Doors

Figure 4.15: Typical Non-Rated Guest Room Door

Figure 4.16: Typical Alarm Bell and Manual Alarm Station

Figure 4.17: Reception Office Manual Fire Alarm Station

Figure 4.18: Typical Battery Powered Guest Room Smoke Detector (Note: This is not connected to the building alarm system.)

- There is not any fire separation between the Third Floor guest rooms and corridors, the attic, or concealed spaces behind knee walls. A fire originating in a guest room could spread quickly into the attic where it could then migrate throughout the underside of the roof.

Attic

- The attic lacks interior fire stops which would allow flames and smoke to spread throughout the space above guest rooms.

Exterior

- An exposure (exterior) fire will have numerous opportunities to spread into the building. The main concern is a fire that ignites exterior bark sheathing and spreads into the framing.
- A fire originating at one of the exterior fans or cooking grease traps will be able to spread into the framing.
- Fire resistance does not exist along the building's eaves allowing flame spread into attics.
- Exterior glazing that is used throughout the building is not fire resistant and could fail in a relatively short (less than five minutes) time period after it has been exposed to flames.

4B.4. Fire Detection and Alarm Observations

4B4.1. Existing System Description

The Chateau's current fire detection and alarm system consists of the following:

- One manual fire alarm station in each of the First, Second and Third floor guest wings,
- One key activated fire alarm station in the office room adjacent to the First Floor check in desk,
- One manual fire alarm station in the First Basement Coffee Shop,
- One manual fire alarm station in the Second Basement staff dining room,
- One manual fire alarm station in the Third Basement mechanical room,
- A fire alarm bell above each of the manual fire alarm stations, with the exception of the First Floor main desk station. A horn is used for the station on the Second Basement level.
- Fire alarm stations and bells/horns are powered by a dedicated 110 VAC circuit that is located on the Second Basement level.
- Battery powered single station smoke sensors are located in each guest room, and in the guest room corridors. These are not tied into a building alarm system.
- A battery powered single station smoke sensor is located above the First Floor reception desk.
- An exterior mounted water motor gong provides the building sprinkler system alarm. The system is not electrically tied to the building alarm system.
- The kitchen cooking hood extinguishing system is not connected to the fire alarm system.
- Operation of the building's fire alarm system requires some aspect of human intervention.
- If a staff member discovers a fire they must activate the closest manual alarm station to activate the evacuation bells.
- If a room smoke detector operates the guest or a staff member must operate the closest alarm station to activate the bells.
- In the event of a sprinkler operation, a staff member must initiate alarm by operating an alarm bell.
- If the kitchen hood extinguishing system operates a staff member must initiate the alarm.
- After the alarm has been activated a staff member must make a telephone call to the fire department.

4B.4.2. Existing System Deficiencies

Key problems with the current system are:

- The number of manual alarm stations is inadequate. In guest room areas stations are not properly located with respect to exits. Manual alarm stations are not found in the First Floor Lobby or First Basement Dining Area. The station in the First Basement Coffee Shop is improperly placed with respect to the exit. There is no alarm station in the Kitchen. Only one manual station was found in the Second Basement and it is improperly placed with respect to the exits.
- The audible warning devices are not properly spaced to ensure that the alarm is heard throughout the occupiable portions of the building. Fire alarm alerting devices are not found in guest rooms or the staff dormitory on the Second Basement level. Alarm warning devices are not found in the First Level Main Lobby, First Basement Dining Room, or Main Kitchen. Only one alarm horn was found in the Second Basement, which will not properly alert the entire level.
- The system does not have visual notification devices.
- All smoke sensors are single station devices and are not connected to a central alarm system.
- Smoke sensor placement is inadequate for the public spaces.
- Smoke sensor placement is inadequate for the storage, work and other non-public areas of the building.
- The fire sprinkler system is not connected to the fire alarm system. A sprinkler activation will not alert building occupants.
- Fire sprinkler control valves are not electrically supervised and can be shut, disabling the sprinkler system, without notifying staff.
- The kitchen hood extinguishing system is not monitored by the fire alarm system. A kitchen hood fire will not alert occupants.
- The system can be easily turned off by shutting the power switch. Alarm system power is not monitored and therefore staff and occupants would normally be unaware that the system is inoperative.
- The system does not have a back up power source. If main power is lost the alarm system is disabled.
- The system is not monitored outside of the building. Therefore if a telephone call is not made to the fire department, emergency services will not be notified.

Figure 4.19: Sprinkler Water Motor Gong (Note: This is the only sprinkler activation alarm.)

Figure 4.20: Fire Alarm Main Switch - Second Basement Level

4B.5. Fire Suppression System Observations

4B.5.1. Fire Suppression Water Supply Description

A fire protection water supply for the sprinkler system is provided by underground tanks that are located on the mountain north of the Chateau. These are automatically refilled by Lake Creek.

Details of the water supply system are:

- Water was originally provided by a single 40,000 gallon dedicated tank that is located on the mountain. Since it was originally installed the fire tank has been manifolded to an adjacent 35,000 gallon domestic water tank for a total, full level capacity of 75,000 gallons. The nominal tank depth is 12 feet.
- Water is automatically filled from Lake Creek. The reported pH level of the water supply is a relatively neutral 7.2. Park maintenance reports that they have not encountered mineral or iron buildup or other problems with the water supply.
- The elevation at the base of the tank is 4,200 feet. The elevation at the base of the sprinkler riser is 3,954 feet. This is an elevation difference is 246 feet resulting in an pressure differential of 106.5 psi.
- The water level in the tank is not monitored and therefore the exact quantity of water at a given period may not be known. It is possible to estimate the depth of water in the tank by viewing the supply pressure gauge at the main sprinkler valve but this may not give an accurate reading.

- Water is transported from the tank to the building exterior through approximately 480 feet of 8-inch (actual I.D. = 8.23 inch) unlined cast iron pipe. At the building exterior the pipe size is reduced to 6-inch (actual I.D.= 6.14 inch) for the final approximate 35 feet (including elbows) into the building.
- A two inch flushing valve has been placed at the base of the 8-inch main. This may be used for annual flushing to remove debris and reduce scale build up within supply piping.

4B.5.2. Fire Suppression Water Supply Analysis

Analysis of the water system concludes:

- Static water pressure (non-flowing conditions) at the main sprinkler alarm valve will be 112 PSI when the tank is full and 106 PSI when the tank is at its lowest level. This is based on the nominal tank depth of 12 feet and the elevation of 246 feet. When the site visit was conducted the gauge on the sprinkler system riser indicated a static pressure of 110 PSI indicating a mid-level quantity of water in the tank.
- The theoretical maximum flow from the tank into the system pipe is calculated at 2,616 GPM based on the equation $Q=29.83(Cd)(D)^2vP$ where the Cd is 0.6.
- The Coefficient of Roughness (C-Factor) as defined by NFPA #24 for new unlined cast iron pipe is 100. The NFPA guide for moderately corrosive water states that the C-factor for a 50 year old pipe will be 50. However the water at the Chateau is relatively neutral and is expected to be 80-90.
- Using a C-Factor of 90 the friction loss, calculated with the Hazen-Williams equation (Pf=4.52(Q)1.85 /C1.85(D)4.87) the friction loss per foot in 8-inch pipe is .079 PSI/foot or 37.9 psi for the 480 foot distance at the maximum water flow rate. The friction loss per foot in 6-inch pipe is 0.33 PSI/foot or 6.6 psi for the 20 foot length at the maximum flow rate. The total friction loss at the base of the riser at the maximum flow is 44.5 PSI. This results in an available pressure of 67.5 PSI and 61.5 PSI respectively at the highest and lowest tank levels.
- Using a C-Factor of 80 the friction loss the friction loss per foot in 8-inch pipe is .099 PSI/foot or 47.5 psi for the 480 foot distance at the maximum water flow rate. The friction loss per foot in 6-inch pipe is 0.41 PSI/foot or 8.2 psi for the 20 foot length at the maximum flow rate. The total friction loss at the base of the riser at the maximum flow is 55.7 PSI. This results in an available pressure of 56.3 PSI and 50.3 PSI respectively at the highest and lowest tank levels.
- Appendix C of this report provides the hydraulic analysis of the sprinkler system and compares the system demand to the available water supply.

4B.5.3. Water System Deficiencies

Specific water system deficiencies that need to be addressed are as follows:

- The tank discharge for fire and domestic service is located at the base of the tanks. As such there is not a mid-level domestic discharge that allows a portion of the tank to serve as fire reserve. An increase in domestic use during drought periods could drain the tank so that water would be unavailable for the sprinkler system.
- The tank does not have a water level indicator. Consequently the volume of water at a given time may be too low to supply sprinklers, without providing a warning indication that could then allow remedy of the situation.
- The pipe system does not have a fire hydrant, which prevents an opportunity for the system to provide a source of water for manual fire fighting operations.
- The exact internal condition of supply pipe is unknown and consequently there may be tuburculation (obstruction). Disassembling a section of pipe will be necessary to properly evaluate conditions.

4B.6. Fire Sprinkler System Observations

The Park does not have its own fire department, relying instead on the services of the Cave Junction Fire Department. The fire department has a minimum 45 minute response time (weather permitting) and if the fire is allowed to develop without control, a complete loss of the structure is probable before the first fire trucks arrive. This problem was recognized in 1949 when NPS installed an automatic fire sprinkler system throughout the entire building.

4B.6.1. Existing Sprinkler System Description

Main characteristics of the existing sprinkler system are:

- It was designed and installed in 1949 by the Automatic Sprinkler Corporation of America.
- It is a single zone serving the entire structure.
- It is a dry-pipe system.
- It was designed under NFPA #13 pipe schedule requirements for an ordinary hazard group structure. Pipe schedule methods were the standard practice when the system was designed. Ordinary hazard criteria are appropriate for the hazards found in the building.
- System piping is primarily schedule 40 steel with threaded couplings, which is typical for the installation period.
- All piping and sprinkler heads are run exposed below ceilings. It should be noted that horizontal sidewall sprinklers were not manufactured when the system was installed and therefore were not an option for the designers of that time.
- An exposure protection system is provided for the roof to suppress burning embers from a wild land fire situation. This consists of a control valve on the third floor, piping in the attic and open sprinklers across the roof. Operation of this system is by manual means only.
- Alarm is provided by an externally mounted water motor gong.

4B.6.2. Existing Sprinkler System Hydraulic Analysis

In the 1940's the majority of sprinkler systems were designed with pipe schedule methods. This design philosophy essentially makes general assumptions about the quantity of water that is expected to flow from each sprinkler orifice and then sized piping based on the number of sprinklers served by an individual pipe section. The problem with this approach is that it does not accurately take into account pipe pressure losses due to friction, elevation pressure losses, nor response delays encountered with dry-pipe sprinkler systems. Contemporary sprinkler standards now require the utilization of hydraulic calculation procedures that accurately establish pipe dimensions.

The observed static pressure at the sprinkler system dry-pipe valve was 110-112 psi. This stable pressure was at a time Chateau was closed and the tank level was mid-quantity to full. Calculating a worst case scenario with low tank water, the static pressure is estimated at 106 psi. The 106 psi pressure was used for the hydraulic calculations.

See Appendix C for a detailed Hydraulic Analysis of the existing sprinkler system.

4B.6.3. Sprinkler System Deficiencies

Specific sprinkler system deficiencies that need to be addressed are as follows:

- The water supply pressure is inadequate for the Third Floor by approximately 9.6-12.9 psi.
- The water supply pressure for the First Basement is inadequate by approximately 67.9-69.9 psi. A similar condition is expected for the First Floor due to similar pipe sizes and the number of sprinkler heads in each zone.

Figure 4.21: Exposed Sprinkler Piping in Main Lobby

Figure 4.22: Exposed Sprinkler Piping in Guest Room

Figure 4.23: Roof Deluge Valve on Third Level

- The original sprinkler heads were replaced in approximately 1998 with newer generation, low profile, quick response models. The replacement sprinkler heads are Central Sprinkler Corporation GB units, which are under federal recall due to reported instances of failed operation.
- The system is not connected to a building fire alarm system.
- The system does not have a low air pressure monitoring device. Consequently, if the air compressor fails, the dry-pipe valve may operate and flood the system piping. If this occurs during freezing periods, pipe breakage and flooding of the building could result.
- Main control valves are not monitored by tamper supervisory devices, nor are they locked in an open position. The present arrangement allows valves to be shut, rendering the system inoperative, without anyone aware of the condition.
- The system does not have a fire department pumping connection. Consequently the fire department cannot supplement the system operating pressure if the water supply fails. The commercial refrigerators and freezers on the Second Basement level do not have the required sprinklers installed within.
- Exterior protection is for the roof only and does not extend to protect the sides of the building.

4B.6.4. Exterior Fire Suppression System

The Chateau is situated along a slope in a box canyon with primarily coniferous vegetation. These type areas are especially susceptible to rapid moving and intense wildfires that can produce heat intensity of 250-400 BTU's per square foot per second. Estimates place the possible fire duration at three to four hours. The building exterior consists of cedar bark siding and cedar shake shingle roofing, both of which are highly combustible and could be readily ignited by an adjacent wildfire.

4B.6.4.1. Existing Exterior Fire Suppression

Exterior fire suppression for the Chateau is provided by a series of open deluge type sprinkler nozzles located along the roof peak. Water for the system is provided by the main building sprinkler system. Operation is accomplished by a manual operation valve that is located in the Third Floor guest corridor.

A hydraulic analysis of the water requirements of the roof sprinklers indicates that the present supply will provide adequate pressure and an estimated flow of 500 GPM. The estimated flow duration will be approximately 150 minutes if the tanks are at full level.

The primary deficiencies with the present system are:

- Sprinkler heads are only on the roof. These will not be effective against a low level fire that threatens exterior walls.
- The roof deluge system is controlled by a valve on the Third Floor. The location of this valve may not be readily known by responding firefighters and therefore the system may be ineffective. Figure 23 shows a photograph of the deluge control valve.

See Chapter 5 for recommendations of how to address these deficiencies.

4C. STRUCTURAL OBSERVATIONS

4C.1. Introduction/Scope

A limited structural assessment has been performed of the Oregon Caves Chateau at the Oregon Caves National Monument in southern Oregon. The Chateau is a six-story historic structure constructed in 1934. This assessment is based on available original drawings, a

site visit on November 4, 2004, and engineering judgment. Limited calculations were performed only for floor joist gravity strength.

4C.2. Structural System Description

The Oregon Caves Chateau is a wood framed structure with concrete at the lowermost levels. The building has four distinct structural systems:

1. The lowermost level, called Third Basement, exists only in the center third of the building's footprint and is of reinforced concrete construction, including slab on grade, retaining walls on three sides and slab above at the Second Basement.
2. The First and Second Basement are a combination of concrete walls on the north and south walls (and east wall at the Second Basement) and heavy timber post and beam construction. The posts are approximately 24-inch diameter logs. The one exception is concrete columns and beams supporting the water feature in the Dining Room at the First Basement. The Second Basement has concrete slab on grade or supported concrete slab over the small Third Basement. The First Basement is supported on 16x20-inch solid wood girders which span between round timber columns, 2x16 wood joists at 16-inch centers supporting diagonal floor sheathing.
3. Above this heavy timber construction are typical wood framed floors with diagonal sheathing, joists and wood stud bearing walls. The 2x16 joists at the First and Second Floor levels transfer the bearing wall loads to the heavy timber beams.
4. The roof has steeply sloped rafters with dormers and there is evidence of added stud supports near the perimeters. Exterior walls above grade appear to be straight sheathed with bark exterior cladding.

There is a large masonry fireplace at the First Floor. The masonry has a footprint of 14 feet by 6 feet from the Second Floor down with a smaller chimney above. It is assumed that this masonry is unreinforced.

Historically, the Chateau had a wood framed porch or balcony on the west side that has since been removed. If this balcony were to be reconstructed, alternative structural systems should be considered which could enhance the structural integrity of the overall Chateau.

4C.3. Structural System Observations

The structural system of the Oregon Caves Chateau appears to be in generally sound condition based on our brief walk through inspection of the building. Some of the round timber columns and 16x20-inch timber beams have very noticeable checks and splits that look somewhat alarming, but we believe the capacity of these members has not been substantially reduced.

The building experienced a mudflow in 1964 when mud and water came down the canyon and backed up against the east wall of the Chateau. Windows were broken and mud was allowed to flow through the building. Some new wood framing and plywood sheathing was observed which were undoubtedly the repairs from this incident.

The concrete exterior retaining wall in the Third Basement on the north side has one fairly large crack, somewhat diagonal, that suggests some minor settlement of the west end of that wall (the down-canyon end of this wall). We do not believe that any repairs are needed for this crack. We also observed several exposed reinforcing bars dowelled from the west wall or footing into the Third Basement slab on grade, suggesting some settlement of the slab on grade. Again, we do not believe that any repairs are needed.

The wood framed walls of the north wing above the First Basement level have some noticeable out of plane distortions that have occurred at some unknown point of time. This may have been a result of the 1964 mudflow but that has not been documented to our

knowledge. The previous Historic Structure Report (McMurry 1999) has documented various measurements of out of plumb where the greatest distortion was 1 11/16 inch in 4 feet on the First Floor north exterior wall. We do not believe that these distortions are a structural concern but they are causing some problems with door and window operation. We will make recommendations later in this report to add plywood on some walls in these levels, which will enhance the stability of these walls and should preclude further distortions from occurring.

There has been some deterioration of the exterior finishes of the building. At the gable type ends at the roof, round wood brackets (which we believe are more decorative than structural) have experienced significant deterioration and need to be replaced. We also noticed some areas of the Port Orford cedar bark siding that were soft showing signs of deterioration, although most of the cedar bark siding appeared to be in good condition. Exterior steel fire escapes, apparently added in 1962, were not inspected in any detail but their supports should be carefully evaluated for corrosion and structural soundness if they are to remain in use. We understand alternate means of exiting are being studied.

4C.3.1. Gravity Load Evaluation

The structure does not have any noticeable signs of distress that would raise questions regarding the gravity load structural system, which has supported normal loads for over 70 years.

The question was raised during this evaluation if the typical floor joists could support new gypsum board ceilings in lieu of the present fiberboard to increase the fire resistance of the building. The critical locations are the longest joists beneath the guest room areas (First Floor framing in North Wing and Second Floor framing in Central and South Wings) where the joists have to also transfer gravity loads from the corridor stud walls to the heavy timber beams which are centered on the corridors above. We performed limited structural calculations for these joists and believe they can support the new gypsum board ceiling with very minimal finish.

4C.3.2. Seismic Evaluation

Oregon Caves National Monument is located in an area of moderate seismicity. Seismicity is higher to the west with the subduction zone along the coast and inland near Klamath Falls. The current seismic intensity maps suggest that the Oregon Caves National Monument area has a seismic ground motion about 75% of the West Coast normal seismic intensity (not considering near fault situations). It was interesting to observe the visual faults within the caves themselves, which obviously occurred many years ago during the coast range mountain-building process. The faults seen in the caves are not considered active or a source of future earthquakes.

The seismic resistance of the Chateau is reasonable, although it would be desirable to strengthen the upper floors. The three basement levels (the floors below the First Floor or Lobby) have reinforced concrete walls plus diagonally sheathed floors and appear able to resist earthquake forces. The upper floors also have diagonal sheathing, making the floors strong horizontally, but the walls only have straight sheathing or fiberboard, giving them little strength for earthquake resistance. In fact, the observed out of plumb wall condition on the north side, probably from the mudflow, resulted from this lack of lateral strength due to weak sheathing on the walls in the guest room floors. On the south side the massive masonry fireplace provides some limited capacity to resist seismic loads.

See Chapter 5 for recommendations of how to address these deficiencies.

4D. MECHANICAL SYSTEMS OBSERVATIONS

4D.1. Heating and Ventilating System Observations

4D.1.1. Heating

The building employs a steam boiler for heating. The boiler has been recently installed, and is in excellent operating condition. Steam radiators are generally located beneath windows throughout the building. The radiators and the two-pipe (steam and condensate) distribution piping are the original installation. The piping is carbon steel. The radiator inlet valves admit some steam when they are closed. It was reported that trap maintenance is current and no trap maintenance or replacement is required. There have been minimal steam system leaks reported.

The maintenance engineers desired a way to add water treatment chemicals to the steam system. We believe this is a prudent measure.

The source of fuel for the boiler is oil. It is stored in an underground tank at the rear of the building. The steel pipe vent in the ground as well as the fuel fill cap indicates the tank location. This tank has been reported to be either steel or concrete. We have never seen a concrete underground oil storage tank, and believe this to be steel. Either way, the fuel storage is at risk. Concrete is prone to cracking and leakage. Steel is subject to corrosion and leakage. There is nothing that indicates the tank is other than original installation, so it is probably single-wall. The underground piping is also most likely single-wall steel. We did not observe a spill-prevention container at the fuel fill location.

4D.1.2. Ventilation

The main kitchen on the First Basement level has a range hood system. Based on current International Mechanical Code (IMC) the air quantity is required to be 400 CFM per linear foot of hood. This hood is 19’-7” long; therefore it will require about 7,800 CFM. The duct is 24” x 24”. Again, according to Code, the duct velocity should be greater than 1,500 feet per minute. The velocity in this duct would be about 2,000 feet per minute, and satisfies code.

The hood appears to be adequate for the range, but the exhaust fan location does not meet the requirements of the International Mechanical Code. The fan is mounted on a wood framed platform on the exterior face of the rear wall of the kitchen. A wood roof has been installed over the fan and platform to protect it from snow. All system components (fan, hoods, duct) should be provided with 18” clearance from combustibles. This clearance may be reduced to 3” if the combustibles are covered with gypsum board with a damage-resistant surface on the top. The fan housing is located very close to the exterior wall of the building, which is covered with bark and highly flammable. If the air discharges away from the building, the discharge duct opening must be five feet from the building and three feet away from any other building openings. This would not be difficult to achieve. It would involve adding an extension to the fan discharge. Also, by code, there must be a way to collect and remove grease from the fan assembly. No immediate means appeared to be obvious. The duct was installed 18” from the ceiling and is in compliance.

The IMC requires a grease clean-out every twenty feet. There were no cleanout openings apparent in the run of ductwork.

The Uniform Mechanical Code specifies that a make-up air system be provided for the kitchen. This system is intended to replace the air exhausted by the kitchen hood. No provisions for make-up air were provided.

There is an employee cafeteria in the Second Basement that contains a hood and range. We understand that this facility is no longer used for food preparation. This is for the best, as there are a number of issues with this installation. The hood is installed against an

exterior wall, and discharges directly outdoors. It does not conform to the discharge opening location criteria described above. The hood does not extend the entire length of the range. We activated the fan and observed that the air movement does not appear to be very great.

The employee cafeteria also contains an electric space heater. This unit appears to be in serviceable condition.
There is also no make-up air system for the employee cafeteria.

The building is cooled by natural ventilation. In the areas where cross-ventilation is possible, such as the Lobby and the Dining Room, natural ventilation is adequate. Because of the heat build-up during the day, guest rooms without cross-ventilation get uncomfortably warm. To reduce the temperature, fans have been provided in the rooms. The fans overload the circuits in some areas. The electrical system evaluation addresses the electrical issues connected with the circuit overloading condition.

See Chapter 5 for recommendations of how to address these deficiencies.

4D.2. Plumbing System Observations

The plumbing system is installed in carbon steel piping throughout the building. The pipe installation appears to be the original construction. There is a new water meter installed in the building at the service entry. The service entry is on the north side, in the basement, over the large coolers and freezers. The waste piping is cast iron, also probably original construction. There have been some reports of leaks in the supply pipe, but this does not appear to be an ongoing maintenance item.

The plumbing fixtures are mostly original. Original fixtures are located in the guest rooms, with more modern fixtures located in high-traffic areas such as common restrooms. Newer fixtures are also located in the kitchen. Staff noted that they have had difficulty obtaining parts to repair the fixture trim.

Water is heated by two gas-fired water heaters located in the sub-basement adjacent the steam boiler. These heaters circulate water through a large storage tank. The heaters are fairly new, and appear to be in excellent condition. The storage tank appears to be somewhat older, but appears to be in good shape as well.

Propane is the source fuel for the water heaters. The propane tank is located at the rear of the building, about twenty-five feet away. This distance is in compliance with the Uniform Fire Code for containers of capacity less than 2,000 water-gallon. The sub-basement has an opening to the outside, and would not be classified as a pit. This consideration is necessary because, unlike natural gas, propane gas is heavier than air. There do not appear to be any significant code compliance issues associated with the use of propane on this site.

See Chapter 5 for recommendations of how to address these deficiencies.

4E. ELECTRICAL SYSTEM OBSERVATIONS

4E.1. Electrical System Observations

4E.1.1. Service

The building service is derived from a utility owned pad mount transformer with underground wiring from the transformer to the

service equipment located inside the building. Service equipment consists of (1) 200-ampere and (2) 400-ampere fusible disconnect switches. Electrical characteristics are 120/240-volt, single phase.

4E.1.2. Power Distribution

Distribution is provided from the service equipment to branch circuit panels. Certain panels are tapped from a wire-way that is supplied from a single feeder from the service equipment. Feeder wiring from the service equipment to the panels is installed in metallic conduit. Panels are residential circuit breaker type load-centers. The equipment suitable for continued use provided no electrical load is added to the facility.

Standby Power

There are frequent utility power interruptions. Standby power is provided from an on site generator that supplies power to egress lighting and food refrigeration equipment.

Branch Circuit Wiring

Branch circuits originate from the circuit breaker load center panels and supply power to various electrical equipment components to include lighting outlets, receptacles and mechanical equipment.

The original wiring consisted of open conductors routed through insulated sleeves (knob & tube). This has been disconnected and replaced with thermoplastic insulated copper conductors installed in metallic conduit.

Although the conduit and wire is in good condition, the circuit capacity is insufficient, as circuits breakers are tripping due to overloads created by electric fans that are operated during the warm weather summer season and other portable appliances.

Wiring Devices

Light switches are functional. Receptacle outlet quantities and spacing are insufficient and subsequently do not comply with current codes. Guest rooms have only one outlet. Receptacle outlets are grounding type.

See Chapter 5 for recommendations of how to address the deficiencies identified.

4E.2. Lighting System Observations

Public Spaces

Common areas are illuminated with incandescent lighting. Illumination intensity in public areas is marginal.

Back of House Areas

Light fixtures located in the kitchen are 8-foot linear fluorescent type with non-energy efficient T-12 lamps.

Guest Rooms

Guest rooms contain wall mount incandescent fixtures connected by cord and plug to receptacle outlets.

Emergency Lighting

Emergency lighting for egress and exit identification is insufficient. Additional fixtures are required to comply with current codes.

See Chapter 5 for recommendations of how to address the deficiencies identified.

4E.3. Telecommunications

Telephone service is underground and consists of three voice lines. There is no computer network or high-speed Internet access. Guest rooms have no communications. The telephone equipment capacity is limited.

4E.4. Security

The security system consists of a single motion sensor located in the gift shop. It is not operational.

4E.5. Fire Alarm

Manual pull stations located at each floor and battery powered household smoke detectors are installed in each guest room.

Audio/visual notification devices and smoke detectors are not installed in common areas or guest rooms in accordance with the requirements of the National Fire Alarm Code.

See Chapter 5 for recommendations of how to address the deficiencies identified.

4E.6. Infrared Analysis of Electrical Components

Due to the combustible nature of the existing building materials, ensuring against the start of a fire is critical to the safety of building occupants and the on-going preservation of the historic structure. As part of this study an infrared analysis was performed on the Chateau to ascertain if there were any “hot spots” at both the building’s exterior or interior that might indicate a malfunction in either the mechanical or electrical system.

The infrared process identifies areas where there is a significant change of temperature. Particularly for electrical equipment, the analysis categorizes a change in temperature as a problem and, based on the amount of temperature change , it gives each problem a severity code starting at four for minor problems and ending at one for severe problems. The detailed findings of this analysis are contained in Appendix D of this report.

Three areas of concern with the electrical were identified by the analysis:

1. The 30-amp Boiler Disconnect in the Boiler Room at the Third Basement - one of the connectors appears to be loose or corroded. This is categorized as a 4 - a minor problem, which should addressed as soon as possible.
2. The 400-amp Zinsco Disconnect in the Boiler Room at the Third Basement - loose or corroded connector or internal problem. This is categorized as a 3 - an important problem, which should addressed as soon as possible.
3. Panel #4 in the Laundry Room at the Second Basement - upper phase heating was identified in circuit breakers #24, #26, #28 and #30 sub-panels further up in the building. This is categorized as a 4 - a minor problem, which should addressed as soon as possible.

As the infrared process identifies all areas of temperature change in the building, it can also identify possible accumulations of moisture in walls or other building components. The other problem area identified by this infrared analysis was at the fire escape support on the south end of the west wing. As noted in the Structural Section of this chapter, all fire escape supports and surrounding walls should be inspected to ascertain their existing condition and soundness before the start of business.

CHAPTER 5: RECOMMENDATIONS

As noted in the preceding chapters there are a number of life safety deficiencies that must be addressed to make the Chateau safer for the users and more defensible against fire so that this important historic structure is not damaged or destroyed. Disabled access deficiencies must be addressed to meet the requirements of the ADA and the NPS mandate to provide universal access to all.

At the same time the National Historic Landmark Oregon Caves Chateau is a uniquely conceived and constructed structure. Much of the original historic fabric, including finishes and furnishing, remains. Therefore the historic nature of the structure as well as the preservation of historic fabric must be part of any plan to upgrade the facility.

The following recommendations address the deficiencies described in Chapter 4.

5A. DISABLED ACCESS

5A.1 Accessible Path of Travel

A path of travel must be created from the parking lot to the building entry, and from there to the public areas throughout the building: check-in, guest rooms, the Gift Shop, Dining Room, and Coffee Shop. The accessible path of travel should also include restrooms, drinking fountains, public telephones and other building amenities usable by the able-bodied guests and staff.

Parking

The parking lot southwest of the Chateau has provisions for accessible parking. The route from the accessible parking spaces, which are the closest ones to the Chateau, slopes gently to the building entrance. The one problem is that there is no separation between vehicle and pedestrian traffic. The lack of separation between cars and pedestrians is not limited to the disabled - all pedestrians walk in the roadway. The park has addressed the problem programmatically by strictly enforcing a 10-mile per hour speed limit within the area around the Caves entrance and the Chateau. Creating an accessible path from the parking to the entry of the Chateau that separates pedestrians from vehicles is desirable.

Entry - Option A

The entry to the Chateau is approximately 1’-6” above grade. There is no landing at the door, only three concrete steps going down to the level of the road. The lack of a landing is problematic, as it does not meet code for exiting. A planter, defined and separated from the road by a rock curb, extends about 4’-0” out from the south face of the building and runs along its entire length.

A ramp or, preferably, a sloped walkway (5% maximum slope) in place of the planter could provide access to the entry with minimal impact on the appearance of this elevation of the building. The walk/ramp should begin as close to the parking lot as possible and be at least 4’-0” wide, with a 5’-0” landing at the door. Because the walk/ramp will be higher than the top of foundation, a wood structure is recommended so that air movement at the face of the building is not impeded. Although this will require more maintenance than a concrete walk, it is more in keeping with the original construction of the Chateau. The walkway could also extend to the east to allow easy access from the Chateau to the Chalet.

The existing entry doors are a pair of doors, with each leaf 2’-8” wide opening into the building. A single leaf of the door is not wide enough to accommodate someone in a wheelchair (32” clear is required). The existing entry doors could be made accessible by the addition of automatic operators to both doors.

See Access Egress Options A - A4A following this section.

Advantages:

- Uses primary entrance to facility.
- Minimal impact to historic appearance.
- Moves disabled and pedestrians out of the roadway.
- Moves planting and irrigation away from the base of the building where it may be damaging the historic bark siding.

Disadvantages:

- Some impact on historic facade.
- Would need to be built next to historic bark siding.
- Wood structure and decking are high maintenance.

Entry - Option B

In lieu of modifying the historic entry, access could be provided to the west side of the building if the original balcony at the First Floor level was reconstructed. A heavy timber deck/walkway could be added from grade at the parking lot level along the backside of the North Wing to connect to the reconstructed balcony. The original building exit balconies, which have since been removed, were laid out in much he same way. A single 3'-0" wide door could be installed with a sidelite to fill the existing window opening.

See Access Egress Options B - A4B following this section.

Advantages:

- No impact to the historic entry.
- Close to parking.
- Moves disabled out of the roadway.
- Allows for fully accessible door.

Disadvantages:

- Does not use original primary entrance, although this may become an alternate entrance for the general public.
- Significant addition to the west elevation of building.
- Wood structure and decking are high maintenance.
- Quite a distance from Chalet and other programs on site.

Reception

Once inside the building the Lobby and Reception Desk are all on this level (First Floor). The reception desk does not make accommodations for the height limitations of wheelchair users; however a careful modification could accommodate a lower writing surface.

Restrooms

There is a small multi-use Women's Room on the guest room level of the First Floor. This room could be remodeled as a single oc-

cupancy or unisex restroom to accommodate the disabled, but it is still two feet above the entry level of the building.

A small multi-use Men's Room is located between the Dining Room and the Coffee Shop on the floor below the entry level (First Basement). This room could be remodeled as a single use or unisex restroom; however this would be an inadequate number of fixtures for the projected number of users (minimum fixture count required for dining and public spaces is two fixtures for each sex).

Restrooms - Option A

New men's and women's restrooms could be created behind the Gift Shop in the First Basement. This area, once a dance floor for the Dining Room, has been modified over time and is therefore no longer an area of primary historical significance.

See Access Egress Options A - A3A following this section.

Advantages:

- Maintains fixture count.
- No differentiation between disabled or able-bodied users.

Disadvantages:

- Disabled access to this level is required to access restrooms.
- Requires significant modification of a space of secondary historical significance.
- Loss of retail space.

Restrooms - Option B

The existing men's and women's restrooms could be remodeled as unisex restrooms. This would provide a single, accessible restroom on the two public-use floors.

See Access Egress Options B - A3B and A4B following this section.

Advantages:

- Minimal impact to primary historically significant areas of the building.
- No differentiation between disabled or able-bodied users.
- Least expensive option.

Disadvantages:

- Cuts fixture count in half.
- Current location of restroom on First Floor is not accessible.
- Best location for elevator goes through existing Men's Room.

Access to Other Levels

The Chateau is a six-story building with the four upper floors housing the public functions of the building. The main entry level is split between the Lobby level, which, as noted above, is on the same level as the entry and the guest room level, which is raised ap-

proximately two feet above the entry level. The floor below the entry level is used for the food service functions and Gift Shop of the facility and the two floors above the entry level house guest rooms. At a minimum, access should be provided to the reception desk, the food service areas, the Gift Shop and at least one level of guest rooms (based on the number of existing guest rooms, two accessible guest rooms are required).

Option A - Elevator

The installation of an elevator would allow for access to all floors in the building. This option goes beyond merely providing access for wheelchair users; people with mobility impairments who don't require a wheelchair, but have limited ability to climb stairs would also benefit. An elevator would also improve facility operations by providing direct access from the laundry area in the Second Basement to guest rooms five stories above.

Careful location of the elevator would minimize impact on both historic fabric and the facility's room count. A minimal sized elevator is recommended, which could be located adjacent to the reception deck. This is the one area of the Lobby where enclosed space - the office - already exists, which would minimize the appearance of the new feature. Going down, the elevator would travel through the current Men's Room, minimizing impact on the historic fabric of the Dining Room or Coffee Shop. The lowest stop would be the Second Basement adjacent to the former Employee Dining Room, which the concessionaire is contemplating remodeling as a conference area. This is also the level where the laundry room and storage areas of the facility are located. Going up from the entry level the elevator would serve the Second and Third Floors. The shaft would impact one Guest Room on the Second Floor, but it is a large room that could be remodeled. One room on the Third Floor would be lost. The raised level of the First Floor would not be accessible to the disabled.

One potential problem is that the ideal location for the elevator straddles a retaining wall at the Third Basement level. This is not an insurmountable problem, but will require additional structural work for the pit and will, increase the cost of the elevator.

Advantages:

- No differentiation between disabled or able-bodied users.
- Access to all floors of the building for wheelchair users, as well as those with other mobility impairments.
- Facilitates operation by providing elevator access from lower floor service areas to upper floor guest rooms.
- Minimal impact to primary historically significant areas of the building.

Disadvantages:

- Some impact to primary historically significant areas of the building.
- Requires remodel of one Guest Room on the Second Floor and loss of one guest room on Third Floor.
- Cost associated with elevator pit/foundation work.

Option B - Lift

Minimal disabled access could be provided for the facility with the installation of a lift from the Lobby Level to the raised guest room level on the First Floor. If accessible guest rooms were located on the First Floor, this option would allow a disabled guest to check in and go to an accessible guest room. If the Women's Room on the raised level of the First floor is remodeled as an accessible, unisex restroom, the disabled would also have access to restrooms.

Accessing the other public areas of the building is more problematic. An access ramp could be developed on the west side of the building to connect the entry and grade at the parking lot, where disabled visitors could access a ramp down to the First Basement. If the historic balcony was rebuilt at this level, they could enter from the balcony and could access the Dining Room, the Coffee Shop, and Gift Shop. If the Men's Room at this level is remodeled as a unisex restroom, they would have access to restrooms.

Although this option meets code requirements, particularly for people that are only going from the parking lot to the Restaurant, it may not meet the spirit of non-discriminatory universal access, particularly for people staying at the lodge who want to use the Restaurant. While the able-bodied can simply walk downstairs, the disabled would be required to go outside and travel down a long ramp to get to the Restaurant.

Advantages:

- Minimal impact to primary historically significant areas of the building.
- Minimal impact to existing building layout or function.
- Lease costly

Disadvantages:

- Access between floors is onerous for the disabled.
- Long ramp to be maintained

Doors

Except at guest rooms, public restrooms and entries there are very few doors in the public spaces of the building. Entry doors were covered above and guest room doors are covered in the following paragraph. If other doors are used on the path of travel, they must have a minimum of 32", clear width opening. This can be accomplished at historic doors a minimum of 32" wide with the use off-set hinges. New doors should be a minimum of 36" wide.

Hardware

Lever hardware is required at doors along the path of travel. Retrofit levers can be installed at doors with historic hardware, while new doors should have new lever hardware that is visually compatible with the historic hardware.

Notification / Warning Signals

Visual warnings (strobes), in conjunction with the fire alarm system, to assist the hearing impaired, are required in all public spaces and at accessible guest rooms.

Signage

Signage should clearly tell which features of the building are accessible and demark the accessible path to those features.

5A.1.2 Accessible Guest Rooms

Code requires that for every 25 guest rooms, one disabled accessible room be provided. Since the Chateau has 27 rooms, 2 accessible guest rooms are required.

Entry Doors

An accessible room must have an entry door 32” clear minimum wide. The existing guest room doors are 32” wide; however with the hinges, the clear opening is about 30 1/2”. Doors 36” wide are preferable for the disabled, however the guest room doors are a character-defining feature of the corridors, which are of primary historic significance. Off-set hinges could be used to swing the doors out of the opening to allow for the 32” clear width required by code. Doors require lever hardware. Retrofit levers could be applied to the existing hardware, or since the number of accessible rooms is very limited, new hardware could be provided at those doors and the historic hardware retained at other rooms.

The other requirement for an accessible guest room is an accessible bathroom. When only two accessible guest rooms are required, a roll-in shower is not required and standard bathroom fixtures may be used. Most of the bathrooms in the Chateau are very small. Options A and B (Sheets A5A, A6A and A4B) show possible guest room and bathroom modifications that would allow a wheelchair user to enter the room and move around.

Additional requirements for accessible guest rooms:

- A path of travel a minimum of 36” on each side of the bed is required. This can, in all likelihood, be accomplished in any room within the facility.
- Outlets, switches and other controls are required to be mounted at accessible heights. While relocation of outlets and switches may impact the fiberboard wall finish, the fact that the panels are easily removable makes relocating these elements quite simple. The panels could be repaired or existing holes coved with bank plates.
- Window operation is required to be of a minimal force so that someone with limited strength and movement capabilities can open the window. This can probably be easily accomplished at casement windows. It will be harder to accomplish at double-hung windows, which are character-defining features of the facility. It may be necessary to develop an assistance program for the operation of these windows.

5B. LIFE SAFETY

5B.1 Exiting

Of greatest concern is the need to get guests on the upper floors safely out of the building in the event of a fire or other emergency.

Guest Room Exit Corridors

The main stair, an important character-defining feature of the facility, is open from the Dining Room at the Second Basement (an area of potential fire ignition) to the Second Floor of guest rooms. Even if a fire does not rise up through the stair, it could become a chimney funneling smoke to the upper floors. The danger of this situation was realized early on and smoke doors were installed at the entry to the guest room corridors on the First and Second Floors. While it is questionable whether the walls in which the doors are installed are fire-resistant, the doors could stop smoke from filling the exit corridors. Unfortunately, the doors work best for the movement of guests and staff when they are held open. As the doors do not have the type of magnetic hold-opens that will cause them to close in the event of a fire, the exit corridors could quickly fill with smoke up to the Third Floor. Installation of fire resistive walls and smoke doors that close automatically at the main stairs is imperative to protect exit paths. These recommendations are detailed in the following section.

Once the exit corridors are protected from fire and smoke, the exit path is the next item to address. Because the open stair is in the middle of the building, exit paths must be developed in each wing of the building. The original building design addressed this problem with heavy timber exit balconies at the west end of the Second and Third Floors accessing a "bridge" at the First Floor to grade on each side of the building. The wood balconies were replaced with metal fire escapes in the 1950s, in all likelihood due to structural failure. This concept still appears to be the best method for exiting the building without losing a considerable amount of interior square footage and having an adverse impact on the historic fabric of the facility. Ideally, the heavy timber exit balconies would be reconstructed, but if not, the existing fire escapes should be evaluated for structural integrity on a regular basis.

One problem with this concept is that the corridor walls and ceilings are not fire resistant and the guest room doors do not have smoke seals. If a fire started in a guest or storage room on one of the upper floors, the exit corridors could quickly fill with smoke. See recommendations in the next section for fire resistive construction to address these problems.

The other problem with this concept is that in order to exit out of the Third Floor the occupants need to go through areas that were originally guest rooms. The two rooms at the west end of the North and South Wings were converted to exit paths at some point, possibly when the fire escapes were installed. While this works in terms of exiting the building, the size of the facility is marginal and the loss of two of the most characteristic guest rooms is problematic.

To address this problem a new enclosed exit stair could be constructed from the Third Floor down to the Second Floor. The stair would open into the corridor on the Second Floor and lead to the exit on the west end of the North Wing. This option would necessitate the remodel of guest rooms and bathrooms on the Second and Third Floor, but the room count would stay the same. This would allow for occupants in the South Wing to use the existing stair to exit and, if that exit path was cut off, occupants in the North Wing could use the new stair to the floor below.

See Sheets A5A, A6A A5B and A6B for the layout of this option.

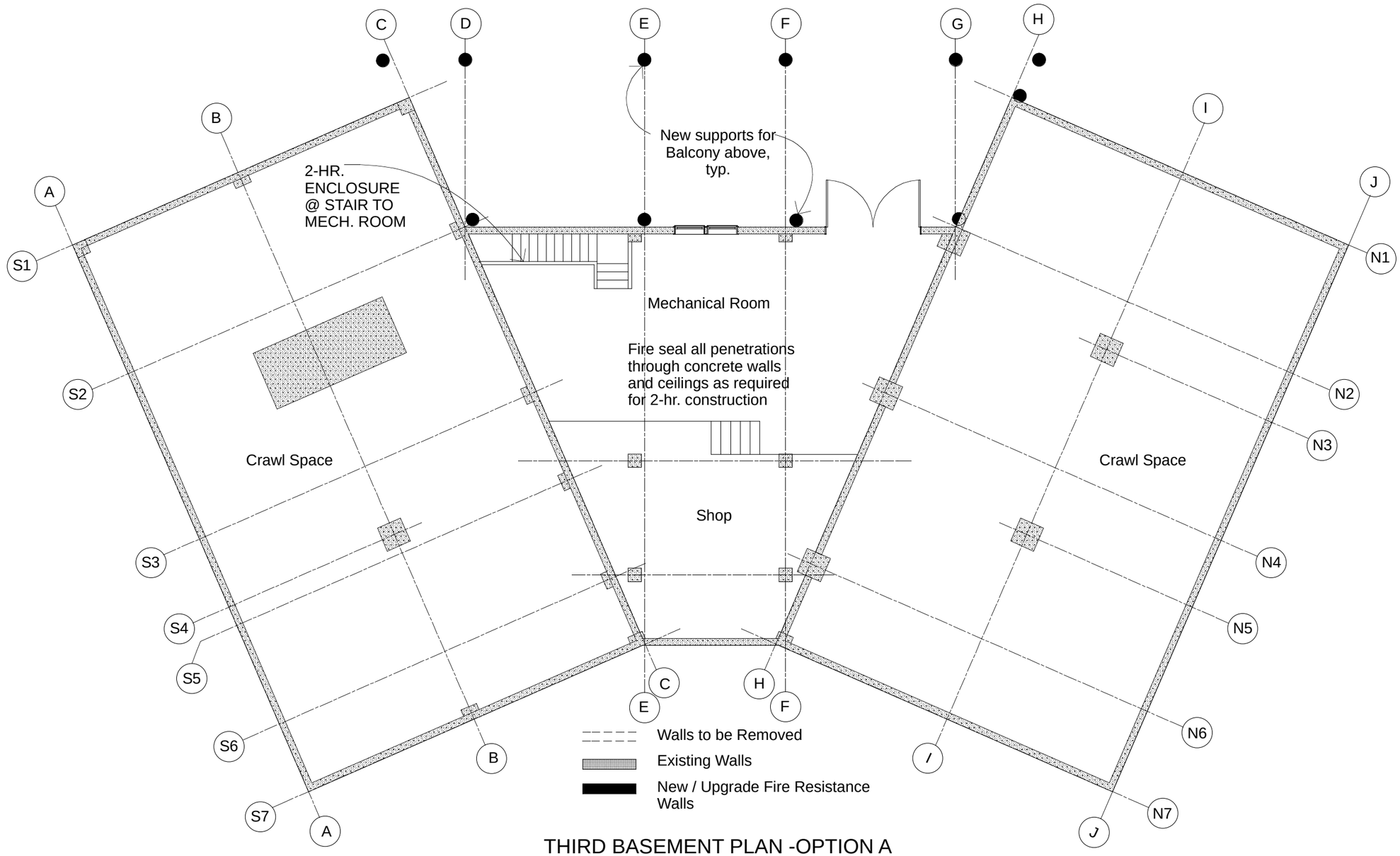
Dining Room

The Dining Room, Coffee Shop and Gift Shop share two exits to grade and an exit up the main stair. All are on the east side of the building and do not comply with the required separation of exits. In effect, if a fire started on the east wall of the building, exiting these public assembly spaces would be problematic. One option is to reconstruct the historic balcony on the west side of the building. This option would allow for an exit out of the west side of the Dining Room. Since the Kitchen is the most likely source of fire ignition at this level, the balcony should connect to the road on the north side of the building via a bridge across the west end of the North Wing.

Second Basement

This level of the building is the service area and has one exit to grade and another onto the metal catwalk. The exit to grade is adjacent to the laundry area, which is not enclosed and is a source of possible ignition for a fire. Therefore, construction of a 1-hour enclosure of the exit path is recommended. This would also serve the second exit from the Third Basement below.

The Employee Sleeping Area has one exit through the former Employee Dining Room / Kitchen to the catwalk. The concessionaire is considering converting the Dining Room / Kitchen to a conference area. Both of these uses/occupancies require two exits from this level. Construction of an exit corridor from the Employee Sleeping Area and Dining Room to the main exit on this floor, or up a new enclosed stair to the Coffee Shop and then out of the building at that point would serve as one exit. Reconstruction of historic balcony with access to grade at one end of the other would create a second exit from both of these areas.



THIRD BASEMENT PLAN -OPTION A

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32

REF
NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly. Repair as required.
2. Confirm that existing water supply piping is not constricted and is operating properly. Repair as required.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
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CHATEAU
LIFE SAFETY / ACCESS STUDY

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DRAWN: K JOHNSON
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SUB SHEET NO. A1.A

TITLE OF SHEET: ACCESS / EGRESS OPTION A

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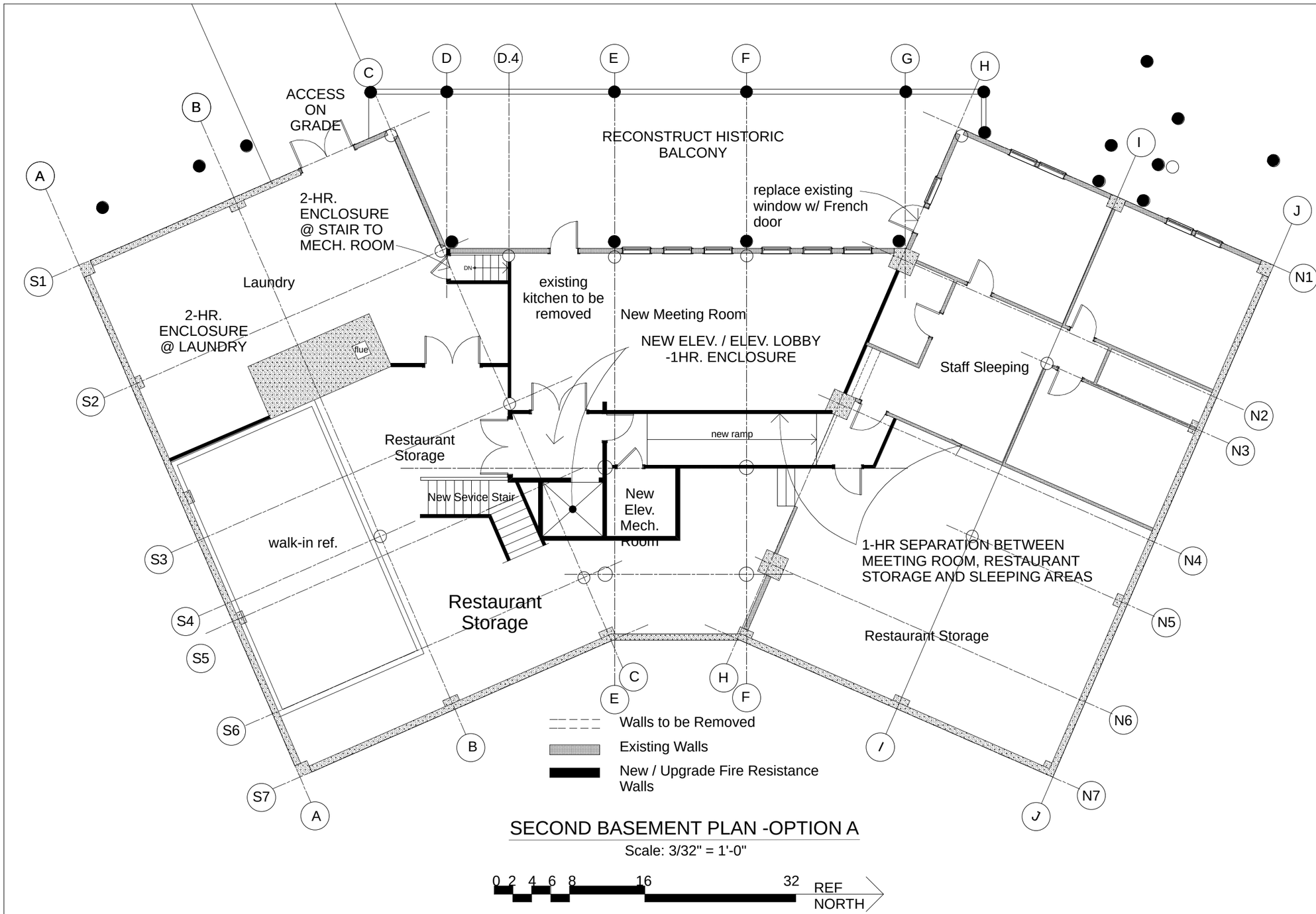

SECOND BASEMENT PLAN -OPTION A

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32

REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting in sleeping areas.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly. Repair problem areas.
2. Confirm that existing water supply piping is not constricted and is operating properly. Repair problem areas.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

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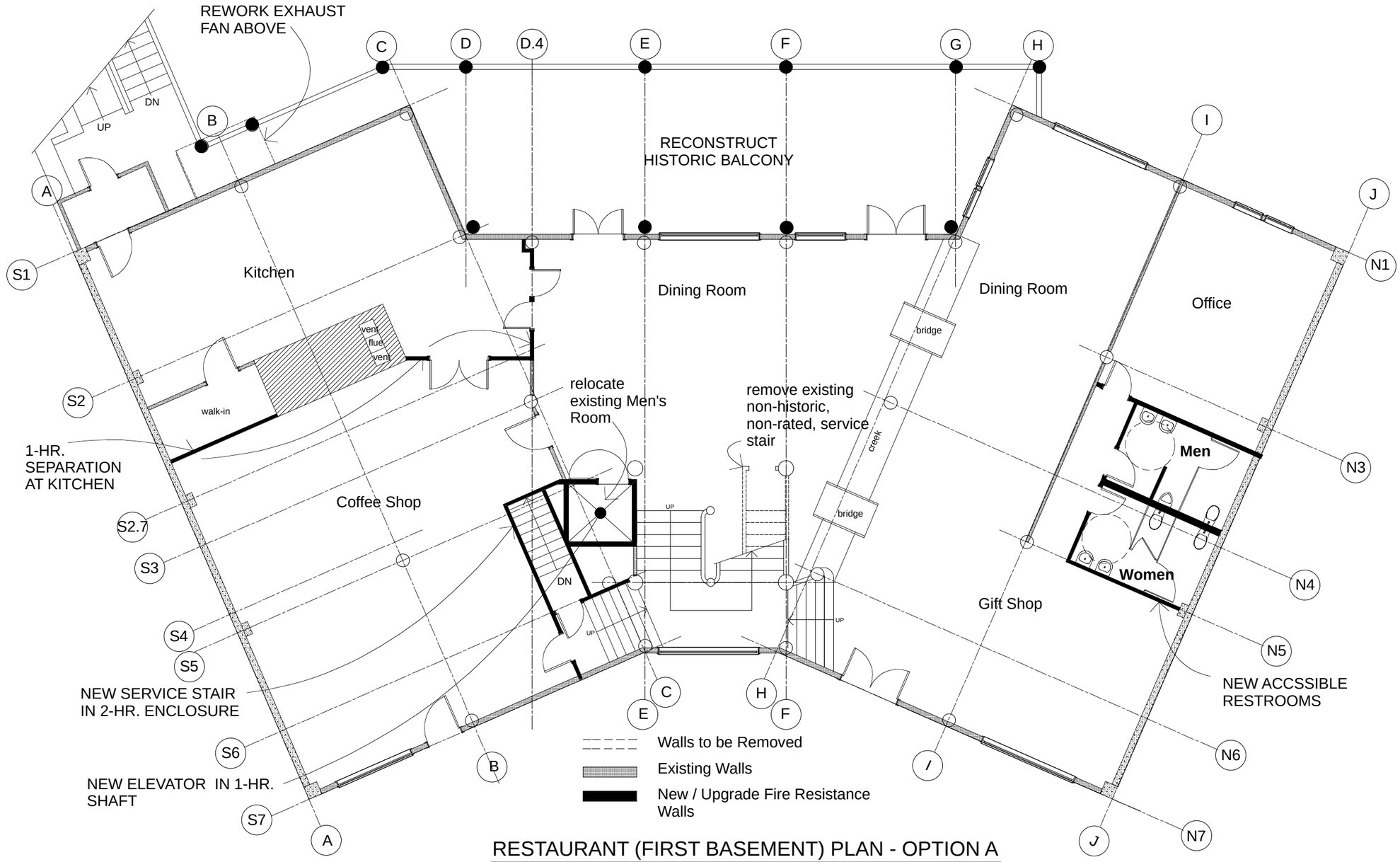

RESTAURANT (FIRST BASEMENT) PLAN - OPTION A

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32

REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly. Repair as required.
2. Confirm that existing water supply piping is not constricted and is operating properly. Repair as required.
3. Modify existing kitchen exhaust fan and housing to meet code.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

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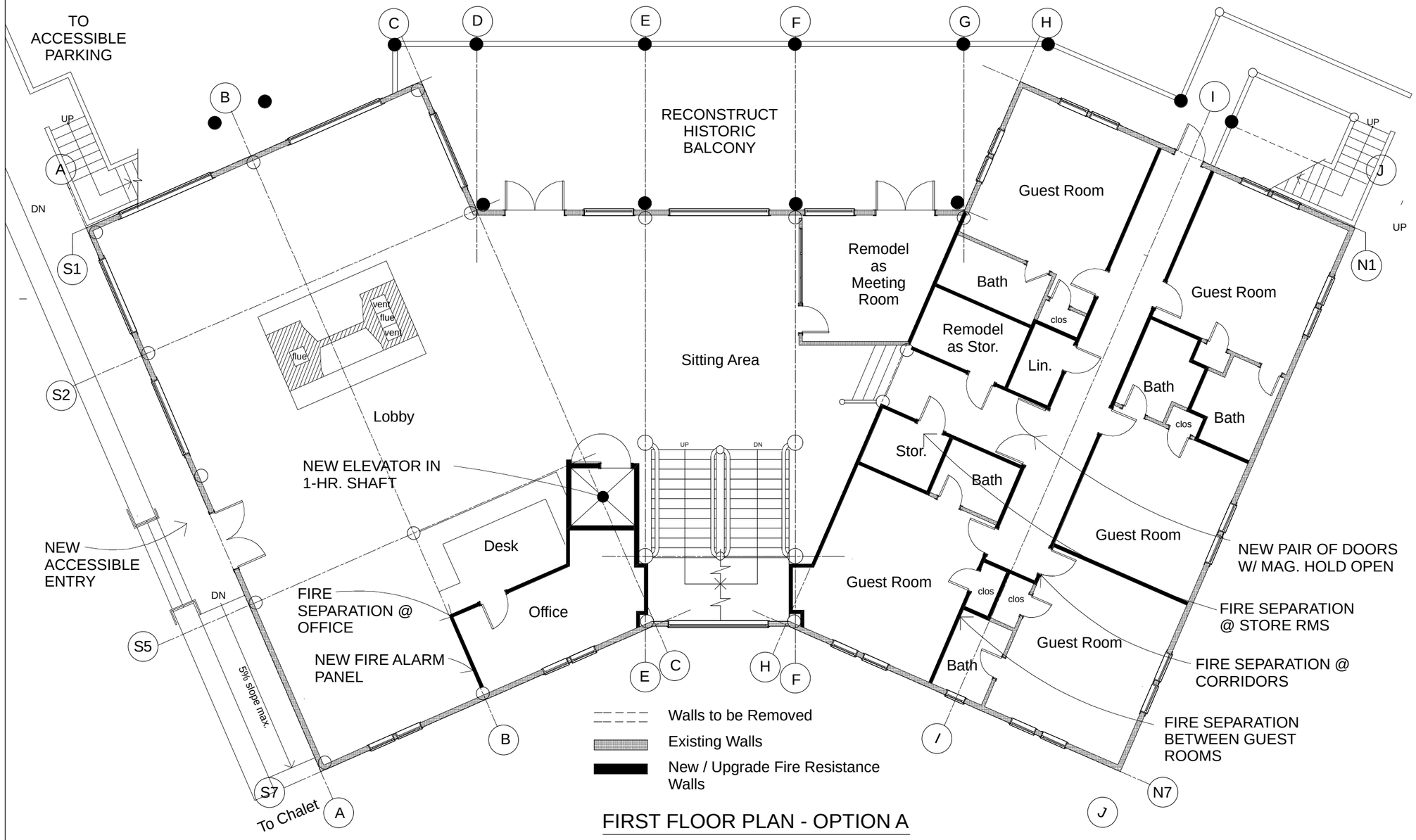

FIRST FLOOR PLAN - OPTION A

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32 REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly.
2. Confirm that existing water supply piping is not constricted and is operating properly.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

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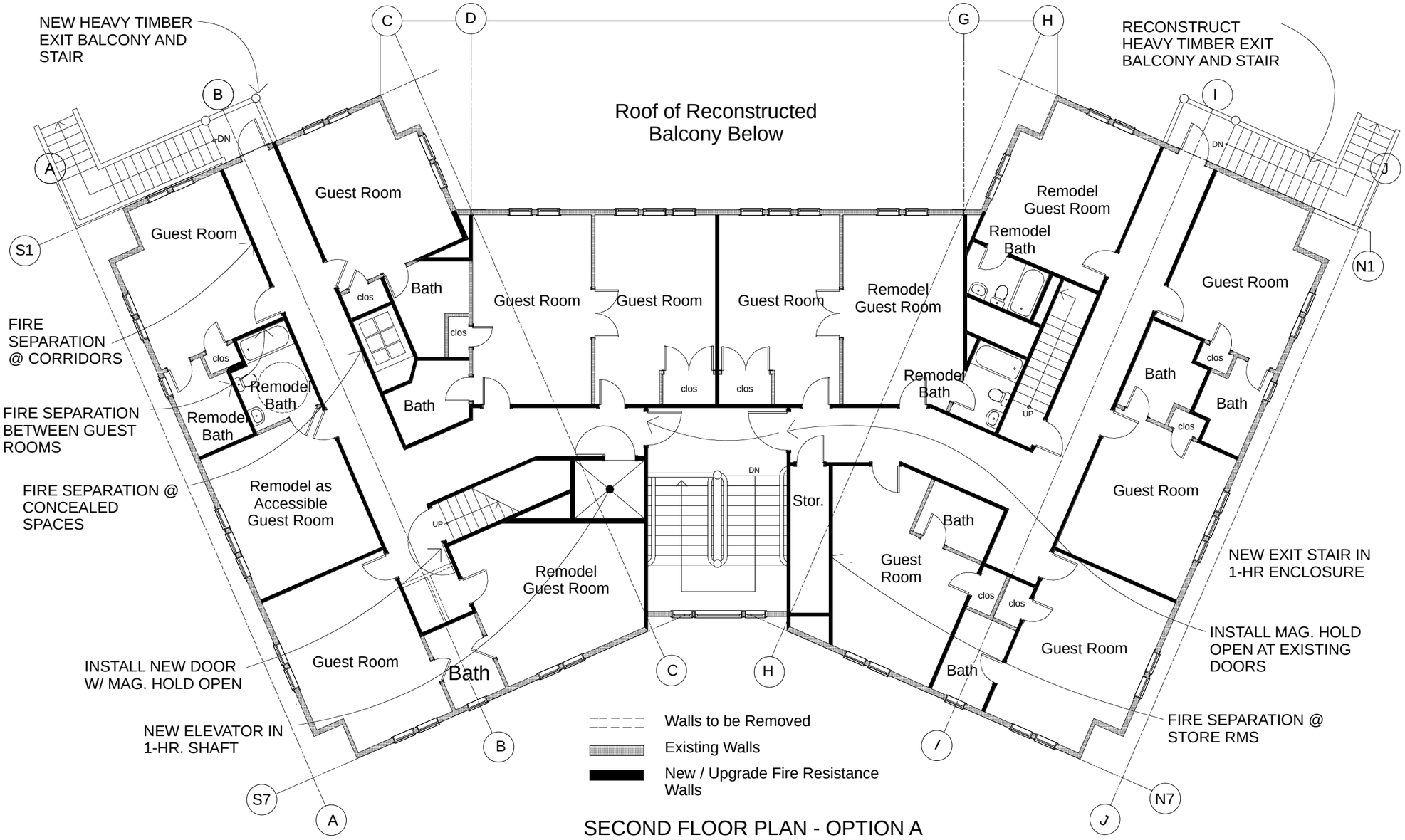

SECOND FLOOR PLAN - OPTION A

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32

REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly.
2. Confirm that existing water supply piping is not constricted and is operating properly.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

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SUB SHEET NO. A5.A

TITLE OF SHEET: ACCESS / EGRESS OPTION A

OREGON CAVE NATIONAL MONUMENT

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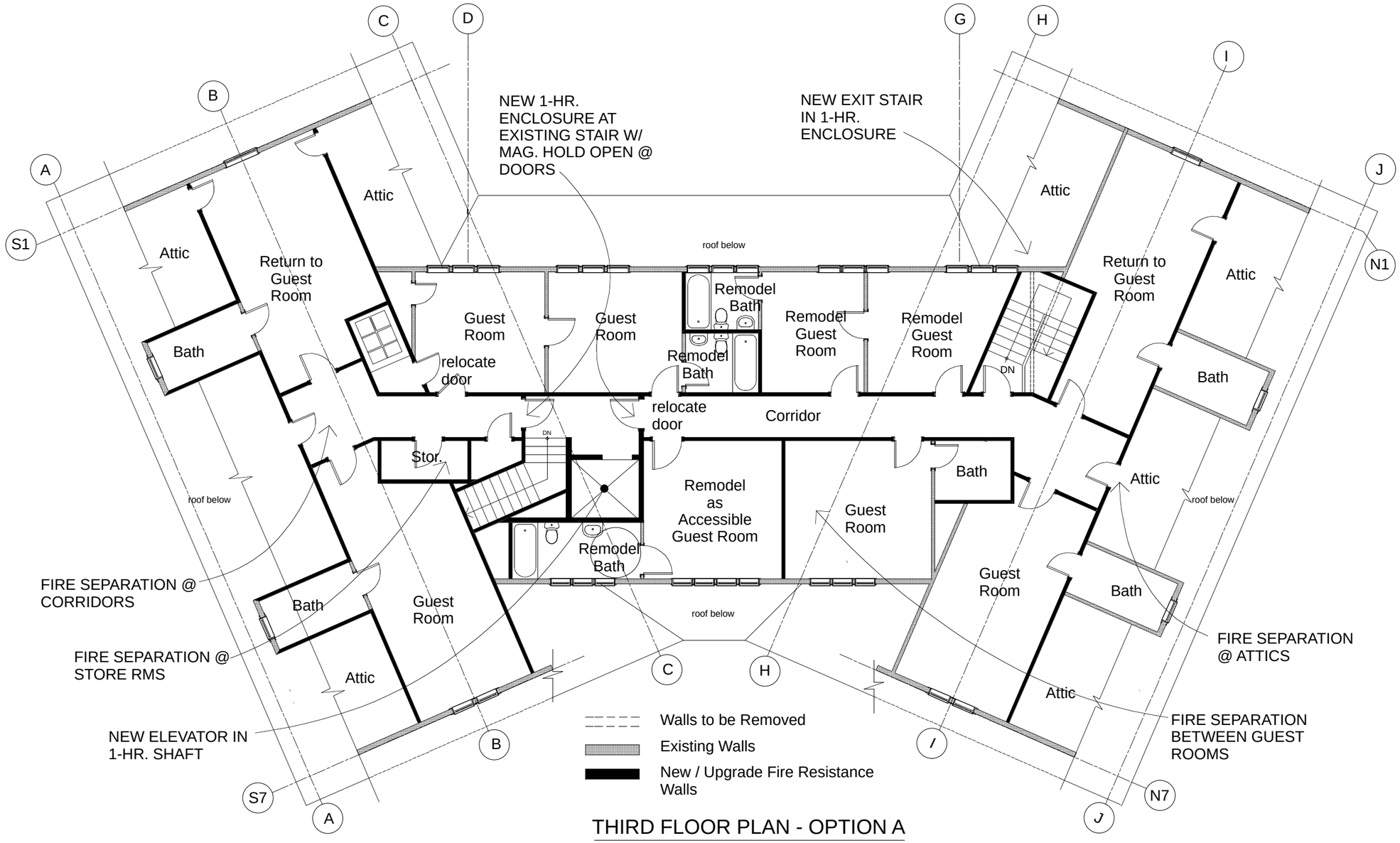

THIRD FLOOR PLAN - OPTION A

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32 REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly.
2. Confirm that existing water supply piping is not constricted and is operating properly.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

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SUB SHEET NO. A6.A

TITLE OF SHEET: ACCESS / EGRESS OPTION A

OREGON CAVE NATIONAL MONUMENT

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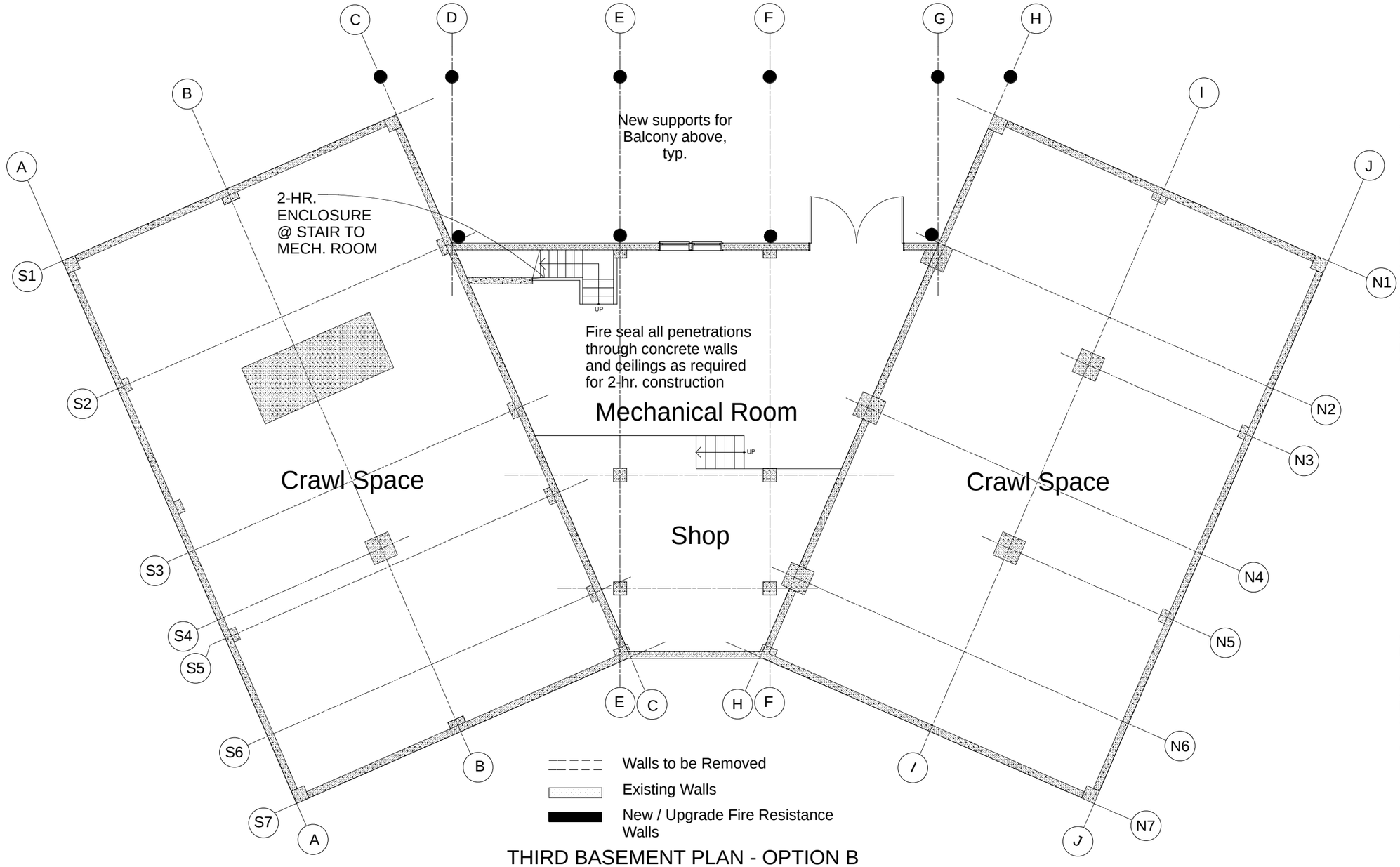

THIRD BASEMENT PLAN - OPTION B

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32

REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.

DISABLED ACCESS
1. Install lever hardware at doors to public spaces along path of travel.
2. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly. Repair as required.
2. Confirm that existing water supply piping is not constricted and is operating properly. Repair as required.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
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OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

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SUB SHEET NO. A1.B

TITLE OF SHEET: ACCESS / EGRESS OPTION B

OREGON CAVE NATIONAL MONUMENT

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PKG. NO.

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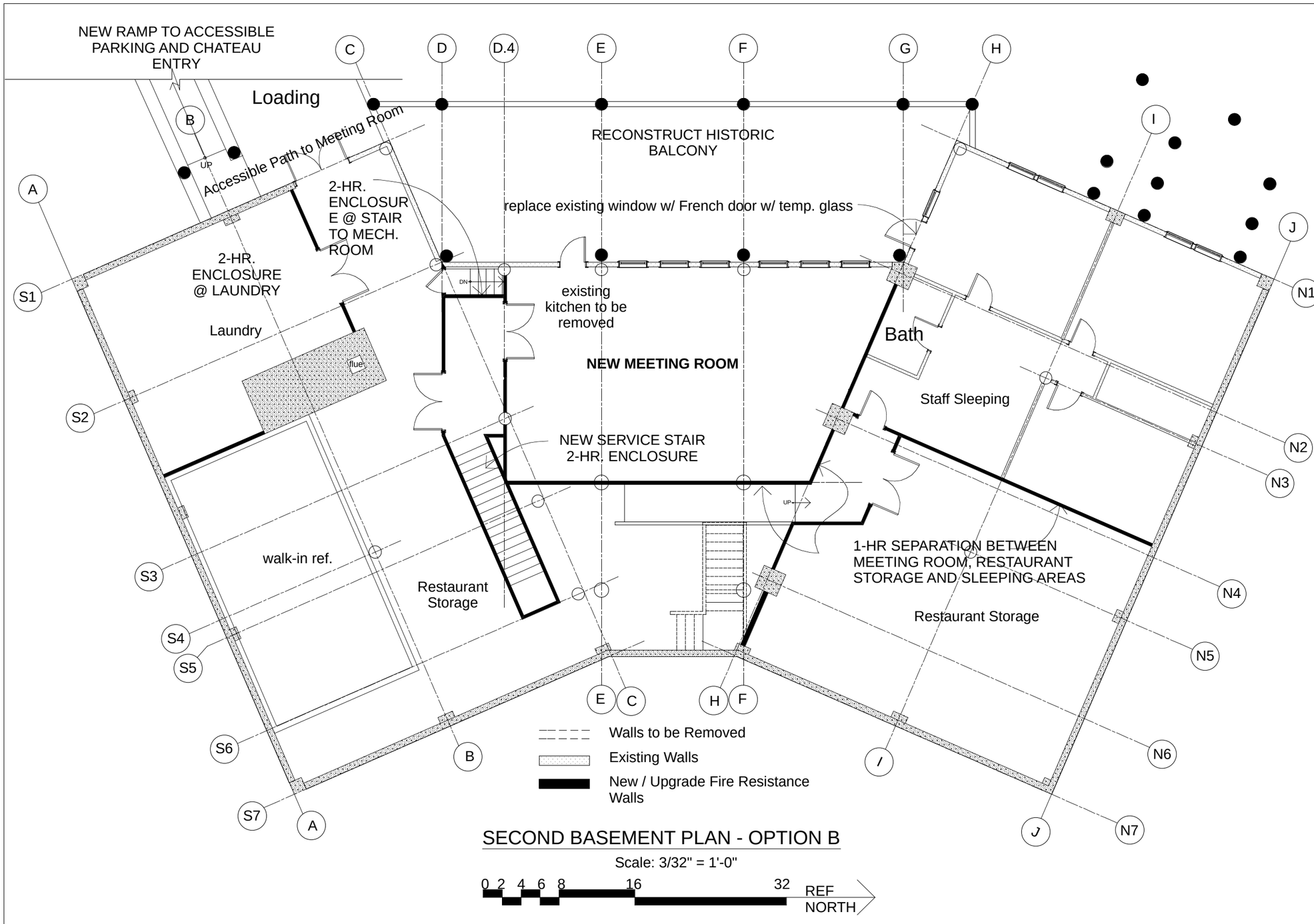

SECOND BASEMENT PLAN - OPTION B

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32

REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Isntall low level exit lights i nsleeping areas.

DISABLED ACCESS
1. Install ramp access as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly. Repair problem areas.
2. Confirm that existing water supply piping is not constricted and is operating properly. Repair problem areas.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

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OREGON CAVE NATIONAL MONUMENT
CHATEAU
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TECH REVIEW:
DATE: 12/28/04

SUB SHEET NO. A2.B

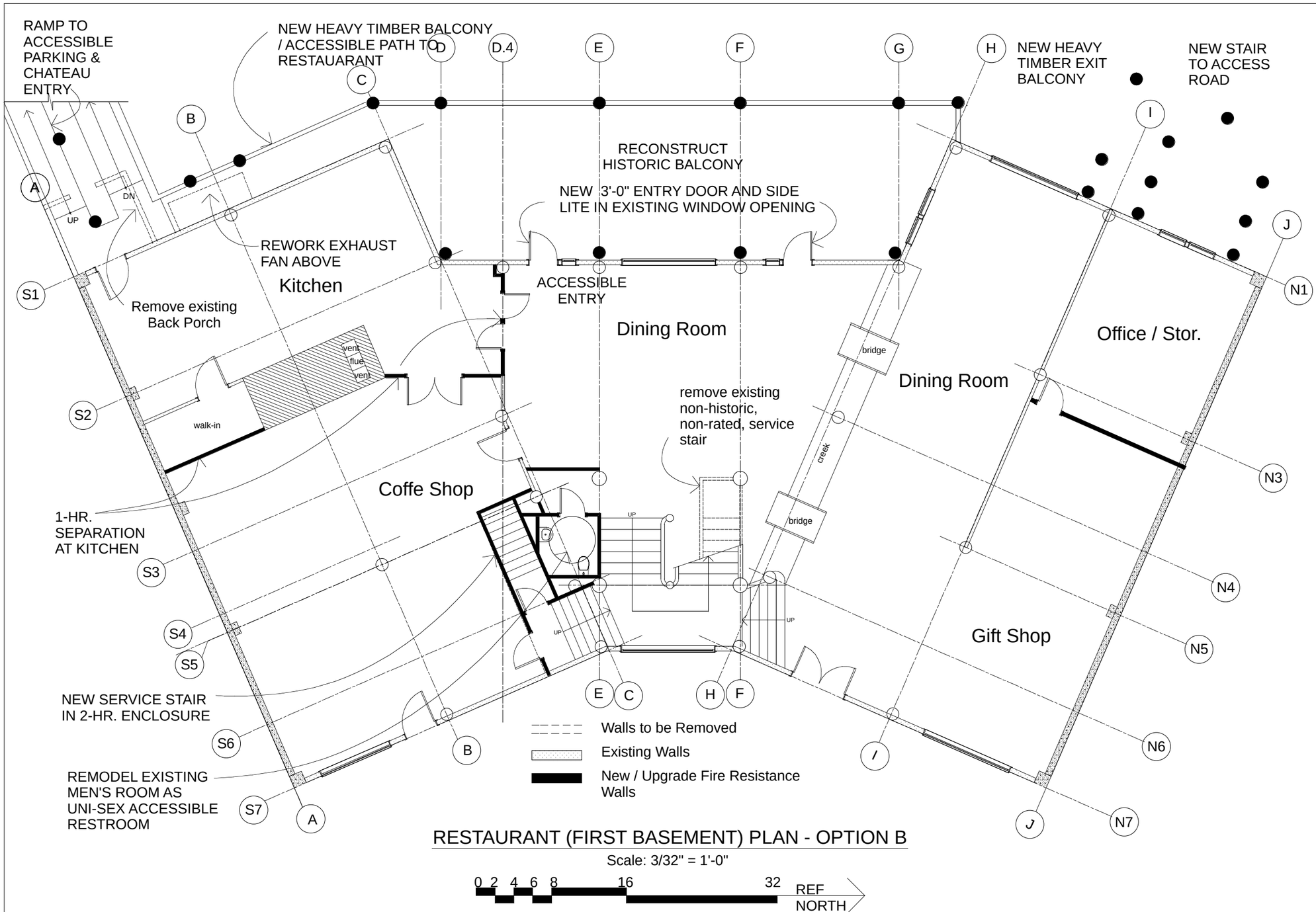
TITLE OF SHEET: ACCESS / EGRESS OPTION B

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET of



RESTAURANT (FIRST BASEMENT) PLAN - OPTION B

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32 REF

NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly. Repair as required.
2. Confirm that existing water supply piping is not constricted and is operating properly. Repair as required.
3. Modify existing kitchen exhaust fan and housing to meet code.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
1. This illustration is for concept evaluation only and is not intended to serve as a detailed design.

OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW:
DATE: 12/28/04

SUB SHEET NO. A3.B

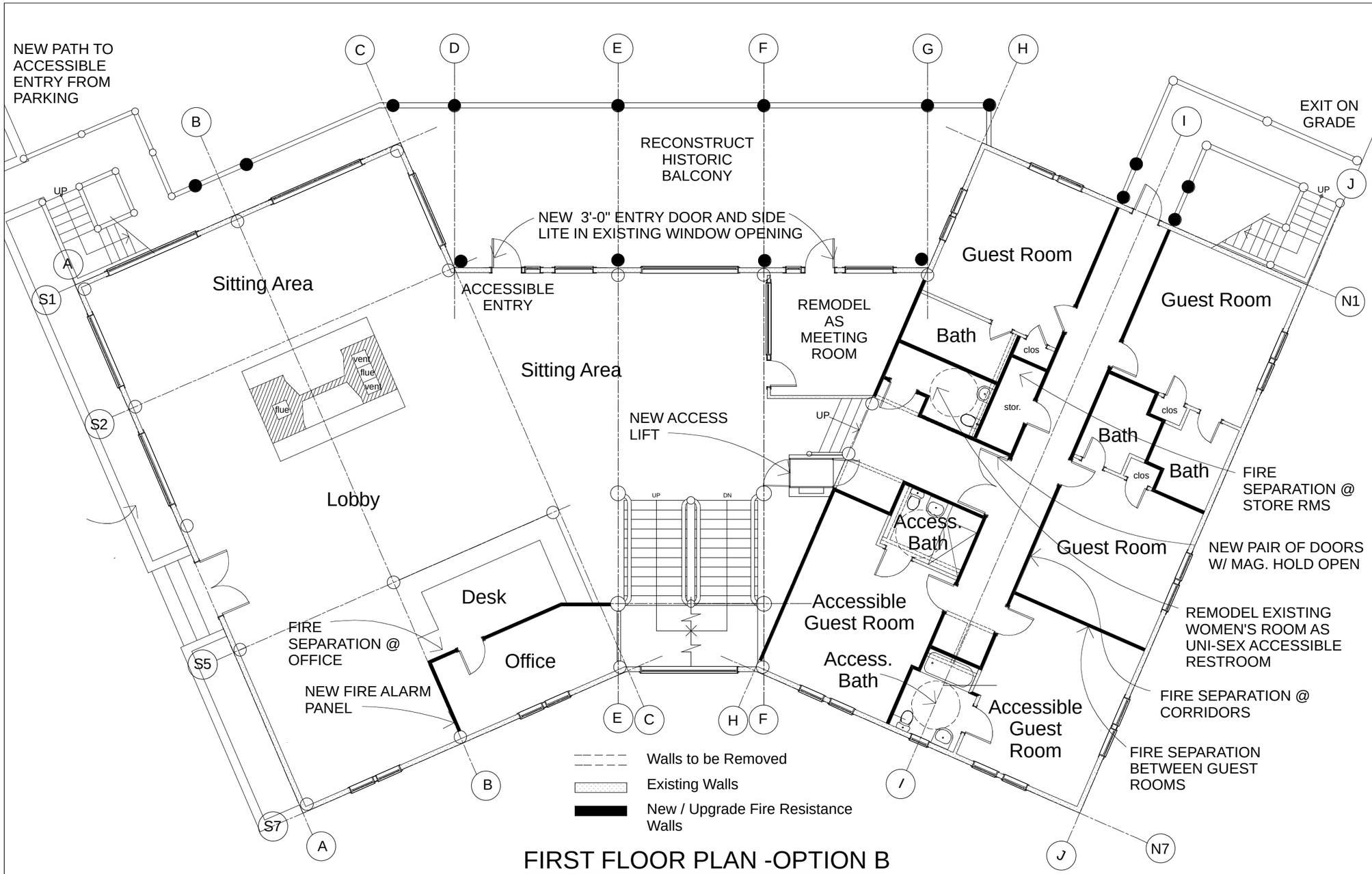
TITLE OF SHEET: ACCESS / EGRESS OPTION B

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET of



FIRST FLOOR PLAN -OPTION B

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32

REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly.
2. Confirm that existing water supply piping is not constricted and is operating properly.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
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OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW:
DATE: 12/28/04

SUB SHEET NO. A4.B

TITLE OF SHEET: ACCESS / EGRESS OPTION B

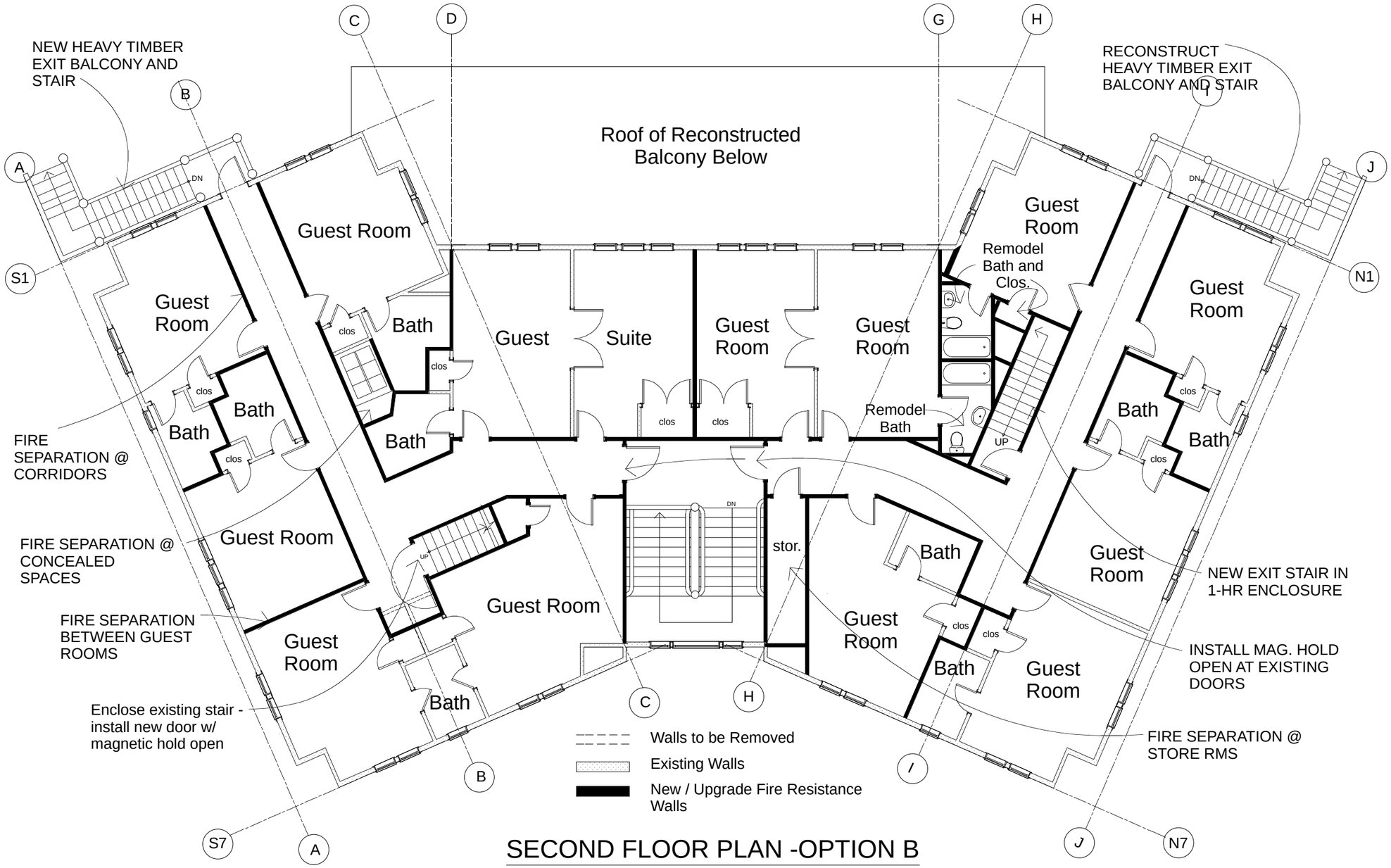
OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET

of



SECOND FLOOR PLAN -OPTION B

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32

REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly.
2. Confirm that existing water supply piping is not constricted and is operating properly.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
1. This illustration is for concept evaluation only and is not intended to serve as a detailed design.

OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW: S FARNETH
DATE: 12/28/04

SUB SHEET NO. A5.B

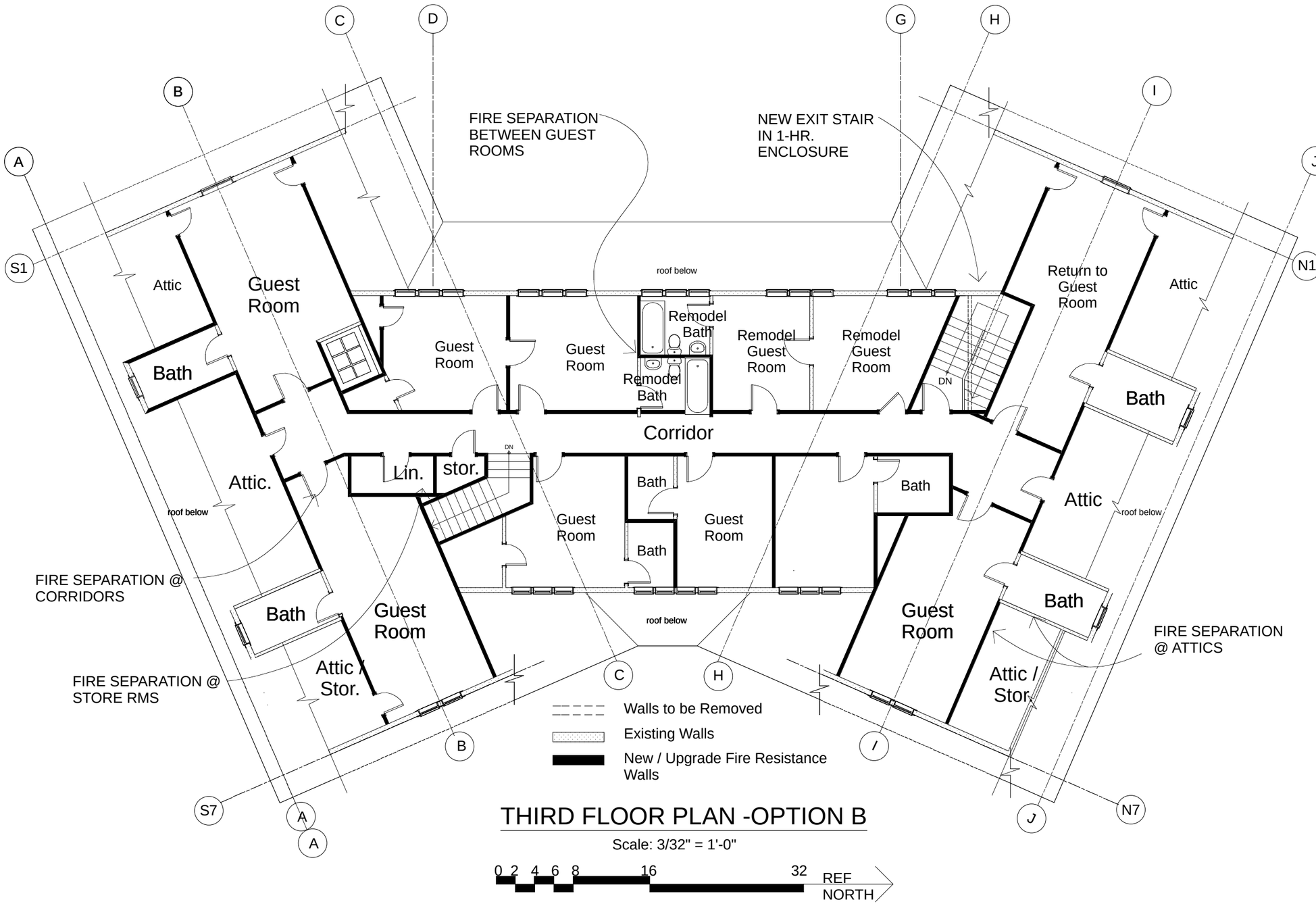
TITLE OF SHEET: ACCESS / EGRESS OPTION B

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET of



THIRD FLOOR PLAN -OPTION B

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32 REF

NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly.
2. Confirm that existing water supply piping is not constricted and is operating properly.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
1. This illustration is for concept evaluation only and is not intended to serve as a detailed design.

OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW:
DATE: 12/28/04

SUB SHEET NO. A6.B

TITLE OF SHEET: ACCESS / EGRESS OPTION B

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET of

5B.2. Fire Resistance Recommendations and Options

There are a number of options for improving the fire resistance (reducing the combustibles and limiting the fire spread potential) of the interior wall assembly. The options presented below vary in their effectiveness as well as in their impact on the historic materials. It may be appropriate to use different options in different situations throughout the structure.

5B.2.1. Wall/Ceiling Option 1 - Recoat Ceiling and Wall Panels

This choice will leave the wall and ceiling panels in their current place and apply new layers of intumescent coatings to reduce the surface flame spread to a Class B rating.

Key advantages of this option:

- Wall and ceiling panels will not need to be removed or relocated, avoiding physical damage to the panels.
- Surface flame spread will be reduced.
- Relatively low levels of disruption and work effort. The lowest among the options.
- The cost for this option will be the lowest among the options.
- The option retains the aesthetic appearance of the site and presents the least amount of impact to the fabric.

Key disadvantages of this option:

- Existing gaps will allow flames and smoke penetration into wall and ceiling cavities. A period of one to two minutes before sprinkler heads activate is adequate time for flame penetration. This will result in fire spread above the sprinkler system, within the non-treated cavity.
- The fiber wall and ceiling panels do not offer significant fire resistance and are subject to failure within five to ten minutes.
- This option will not meet the fire or smoke resistance requirements in the Life Safety Code.

5B.2.2. Wall/Ceiling Option 2 - Repair Existing Wall and Ceiling Panels

This involves sealing all gaps between wall and ceiling panels with fire resistant caulks, and decreasing combustibility by applying new layers of intumescent coatings.

Key advantages of this option:

- Work can be accomplished without removing panels, diminishing potential damage.
- The work will have a relatively low amount of disruption and can be accomplished in a relatively short time period.
- The cost is higher than option 1 but is lower than replacing wall and ceiling panels.
- Original building fabric is retained.

Key disadvantages of this option:

- Changes the appearance of the significant historic material.
- Difficulty ensuring that all gaps are properly sealed.
- The need to periodically apply additional sealant when panels shift or settle.
- This will improve the fire resistance but only for an estimated five to ten minute period. This will allow the sprinklers to operate

but the panels may fail soon afterward.

- Panel combustibility will be reduced on the exposed (room) side but not on the concealed (framing) side. Consequently if the fire extends into the wall cavity it will have the opportunity to spread rapidly over the unprotected side.
- Fiber panels can readily fail when they become wet which will occur from operating fire sprinklers and/or manual fire hose use.
- This option will not meet the fire or smoke resistance requirements in the Life Safety Code.

5B.2.3. Wall/Ceiling Option 3 - Replace Wall/Ceiling Panels with Contemporary Materials

This option will remove the panels and replace them with a fire resistant material such as gypsum drywall. The drywall would be finished with a plaster skim coat beveled along the existing panel grid lines, then finished to simulate the appearance of the existing panels.

Key advantages of this option:

- The elimination of very combustible interior walls and ceilings with a non-combustible material.
- More reliable fire resistance with gaps properly sealed.
- Diminishing long-term maintenance requirements.
- Improved internal smoke spread resistance.
- Compliance with the Life Safety Code fire and smoke requirements.

Key disadvantages of this option:

- Loss of historic fabric and appearance.
- Relatively high expense associated with replacing all interior walls and ceilings.
- Extensive construction efforts and the potential disruption of Chateau operations.
- Excessive dust and debris during construction.
- Added weight to the structure (this was checked by Structural Engineer and the existing structure can support the weight).

5B.2.4. Wall/Ceiling Option 4 - Install a Fire Resistant Sub-Wall Assembly and Reinstall the Original Panels

Under this option wall and ceiling panels will be removed and a new layer of fire resistant gypsum wallboard will be applied to interior framing. The original panels will then be treated with intumescent coatings (all sides) and reinstalled over the new wallboard.

Key advantages of this option:

- The construction of a reliable fire resisting barrier.
- A reduction of the wall and ceiling combustibility.
- Improved flame spread resistance.
- Diminished maintenance requirements.
- Improved internal smoke spread resistance.
- Retention of the original fabric.
- Compliance with the Life Safety Code.

Key disadvantages of this option:

- A significant number of panels maybe lost during removal.
- Reinstallation of the panels over gypsum board will change the relationship of the wall finish to the trim (door and window casings) throughout the building.
- Highest cost option.
- Extensive construction requirements and the potential disruption of Chateau operations.
- Excessive dust and debris during construction.
- Possible damage to panels during removal and reinstallation and subsequent loss of historic fabric.
- Added weight to the structure (this was checked by Structural Engineer and the existing structure can support the weight).

5B.2.5. Fire Resistance Upgrade for Existing Doors

One architectural objective may be retaining existing guest room doors due to their significance as a part of the historic fabric. Currently these doors are not compliant with fire resistance standards due to gaps between door boards and doors and jambs, the thin dimension of the door panel, and substandard hardware.

The British Standards Institute (BSI) in conjunction with English Heritage conducted a series of tests to determine the fire resistance of timber panel doors and to develop methods to upgrade the fire resistance of period doors. These are presented in English Heritage Technical Guidance Note, Timber Panel Doors and Fire. The results have also been reprinted in Appendix J of NFPA #914, Code for Fire Protection in Historic Structures.

Upon reviewing the data it is possible to achieve a fire resistance rating that is close to thirty minutes in duration. Improvements will consist of:

- Adding 2-mm intumescent paper on the room side (assumed fireside) of the door. This paper can be purchased with a wood veneer facing that is similar to current finishes.
- Adding intumescent mastic between the door boards and pining them together to prevent an individual member from failing.
- Adding intumescent fire and smoke strips around the edge of doors.
- Providing fire sealants between the door jamb and wall structure.

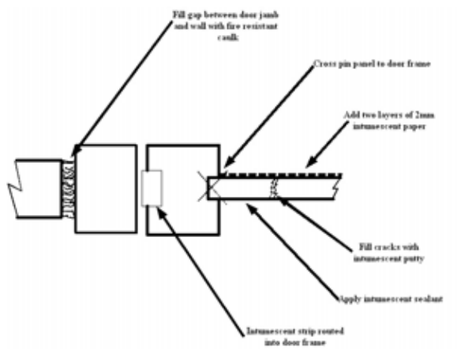


Figure 5.1: Recommended Guest Room Door Upgrade (based on information provided by English Heritage).

5B.2.6. Specific Floor Fire Resistance Improvement Options

This section lists specific options for improving the fire resistance of each floor level. These may be applied individually or in combination to achieve the desired level of fire protection. The attached drawings FS-1 through FS-6 illustrate approximate locations for the fire resistance improvements.

Third Basement

- Seal all pipe and electrical penetrations with fire resistant caulks to ensure a two-hour fire rating.
- Rebuild the access stair to a two-hour assembly.
- Move the emergency generator to an exterior location to avoid the threat of a propane leak. An alternative is to construct a one-hour rated enclosure that is properly sealed to prevent propane gas migration into the main boiler room. This enclosure should be vented to the exterior and be fitted with explosion proof electrical and lighting fixtures.
- Enclose the propane fired water heaters in a one-hour enclosure and vent them to the outside to prevent gas buildup. All electrical service and lighting within the enclosure should be explosion proof.

Second Basement

- Construct a new one-hour rated ceiling throughout the entire level including patching and repairing all holes and penetrations. This is the most complete solution to the Second Basement fire resistance problem; however it will pose the greatest level of difficulty with respect to the obstructions caused by existing plumbing, heating and electrical services. A rated, suspended ceiling with access panels is recommended.
- Enclose the highest risk spaces in separate one-hour enclosures. This will provide enclosures for the refrigeration and laundry equipment, dry-goods storage and employee housing.
- Construct a one-hour rated enclosure for refuse cardboard and other waste materials. An alternative is to build a new structure on the exterior of the building where these materials can be housed away from the Chateau.
- Seal the dumb-waiter that runs from the Second to First Basement into a one hour enclosure. This does not appear to be in service and therefore the improvement is not expected to impact property operations. If the dumb-waiter is to be retained, a new one-hour shaft with fire rated doors should be provided.
- Provide a minimum one-hour fire resistance rating for the passage stair between the First and Second Basement levels.
- Repair all holes and other openings in the Employee Sleeping Area. Provide a rated door.
- Fill all perimeter framing voids to prevent vertical fire migration within walls to the upper floors.

First Basement

- Provide a one-hour fire rated separation between the Kitchen and adjacent Dining room and Coffee Shop. Passage doors that must normally be in an open position should be fitted with magnetic hold open devices that are interfaced with the fire alarm system to release upon alarm activation.
- Repair all holes and penetrations in the kitchen ceilings and walls.
- Provide a smoke barrier at the main stairway between the First Basement and First Floor.
- Upgrade the Dining Room, Gift Shop and Coffee Shop ceiling with one of the options listed in Section 5B2.1 thru 5B2.4.

First Floor

- Upgrade the lobby ceiling with one of the Section 5B2.1 thru 5B2.4 options.
- Enclose the reception office with thirty-minute construction.
- Provide a one-hour fire barrier between the Lobby and guest room corridor. This should include improvements to the walls and exiting door assembly. If the door is to remain it should be fitted with magnetic hold open equipment that is interfaced with the fire alarm system to prevent it from being propped open.
- Upgrade the fire resistance of the guest room corridors, including walls and ceilings, with one of the Section 5B2.1 thru 5B2.4 options.
- Upgrade the fire resistance of the guest rooms, including separation between rooms and floors with one of the Section 5B2.1 thru 5B2.4 options.
- Upgrade the fire resistance of all guest room corridor doors with smoke seals, door closers and positive latching hardware, or replace the doors with contemporary fire rated units.
- Upgrade the fire resistance of storage rooms with one of the Section 5B2.1 thru 5B2.4 options.

Second Floor

- Provide a one-hour fire rate assembly around the main access stair at the present top of the stair lobby. The fire resistance of walls should be upgraded with one of the Section 5B2.1 thru 5B2.4 options. If existing fire doors are to remain then they should be fitted with magnetic hold open devices that are interfaced with the fire alarm system to close upon system activation.
- Upgrade the fire resistance of the guest room corridors, including walls and ceilings, with one of the Section 5B2.1 thru 5B2.4 options.
- Upgrade the fire resistance of the guest rooms, including separation between rooms and floors with one of the Section 5B2.1 thru 5B2.4 options.
- Upgrade the fire resistance of all guest room doors with smoke seals, door closers, and positive latching hardware, or replace the doors with contemporary units.
- Upgrade the fire resistance of storage rooms with one of the Section 5B2.1 thru 5B2.4 options.
- Provide a one-hour assembly between the Second and Third Floor guest room areas. Provide a magnetic hold open device at the base of the stairway (Second Level).

Third Floor

- Upgrade the fire resistance of the guest room corridors, including walls and ceilings, with one of the section 5B2.1 thru 5B2.4 options.
- Upgrade the fire resistance of the guest rooms, including separation between rooms and floors with one of the Section 5B2.1 thru 5B2.4 options.
- Upgrade the fire resistance of all guest room doors with smoke seals, door closers, and positive latching hardware, or replace the doors with contemporary units.
- Upgrade the fire resistance of storage rooms with one of the Section 5B2.1 thru 5B2.4 options.

Attic

- Provide one hour fire resistive separations to subdivide the attic into a minimum of three fire zones.
- Provide a smoke separation to subdivide the attic into a minimum of three smoke zones.

5B.2.7. Exterior Recommendations

An exterior fire can threaten the Chateau by igniting and penetrating the building wall sheathing, igniting the roof assembly, causing exterior glazing to fail, and/or entering the attic at eaves.

With respect to glazing tests conducted by the National Research Council of Canada (NRC) for the atrium of the Toronto, Ontario Hospital for Sick Children in 1984 (NRC Test CBD-248) demonstrated that when properly wetted by sprinklers glazed windows can provide a satisfactory fire barrier. A summary of these tests found:

- Unsprinklered glass failed after 5 to 6.5 minutes of fire exposure
- Sprinklered plain glass cracked after 10-15 minutes but remained in place for the 120 minute duration of the fire test.
- Tempered glass did not crack and withstood the fire for the 120 minute test duration
- The minimum water flow rate to prevent dry spots and subsequent failure is 70 and 90 liters per minute per square meter of glass (1.7-2.1 gallons per square foot)

Exterior fire resistance improvement options are as follows:

- Move vegetation at least 30 feet from the east exposure (cave side), 50 feet from the north and south exposure, and 100 feet from the west (canyon side) exposure. While this is a fire prevention technique, the implementation of this process can reduce the fire threat to the building's exterior.
- Provide non-combustible sheathing on all walls within 10 feet of all exterior motors, fans and grease traps. Provide a non-combustible barrier to the underside of all roofs over these potential ignition sources.
- Routinely clean grease traps and ducts, and lubricate all fan equipment to reduce the ignition threat. This is also a fire prevention technique that is intended to diminish the hazard.
- Provide sprinkler spray onto the exterior surface of all windows. Sprinklers should be at a maximum distance of 300 mm (1 ft) from the glazing and at maximum horizontal distances of 1.8 m (6 ft). The wetting on the glass shall not be less than 75 mm/min (6 gpm/ft²) of glass surface area as recommended by NFPA 13. Sprinkler heads must be spaced to keep the entire glazing surface wet to prevent dry spots that could lead to glass failure.
- Replace the present glass with tempered glazing.
- Seal all eave openings with fire rated materials to prevent fire infiltration.
- Apply intumescent coatings on the underside of all eaves to diminish combustibility of the structure.
- An alternative option is to provide fire sprinklers under all eaves.

Options for treatment of exterior siding:

- Apply fire retardant penetrating materials such as NFP to all exterior sheathing in order to produce a Class B rating. This will need to be reapplied every approximate five-year period to ensure continued effectiveness.
- Provide sprinkler spray onto the exterior surface of all walls.
- Remove all siding and attach a non-combustible sheathing to the exterior framing. Reapply the siding. This option is intended to prevent an exterior fire from penetrating into the building's concealed framing via gaps in the sheathing. This option is least desirable because removal of the bark would, in all likelihood, damage it to an extent that it could not be reinstalled.

5B.3. Fire Alarm System General Improvements

The present fire detection and alarm system is inadequate for the safety of the building and occupants. A new, complete addressable fire detection and alarm system should be installed. The basic system should consist of:

- An addressable fire control panel, preferably located in close proximity to the main desk where an alarm condition can be readily identified. If the panel is not located at the main desk then a remote annunciator shall be placed at the desk or reception office. The panel should have an alpha-numeric display that accurately describes the nature of the device that is in alarm and its location within the building.
- Power shall be from a dedicated circuit and standby power shall be provided to allow system function if the main service is lost. Due to the remote nature of the structure 72 hours of standby power should be provided.
- An automatic dialer to notify the fire department, and key NPS and concessionaire personnel.
- Manual alarm initiating stations at each egress door.
- Electric flow switches for the sprinkler system. If new sprinkler zones are added then a flow switch should be provided for each zone.
- Low air-pressure monitoring switches for the sprinkler dry zone. If multiple dry zones are added then a separate switch should be provided for each.
- Electric supervisory (tamper) switches for all sprinkler control valves.
- Sprinkler water tank low-level alarm switches.
- Kitchen hood extinguishing system operation monitoring switches.
- Spot type addressable smoke sensors (photoelectric or ionization) in all heated portions of the building including guest rooms, corridors, offices, storage rooms and work spaces.
- Smoke detection in all public spaces including the MainLobby, Dining Room, Gift Shop and Coffee Shop. Detection may be spot sensors similar to guest rooms or another option as presented in section 3.4.
- Audible and visual fire alerting devices. These shall be located in all public areas, corridors, guestrooms and main work areas.
- If magnetic door holders are installed, they shall be connected to the fire alarm system to release upon alarm activation.

The estimated number of components for the basic fire detection and alarm system described in this section is:

- Addressable fire alarm control panel with standby power..... 1
- Automatic dialer 1
- Remote annunciator panel 3
- Manual alarm stations 32
- Sprinkler flow switches 1-4*
- Sprinkler supervisory switches 2-8**
- Water tank low level monitor switch 1
- Kitchen hood monitoring switch 1
- Spot smoke sensors ..... See Section 3.4
- Alarm horn/strobes 60
- Alarm strobes 4

* The number of sprinkler flow sensors will be based on the selected suppression system
** The number of supervisory devices will be based on the selected suppression system

5B.4. Smoke Detection Options

Providing early warning (incipient) smoke detection is important for identifying a fire while it is relatively minor, thereby allowing an opportunity for corrective actions before significant damage occurs. For the majority of the building's spaces, addressable spot-type smoke sensors are appropriate. For the main public spaces (First Level Lobby, First Basement Dining Room/Gift Shop) aesthetics also becomes an important issue, thereby requiring an examination of other detection options.

5B.4.1. Smoke Detection Option 1 - Spot Smoke Sensors

This choice will provide the same type of smoke sensors that are used in the guest rooms and other areas of the building. These units will be placed on a nominal 900 ft² spacing, with appropriate additional sensors as required to properly address the ceiling structure configuration.

With this option the estimated number of smoke sensors is 130. These are in addition to the basic fire alarm components listed in section 3.3.

Key advantages of this option:

- Compatibility with the remainder of the building by using the same type of sensing devices.
- Point specific identification about the device in alarm.
- Lower individual cost per device. However, this can be negated by higher installation costs and the concealing of cabling.

Key disadvantages of this option:

- A greater number of individual devices when compared to other choices, which will require high installation labor.
- High annual maintenance requirements due to the quantity of devices.
- A relatively high level of aesthetic impact from the number of devises and associated cabling. This may be minimized by placing sensors close to beams, away from the ceiling centers and normal visitor line of sight and by concealing all cabling within the ceiling and/or wall structure.

5B.4.2. Smoke Detection Option 2 - Projected Beam Smoke Detectors

This option will use projected (linear) beam smoke sensors in lieu of spot type sensors in the main public spaces on the First Basement and First Floor levels. Specific spaces where beam detectors will be used are the main entrance Lobby, main Dining Room/Gift Shop and Coffee Shop. The beam detectors may be either single transmitter/receiver units in one housing with a reflective mirror to return the light beam, or separate transmitter and receiver units.

With this option two units will be needed in each the main lobby and dining room, and one in the coffee shop for a total of five. The number of spot smoke sensors in this option is 105. These are in addition to the basic fire alarm components listed in Section 3.3.

Key advantages of this option:

- Reduced aesthetic impact since fewer devices are needed (compared to spot sensors), and they will not need to be placed along ceilings.
- Reduced installation labor and associated expenses since fewer devices are needed.
- Potentially reduced impact on historic fabric that is associated with a lower number of devices. This is the result of avoiding

mounting devices onto ceilings. The quantity of cabling to serve the beam sensors will also be lower.
- Reduced maintenance efforts and expenditure.

Key disadvantages of this option:

- Higher costs per individual detector unit
- Care must be exercised when installing the units to ensure that the beam is not obstructed by the building's physical characteristics.
- Routine building operations may obstruct the beam pattern. Care will need to be exercised to prevent this occurrence.

5B.4.3. Smoke Detection Option 3 - Air Aspiration Detection

This option will install air-aspiration sensors in lieu of spot sensors in the key spaces on the first and first basement level. Specific spaces where aspiration detectors will be used are the main entrance Lobby, main Dining Room/Gift Shop and Coffee Shop.

With this option one unit will be needed for each floor for a total of two detectors. The number of spot smoke sensors in this option is 105. These are in addition to the basic fire alarm components listed in Section 3.3.

Key advantages of air aspiration include:

- A highly sensitive detection method that can potentially allow an earlier recognition of a developing fire. This can increase the opportunity for manual fire intervention before the fire reaches its most destructive phase.
- Potentially low level of aesthetic impact if the tubing is concealed in ceiling cavities. The only visible component will be nominal 0.25 inch sampling points where spot smoke sensors would otherwise be. If tubing is run exposed to avoid impacting existing wall and ceiling materials the aesthetic impact can be diminished by locating them out of the normal line of site.
- Maintenance is conducted at a single point rather than at multiple sensors across the ceiling. This can result in reduced labor efforts and the avoidance of ladders to access the detector.

Key disadvantages of this option:

- Higher expense associated with purchasing and installing the equipment.
- Fewer options with respect to manufacturers/installation contractors when compared to standard sensors.
- Potentially higher maintenance expenditures due to the complexity of the device.

Attached drawings FA-1 through FA-6 show the general concept location for fire detection and alarm components.

5B.5. Water System Improvement Options

Water supply improvement options are as follows:

- Provide a mid level point of discharge for the domestic water service, thereby creating a fire reserve water volume within the tank. The reserve should provide a minimum 30 minutes duration for the sprinkler system at peak flow demand. Based on the maximum sprinkler demand of 1230 GPM, the reserve should be 36,900 gallons.
- Provide an electric tank level monitor.
- Install a fire hydrant along the access road near the Chateau. The hydrant will be connected to the 8-inch water supply pipe.
- Flush the system a minimum of once per year.

- Remove a section of the 8-inch pipe and evaluate the internal condition. If excessive buildup is present the pipe should be cleaned out.
- Provide additional tank capacity based on the selected sprinkler option and the exterior deluge system demand.

5B.6. Sprinkler System Specific Improvement Options

A series of fire sprinkler system improvement options have been reviewed, covering the spectrum from retaining the existing arrangement to modifying the present system and completely replacing the existing. It should be noted that replacing the fire sprinkler system with a high-pressure water mist system was evaluated. The technology would have been a cost effective option if the site did not have a reliable water supply, or if the supply was not capable of the flow and pressure demands of the sprinkler system. The existing water supply and existing sprinkler piping network does not warrant the added expense at this time.

5B.6.1. Sprinkler Option 1 - Retain the Existing System

This option will keep the sprinkler system as it is without any significant alterations. The deficiencies will be corrected.

If this option is selected the following modifications will be necessary:

- Run a new 6-inch sprinkler main from dry-pipe valve in the Third Basement across the Second Basement and up to serve the First Basement and First Floor. This new main will be in addition to the existing 3.5-inch main to provide a looped water supply. The approximate length of the new pipe will be 180 feet.
- Provide additional dry pendent sprinklers for the commercial refrigerators and freezers. It is estimated that 10 units will be necessary.
- Replace all sprinklers, which are under recall, with new low profile units. The manufacturer has been providing this service at no cost to the customer. To arrange replacement contact Central Sprinkler Corporation at <http://www.sprinklerreplacement.com/VPR/enterVRP.php3>
- Provide electrical tamper switches for all valves and connect these to the fire alarm system. As an alternative these valves may be chained and locked in an open position with the keys kept in a limited access secure location.
- Provide a system low air pressure monitoring switch to alert maintenance of a possible dry-pipe valve operation if the system develops a leak.
- Remove and inspect a representative group of 1-inch pipes at the end of several branches. The system is now 65 years old and may have some scale and corrosion buildup within piping. The purpose of this exercise is to establish the condition of piping and determine if any of it needs replacement.
- Relocate the roof deluge valve to the Third Basement level where it can be quickly accessed by emergency responders. Mark the location with placards.
- Provide a fire department pumping connection.

The main advantages of this option include:

- This option is the least expensive option. The exception to this would result if an internal inspection of pipes reveals that severe corrosion exists and the pipes need to be replaced.
- This will be the least disruptive option. Note that the level of disruption will increase if an internal inspection of the sprinkler branch lines pipe reveals significant corrosion and the need for replacement.

Primary disadvantages of this option include:

- An inherently longer sprinkler response time due to the time period required for the system air to be evacuated and the water to fill the piping. This may add up to one minute of response time, resulting in approximately 30% more water discharge.
- Significant aesthetic impact from the centrally placed exposed piping. This is especially noticeable in the main public spaces such as the First Floor Lobby and First Basement Dining Room. Figures 2 and 3 show the typical visual impact that results from the present sprinkler piping arrangement.
- Approximately 100% greater water application rates in the fire area can be expected. This can result in higher levels of water saturation and damage to the building fabric and contents.

Figure 5.2: Exposed Sprinkler Piping in Main Lobby

Figure 5.3: Exposed Sprinkler Piping in Guest Room

5B.6.2. Sprinkler Option 2 - Retain the Existing System as a Seasonal Wet-Pipe/Dry-Pipe System

This option will not change the existing system components. However to compensate for the longer response times that dry-pipe systems have, this option will fill the sprinkler system's piping with water during the summer (occupied) periods of the year. When the season is over and the internal fire risk and life safety concerns diminish, the system will be drained and restored to a dry-pipe system. If the sprinkler system is wet-pipe the flow and pressure demand for the three analyzed areas will be as follows:

Area #1 with interior hose allowance: The water system will be able to adequately supply the maximum sprinkler flow for approximately 61 minutes. The supply pressure at maximum flow will be adequate by approximately 6.5-9.8 psi depending on the supply pipe condition.

Area #2 with interior hose allowance: The water system will be able to adequately supply the maximum sprinkler flow for approximately 87 minutes. The supply pressure at maximum flow will be adequate by approximately 55.0-56.5 psi.

Area #3 with interior hose allowance: The water system will be able to adequately supply the maximum sprinkler flow for approximately 70 minutes. The supply pressure at maximum flow will be inadequate by approximately 1.9-4.2 psi depending on the supply pipe condition

Table 5.1: Sprinkler Demand and Available Water Pressure Summary
Area 1 Third Floor NFPA OH 1 Wet-Pipe System with Hose Allowance

Water Quantity	1230 GPM	1230 GPM
Pipe Coefficient (C)	C=90	C=80
Total friction loss 8" and 6"	12.4 psi	15.5 psi
Static pressure at base of riser	106 psi	106 psi
Residual pressure at base of riser	92.4 psi	89.1 psi
Flow at base of riser	1230 GPM	1230 GPM
Sprinkler demand pressure	82.6 psi	82.6 psi
Sprinkler flow demand (including 250 gpm interior hose)	1230 GPM	1230 GPM
Tank Duration (maximum level)	61 minutes	61 minutes
Pressure safety margin	9.8 psi	6.5 psi

Table 5.2: Sprinkler Demand and Available Water Pressure Summary
Area 2 Second Basement NFPA OH 1 Wet-Pipe System with Hose Allowance

Water Quantity	864 GPM	864 GPM
Pipe Coefficient (C)	C=90	C=80
Total friction loss 8" and 6"	6.8 psi	7.7 psi
Static pressure at base of riser	106 psi	106 psi
Residual pressure at base of riser	99.2 psi	97.7 psi
Flow at base of riser	864 GPM	864 GPM
Sprinkler demand pressure	49.9 psi	49.9 psi
Sprinkler flow demand (including 250 gpm interior hose)	864 GPM	864 GPM
Tank Duration (maximum level)	87 minutes	87 minutes
Pressure safety margin	56.5 psi	55.0 psi

Table 5.3: Sprinkler Demand and Available Water Pressure Summary
Area 3 First Basement NFPA OH 1, Wet-Pipe System with Hose Allowance

Water Quantity	651 GPM	651 GPM
Pipe Coefficient (C)	C=90	C=80
Total friction loss 8" and 6"	10.9 psi	13.2 psi
Static pressure at base of riser	106 psi	106 psi
Residual pressure at base of riser	102.2 psi	101.2 psi
Flow at base of riser	651 GPM	651 GPM
Sprinkler demand pressure	59.0 psi	59.0 psi
Sprinkler flow demand (including 250 gpm interior hose)	651 GPM	651 GPM
Tank Duration (maximum level)	115 minutes	115 minutes
Pressure safety margin	43.8 psi	42.2 psi

If this option is selected the following modifications will be necessary:

- Run a new 6 inch sprinkler main from dry-pipe valve in the Third Basement across the Second Basement and up to serve the First Basement and First Floor. This new main will be in addition to the existing 3.5 inch main to provide a looped water supply. The approximate length of the new pipe will be 180 feet.
- Provide additional dry pendent sprinklers for the commercial refrigerators and freezers. It is estimated that 10 units will be necessary.
- Replace all sprinklers, which are under recall, with new low profile units. The manufacturer has been providing this service at no cost to the customer.
- Provide electrical tamper switches for all valves and connect these to the fire alarm system. As an alternative these valves may be chained and locked in an open position with the keys kept in a limited access secure location.

- Provide a system low air pressure monitoring switch to alert maintenance of a possible dry-pipe valve operation if the system develops a leak.
- Remove and inspect a representative group of 1-inch pipes at the end of several branches. The system is now 65 years old and may have some scale and corrosion buildup within piping. The purpose of this exercise is to establish the condition of piping and determine if any of it needs replacement.
- Relocate the roof deluge valve to the third basement level where it can be quickly accessed by emergency responders. Mark the location with placards.
- Provide a fire department pumping connection.

Key advantages of this option:

- Faster sprinkler system response during occupied, higher risk periods.
- The system pressure will be adequate when it is wet.
- Potentially lower water damage (estimate 30%) when system is wet pipe.
- Least disruptive option with respect to physical changes to the system.
- Minimal additional expense associated with filling and draining the system.

Key disadvantages of this option:

- Two extra service requirements per year for system filling and draining and the associated labor and expense associated with the effort.
- The system pressure will by slightly inadequate for the First Floor and First Basement Levels when it is dry.
- Possible increased risk of pipe corrosion due to moisture that remains in piping after system draining.
- Continued aesthetic impact.
- Relatively high water flow due the great number of sprinklers in each area.

5B.6.3. Sprinkler Option 3 - Year Round Wet Sprinkler System with Limited Area Dry-Sprinkler Zones

For this option the main sprinkler piping that is located within heated areas of the building will remain wet year round. All piping that is in attics and behind knee walls, which is subject to freezing, will be modified into a separate dry-pipe zone.

If this option is selected the following modifications will be necessary:

- Run a new 6-inch sprinkler main from dry-pipe valve in the Third Basement across the Second Basement and up to serve the First Basement and First Floor. This new main will be in addition to the existing 3.5-inch main to provide a looped water supply. The approximate length of the new pipe will be 180 feet.
- Install a new wet-pipe alarm valve and connect it to the main sprinkler piping.
- Install a new valve header between the water supply and the dry-pipe and wet-pipe valves.
- Modify the existing dry-pipe valve to serve a new dedicated zone for the cold areas.
- Install a new four inch dry system riser (approximate 100 feet).
- Install approximately 500 feet of dry zone piping.
- Provide additional dry pendent sprinklers for the commercial refrigerators and freezers. It is estimated that 10 units will be necessary.

- Replace all sprinklers, which are under recall, with new low profile units. The manufacturer has been providing this service at no cost to the customer.
- Provide electrical tamper switches for all valves and connect these to the fire alarm system. As an alternative these valves may be chained and locked in an open position with the keys kept in a limited access secure location.
- Provide a system low air pressure monitoring switch to alert maintenance of a possible dry-pipe valve operation if the system develops a leak.
- Remove and inspect a representative group of 1-inch pipes at the end of several branches. The system is now 65 years old and may have some scale and corrosion buildup within piping. The purpose of this exercise is to establish the condition of piping and determine if any of it needs replacement.
- Relocate the roof deluge valve to the third basement level where it can be quickly accessed by emergency responders. Mark the location with placards.
- Provide a fire department pumping connection.

Key advantages of this option:

- Faster sprinkler operation for those areas that are subject to the highest ignition risk.
- Potentially a 30% lower water application rate and resultant damage from sprinkler operation.
- Decreased demand (approximately 30%) in most areas due to the use of quick response sprinkler heads. This allowance reduction is not permitted for dry-pipe systems.
- Costs for new dry-pipe zone and new wet-pipe valves is less than replacing the entire sprinkler system.
- Minimally disruptive in main public and private portions of the building.

Key disadvantages of this option:

- Costs associated with installing the new dry zone and the new wet-pipe control valves.
- Continued aesthetic impact.
- Continue high water application rates (50%-100%) due to the large number of sprinklers in a given area.
- Cost of continually heating the building.

5B.6.4. Sprinkler Option 4 - Replace the Existing System with a New Dry-Pipe System, Exposed Piping

Under this option the existing dry-pipe sprinkler system will be completely rebuilt with a new system. Piping will continue to be exposed however the system will extensively use horizontal sidewall sprinkler heads, which were not available in 1949, to avoid placing piping in the middle of ceilings. In main public spaces the sprinkler piping and heads will be it will be located close to walls and beams in the least visible locations. In guest room areas piping will be run within the guest rooms along the walls closest to the corridors. Sidewall sprinklers will serve the guest rooms and will penetrate into the corridors to protect those areas. All exposed piping may be placed in decorative soffits to match existing finishes.

If this option is selected the following approximate number of components are expected:

- New dry-pipe valve with compressor, trim 1
- New fire department siamese connection 1
- Third Basement/Crawl Space sprinkler heads with pipe 90
- Second Basement sprinkler heads with pipe 100

- Second Basement freezer/refrigerator dry-pendent heads with pipe 10
- First Basement sprinkler heads with pipe 80
- First Floor sprinkler heads with pipe 75
- Second Floor sprinkler heads with pipe 85
- Third Floor/Attic sprinkler heads with pipe 110
- Inspector's test fittings 2

Note that this does not include exterior sprinkler protection, which will be covered in Section 5B.7.

Key advantages of this option:

- Potentially a lower water application rate and resultant damage from sprinkler operation due to the lower number of sprinklers that will be needed. The required water volume may also be reduced by engineering.
- The system piping can be sized to comply with the water supply pressures.
- Reduced aesthetic impact by removing sprinkler piping from the center of the ceiling and locating it out of the normal line of site.
- Possible reduced sprinkler pipe dimensions due to hydraulic design techniques.

Key disadvantages of this option:

- Costs associated with installing the new system.
- Continued aesthetic impact.
- Disruptions associated with the installation effort. This can be minimized by installing the system during winter periods.
- Potentially higher water application rates (30%) due to the dry-system.
- Longer response times (up to one minute) that are inherent in dry-pipe systems when compared to wet systems.
- Reduced design flexibility associated with dry systems when compared to wet systems. Consequently this can result in greater aesthetic impact due to the draining requirements of dry systems.

5B.6.5. Option 5: Replace the Existing System with a New Dry-Pipe System. Concealed Piping in Public Spaces

This option is the same as Option 4 except all piping in public spaces (Main Lobby, Dining Room/Gift Shop and Coffee Shop) will be concealed in the ceiling cavity. Sprinkler heads will be dry-concealed sprinklers with finishes to match the ceiling.

If this option is selected the following approximate number of components are expected:

- New dry-pipe valve with compressor, trim..... 1
- New fire department siamese connection..... 1
- Third Basement/Crawl Space sprinkler heads with pipe 90
- Second Basement sprinkler heads with pipe 100
- Second Basement freezer/refrigerator dry-pendent heads with pipe..... 10
- First Basement dry-pendent sprinkler heads with pipe 82
- First Floor dry-pendent sprinkler heads with pipe 92
- Second Floor dry-pendent sprinkler heads with pipe..... 100
- Third Floor dry pendent sprinkler heads with pipe 80

- Attic sprinkler heads with pipe 28
- Inspector's test fittings 2

Note that this does not include exterior sprinkler protection, which will be covered in Section 5B.7.

Key advantages of this option:

- Potentially a lower water application rate and resultant damage from sprinkler operation due to the lower number of sprinklers that will be needed. The required water volume may also be reduced by engineering.
- The system can be sized to comply with water service capabilities.
- Low aesthetic impact by removing sprinkler piping from the center of the ceiling and locating it out of the site above ceilings. The visual impact may be further reduced by utilizing concealed sprinkler heads with cover plats that are custom finished to match existing finishes.
- Possible reduced sprinkler pipe dimensions due to hydraulic design techniques.

Key disadvantages of this option:

- Costs will be higher than the previous options due to extensive removal and reinstallation of ceiling and wall materials, and the use of more expensive dry-pendent sprinkler heads (typically 5-6 times higher cost per unit).
- Potential damage of wall and ceiling fabric. If the decision is made to reduce the wall combustibility by one of the options mentioned in section 2.3.3 or 2.3.4 then the damage impact and costs will be shared with the fire barrier improvements.
- Disruptions associated with the installation effort. This can be minimized by installing the system during winter periods.
- Potentially higher water application rates (30%) due to the dry-system.
- Longer response times (up to one minute) that are inherent in dry-pipe systems when compared to wet systems.
- Reduced design flexibility associated with dry systems when compared to wet systems. Consequently this can result in greater aesthetic impact due to the draining requirements of dry systems.

5B.6.6. Sprinkler Option 6 - Replace the Existing Sprinkler System with a New Seasonal System, Exposed Piping

Under this option a new system will be installed with exposed piping that is installed to reduce the aesthetic impact of the present sprinkler arrangement. System design will be similar to Sprinkler Option 4 as described in Section 5B.6.4. The system will serve as a dry-pipe system during the winter months and will be converted to a wet-pipe system during the summer (occupied) periods as described in Sprinkler Option 2 in Section 5.4.2.

If this option is selected the number of components will be similar to the system described in Section 5B.5.4; however all piping will be internally galvanized to reduce the corrosion risk.

Key advantages of this option:

- Potentially a lower water application rate and resultant damage from sprinkler operation due to the lower number of sprinklers that will be needed. The required water volume may also be reduced by engineering.
- The system can be sized to comply with water service capabilities.
- Reduced water demand (approximately 30%) during periods when the system is wet-pipe.
- Faster sprinkler response (approximately one minute) when the system is wet.

- Reduced aesthetic impact by removing sprinkler piping from the center of the ceiling and locating it out of the normal line of site.
- Possible reduced sprinkler pipe dimensions due to hydraulic design techniques.

Key disadvantages of this option:

- Costs associated with installing the new system.
- Increased costs associated with the twice per year conversion effort.
- Continued aesthetic impact.
- Disruptions associated with the installation effort. This can be minimized by installing the system during winter periods.
- Potentially higher water application rates (30%) when the due system is dry-pipe.
- Longer response times (up to one minute) when the system is dry-pipe.
- Reduced design flexibility associated with dry systems when compared to wet systems. Consequently this can result in greater aesthetic impact due to the draining requirements of dry systems.
- Possible pipe corrosion from conversions between dry-pipe and wet-pipe modes. This will be reduced by utilizing galvanized pipe.

5B.6.7. Sprinkler Option 7 - Replace the Existing Sprinkler System with a New Seasonal System, Concealed Piping

Under this option a new system will be installed with exposed piping that is installed to reduce the aesthetic impact of the present sprinkler arrangement. System design will be similar to Sprinkler Option 5 as described in Section 5.4.5. The system will serve as a dry-pipe system during the winter months and will be converted to a wet-pipe system during the summer occupied periods as described in Sprinkler Option 2 in Section 5.4.2.

If this option is selected the number of components will be similar to the system described in Section 5B.6.5

Key advantages of this option:

- Potentially a lower water application rate and resultant damage from sprinkler operation due to the lower number of sprinklers that will be needed. The required water volume may also be reduced by engineering.
- The system can be sized to comply with water service capabilities.
- Reduced water demand (approximately 30%) when the system is wet-pipe.
- Faster sprinkler response (approximately one minute) when the system is wet.
- Relatively low aesthetic impact by concealing piping above ceilings and behind walls. Impact may be further reduced by using concealed sprinkler heads with matching finishes.
- Possible reduced sprinkler pipe dimensions due to hydraulic design techniques.

Key disadvantages of this option:

- Costs associated with installing the new system.
- Possible damage to wall and ceiling fabric during installation.
- Increased costs associated with the twice per year conversion effort.
- Disruptions associated with the installation effort. This can be minimized by installing the system during winter periods.
- Potentially higher water application rates (30%) when the due system is dry-pipe.

- Longer response times (up to one minute) when the system is dry-pipe.
- Reduced design flexibility associated with dry systems when compared to wet systems. Consequently this can result in greater aesthetic impact due to the draining requirements of dry systems.
- Possible pipe corrosion from conversions between dry-pipe and wet-pipe modes. This will be reduced by utilizing galvanized pipe.

5B.6.8. Sprinkler Option 8 - Replace the Existing Sprinkler System with a New Combined Wet and Dry System, Exposed Piping

This option would replace the existing sprinkler system with a new wet-pipe sprinkler system throughout most areas of the building. Limited area dry-pipe zones would be provided in attics and behind knee walls that are subject to freezing. Piping would be exposed as in Option 2 presented in Section 5.4.2.

If this option is selected the estimated components are as follows:

- New dry-pipe valve with compressor, trim..... 1
- New wet-pipe alarm valve with trim 1
- New fire department siamese connection..... 1
- Third Basement/Crawl Space sprinkler heads with pipe 90
- Second Basement sprinkler heads with pipe 100
- Second Basement freezer/refrigerator dry-pendent heads with pipe..... 10
- First Basement sprinkler heads with pipe 80
- First Floor sprinkler heads with pipe 75
- Second Floor sprinkler heads with pipe 85
- Third Floor/Attic sprinkler heads with pipe 110
- Inspector's test fittings 2

Note that this does not include exterior sprinkler protection, which will be covered in Section 5B.7.

Key advantages of this option:

- Lower water application rate and resultant damage from sprinkler operation due to the lower number of sprinklers that will be needed. The required water volume may also be reduced by engineering.
- The system can be sized to comply with water service capabilities.
- Reduced water demand for wet-pipe protected areas.
- Faster sprinkler response (approximately one minute) for wet-pipe protected areas.
- Reduced aesthetic impact by removing sprinkler piping from the center of the ceiling and locating it out of the normal line of site.
- Possible reduced sprinkler pipe dimensions due to hydraulic design techniques.
- The benefits of wet-pipe systems without the expense of converting them to dry-pipe systems during the operating year.
- Increased design flexibility for sprinkler piping that is located in public spaces. This is the result of avoiding the level of drain points that must occur in comparable dry-pipe systems.

Key disadvantages of this option:

- Costs associated with installing the new system.
- Continued aesthetic impact.
- Disruptions associated with the installation effort. This can be minimized by installing the system during winter periods.
- Must maintain heat in most portions of the building during the winter. Energy costs must be included is the system operating costs.

5B.6.9. Sprinkler Option 9 - Replace the Existing Sprinkler System with a New Combined Wet and Dry System, Concealed Piping

This option would replace the existing sprinkler system with a new wet-pipe sprinkler system throughout most areas of the building. Limited area dry-pipe zones would be provided in attics and behind knee walls that are subject to freezing. Piping would be exposed as in Option 3 presented in Section 5.4.3.

If this option is selected the estimated components are as follows:

- New dry-pipe valve with compressor, trim..... 1
- New wet-pipe alarm valve with trim 1
- New fire department siamese connection..... 1
- Third Basement/Crawl Space sprinkler heads with pipe 90
- Second Basement sprinkler heads with pipe 100
- Second Basement freezer/refrigerator dry-pendent heads with pipe..... 10
- First Basement sprinkler heads with pipe 82
- First Floor sprinkler heads with pipe 92
- Second Floor sprinkler heads with pipe 100
- Third Floor/Attic sprinkler heads with pipe 80
- Attic sprinkler heads with pipe 28
- Inspector's test fittings 2

Note that this does not include exterior sprinkler protection, which will be covered in Section 5B.7.

Key advantages of this option:

- Lower water application rate and resultant damage from sprinkler operation due to the lower number of sprinklers that will be needed. The required water volume may also be reduced by engineering.
- The system can be sized to comply with water service capabilities.
- Reduced water demand for wet-pipe protected areas.
- Faster sprinkler response (approximately one minute) for wet-pipe protected areas.
- Low aesthetic impact.
- Possible reduced sprinkler pipe dimensions due to hydraulic design techniques.
- The benefits of wet-pipe systems without the expense of converting them to dry-pipe systems during the operating year.
- Increased design flexibility for sprinkler piping that is located in public spaces. This is the result of avoiding the level of drain points that must occur in comparable dry-pipe systems.

Key disadvantages of this option:

- Costs associated with installing the new system.
- Continued aesthetic impact.
- Potential wall and ceiling fabric impact and/or damage.
- Disruptions associated with the installation effort. This can be minimized by installing the system during winter periods.
- Must maintain heat in most portions of the building during the winter. Energy costs must be included in system operating costs.

Attached drawings SP-1 through SP-6 illustrate sprinkler concepts for each of the described options.

5B.7. Exterior Fire Suppression Options

5B.7.1. Exterior Sprinkler Option 1 - Retain the Existing System

This option will retain the existing roof system but will relocate the control valve to the Third Basement where it is readily accessible. The material estimate is estimated at 260 feet of 3-inch pipe plus one control valve. Protection of the building sides will be provided by firefighters applying water or fire retardant chemicals.

Key advantages of this option are:

- Retains historic feature of building.
- Minimal aesthetic impact by avoiding pipes on the side of the building.
- Minimal installation and maintenance cost.

Disadvantages of this option:

- The system does not provide protection for the building sides.
- Wall protection is dependent upon firefighters setting up water spray equipment.
- Potential fabric damage associated with chemical applications.
- Danger to fire fighters due to dead-end ravine.

5B.7.2. Exterior Sprinkler Option 2 - Provide A Single New Deluge System Along The Building Perimeter, Manual Control

This option will add an exterior deluge sprinkler system around the perimeter of the building. Piping will be located along eaves and under overhangs. If the exterior veranda is reinstalled a separate pipe will be added to cover the space under the veranda. This system will be a single zone so that the entire building exterior is sprayed at once.

Advantages of this option:

- The building siding is wetted, improving fire resistance.
- As a single zone the building is protected against a shifting fire that threatens multiple sides.

Key disadvantages of this option:

- Aesthetic impact associated with placing piping along the building exterior. This can be reduced by careful engineering and coordination with the architect.

- Installation and maintenance costs.
- A very high water flow rate that is estimated at 3,500-4,000 GPM. This flow rate will drain the tank (assuming full level in 18-21 minutes. Communication with the NPS Wildland Fire Fighting Agencies indicate that a fire in a box canyon arrangement similar to Oregon Caves can produce a fire of two to three hours duration. Consideration could be given to designing a control system for a reduced flow rate after the initial deluge.

If this option is selected the estimated components are as follows:

- New deluge valve with compressor, trim..... 1
- Deluge sprinkler heads with pipe 130
- Inspector's test fittings 1

5B.7.3. Exterior Sprinkler Option 3 - Provide A Single New Deluge System Along The Building Perimeter, Automatic Or Manual Control

This option will add an exterior deluge sprinkler system around the perimeter of the building. Piping will be located along eaves and under overhangs. If the exterior veranda is reinstalled a separate pipe will be added to cover the space under the veranda. This system will be a single zone so that the entire building exterior is sprayed at once. The system will be activated by a manual release valve or by a network of thermally activated fire sensors along the building perimeter.

Advantages of this option:

- The building siding is wetted, improving fire resistance.
- As a single zone the building is protected against a shifting fire that threatens multiple sides.
- Automatic activation can prevent the system from activating too early and draining the water supply down before the fire directly threatens the building.

Key disadvantages of this option:

- Damage to historic fabric if system is accidentally set off.
- Aesthetic impact associated with placing piping along the building exterior. This can be reduced by careful engineering and coordination with the architect.
- Higher aesthetic impact from the added detection system.
- Installation and maintenance costs.
- A very high water flow rate that is estimated at 3,500-4,000 GPM. This flow rate will drain the tank (assuming full level) in 18-21 minutes. Communication with the NPS Wildland Fire Fighting Agencies indicate that a fire in a box canyon arrangement similar to Oregon Caves can produce a fire of two to three hours duration.

If this option is selected the estimated components are as follows:

- New deluge valve with compressor, trim..... 1
- Deluge sprinkler heads with pipe 130
- Inspector's test fittings 1
- New thermal sensors connected to the building fire alarm system 65

5B.7.4. Exterior Sprinkler Option 4 - Zoned Deluge System Along The Building Perimeter, Manual Control

This option will add an exterior deluge sprinkler system around the perimeter of the building. Piping will be located along eves and under overhangs. If the exterior veranda is reinstalled a separate pipe will be added to cover the space under the veranda. This system will be piped into four zones covering the side(s) of the building that are immediately threatened.

Advantages of this option:

- The building siding is wetted, improving fire resistance.
- The quantity of water is conserved since fewer sides are wetted at once.

Key disadvantages of this option:

- Aesthetic impact associated with placing piping along the building exterior. This can be reduced by careful engineering and coordination with the architect.
- Installation and maintenance costs.
- A high water flow rate that is estimated at 1,200-1,500 GPM for a single side up to 3,500-4,000 GPM if all sides are wetted. This flow rate will drain the tank (assuming full level) in 50-62 minutes for the single largest side, down to 18-21 minutes if all sides are flowing.
- Risk to unprotected areas if fire changes direction.

If this option is selected the estimated components are as follows:

- New deluge valve with compressor, trim..... 4
- Deluge sprinkler heads with pipe 130
- Inspector's test fittings 4

5B.7.5. Exterior Sprinkler Option 5 - Provide A New Deluge System In Four Zones Along The Building Perimeter, Automatic Or Manual Control

This option will combine the four zone concept of Option 4 and add an automatic detection component similar to Option 3.

Advantages of this option:

- The building siding is wetted, improving fire resistance.
- The water quantity is conserved.
- Automatic activation can prevent the system from activating too early and draining the water supply down before the fire directly threatens the building.

Key disadvantages of this option:

- Aesthetic impact associated with placing piping along the building exterior. This can be reduced by careful engineering and coordination with the architect.
- Higher aesthetic impact from the added detection system.
- Installation and maintenance costs.

If this option is selected the estimated components are as follows:

- New deluge valve with compressor, trim..... 4
- Deluge sprinkler heads with pipe 130
- Inspector's test fittings 4
- New thermal sensors connected to the building fire alarm system 65

5B.8. Deluge Water Supply Improvements

The existing water supply system was designed for the interior fire sprinkler system. Based on the hydraulic analysis the system should be able to provide an adequate water quantity for at least one hour, offering an opportunity for the fire department to respond. If an exterior water spray deluge system is added, the system will only provide water for approximately 18-50 minutes, depending on the type of system that is selected. To increase deluge duration for the potential fire duration additional tanks should be added to increase the total storage capacity to approximately 720,000 gallons. This will require an additional 645,000 gallons of stored water, manifolded into the present water main.

5C. STRUCTURAL RECOMMENDATIONS

A limited structural evaluation of the Oregon Caves Chateau has been performed. This six-level wood framed structure with some concrete walls in the lower three levels is generally in good structural condition. Some out of plumb walls exist on the northern side, possibly caused by weak vertical sheathing and the 1964 mud flow.

To enhance the structural system, we recommend consideration be given to the following:

- Adding plywood sheathing to selected walls in the upper stories to improve potential seismic performance. The structure is quite weak in the upper guest floors as evidenced by the permanent distortion apparently caused by the mud flow. This will entail removal of existing fiberboard finish and covering the plywood with new gypsum board.
- Rotten log roof support brackets at the roof need to be replaced. These may be decorative rather than structural.
- The structure can support the weight of a gypsum board ceiling system to improve fire resistance if that is recommended.
- Exterior fire escapes, if they are to remain, should be thoroughly inspected for structural adequacy. If a new balcony/porch structure is to be added on the west side of the building, it should have a structural system that enhances the overall building rather than simply being a lean-to type structure increasing seismic demands on existing building elements.

5D. MECHANICAL RECOMMENDATIONS

5D.1. Heating and Ventilation

There are no significant recommendations for the steam heating system. This central plant is essentially new. Periodic maintenance replacement of radiator supply valves could be considered, but this is not an urgent recommendation. As the facility is open to the public only during the warmer months, optimal control for comfort is not a primary concern. The radiators will probably never break; however the piping may have deteriorated over time. Therefore, it is strongly recommended that the steam system pipes be "sampled" in about six or eight locations. Because of the age of the piping, the internal condition is suspect. Erosion wears away the wall of

steam piping, and minerals (scale) builds up on the condensate piping. The condensate piping is usually the most susceptible to damage over time. Taking samples in select locations would allow a reasonable forecast of piping replacement. Should significant deterioration be identified, piping replacement may be required.

Chemical treatment of steam and condensate systems prolongs the life of the piping, boiler and components. We recommend that a way be provided to add chemicals to the steam and condensate system so that treatment chemicals may easily be introduced.

We recommend replacement of the underground fuel storage system with a system that complies with State and Federal spill containment criteria. Such replacement is not mandatory for use for heating fuel. However, replacement of this tank is required by the Code of Federal Regulations for generator facilities. Regardless of the nature of the codes, the potential for leakage increases each year as the portion of the system underground deteriorates. The cost to deal with it now would be less than the cost to clean up a fuel spill later.

The exhaust fan for the main kitchen hood is recommended for replacement, and the exterior duct re-configured. There are a number of configurations that could be considered. A new fan in the same location could be provided, and a non-combustible material provided over the cedar bark siding. The duct could be run up the side of the building to the roof, and an upblast fan installed atop the duct. The duct could be run down to the ground to a fan, then up and out to the point of discharge. There are some critical distances involved with the location of a kitchen duct discharge. It must be forty inches above a roof, ten feet away from a building and ten feet above ground. The distance away from a building may be reduced to five feet if the exit from the discharge is pointed away from the building.

There is a code requirement for a make-up air system in the kitchen. Kitchen hood make-up air systems have been added to the model codes over the last ten or fifteen years. Even though this is a code item, we do not have a strong recommendation in this regard. The building is of loose construction, with plenty of openings for infiltration air. The air will have to be drawn from other areas of the building, increasing the building air movement somewhat when the kitchen hood fan is activated. This is not a bad thing for a building used only during the summer months. We have provided a cost for an air handling system for programming purposes.

If the existing range in the Employee Dining Room/Kitchen is to remain in use, a new hood, exhaust fan and make-up air system will be required. As the concessionaire has noted that they do not plan to use this kitchen, and we have not made further recommendations, or included costs for upgrading this area.

5D.2. Plumbing

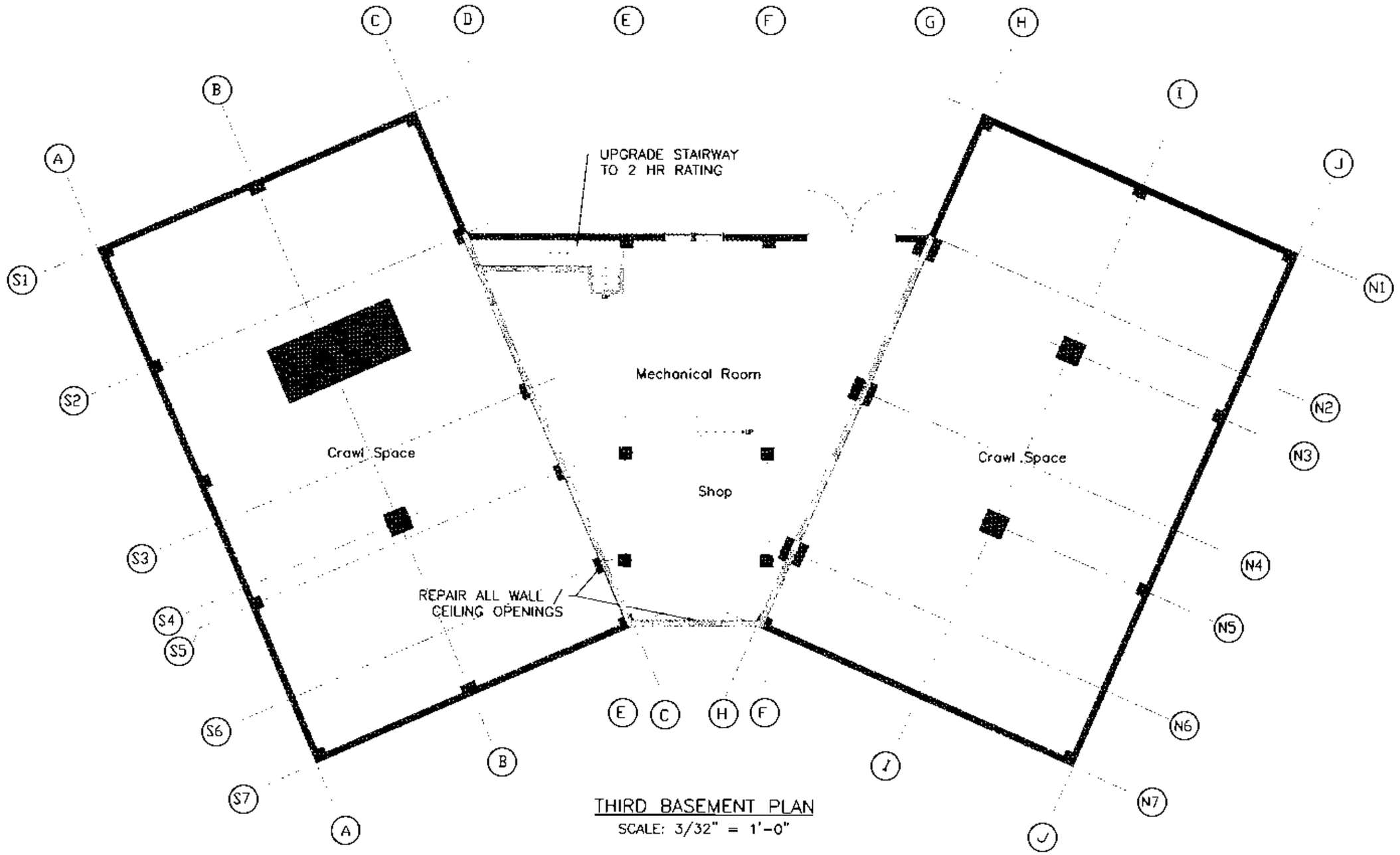
We recommend sampling the plumbing water supply piping because of its age and the materials of construction (steel). This is the same methodology and justification as the recommendation for the steam system. Pipe that experiences the most scale formation is the hot water and hot water recirculation piping. There are no other recommendations for the water or waste piping systems. Should excessive scale or corrosion be identified, piping systems may have to be replaced.

The existing plumbing features have been identified as contributing to the historic character of the Chateau. The existing lavatory trim (faucets) are wearing out and it appears that continued use will become unfeasible because of lack of available parts. It is recommended that the trim be replaced with currently available historic reproduction fixtures on an as-needed basis.

5E. ELECTRICAL RECOMMENDATIONS

The following upgrades are recommended to address life-safety issues:

- Enhance egress and exit identification lighting to current codes.
- Install additional receptacle outlets to comply with the National Electrical Code to include general lighting outlets in guest rooms and guest bathrooms, adjacent to the basin.
- Provide additional branch circuit wiring for increased receptacle quantity with separate 20-ampere circuits to guest bathroom outlets in accordance with the National Electrical Code.
- Evaluate the existing service and power distribution system to determine if capacity is sufficient to support possible additional loads imposed by additional lighting, receptacle or mechanical equipment upgrades. Install electrical ampere data loggers to existing distribution equipment to obtain accurate existing demand information. Increase capacity of service and distribution, if required.
- Provide a Protected Premises Fire Alarm System in accordance with the International Building Code and the National Fire Alarm Code. Install full coverage smoke detection, manual pull stations and audio/visual notification devices throughout the facility. Provide connections to kitchen hood fire suppression system, fire sprinkler for water-flow and valve tamper. If elevator is installed, connect to fire alarm system for Phase l Fire Fighter Recall and automatic power disconnect when heat is detected in the machine room or hoistway. Connect system to 24-hour U. L. listed monitoring service.



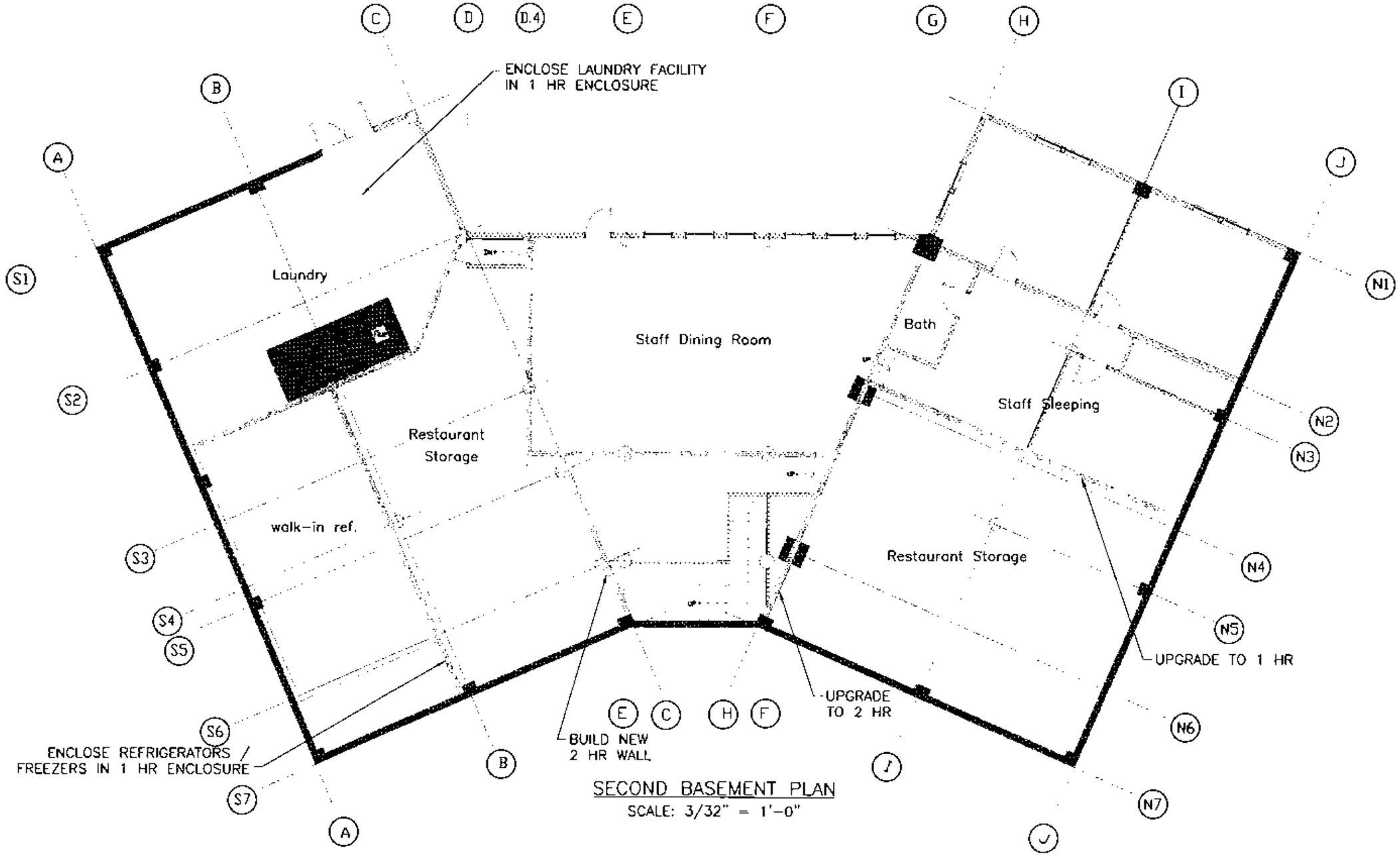
THIRD BASEMENT PLAN

SCALE: 3/32" = 1'-0"

NOTES:

1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

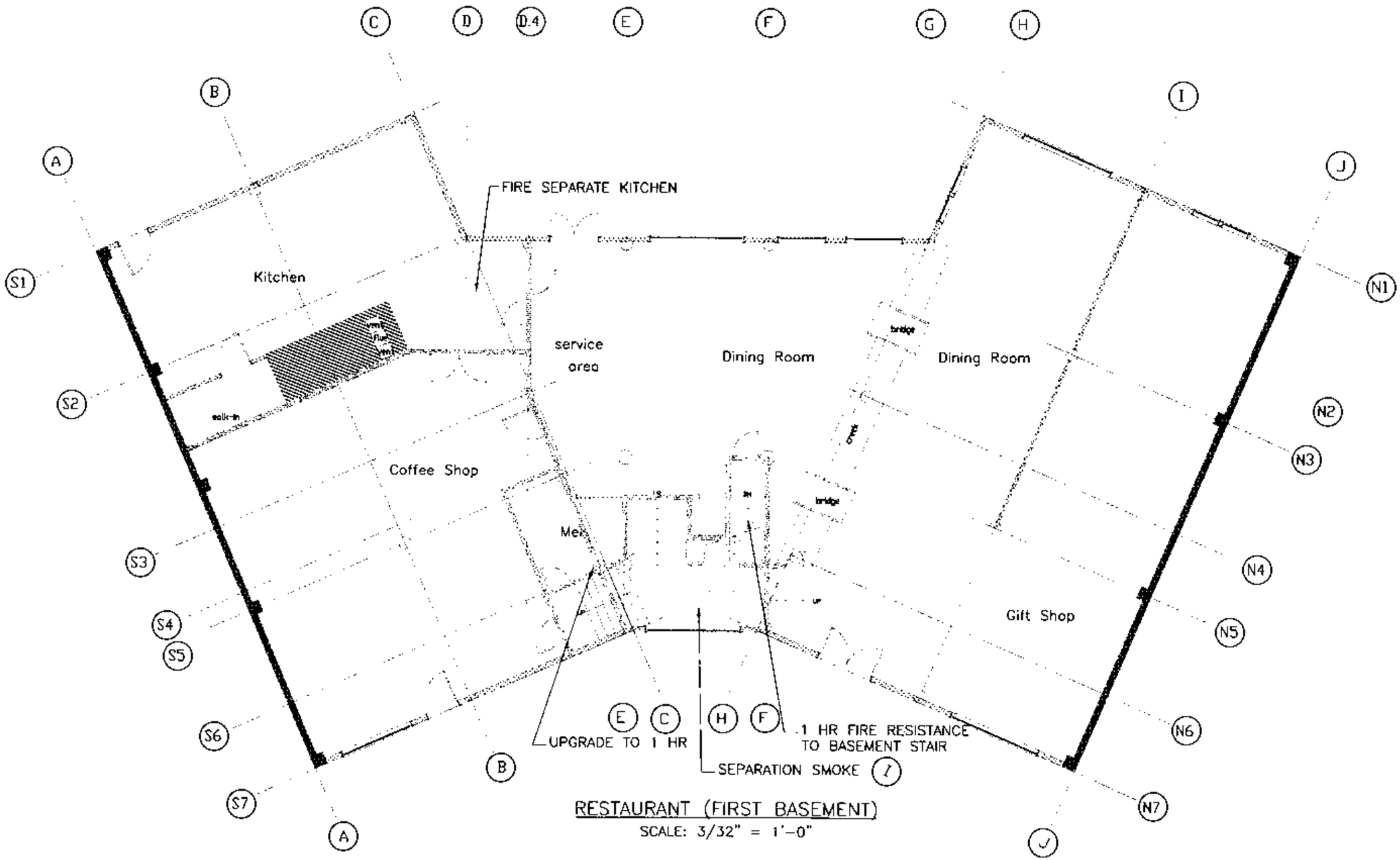
DESIGNED: N. ARTIM	SUB SHEET NO.	TITLE OF SHEET: FIRE SAFETY CONCEPT	DRAWING NO.
DRAWN: J. LAROCQUE	FS1	FIRE RESISTANCE THIRD BASEMENT	PKG NO. / SHEET / OF
TECH. REVIEW:		OREGON CAVES NATIONAL PARK	
DATE: 12/20/04			



SECOND BASEMENT PLAN
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

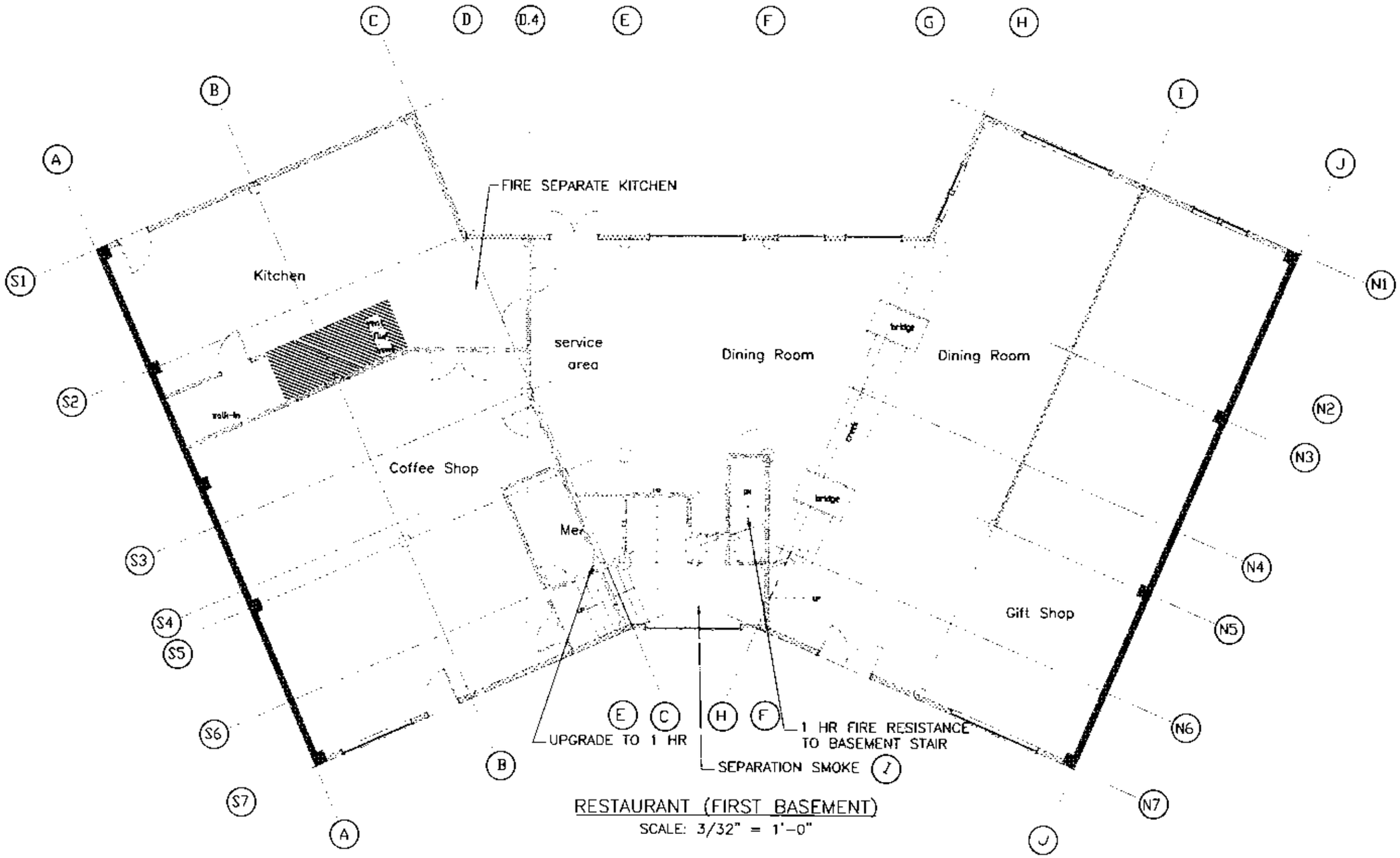
DESIGNED: N. ARTEM CHKD: J. LAROCQUE TECH. REVIEW: DATE: 12/20/04	SUB SHEET NO. FS2	TITLE OF SHEET FIRE SAFETY CONCEPT FIRE RESISTANCE SECOND BASEMENT OREGON CAVES NATIONAL PARK	DRAWING NO. PKG. NO. SHEET OF



RESTAURANT (FIRST BASEMENT)

SCALE: 3/32" = 1'-0"

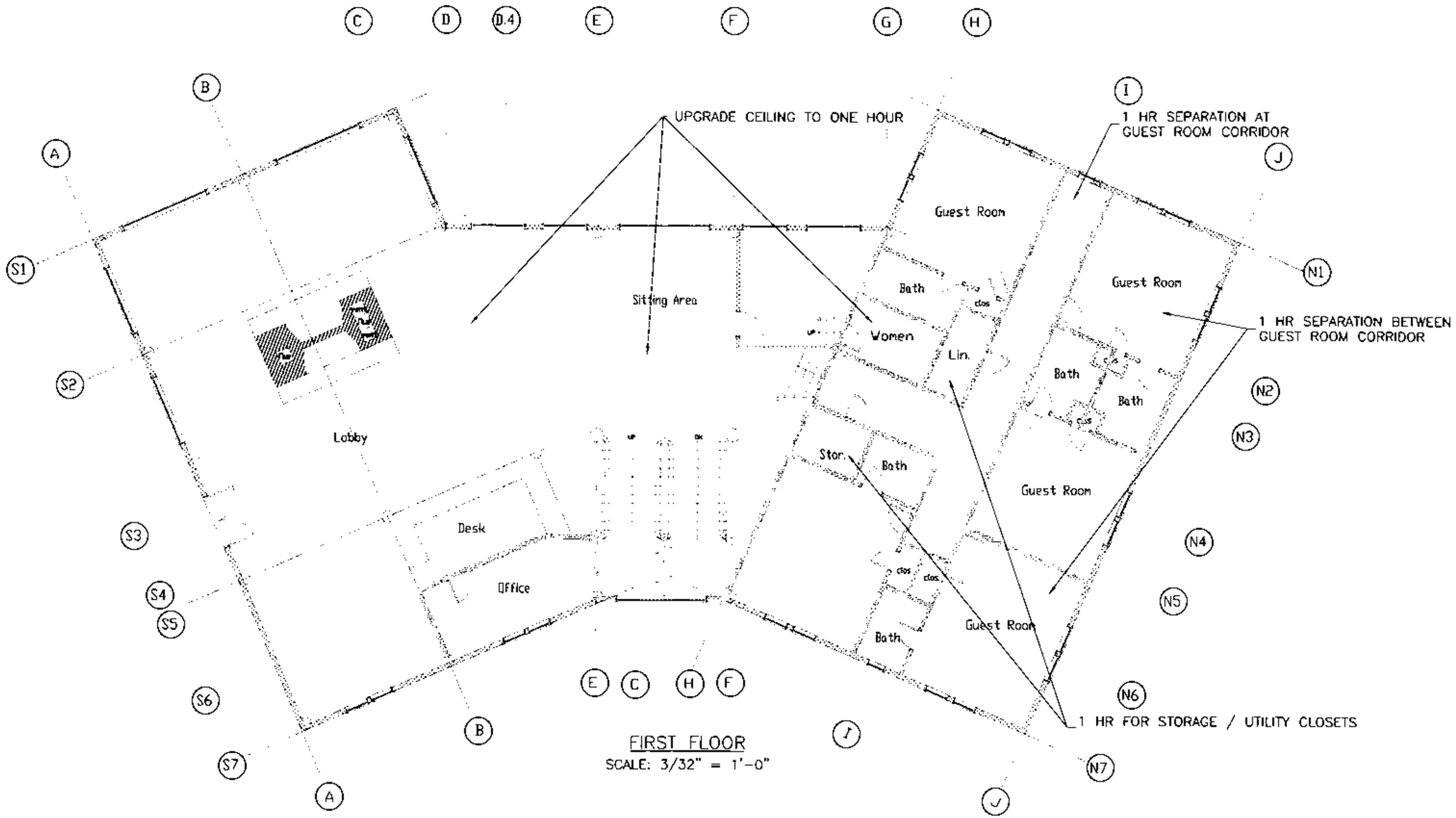
DESIGNED: N. ARTIM	SUB SHEET NO. FS3	TITLE OF SHEET: FIRE SAFETY CONCEPT FIRE RESISTANCE FIRST BASEMENT OREGON CAVES NATIONAL PARK	DRAWING NO.
DRAWN: J. LAROCQUE			PKG. NO. / SHEET / OF
TECH. REVIEW:			
DATE: 12/20/04			



RESTAURANT (FIRST BASEMENT)

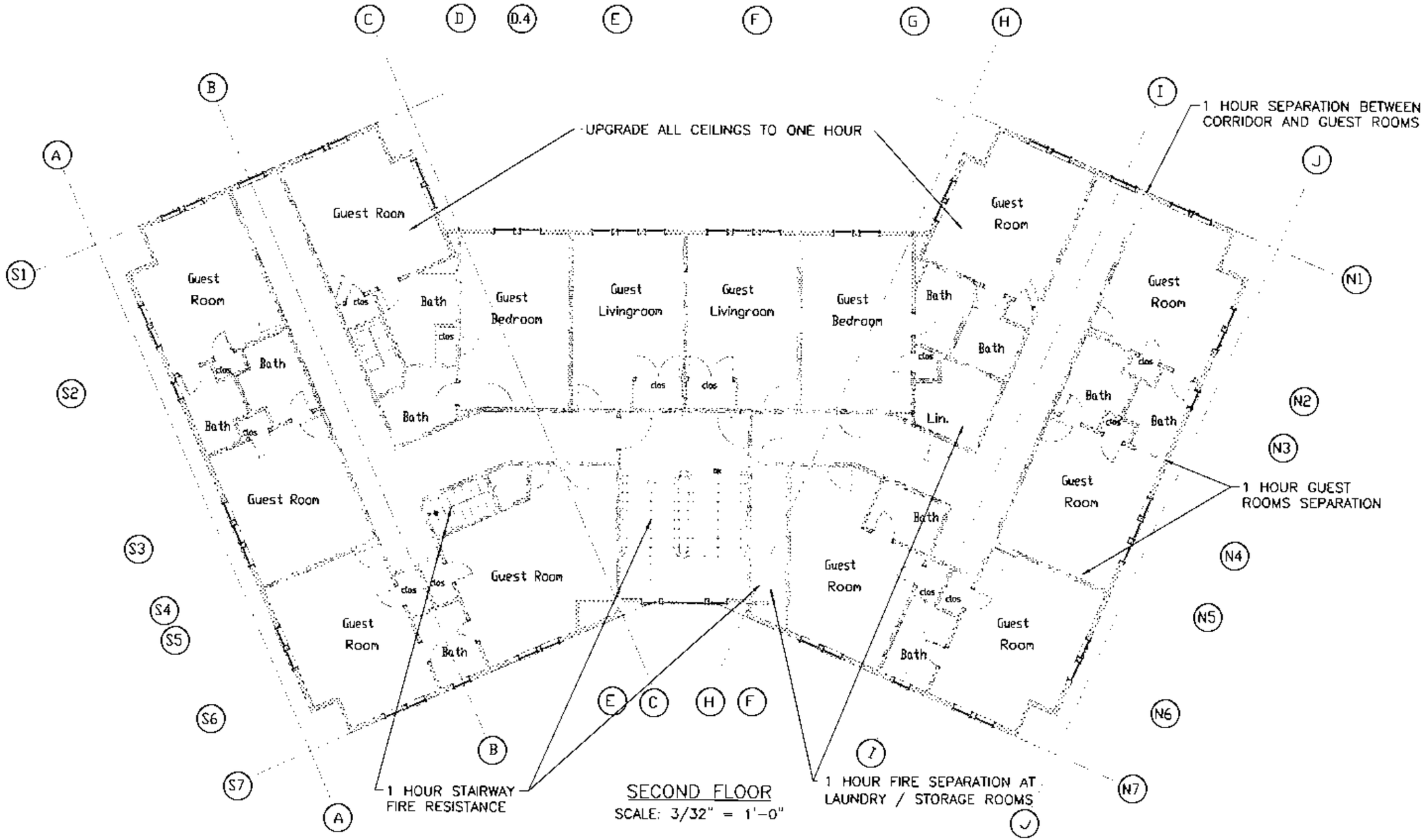
SCALE: 3/32" = 1'-0"

DESIGNED: N. ARTUR DRAWN: J. LAROCQUE TECH. REVIEW: DATE: 12/20/04	SUB SHEET NO. FS3	TITLE OF SHEET FIRE SAFETY CONCEPT FIRE RESISTANCE FIRST BASEMENT OREGON CAVES NATIONAL PARK	DRAWING NO. PKG. NO. SHEET OF



FIRST FLOOR
SCALE: 3/32" = 1'-0"

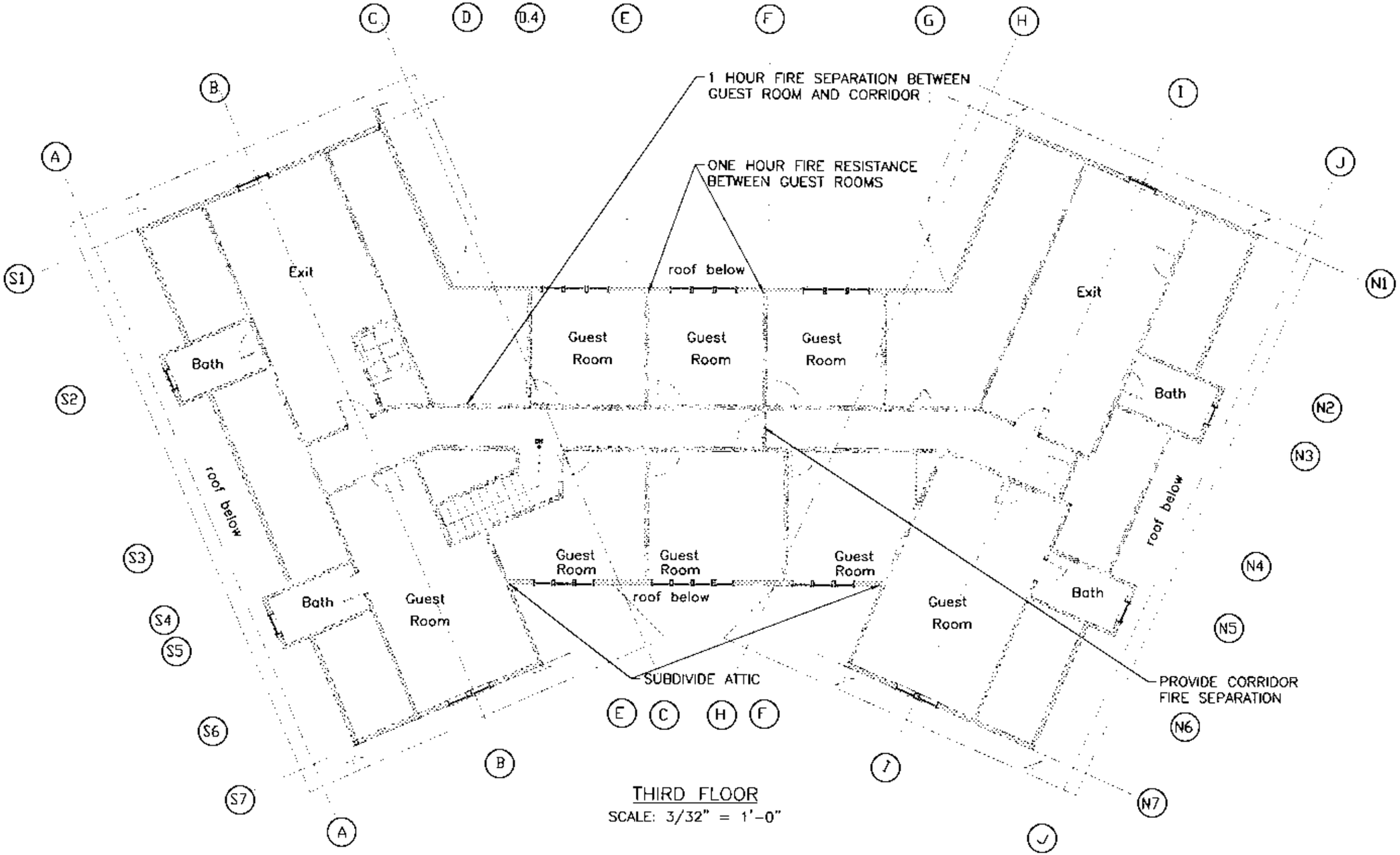
DESIGNED: M. ARTIM	SUB SHEET NO. FS4	TITLE OF SHEET: FIRE SAFETY CONCEPT FIRE RESISTANCE FIRST FLOOR OREGON CAVES NATIONAL PARK	DRAWING NO.
CHKD: J. LAROCQUE			PKG. NO.
TECH. REVIEW:			SHEET OF
DATE: 12/20/04			



SECOND FLOOR

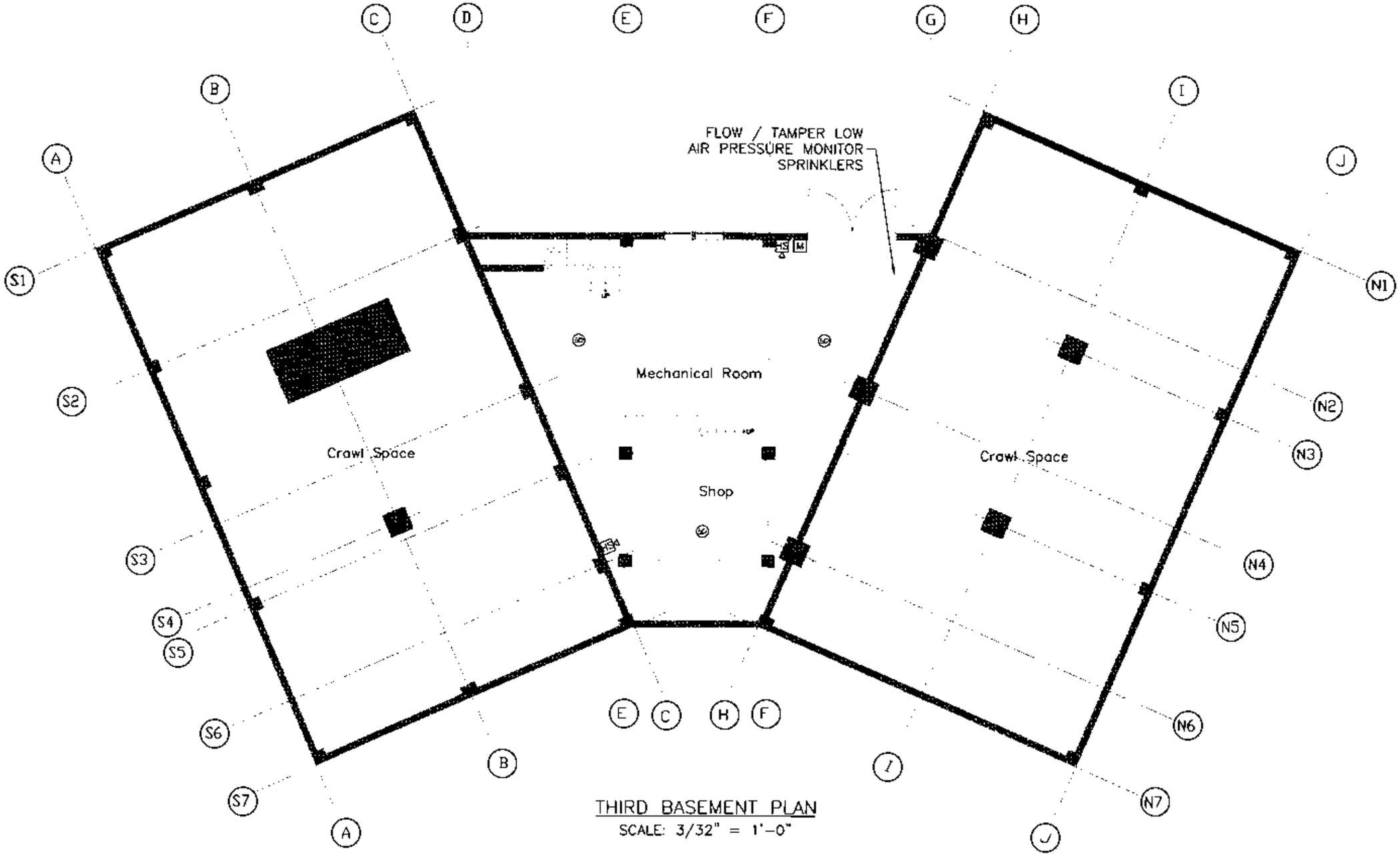
SCALE: 3/32" = 1'-0"

DESIGNED: N. ARTIM; DRAWN: J. LAROCQUE; TECH. REVIEW:	SUB SHEET NO: FS5	TITLE OF SHEET: FIRE SAFETY CONCEPT — FIRE RESISTANCE SECOND FLOOR — OREGON CAVES NATIONAL PARK	DRAWING NO.; PKG. NO.; SHEET; OF
DATE: 12/20/04			



THIRD FLOOR
SCALE: 3/32" = 1'-0"

DESIGNED: H. ARTIM DRAWN: J. LAROCQUE TECH. REVIEW: DATE: 12/20/04	SUB SHEET NO FS6	TITLE OF SHEET FIRE SAFETY CONCEPT FIRE RESISTANCE THIRD FLOOR OREGON CAVES NATIONAL PARK	DRAWING NO. PKG NO. SHEET OF



THIRD BASEMENT PLAN

SCALE: 3/32" = 1'-0"

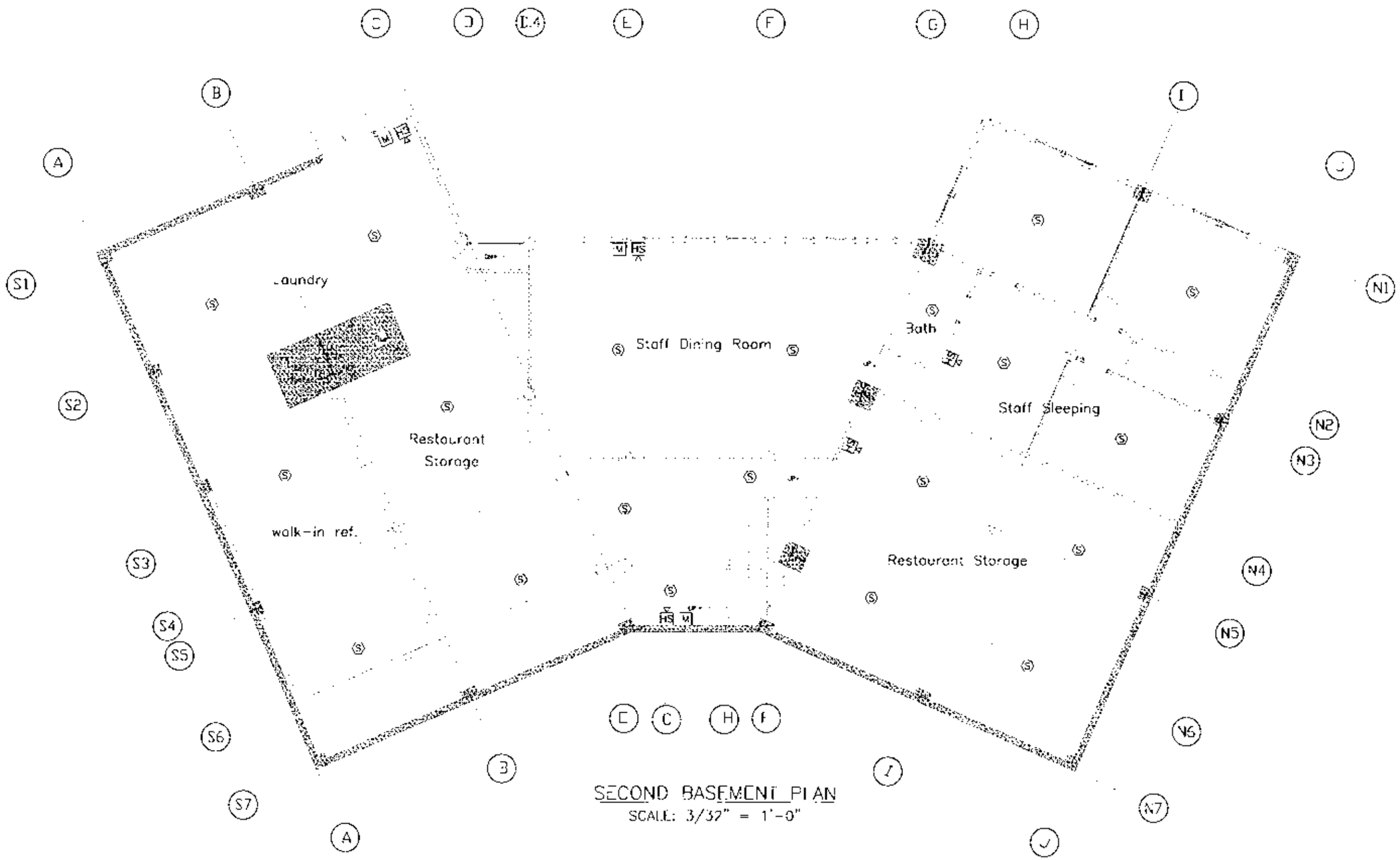
NOTES:

1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

FIRE ALARM KEY:

- STROBE
- HORN/STROBE
- MANUAL ALARM STATION
- SPOT SMOKE SENSOR
- BEAM SMOKE SENSOR TRANSMITTER
- BEAM SMOKE SENSOR RECEIVER
- SMOKE DETECTOR

DESIGNED:	N. ARTIM
DRAWN:	J. LAROCQUE
TECH. REVIEW:	
DATE:	12/20/04
SUB SHEET NO.	FA1
TITLE OF SHEET	FIRE ALARM CONCEPT
	THIRD BASEMENT
	OREGON CAVES NATIONAL PARK
DRAWING NO.	
PKG. NO.	
SHEET	OF



SECOND BASEMENT PLAN
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

FIRE ALARM KEY:

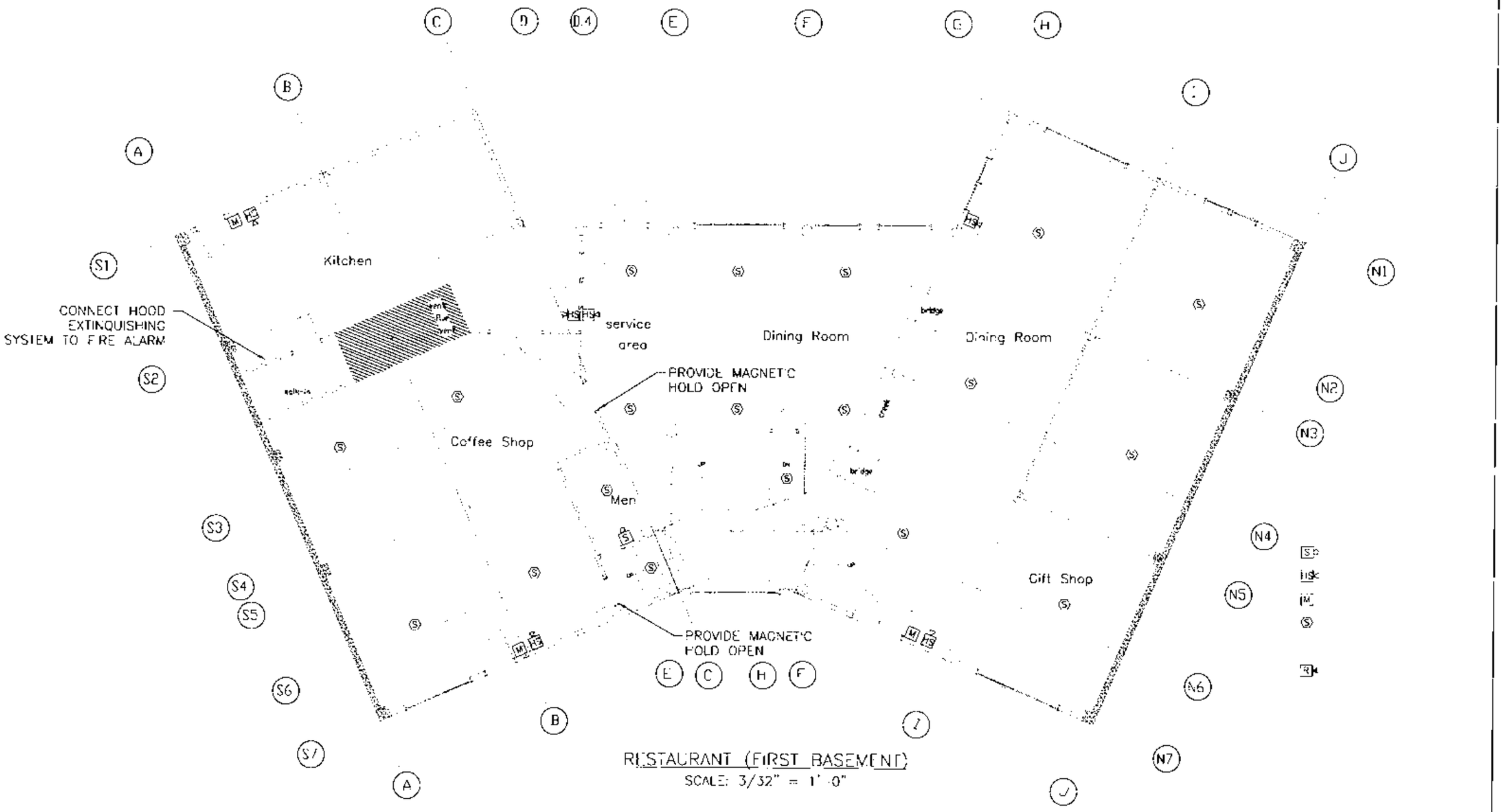
- (S) SPOT SMOKE SENSOR
- (T) BEAM SMOKE SENSOR TRANSMITTER
- (R) BEAM SMOKE SENSOR RECEIVER
- (S) STROBE
- (HS) HORN/STROBE
- (M) MANUAL ALARM STATION

DESIGNED: N. ARTIM
DRAWN: J. LAROCQUE
TECH. REVIEW:
DATE: 12/20/04

SHEET NO: FA2

TITLE OF SHEET: FIRE ALARM CONCEPT
SECOND BASEMENT
OREGON CAVES NATIONAL PARK

DRAWING NO.
PKG. NO.
SHEET



RESTAURANT (FIRST BASEMENT)

SCALE: 3/32" = 1'-0"

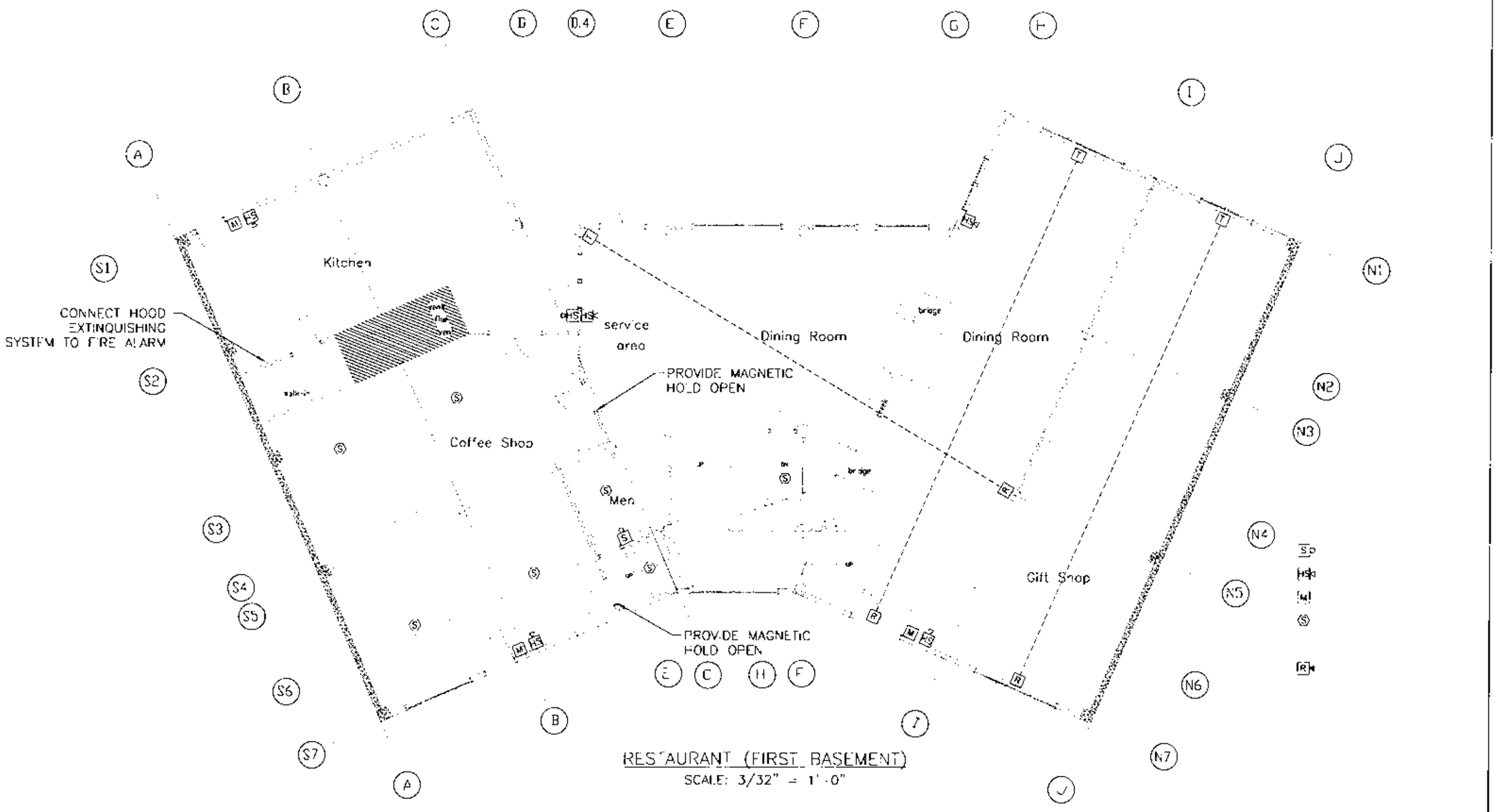
NOTES:

1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

FIRE ALARM KEY:

- (S) STROBE
- (HS) HORN/STROBE
- (M) MANUAL ALARM STATION
- (S) SPOT SMOKE SENSOR
- (T) BEAM SMOKE SENSOR TRANSMITTER
- (R) BEAM SMOKE SENSOR RECEIVER

DESIGNED: N. ARTIM; DRAWN: L. LAROCQUE; TECH. REVIEW:	SUB SHEET NO: FA3A	TITLE OF SHEET: FIRE ALARM CONCEPT OPTION A FIRST BASEMENT OREGON CAVES NATIONAL PARK	DRAWING NO:
DATE: 12/20/04			PKG NO. / SHEET / OF



RESTAURANT (FIRST BASEMENT)

SCALE: 3/32" = 1'-0"

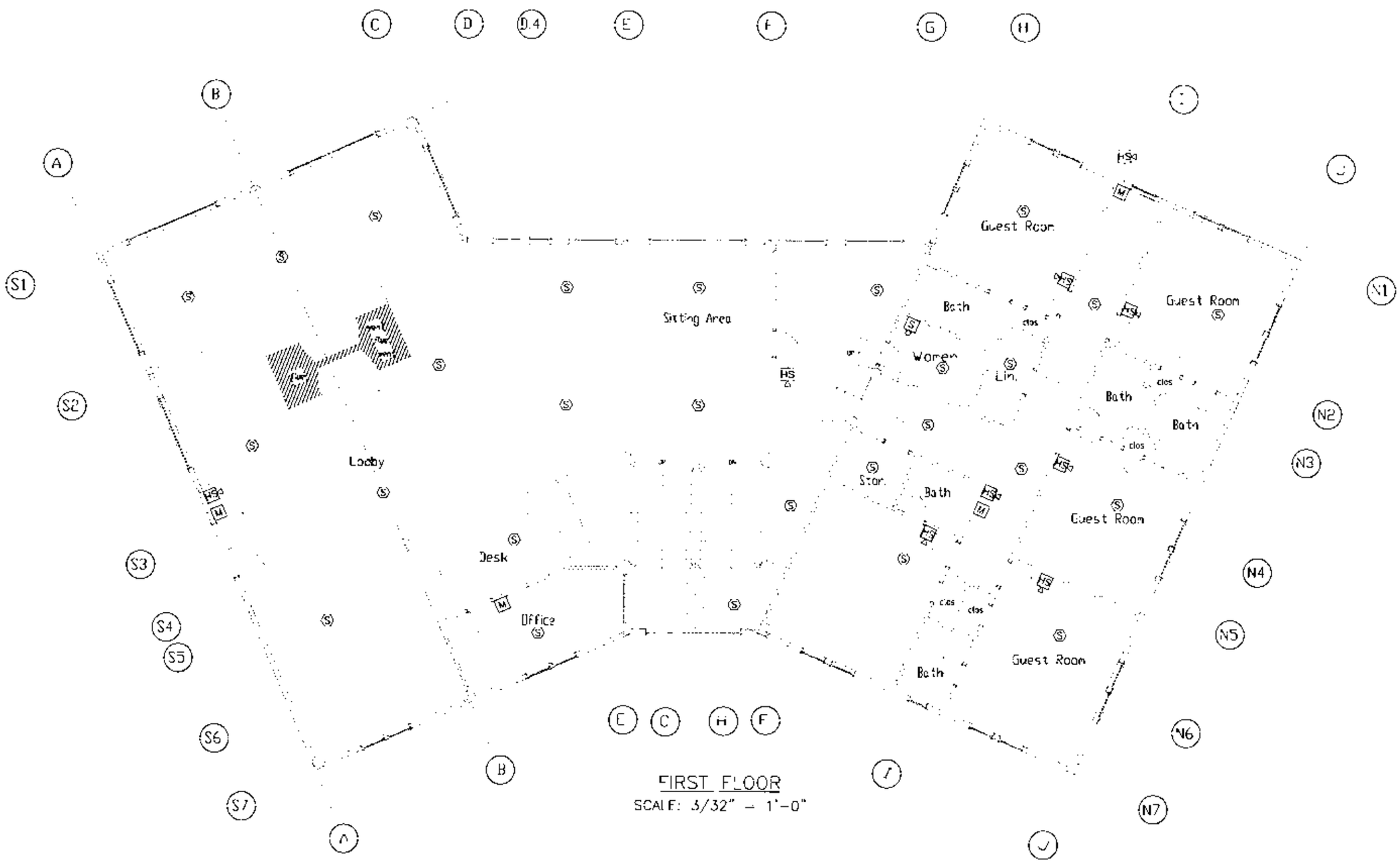
NOTES:

1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

FIRE ALARM KEY:

- Sp STROBE
- HS HORN/STROBE
- M MANUAL ALARM STATION
- S SPOT SMOKE SENSOR
- T BEAM SMOKE SENSOR TRANSMITTER
- R BEAM SMOKE SENSOR RECEIVER

DESIGNED: N. ARTIM; DRAWN: J. LAROCQUE; TECH. REVIEW:	SUB SHEET NO: FA3B	TITLE OF SHEET: FIRE ALARM CONCEPT OPTION B FIRST BASEMENT ORFGON CAVES NATIONAL PARK	DRAWING NO.: - —
DATE: 12/29/04			PKG. NO.: — SHEET: — OF —



FIRST FLOOR

SCALE: 3/32" = 1'-0"

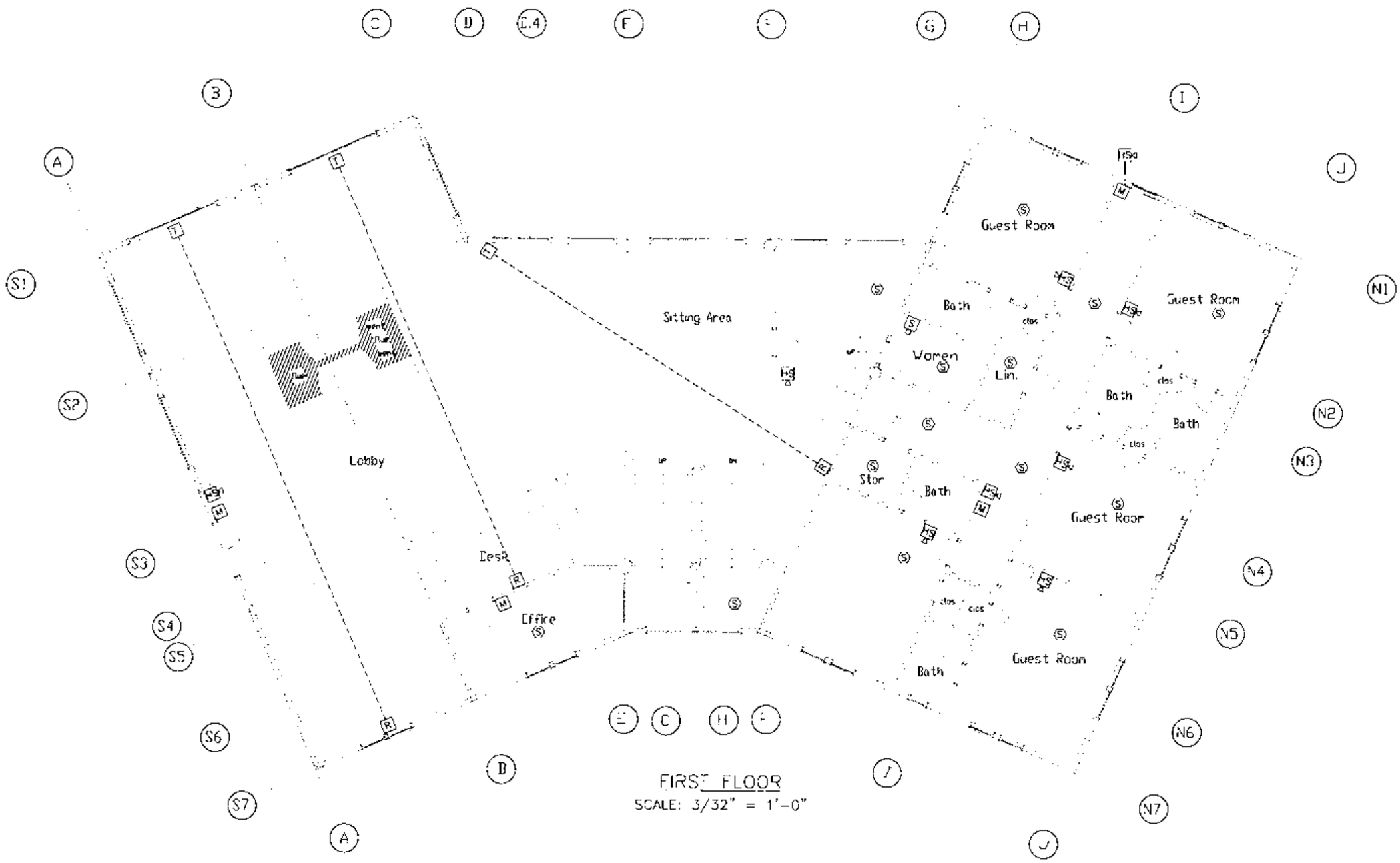
NOTES:

1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

FIRE ALARM KEY:

- (S)P STROBE
- (H)S HORN/STROBE
- (M) MANUAL ALARM STATION
- (S) SPOT SMOKE SENSOR
- (T) BEAM SMOKE SENSOR TRANSMITTER
- (R) BEAM SMOKE SENSOR RECEIVER

DESIGNED: N. ARTW DRAWN: J. ARCCOUL TECH. REVIEW: DATE: 12/20/04	SUB SHEET NO: FA4A	TITLE OF SHEET: FIRE ALARM CONCEPT FIRST FLOOR OREGON CAVES NATIONAL PARK	DRAWING NO. PKG NO. SHEET OF

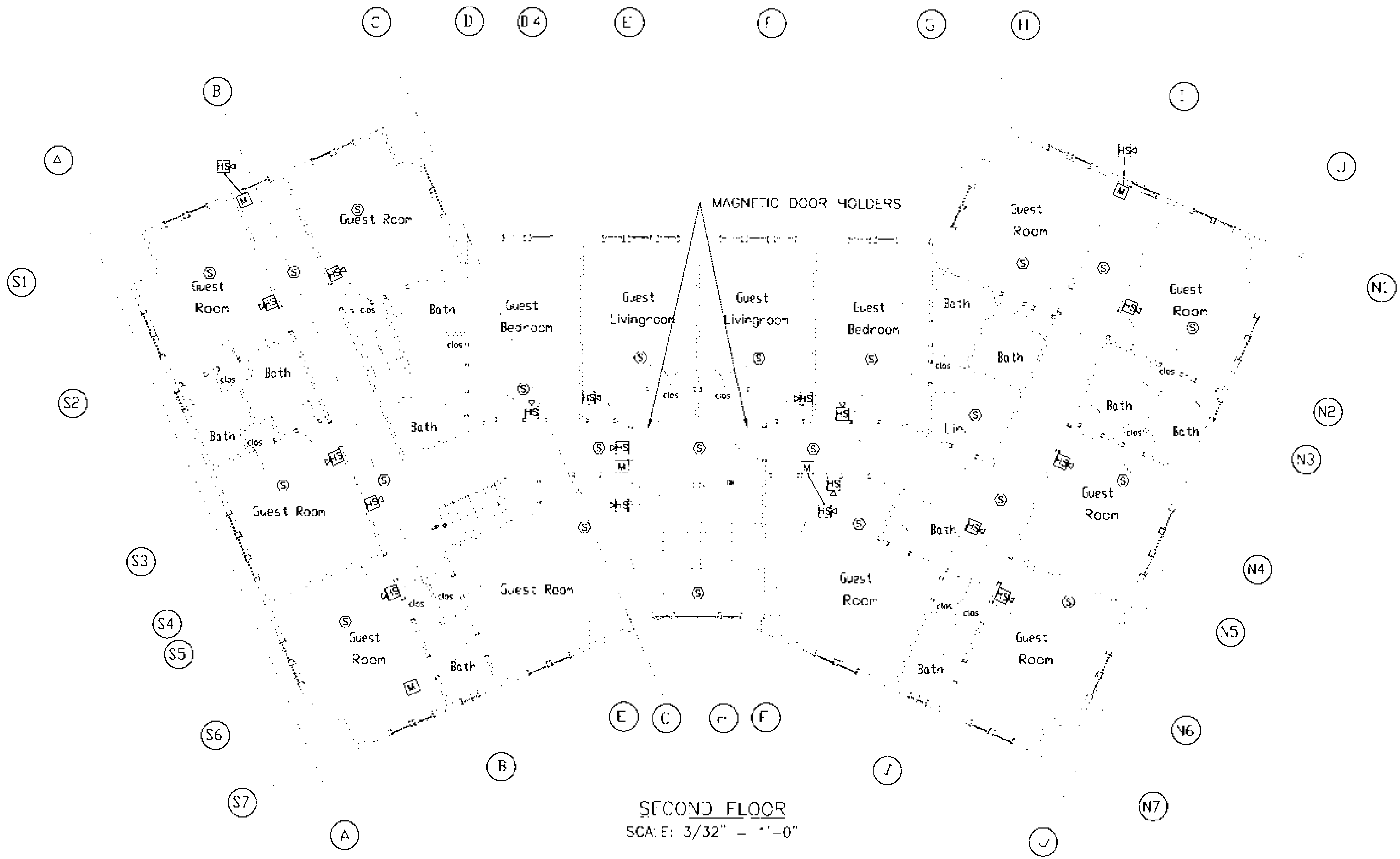


NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

FIRE ALARM KEY:

- (S) STROBE
- Hsc HORN/STROBE
- M MANUAL ALARM STATION
- (S) SPOT SMOKE SENSOR
- [T] BEAM SMOKE SENSOR TRANSMITTER
- [R] BEAM SMOKE SENSOR RECEIVER

DESIGNED: N. ARMM	SUB SHEET NO. FA4B	TITLE OF SHEET: FIRE ALARM CONCEPT	DRAWING NO.
DRAWN: J. LARCOQUE		FIRST FLOOR	PKG. NO. --
TECH. REVIEW		OREGON CAVES NATIONAL PARK	SHEET -- OF --
DATE: 12/20/04			



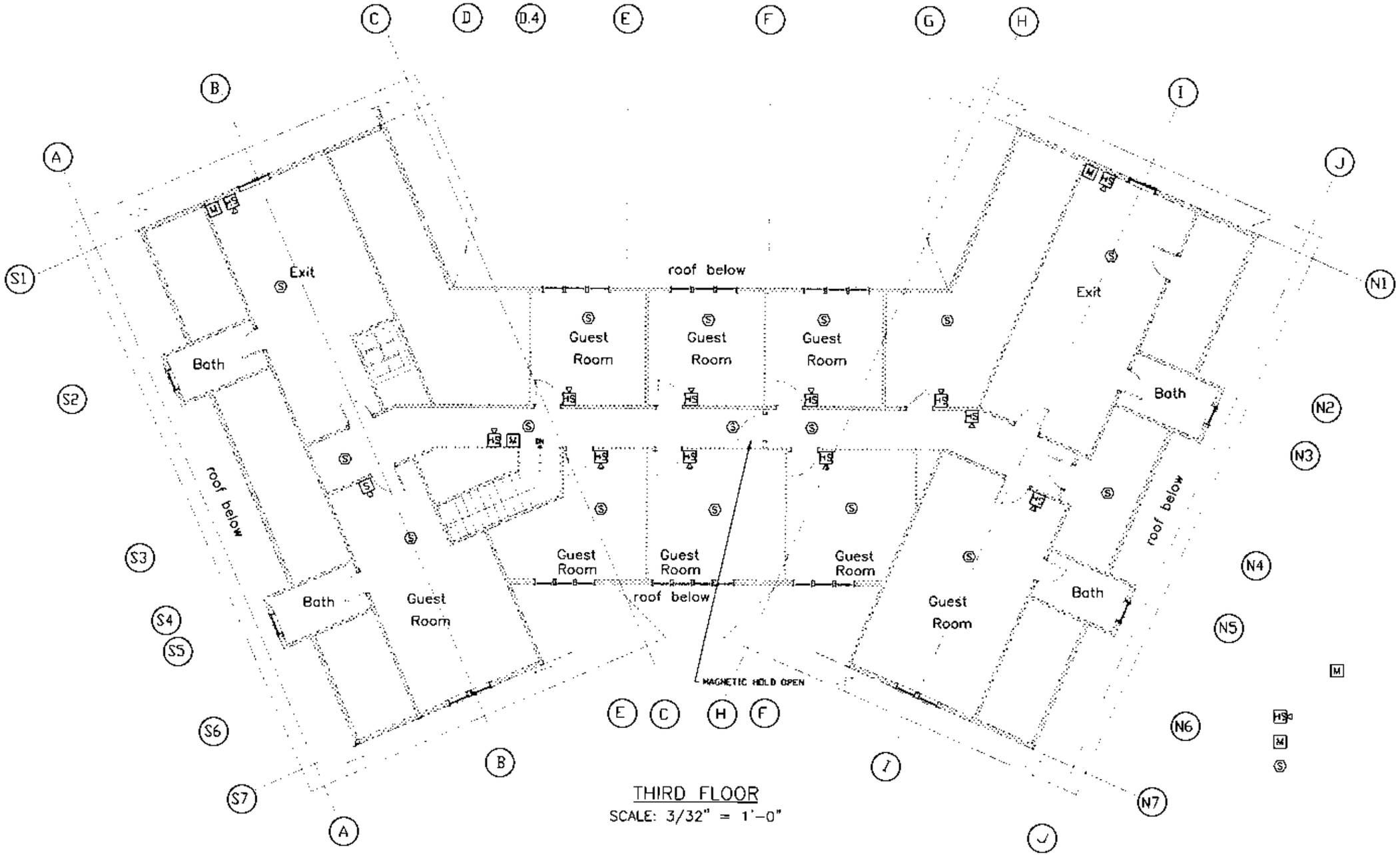
SECOND FLOOR
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

FIRE ALARM KEY:

- S STROBE
- HS HORN/STROBE
- M MANUAL ALARM STATION
- S SPOT SMOKE SENSOR
- T BEAM SMOKE SENSOR TRANSMITTER
- R BEAM SMOKE SENSOR RECEIVER

DESIGNED: N. ARLEN J. LAROCQUE TECH. REVIEW: DATE: 12/20/04	SUB SHEET NO. FA5	TITLE OF SHEET: FIRE ALARM CONCEPT SECOND FLOOR OREGON CAVES NATIONAL PARK



THIRD FLOOR

SCALE: 3/32" = 1'-0"

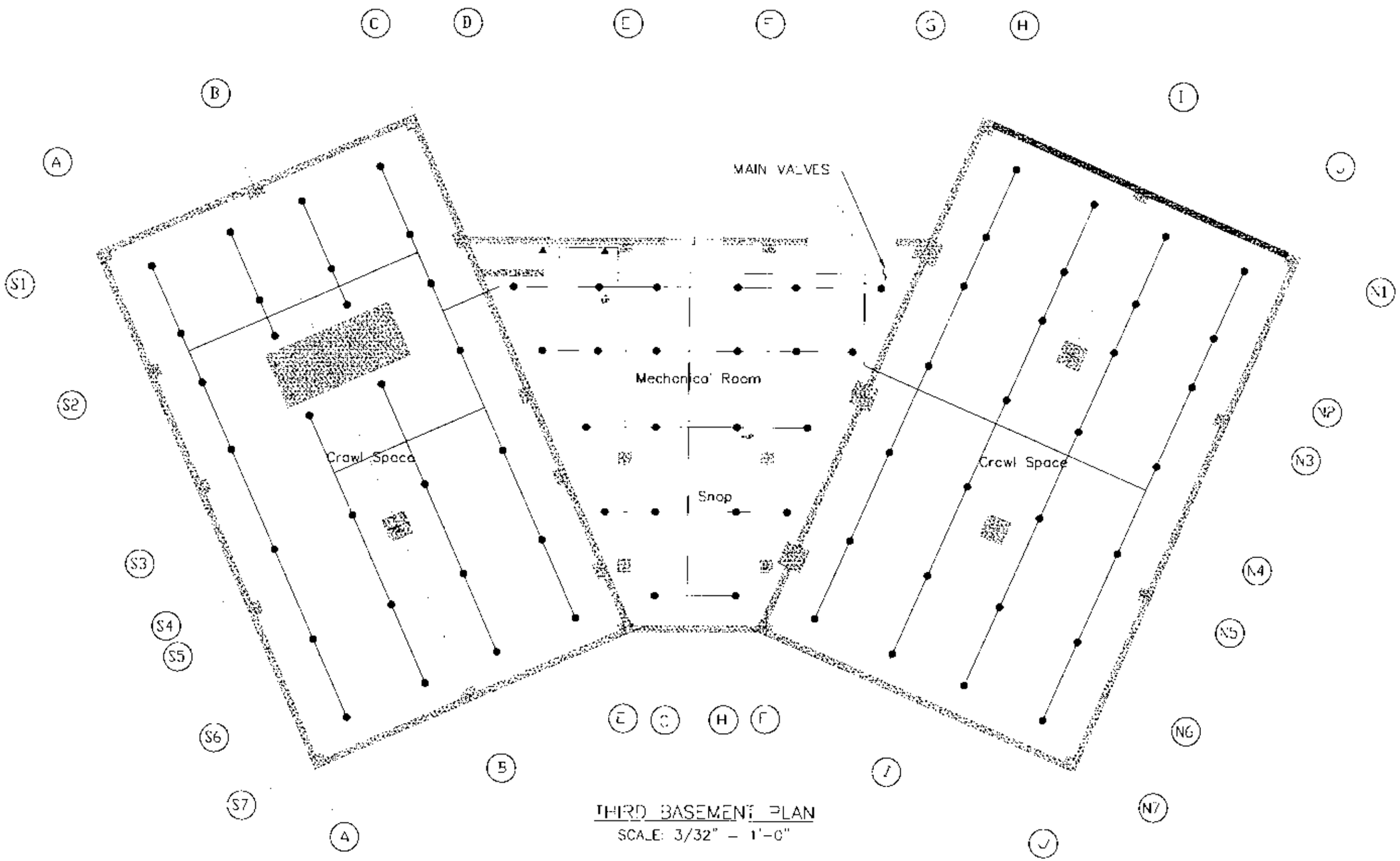
NOTES:

1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

FIRE ALARM KEY:

- (S)p STROBE
- (HS)p HORN/STROBE
- (M) MANUAL ALARM STATION
- (S) SPOT SMOKE SENSOR
- (T) BEAM SMOKE SENSOR TRANSMITTER
- (R) BEAM SMOKE SENSOR RECEIVER

DESIGNED: R. ARTIM	SUB SHEET NO	TITLE OF SHEET: FIRE ALARM CONCEPT	DRAWING NO.
DRAWN: J. LAROCQUE	FA6	THIRD FLOOR	PKG NO. / SHEET / OF
TECH. REVIEW:		OREGON CAVES NATIONAL PARK	
DATE: 12/20/04			



THIRD BASEMENT PLAN
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.
2. USE UPRIGHT SPRINKLERS FOR DRY PIPE SYSTEM ZONES.

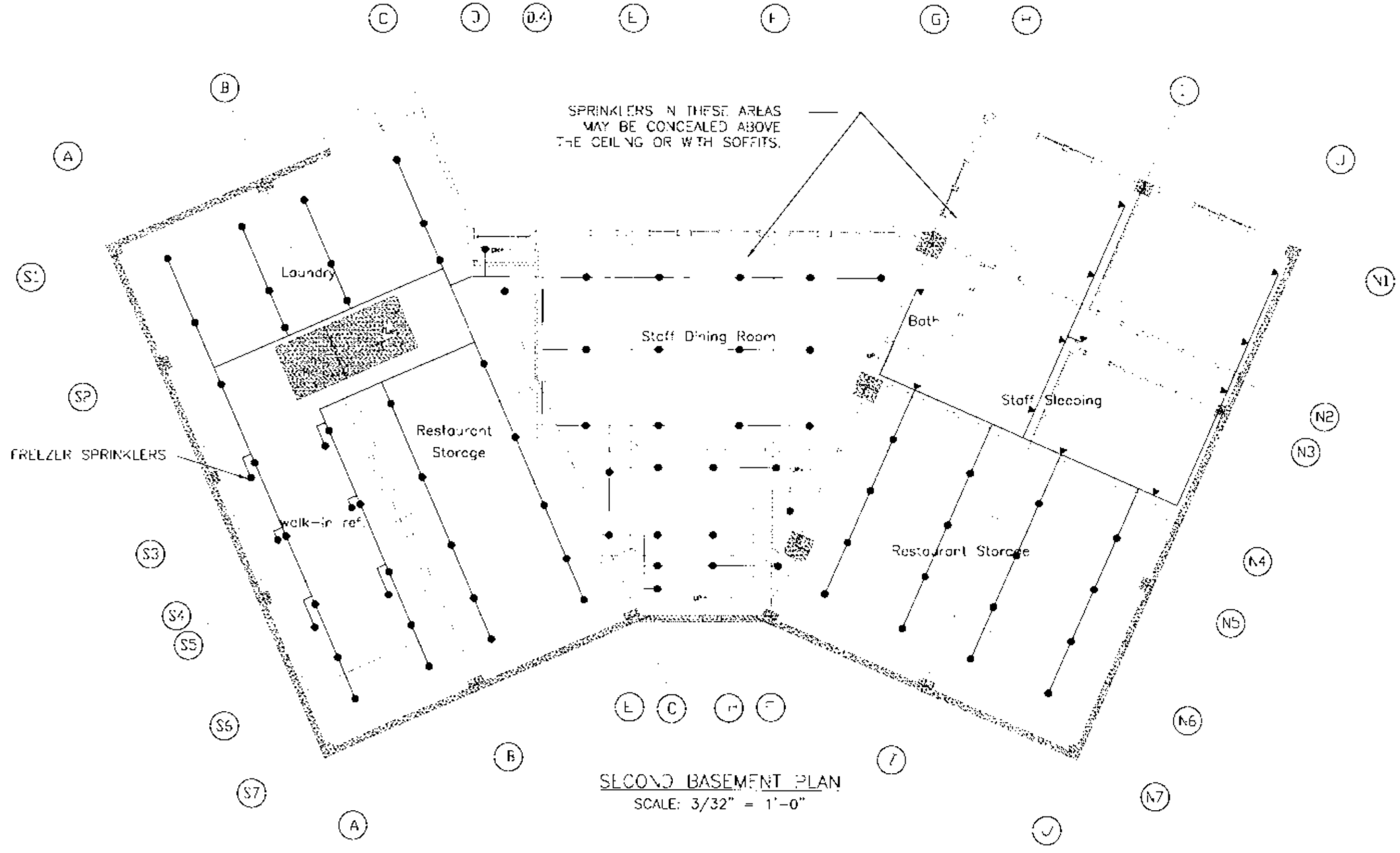
KEY:
- ● CONCEALED OR RECESSED PENDENT SPRINKLER
- ◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED: M. ARTIM
DRAWN: J. ARROCUE
TECH. REVIEW:
DATE: 12/20/01

SUB SHEET NO: SP1

TITLE OF SHEET: FIRE SPRINKLER CONCEPT
EXPOSED PIPING
THIRD BASEMENT
OREGON CAVES NATIONAL PARK

DRAWING NO.
PKG NO.
SHEET
OF

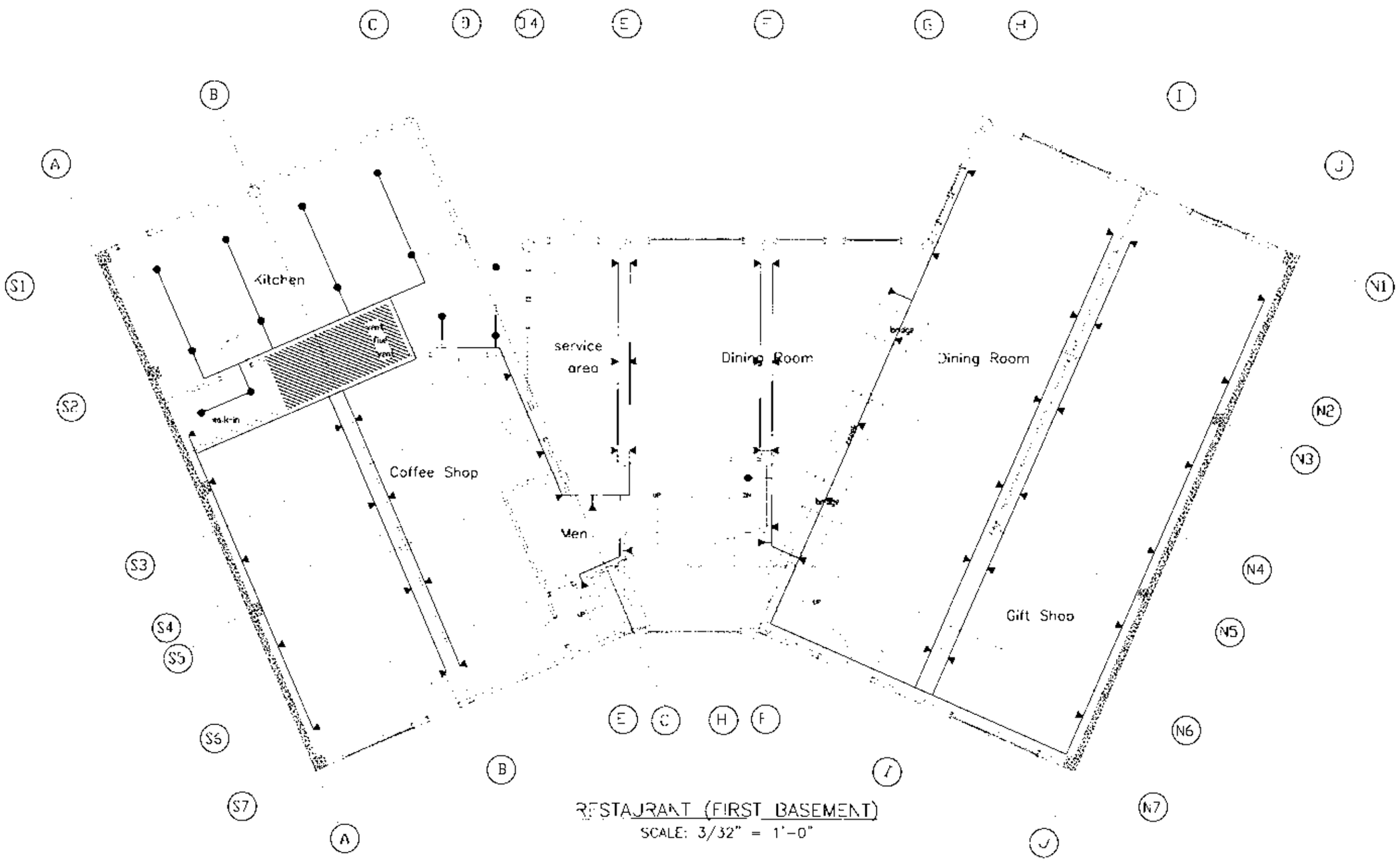


SECOND BASEMENT PLAN
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.
2. UPRIGHT SPRINKLERS MUST BE USED IF SYSTEM IS DRY-PIPE.

KEY:
- ● CONCEALED OR RECESSED PENDENT SPRINKLER
- ◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED N. ARIM; DRAWN J. LAROCQUE; TECH. REVIEW; DATE 12/20/04	SUB SHEET NO. SP2	TITLE OF SHEET: FIRE SPRINKLER CONCEPT EXPOSED PIPING SECOND BASEMENT OREGON CAVES NATIONAL PARK	DRAWING NO. PROJ. NO. SHEET OF



RESTAURANT (FIRST BASEMENT)

SCALE: 3/32" = 1'-0"

NOTES:

1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

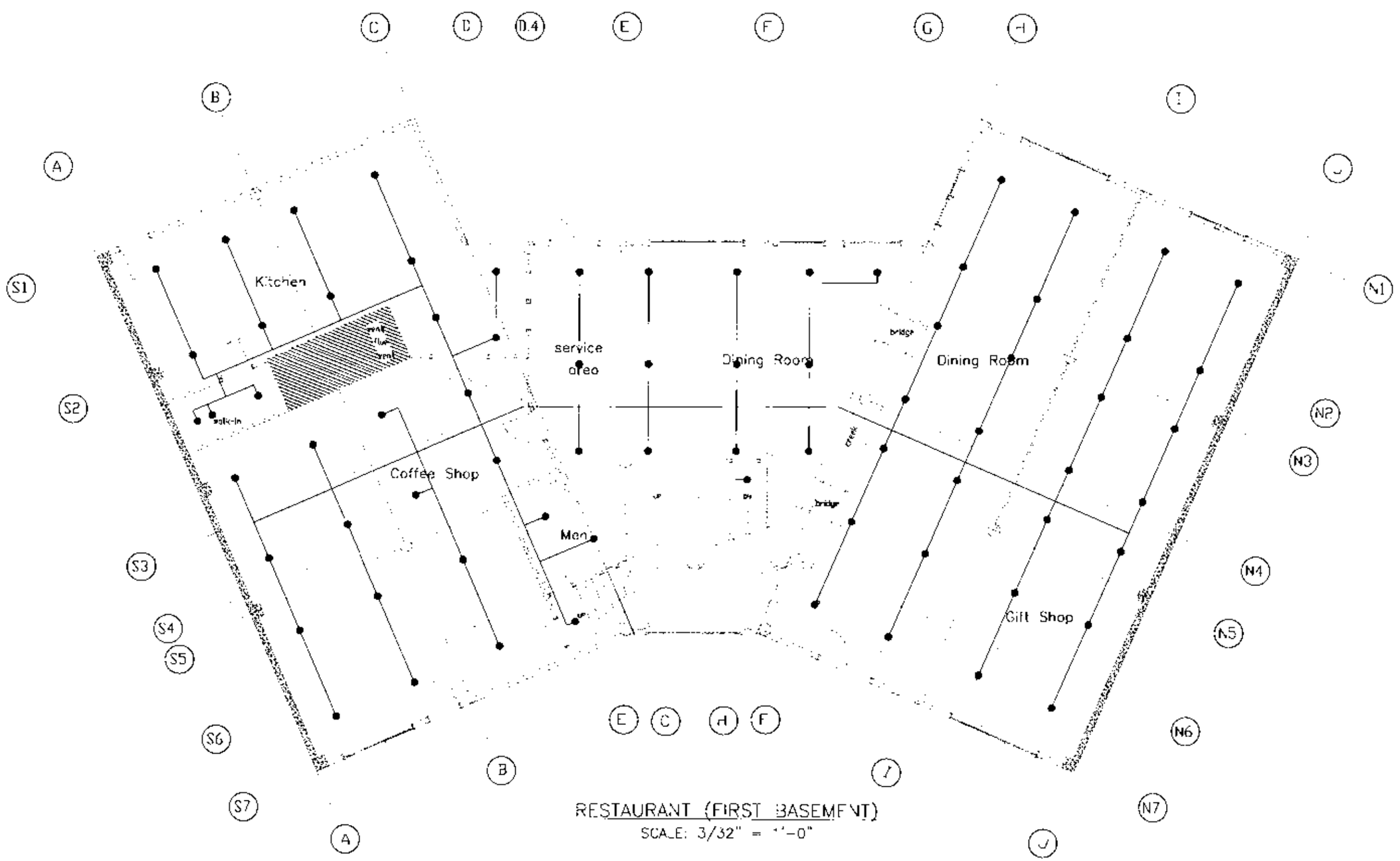
2. UPRIGHT SPRINKLERS MUST BE USED IF SYSTEM IS DRY-PIPE.

KEY:

● CONCEALED OR RECESSED PENDENT SPRINKLER

◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED: K. ARIEW DRAWN: J. LAROCQUE FIELD REVIEW: DATE: 12/20/04	SUB SHEET NO. SP3	TITLE OF SHEET: FIRE SPRINKLER CONCEPT EXPOSED PIPING FIRST BASEMENT OREGON CAVES NATIONAL PARK	DRAWING NO. PKG. NO. SHEET OF



RESTAURANT (FIRST BASEMENT)
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

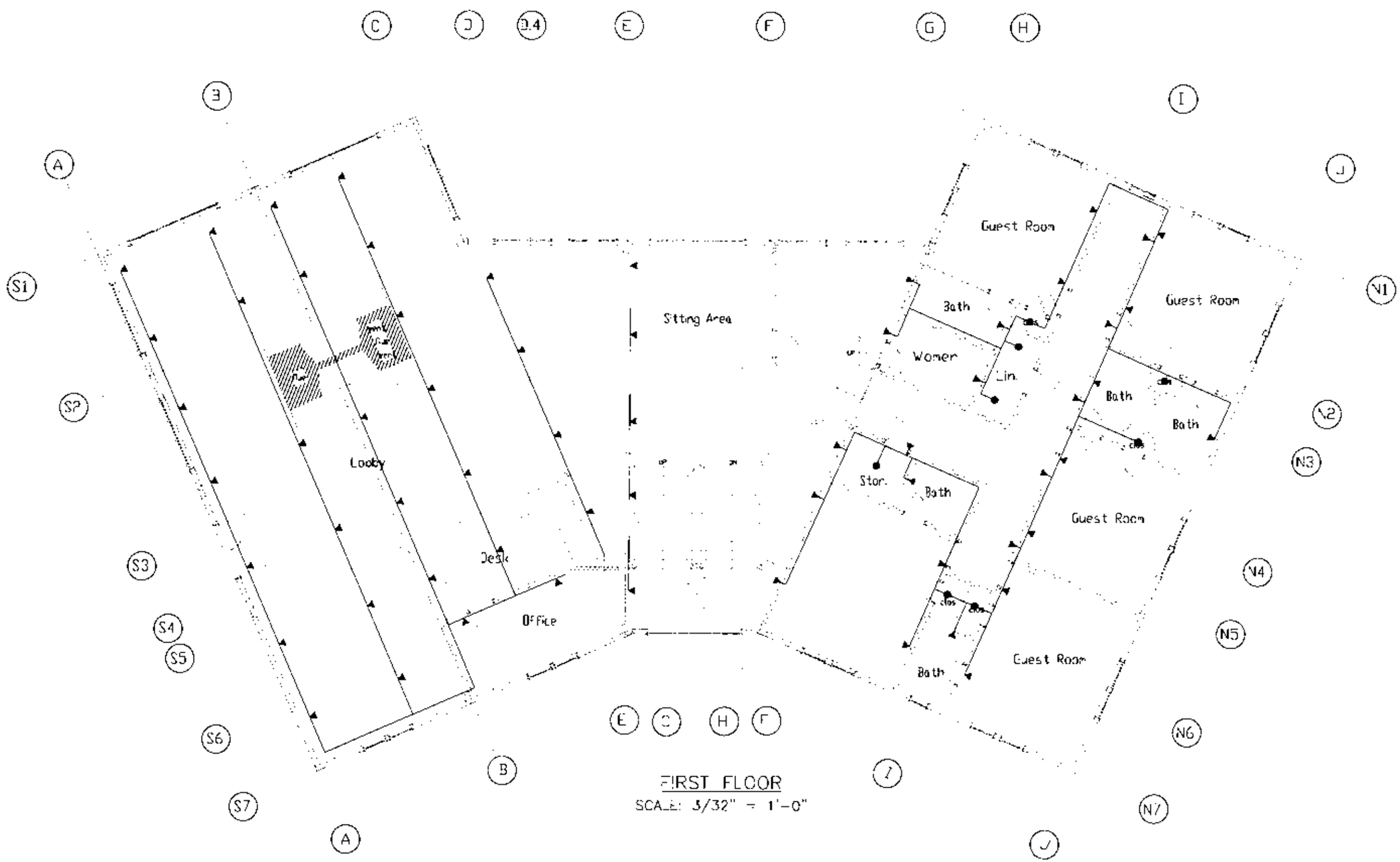
2. DRY-PENDENT SPRINKLERS MUST BE USED IF SYSTEM IS IS DRY-PIPE.

KEY:

● CONCEALED OR RECESSED PENDENT SPRINKLER

◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED: N. ARDN DRAWN: J. LAROCQUE TECH REVIEW: DATE: 12/20/04	SUB SHEET NO. SP3A	TITLE OF SHEET: FIRE SPRINKLER CONCEPT CONCEALED PIPING FIRST BASEMENT OREGON CAVES NATIONAL PARK	DRAWING NO. — PROJ NO. — SHEET — OF



FIRST FLOOR

SCALE: 3/32" = 1'-0"

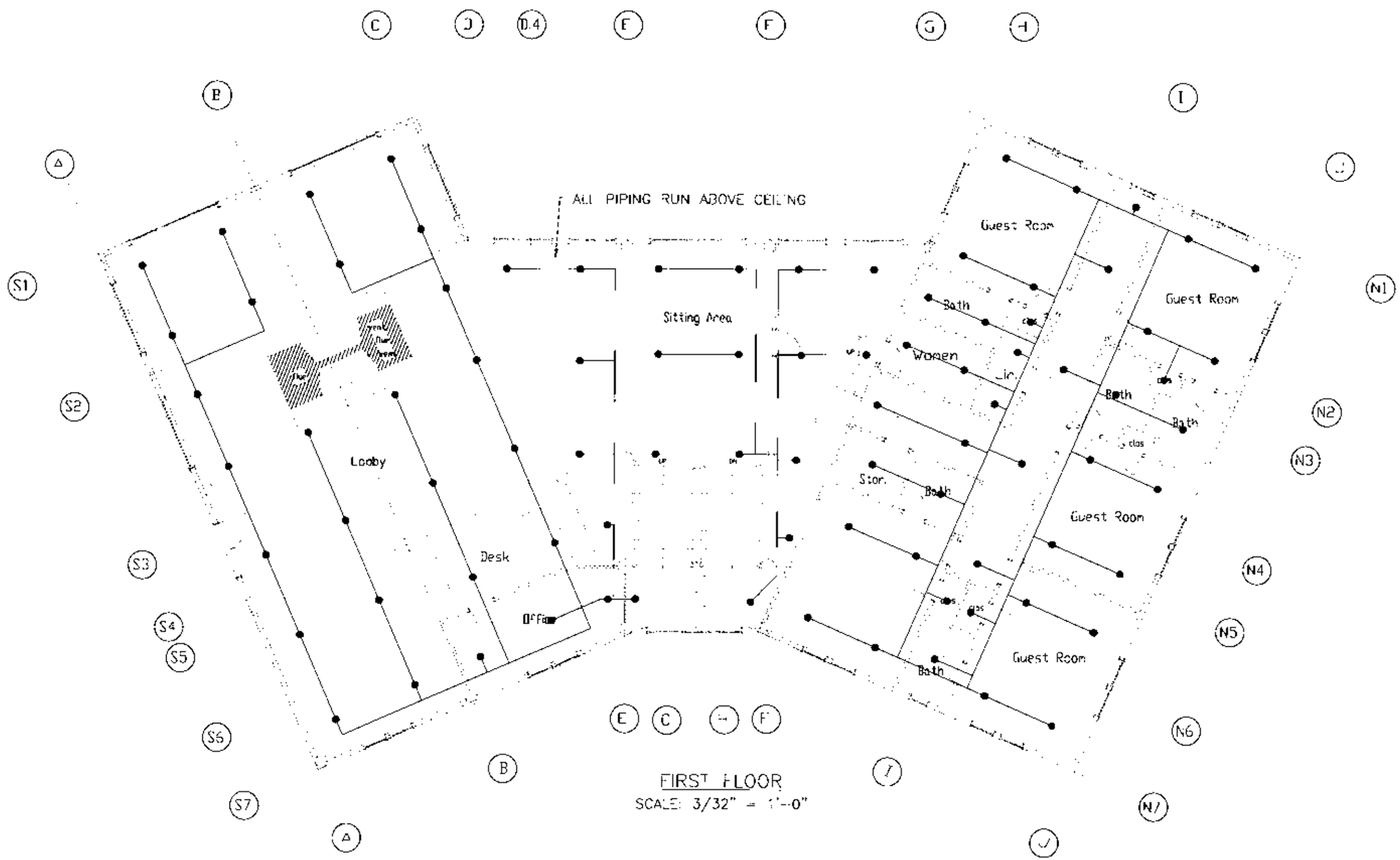
NOTES.

1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.
2. PIPING MAY BE CONCEALED IN SOFFITS.
3. UPRIGHT SPRINKLERS MUST BE USED IF SYSTEM IS DRY-PIPE.

KEY:

- ● CONCEALED OR RECESSED PENDENT SPRINKLER
- ◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED: N. ARTIM; DRAWN: J. JAROCQUE; TECH. REVIEW:	SUB SHEET NO. SP4	TITLE OF SHEET: FIRE SPRINKLER CONCEPT EXPOSED PIPING FIRST FLOOR OREGON CAVES NATIONAL PARK	DRAWING NO.
DATE: 12/20/04			PROJ. NO. - SHEET - OF -



FIRST FLOOR
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

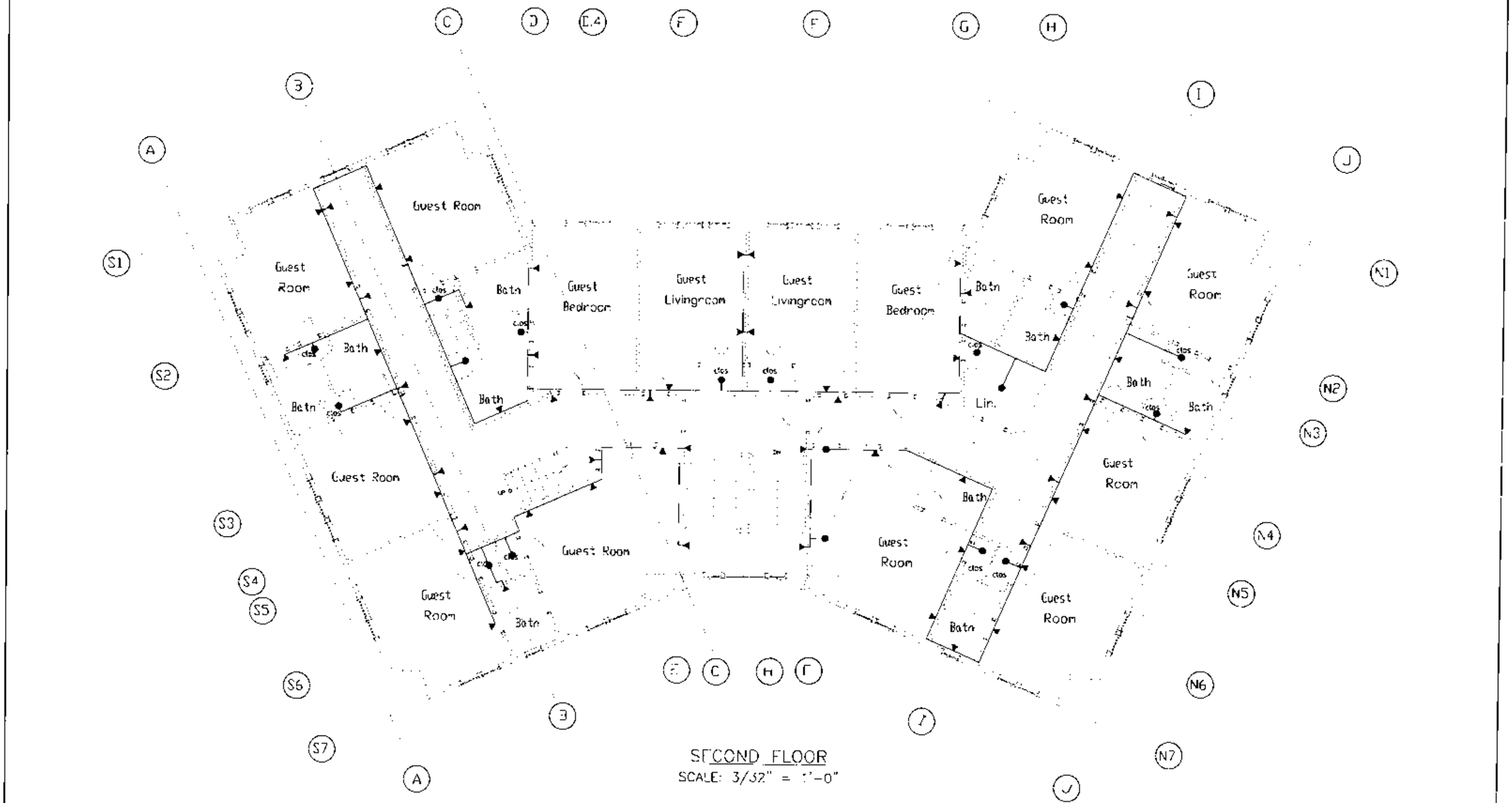
2. DRY-PENDENT SPRINKLERS MUST BE USED IF THE SYSTEM IS DRY PIPE.

KEY:

● CONCEALED OR RECESSED PENDENT SPRINKLER

◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED: N. ARTIM DRAWN: J. JAROCQUE TECH. REVIEW: DATE: 12/20/04	SUB SHEET NO. SP4A	TITLE OF SHEET: FIRE SPRINKLER CONCEPT CONCEALED PIPING FIRST FLOOR OREGON CAVES NATIONAL PARK	DRAWING NO. PKG NO. SHEET OF

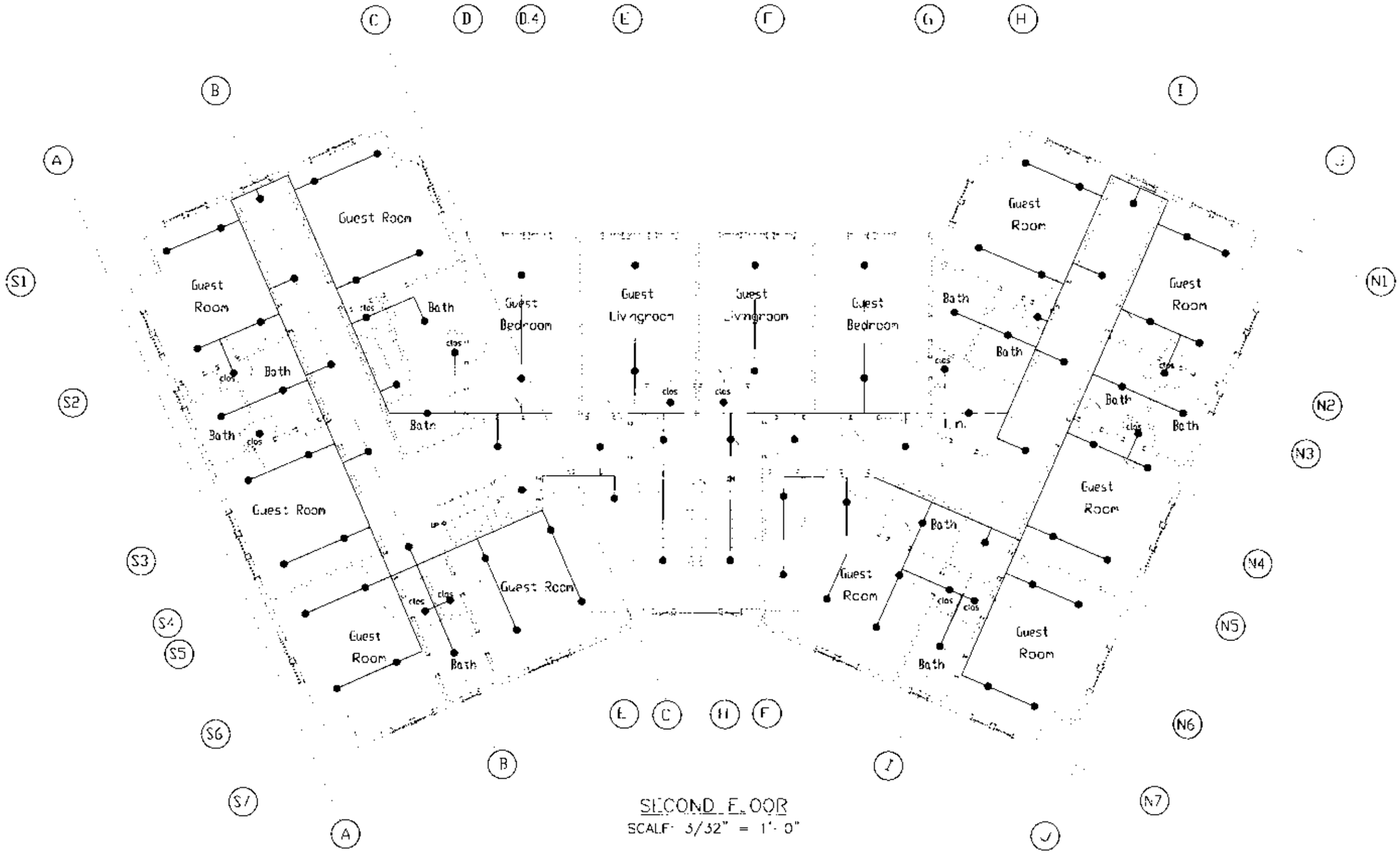


SECOND FLOOR
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.
2. SIDEWALL PIPING MAY BE INSTALLED IN A MATCHING SOFFIT.

KEY:
- ● CONCEALED OR RECESSED PENDENT SPRINKLER
- ◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED: M. ARTIM DRAWN: J. LAROCQUE QC REVIEW: DATE: 12/20/04	SUB SHEET NO. SP5	TITLE OF SHEET: FIRE SPRINKLER CONCEPT EXPOSED PIPING SECOND FLOOR OREGON CAVES NATIONAL PARK	DRAWING NO. PKG. NO. SHEET OF



SECOND FLOOR
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALJATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

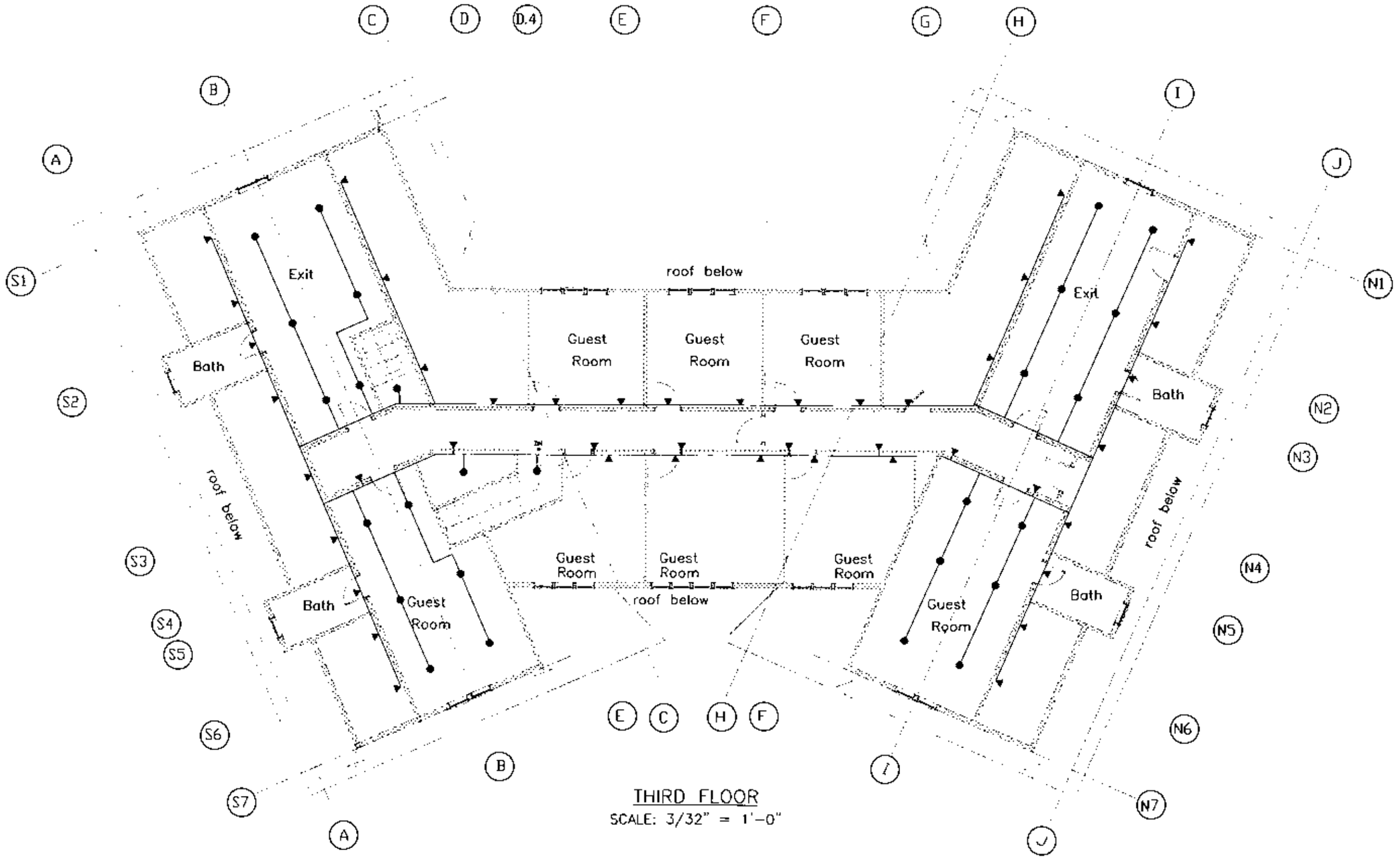
2. DRY-PENDENT SPRINKLERS MUST BE USED IF THE SYSTEM IS DRY-PIPE.

KEY:

● CONCEALED OR RECESSED PENDENT SPRINKLER

◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED: N. ARTIN DRAWN: J. LAROCQUE REGN. REVIEW DATE: 12/20/04	SUB SHEET NO: SP5A	TITLE OF SHEET: FIRE SPRINKLER CONCEPT CONCEALED PIPING SECOND FLOOR OREGON CAVES NATIONAL PARK	DRAWING NO PKG. NO. SHEET 1 OF



THIRD FLOOR
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

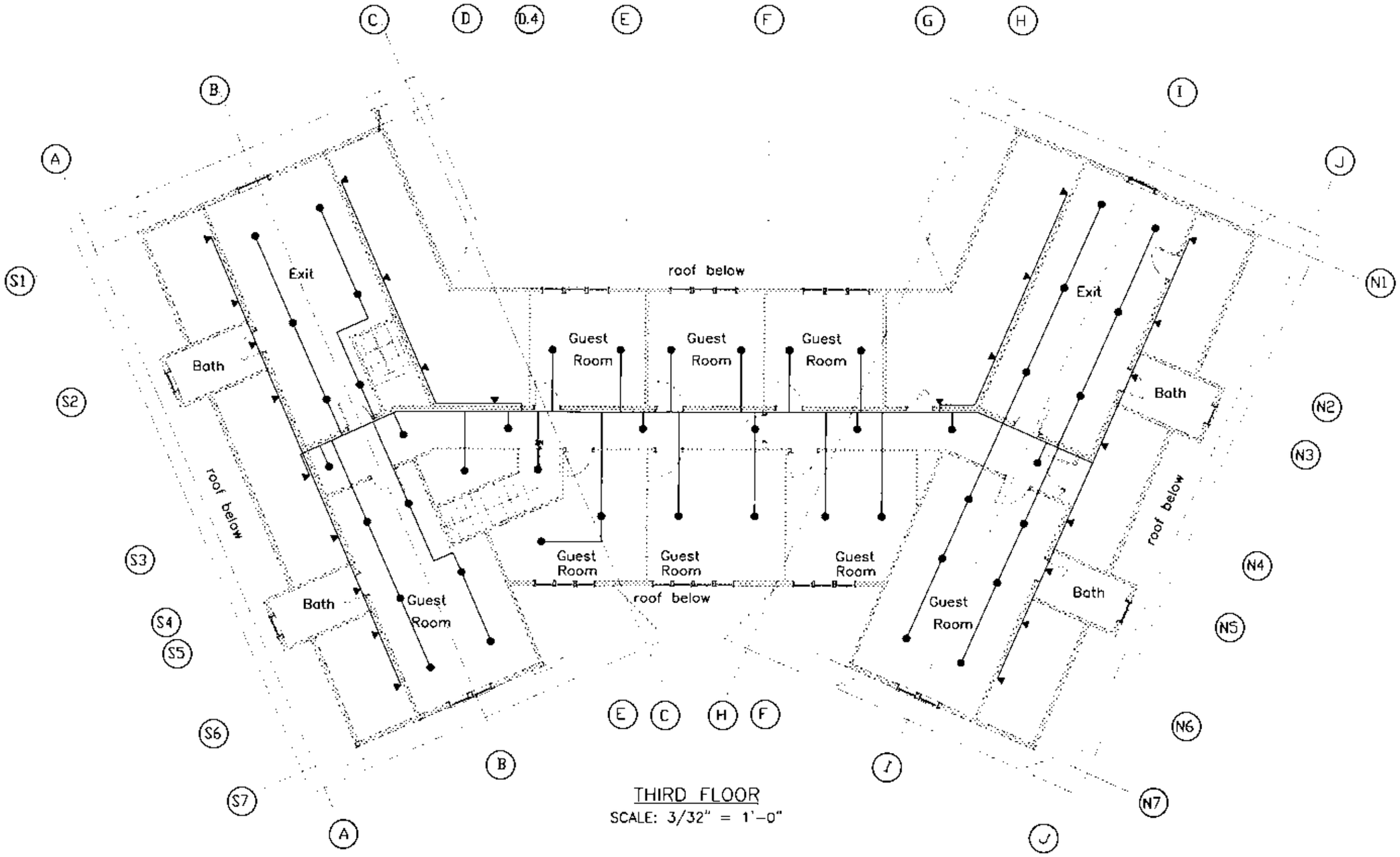
2. ALL PENDENT SPRINKLERS MUST BE DRY TYPE.

KEY:

● CONCEALED OR RECESSED PENDENT SPRINKLER

◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED: N. ARTIM; CHECKED: J. LAROCQUE; TECH REVIEW: ; DATE: 12/20/04	SUB SHEET NO. SP6	TITLE OF SHEET: FIRE SPRINKLER CONCEPT EXPOSED PIPING THIRD FLOOR OREGON CAVES NATIONAL PARK	DRAWING NO. — PKG NO. — SHEET — OF —



THIRD FLOOR
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

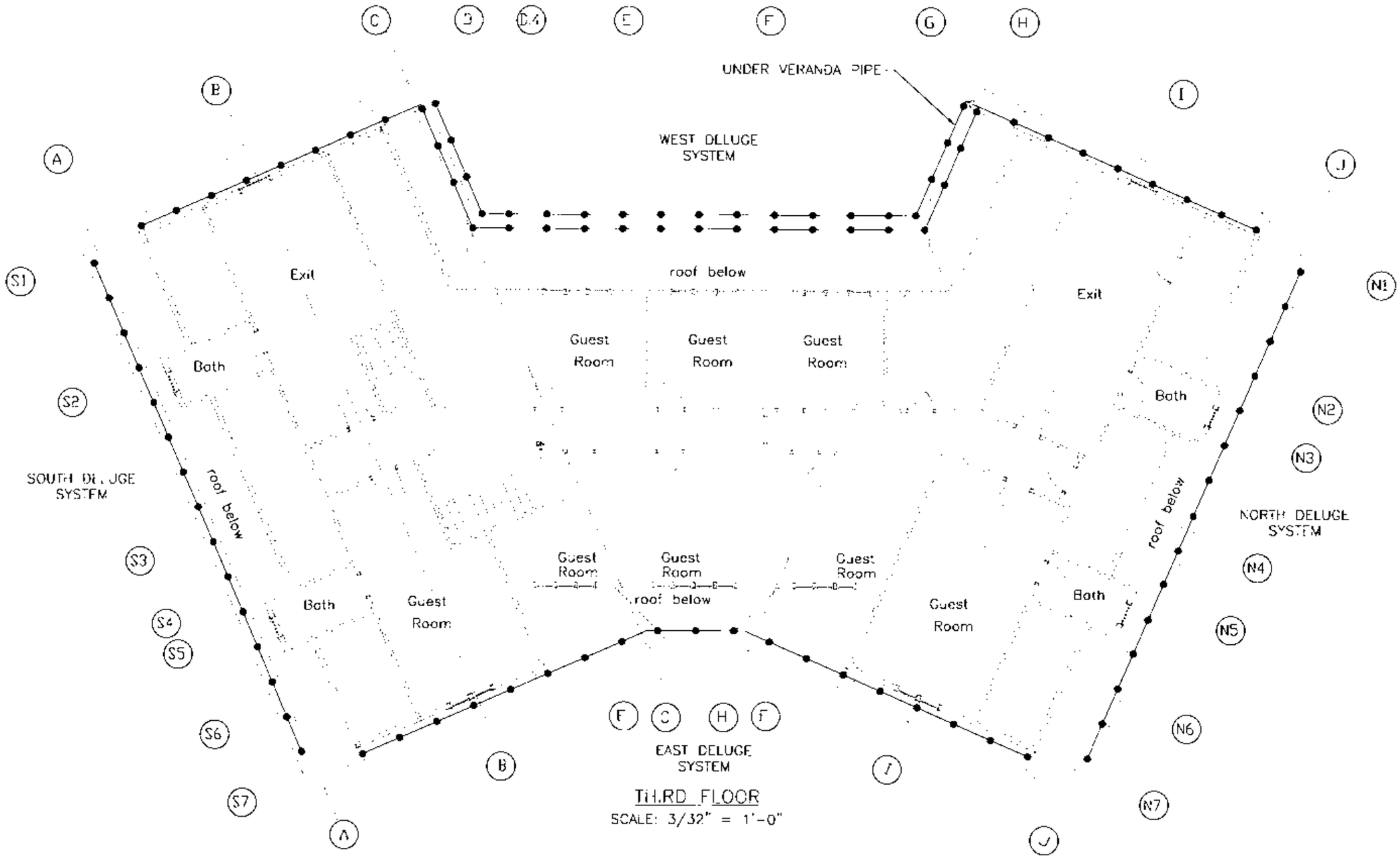
2. DRY-PENDENT SPRINKLERS MUST BE USED IF THE SYSTEM IS DRY-PIPE.

KEY:

● CONCEALED OR RECESSED PENDENT SPRINKLER

◀ HORIZONTAL SIDEWALL SPRINKLER

DESIGNED: N. ARTIM	SUB SHEET NO. SP6A
DRAWN: J. LAROCQUE	TITLE OF SHEET: FIRE SPRINKLER CONCEPT CONCEALED PIPING THIRD FLOOR OREGON CAVES NATIONAL PARK
TECH. REVIEW:	DRAWING NO.
DATE: 12/20/04	PKG. NO. / SHEET / OF



THIRD FLOOR
SCALE: 3/32" = 1'-0"

NOTES:
1. THIS ILLUSTRATION IS FOR CONCEPT EVALUATION ONLY AND IS NOT INTENDED TO SERVE AS A DETAILED DESIGN.

KEY:

● OPEN HEAD DELUGE SPRINKLER NOZZLE

DESIGNED: N. ARTIM DRAWN: J. LAROCQUE TECH. REVIEW: DATE: 12/20/04	SUB SHEET NO.: SP7	TITLE OF SHEET: FIRE SPRINKLER CONCEPT EXTERIOR DELUGE SPRINKLER SYSTEM OREGON CAVES NATIONAL PARK	DRAWING NO. PROJ. NO. SHEET

CHAPTER 6: COST ESTIMATE

A cost estimate was prepared for this study based on a project the incorporates the scope of work necessary to address the deficiencies identified in Chapter 4 and relying on selected recommendations outlined in Chapter 5. The work shown on Sheets A1A through A6A, are the basis for this proposed project and the following cost estimate.

The estimated overall construction cost of this proposed project is $3,323,000. This cost is based on a construction start date of 2007, and does not include soft costs such as owner's project management, design fees, testing, permits, etc.

See attached cost estimate breakdown for summary and detailed costs, as well as an outline of what is included and excluded from the cost information.

BASIS OF COST PLAN

Cost Plan Prepared From	Dated	Received
Drawings issued for		
Architectural		
A1-A6, FS3-FS6	12/28/04	01/11/05
Mechanical		
FA1-FA6, SP1 SP7	12/28/04	01/11/05
Outline Specification		
Discussions with the Project Architect and Engineers		

BASIS OF COST PLAN

Conditions of Construction

The pricing is based on the following general conditions of construction

A start date of October 2007

A construction period of 6 months

The general contract will be competitively bid with qualified general and main subcontractors

There will not be small business set aside requirements

The contractor will be required to pay prevailing wages

There are no phasing requirements

The general contractor will have full access to the site during normal business hours

INCLUSIONS

The project consists of the ADA and life safety upgrade to the existing Chateau at the Oregon Caves National Monument

Foundations consist of new isolated footings to accommodate the new balcony columns and a new elevator pit

Vertical structure includes new concrete columns to support the new/re-built balconies. In addition, 30% of the walls affected by the fire rating upgrade will receive plywood and blocking to allow for shear bracing

Floor and roof structures consist of wood/timber framing infills at the removed stairs, steel beams, timber framing and 2x sheathing at the new/reconstructed balconies; and the replacement of the log cave brackets. In addition, an allowance has been made for roof diaphragm connections.

Exterior cladding consists of the replacement of the inner face of the exterior walls, the replacement of existing door and window openings to accommodate wider and new doors; and the provision of new wood guardrails at the balconies.

Roofing and waterproofing consists of new roof insulation; removal and replacement of the cedar shakes with fire treated shakes; new roof flashings; and an allowance for caulking and sealants.

Interior partitions consist of limited new wood framing; new shaftwall at the elevator; limited new one hour rated painted surfacing; and limited new sound insulation. Interior doors consist of limited new custom wood doors to match existing; and the replacement of of limited existing doors

Floor finishes consist of the protection of flooring to remain; the removal and replacement of carpet; and the addition of ceramic tile in the new public restrooms. New wood base will be provided in the carpeted areas. Wall finishes consist of the removal (100%) and reinstallation (25%) of fiberboard panels where upgraded one hour partitions are required; and ceramic tile wainscot at the new public restroom and guest baths affected by the upgraded partition surfacing. Ceilings consist of the removal and salvage of the fiberboard ceilings; new sound insulation at floors 1 and 2; the addition of one hour ceilings as required. The majority of the new ceilings will be installed on existing framing.

Function equipment consists of new partitions and accessories at the new public restroom; limited new room identification and code signage; the addition of a fire suppression system in the existing kitchen hood; and the removal, storage and re-installation of the furnishings.

INCLUSIONS

Vertical transportation consists of the addition of an accessible interior wood ramp; a new metal service stair; a new metal exit stair; the replacement of existing railings; two exterior heavy timber exit stairs, and one 2500# passenger elevator.

Plumbing includes the removal and re-setting of guest bath plumbing fixtures as required to accommodate the new one hour partitions; new fixtures at the new public restroom; and an allowance for the replacement of the domestic water piping.

Heating, ventilation and air conditioning consists of the investigation of the steam piping, and the relocation of the existing kitchen exhaust fan.

Electrical consists of limited machine power; limited addition of convenience power; the replacement of emergency exit lighting, and a new fire alarm system.

Fire protection consists of the removal and replacement of the fire sprinkler system a wet system and a localized dry system at the kitchen cold storage; and the addition of a dry system to the underside of the eaves and balconies.

Site preparation consists of limited select demolition required to accommodate the renovation.

Site paving consists of limited new pedestrian walks, decks and stairs.

EXCLUSIONS

Any work, including finishes, to existing building façade (elevations)

Any work, including finishes, to existing partitions (adjoining areas) and/or doors that are not indicated to be upgraded to rated construction

Replacement of the steam piping

Fire pumps and fire water storage

Telephone and communications systems work

Removal and/or replacement of the underground fuel tank

Owner supplied and installed furniture, fixtures and equipment

Loose furniture and equipment except as specifically identified

Security equipment and devices

Audio visual equipment

Hazardous material handling, disposal and abatement

Compression of schedule, premium or shift work, and restrictions on the contractor's working hours

Design, testing, inspection or construction management fees

Architectural and design fees

Scope change and post contract contingencies

Assessments, taxes, finance, legal and development charges

Environmental impact mitigation

Builder's risk, project wrap up and other owner provided insurance program

Land and easement acquisition

Cost escalation beyond a start date of October 2007

OVERALL SUMMARY

	Gross Floor Area	$ / SF	$x1,000
Building	35,679 SF	93.13	3,323
TOTAL Building & Sitework Construction	***October 2007***		***3,323***

Please refer to the Inclusions and Exclusions sections of this report

BUILDING AREAS & CONTROL QUANTITIES

Areas

	SF	SF	SF
Enclosed Areas			
Building	32,468		
SUBTOTAL, Enclosed Area		32,468	
Covered area	6,421		
SUBTOTAL, Covered Area @ ½ Value		3,211	
TOTAL GROSS FLOOR AREA			35,679

Control Quantities

			Ratio to Gross Area
Functional Units	24	RMS	0.673
Number of stories (x1,000)	6	EA	0.168
Gross Area	35,679	SF	1.000
Enclosed Area	32,468	SF	0.910
Covered Area	6,421	SF	0.180
Footprint Area	5,716	SF	0.160
Volume	422,084	CF	11.830
Roof Area - Sloping	9,534	SF	0.267
Roof Area - Total	9,534	SF	0.267
Elevators (x10,000)	1	EA	0.280

BUILDING COMPONENT SUMMARY

		Gross Area: 35,679 SF	
		$/SF	$x1,000
1. Foundations		1.11	40
2. Vertical Structure		4.41	157
3. Floor & Roof Structures		5.49	196
4. Exterior Cladding		4.49	160
5. Roofing, Waterproofing & Skylights		2.24	80
Shell (1-5)		17.73	633
6. Interior Partitions, Doors & Glazing		9.29	331
7. Floor, Wall & Ceiling Finishes		11.24	401
Interiors (6-7)		20.52	732
8. Function Equipment & Specialties		2.36	84
9. Stairs & Vertical Transportation		5.34	191
Equipment & Vertical Transportation (8-9)		7.71	275
10. Plumbing Systems		4.33	155
11. Heating, Ventilating & Air Conditioning		0.28	10
12. Electric Lighting, Power & Communications		5.05	180
13. Fire Protection Systems		4.32	154
Mechanical & Electrical (10-13)		13.97	499
Total Building Construction (1-13)		**59.94**	**2,138**
14. Site Preparation & Demolition		4.34	155
15. Site Paving, Structures & Landscaping		0.68	24
16. Utilities on Site		0.00	0
Total Site Construction (14-16)		**5.02**	**179**
TOTAL BUILDING & SITE (1-16)		**64.96**	**2,318**
General Conditions	8.00%	5.19	185
Contractor's Overhead & Profit or Fee	10.00%	7.01	250
PLANNED CONSTRUCTION COST	***January 2005***	**77.15**	**2,753**
Contingency for Development of Design	10.00%	7.71	275
Escalation to Start Date (October 2007)	9.75%	8.27	295
RECOMMENDED BUDGET	***October 2007***	**93.13**	**3,323**

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
1. Foundations				
Reinforced concrete including excavation				
Column bases or pile caps				
Concrete, 3'x3'x2'	22	EA	600.00	13,200
Extra over for tie in to existing	4	EA	350.00	1,400
Elevator pit including modify existing concrete wall	1	EA	25,000.00	25,000
				39,600
2. Vertical Structure				
Columns and pilasters				
Concrete, 16" rnd	976	LF	85.00	82,960
Shear bracing				
Plywood sheathing and blocking, allow 30% of reconstructed surface	24,800	SF	3.00	74,400
				157,360
3. Floor and Roof Structure				
Suspended floors				
Infill floor at removed stair	1	LS	3,500.00	3,500
Reconstruct historic balcony, steel beams, 4x purlins @ 24" o.c. and 2x T&G decking	3,335	SF	35.00	116,725
Roof framing				
Timber (log) framing				
Replace deteriorated log eave brackets	32	EA	600.00	19,200
Allow for roof diaphragm connectors 2' o.c	229	EA	65.00	14,885
Reconstruct roof of balcony, steel beams, 4x purlins @ 24" o.c. and 2x T&G decking	1,186	SF	35.00	41,510
				195,820

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
4. Exterior Cladding				
Wall framing, furring and insulation				
Batt insulation in walls	22,542	SF	1.00	22,542
Applied exterior finishes				
Allow for concrete column finish	976	LF	16.00	15,616
Interior finish to exterior walls				
Gypsum board walls, taped and textured	22,542	SF	2.25	50,720
Paint gypsum board or plaster	22,542	SF	0.75	16,907
Exterior doors, frames and hardware				
Replace exterior door/window with new french door including enlarging opening				
Single, 3'0 x 7'0	6	EA	1,500.00	9,000
Double, 6'0 x 7'0	7	EA	2,300.00	16,100
Extra over for exting hardware, per leaf	15	EA	1,000.00	15,000
Balustrades, parapets and roof screens				
Wood railings at reconstructed balcony	284	LF	50.00	14,200
				160,084
5. Roofing, Waterproofing & Skylights				
Insulation				
Batt insulation between joists	4,456	SF	1.15	5,124
Roofing				
Wood shakes or shingles				
New cedar shingle, fire treated	9,534	SF	4.00	38,136
Roof upstands and sheetmetal				
Flashings				
Valley	176	LF	15.00	2,640

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
Ridge	275	LF	15.00	4,125
Eave	1,500	LF	8.00	12,000
Caulking and sealants				
Allow	35,679	SF	0.50	17,840
				79,865

6. Interior Partitions, Doors & Glazing

Partition framing and cores				
Wood stud framing, 2" x 4"	4,380	SF	3.50	15,330
Shaftwall system complete at elevator shaft	2,016	SF	14.00	28,224
Partition surfacing				
Gypsum board underlayment	1,001	SF	2.00	2,002
Gypsum board walls, taped and textured	60,122	SF	2.25	135,275
Paint gypsum board or plaster	60,122	SF	0.75	45,092
Sound insulation				
Batt insulation in walls at new partitions	33,085	SF	1.00	33,085
Interior doors, frames and hardware				
Custom wood doors and hollow metal frames to match existing				
Single, 3'0 x 7'0, new	8	EA	1,500.00	12,000
Double, 6'0 x 7'0, new	4	EA	2,600.00	10,400
Single, 3'0 x 7'0, fire door at elevator	5	EA	2,500.00	12,500
Single, 3'0 x 7'0, relocate existing	3	EA	600.00	1,800
Replace door and hardware and widen opening at existing guest rooms and public rooms with ADA				
Single, 3'0 x 7'0, custom to match existing	12	EA	1,900.00	22,800
Add for automatic opener at new accessible entry	1	EA	8,000.00	8,000
Finish new/relocated doors and frames, per leaf	24	EA	200.00	4,800
				331,307

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
7. Floor, Wall & Ceiling Finishes				
Floors				
Allow for protection of existing	7,472	SF	1.50	11,208
Ceramic tile	346	SF	12.00	4,152
Remove and replace carpet	17,931	SF	5.00	89,655
Bases or skirtings etc				
Wood base	5,824	LF	10.00	58,240
Walls				
Extra over for allow for re use of fiberboard, 75%	5,636	SF	1.25	7,045
Extra over for allow for re use of fiberboard, 25%	13,345	SF	1.25	16,681
Ceramic tile - removal	5,837	SF	1.50	8,756
Ceramic tile - thinset, wainscot 42"H	1,873	SF	14.00	26,222
Ceilings				
Sound insulation blanket or batts 1st and 2nd floor ceilings	10,972	SF	1.00	10,972
Underlayment	865	SF	3.00	2,595
Gypsum board ceilings and finish on existing framing, 1hr	19,741	SF	5.00	98,705
Gypsum board ceilings and finish including new framing, 1hr	5,662	SF	10.00	56,620
				400,851
8. Function Equipment & Specialties				
Protective guards, barriers and bumpers				
Allow for corner guards and wall protection	35,679	SF	0.10	3,568
Prefabricated compartment and accessories				
Toilet partitions	3	EA	1,400.00	4,200
Allow for accessories	1	LS	2,000.00	2,000
Chalkboards, insignia and graphics				
Allow for room ID	15	EA	100.00	1,500
Allow for code signage	30	EA	100.00	3,000

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
Special use equipment of all types				
Kitchen and food service equipment				
Kitchen hood fire suppression system	1	EA	7,500.00	7,500
Miscellaneous				
Allow for remove and re-set furnishings, allow 4#/sf	111,168	SF	0.50	55,584
Extra over for on-site storage rental for furnishings	4	MO	1,000.00	4,000
Extra over for on-site storage rental pick-up and delivery	1	LS	3,000.00	3,000
				84,352

9. Stairs & Vertical Transportation

Pedestrian and wheelchair ramps				
Wood ramp including handrails	120	SF	40.00	4,800
Staircase flights - floor to floor				
New service stair, steel	1	FLT	15,000.00	15,000
New exit stair, steel	1	FLT	17,500.00	17,500
Replace existing stair handrails at public stairs, brass	128	LF	100.00	12,800
Replace existing stair guardrails at public stairs, brass	63	LF	250.00	15,750
Replace existing stair guardrails at non-public stairs, pipe	105	LF	65.00	6,825
Ladders and fire escapes				
Reconstruct heavy timber exit balcony and stair	1	FLT	14,000.00	14,000
New heavy timber exit balcony and stair	1	FLT	14,000.00	14,000
Elevators				
Hydraulic, 2500# 5-stop passenger	1	EA	90,000.00	90,000
				190,675

10. Plumbing Systems

Sanitary fixtures and connection piping				
Remove and re-set bath plumbing fixtures	75	EA	150.00	11,250

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
Watercloset, new	3	EA	1,050.00	3,150
Urinals, new	1	EA	1,100.00	1,100
Lavatory, wall mounted	4	EA	1,000.00	4,000
Sanitary waste, vent and service piping				
Allow for removal and replacement of domestic water piping	100	LA	1,350.00	135,000
				154,500

11. Heating, Ventilation & Air Conditioning

Piping, fittings, valves and insulation				
Investigate only steam piping level of functionality	1	LS	2,500.00	2,500
Independent exhaust ventilation				
Rework kitchen exhaust fan including extend duct and new concrete pad	1	EA	7,500.00	7,500
				10,000

12. Electrical Lighting, Power & Communication

Machine and equipment power				
To elevator, relocated kitchen exhaust fan and auto door	3	EA	1,500.00	4,500
User convenience power				
Allow for additional outlets and circuiting	52	EA	300.00	15,600
Allow for additional panel boards	2	EA	2,500.00	5,000
Allow for removal and resetting of devices/cover plates at walls/ceilings to be resurfaced	900	EA	25.00	22,500

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
Lighting				
Remove existing and provide new emergency lighting battery packs	112	EA	325.00	36,400
Alarm and security systems				
Fire alarm control panel	1	EA	15,000.00	15,000
Fire alarm devices	180	EA	450.00	81,000
				180,000

13. Fire Protection Systems

Fire sprinkler systems complete				
Dismantle and remove existing fire protection system	33,418	SF	0.75	25,064
Concealed pipes and recessed heads	497	EA	175.00	86,975
Extra over for air compressor and dry valve for kitchen cold storage	1	EA	10,000.00	10,000
Exterior open head deluge system at roof eave and under balconies tied to existing roof dry system	160	EA	200.00	32,000
				154,039

14. Site Preparation & Building Demolition

Selective demolition and removal				
Allow for removal and salvage of fiberboard at interior of exterior	22,542	SF	1.25	28,178
Allow for removal and salvage of fiberboard at interior partitions	53,378	SF	1.25	66,723
Allow for removal and salvage of fiberboard ceilings	25,403	SF	1.25	31,754
Remove roofing	9,534	SF	0.35	3,337
Allow for new elevator floor openings	5	EA	1,500.00	7,500
Allow for new stair openings	2	EA	2,500.00	5,000
Allow for stair removal	1	FLT	2,500.00	2,500
Allow for miscellaneous demo	1	LS	10,000.00	10,000

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
				154,991

15. Site Paving, Structures & Landscaping

Pedestrian paving				
Concrete walks	150	SF	6.00	900
Concrete steps	132	LF	35.00	4,620
Extra over for railings	56	LF	65.00	3,640
Wood framed board walks or decks including wood rail one side	300	SF	30.00	9,000
Structures and water features				
Allow for modification of dry stack rock wall	1	LS	6,000.00	6,000
				24,160

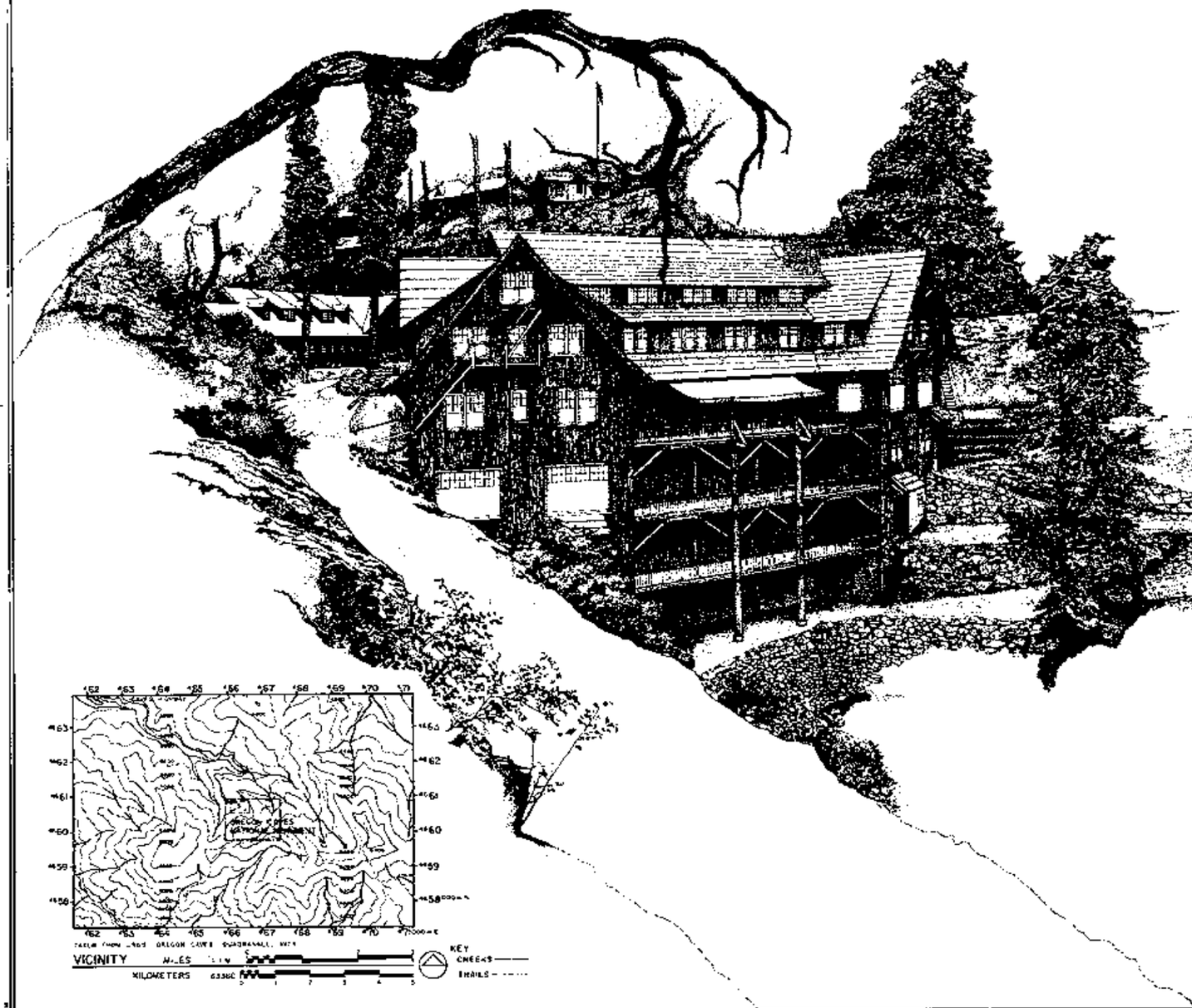
APPENDIX A

OREGON CAVES NATIONAL MONUMENT CHATEAU
HISTORIC AMERICAN BUILDING SURVEY DRAWINGS

Prepared in 1989

- Site Plan
- Site Section
- Second Basement Plan
- First Floor Plan (Third Basement)
- Second Floor Plan (Second Basement)
- Third Floor Plan (First Basement)
- Fourth Floor Plan (First Floor)
- Fifth Floor Plan (Second Floor)
- Sixth Floor Plan (Third Floor)
- West Elevation
- East Elevation

OREGON CAVES NATIONAL MONUMENT



THE CHATEAU, CHALET, AND PARK RANGERS' RESIDENCE AT OREGON CAVES NATIONAL MONUMENT ARE NOTABLE EXAMPLES OF RUSTIC ARCHITECTURE, ERECTED BETWEEN 1923 AND 1941, TO SERVE CONCESSIONAIRES AT THE PARK. ALTHOUGH THE CAVES IN JOSEPHINE COUNTY-THE ONLY ACTIVE LIMESTONE FORMATION IN THE STATE-WERE DISCOVERED IN 1874 AND WERE DESIGNATED A NATIONAL MONUMENT IN 1909, DEVELOPMENT OF THE SITE AS A TOURIST ATTRACTION DID NOT OCCUR UNTIL LATER; THE NATIONAL PARK SERVICE ASSUMED ITS MANAGEMENT IN 1933.

IN 1923, A LOCAL BUSINESS CONSORTIUM WAS FORMED TO CAPITALIZE ON VISITATION TO THE CAVES. ALL CONSTRUCTION AT THE PARK IS DISTINGUISHED BY THE USE OF SHAGGY PORT ORFORD CEDAR BARK AS EXTERIOR SHEATHING. OF THE EXTANT BUILDINGS ERECTED BY THE OREGON CAVES COMPANY, THE CHATEAU (1932-34) IS THE EARLIEST BUILT FOR $50,000 AND "PATTERNED AFTER SWISS CHALETS," THE MULTI-LEVEL BUILDING IS HARMONIOUSLY BANKED INTO A GORGE AND FEATURES NATIVE FIR, MARBLE, AND STONE MATERIALS. ITS INTEGRITY AND STYLE RESULTED IN DESIGNATION AS A NATIONAL HISTORIC LANDMARK IN 1987. THE SMALLER CHALET (1941-42) DESIGNED BY GUST LIUM, REPLACED A SIMILAR EARLIER STRUCTURE; IT SERVES A VARIETY OF CONCESSION FUNCTIONS. THE RANGERS' RESIDENCE ABOVE THE CAVE (1935-36) WAS DESIGNED BY LANDSCAPE ARCHITECT FRANCIS LANGE AND WAS BUILT BY THE CIVILIAN CONSERVATION CORPS, THE GROUP LARGELY RESPONSIBLE FOR LANDSCAPING AT THE PARK.

DOCUMENTATION OF THE STRUCTURES AT OREGON CAVES NATIONAL MONUMENT WAS UNDERTAKEN BY THE HISTORIC AMERICAN BUILDINGS SURVEY (HABS), ROBERT J. KAPSCH, CHIEF, AND WAS SPONSORED BY THE PACIFIC NORTHWEST REGIONAL OFFICE, STEPHANIE TOOTHMAN, CHIEF OF CULTURAL RESOURCES, BOTH ARE ENTITIES OF THE NATIONAL PARK SERVICE. THE 1989 SUMMER RECORDING WAS INITIATED BY PROJECT LEADER PAUL D. DOLINSKY, HABS PRINCIPAL ARCHITECT. DOCUMENTATION WAS PRODUCED BY PROJECT SUPERVISOR KURT M. KLINT (LOS ANGELES, CALIFORNIA), ARCHITECTURE TECHNICIAN BELINDA SOSA (TULANE UNIVERSITY), AND LANDSCAPE ARCHITECTURE TECHNICIANS MICHAEL EGAN (OKLAHOMA STATE UNIVERSITY) AND JOHN NICELY (WEST VIRGINIA UNIVERSITY).

HISTORIC AMERICAN BUILDINGS SURVEY
sheet 1 of 3 sheets

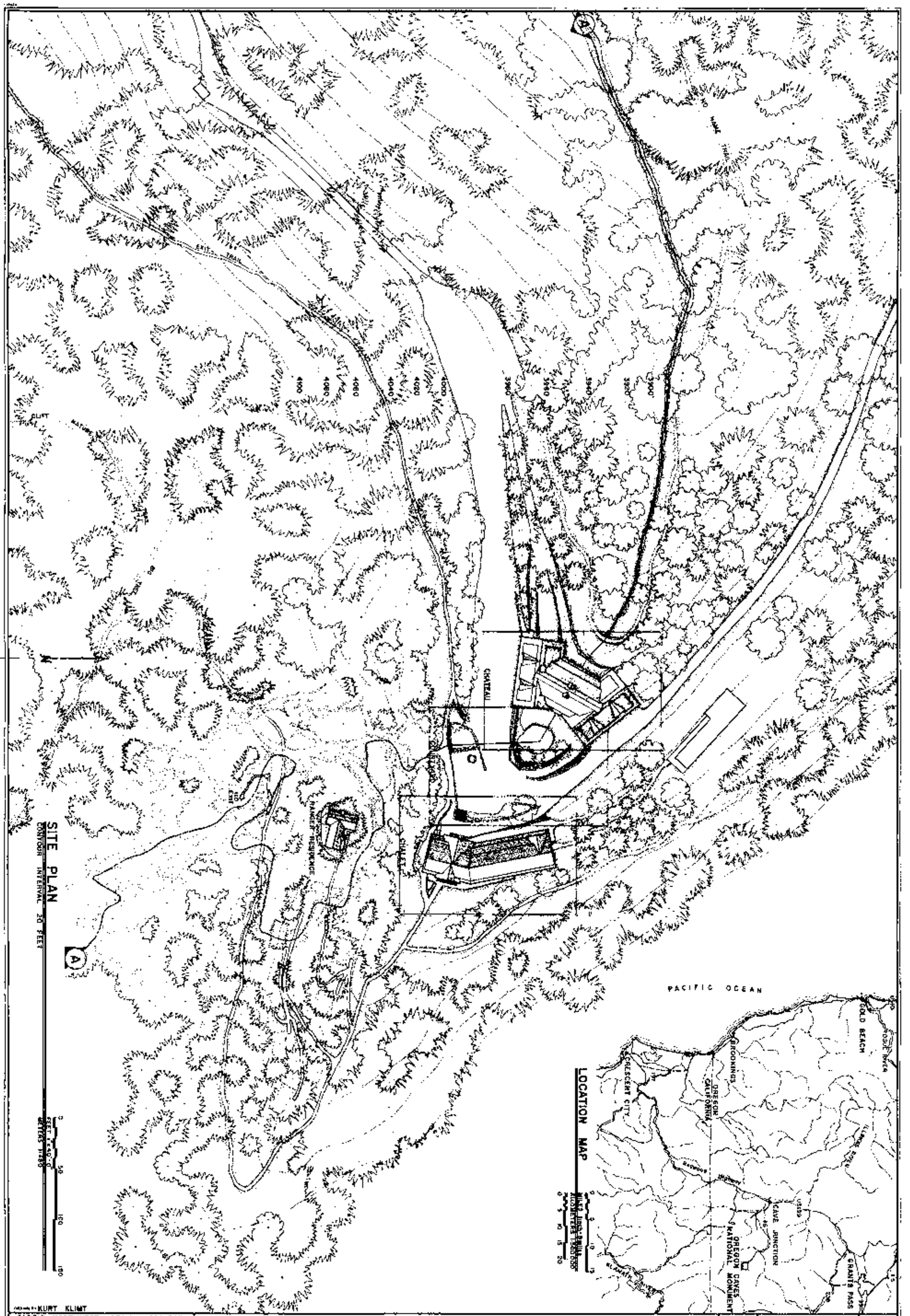
HABS OR 145

OREGON CAVES NATIONAL MONUMENT
JOSEPHINE COUNTY OREGON

19000 CAVES HIGHWAY
CAVE JUNCTION

PACIFIC NORTHWEST REGION PROJECT
1989

delineated by: RANNE RHEE



KURT KLIMT

PACIFIC NORTHWEST REGION PROJECT

NATIONAL P.P.S.

UNITED STATES DEPARTMENT OF THE INTERIOR

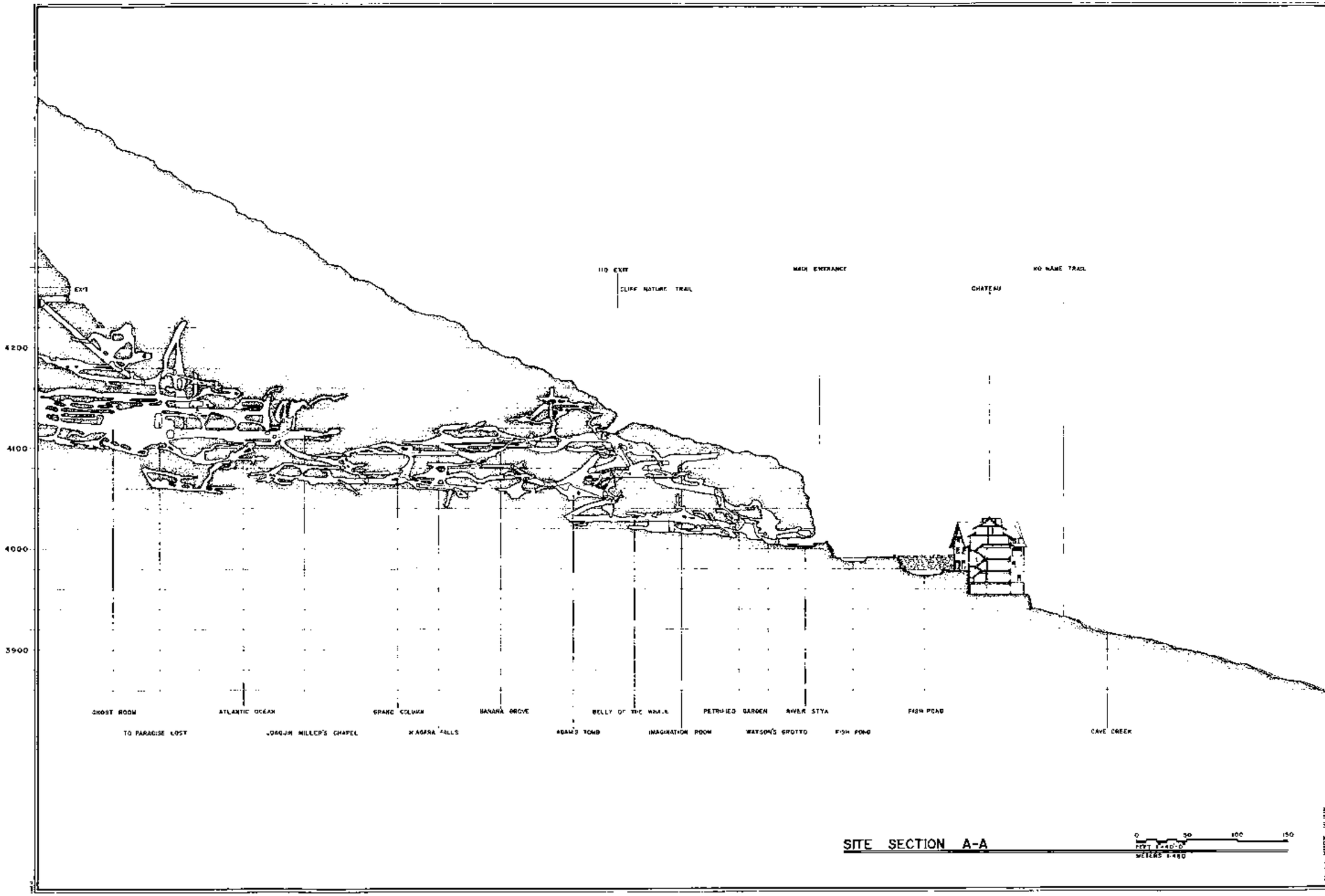
OREGON CAVES NATIONAL MONUMENT

19000 CAVES HIGHWAY — CAVE JUNCTION — JOSEPHINE COUNTY — OREGON

DR-145

HISTORIC AMERICAN BUILDINGS SURVEY

SHEET 2 OF 3 SHEETS



SITE SECTION A-A

0 50 100 150
FEET 1"=40'-0"
METERS 1:480

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 3 OF 3 SHEETS

SURVEY NO. OR-45

OREGON CAVES NATIONAL MONUMENT
19000 CAVES HIGHWAY
CAVE JUNCTION
JOSEPHINE COUNTY
OREGON

PACIFIC NORTHWEST REGION PROJECT
1989

Drawn by KURT KLIMY

INACCESSABLE

FURNACE ROOM

INACCESSABLE

FIRST FLOOR PLAN

FEET 3/16"=1'-0"

METERS 1:64

OREGON CAVES NATIONAL MONUMENT - CHATEAU

JOSEPHINE COUNTY OREGON

19000 CAVES HIGHWAY CAVE JUNCTION

PACIFIC NORTHWEST REGION PROJECT 1989

drawn by CHRISTIAN L. YADEN

HISTORIC AMERICAN BUILDINGS SURVEY

OR-1454

HISTORIC AMERICAN BUILDINGS SURVEY
sheet 2 of 8 sheets

SURVEY NO
OR-1-1854

OREGON

OREGON CAVES NATIONAL MONUMENT- CHATEAU

JOSEPHINE COUNTY

CAVE JUNCTION

19000 CAVES HIGHWAY

SECOND FLOOR PLAN

GUEST ROOM
14' - 7" X 19' - 3"

GUEST ROOM
9' - 3" X 19' - 3"

GUEST ROOM
8' - 1" X 19' - 3"

16' - 6" X 29' - 4"

6' - 8" X 22' - 6"

16' - 5" X 16' - 10"

DINING ROOM
22' - 6" X 23' - 7"

KITCHEN
9' - 9" X 7' - 5"

STORAGE
18' - 3" X 35' - 5"

STORAGE
15' - 4" X 28' - 8"

STORAGE
9' - 7" X 11' - 3"

MEN
7' - 8" X 10' - 3"

WOMEN
5' - 7" X 7' - 8"

DN

35' - 5 1/2"

60' - 7 1/2"

35' - 7 3/4"

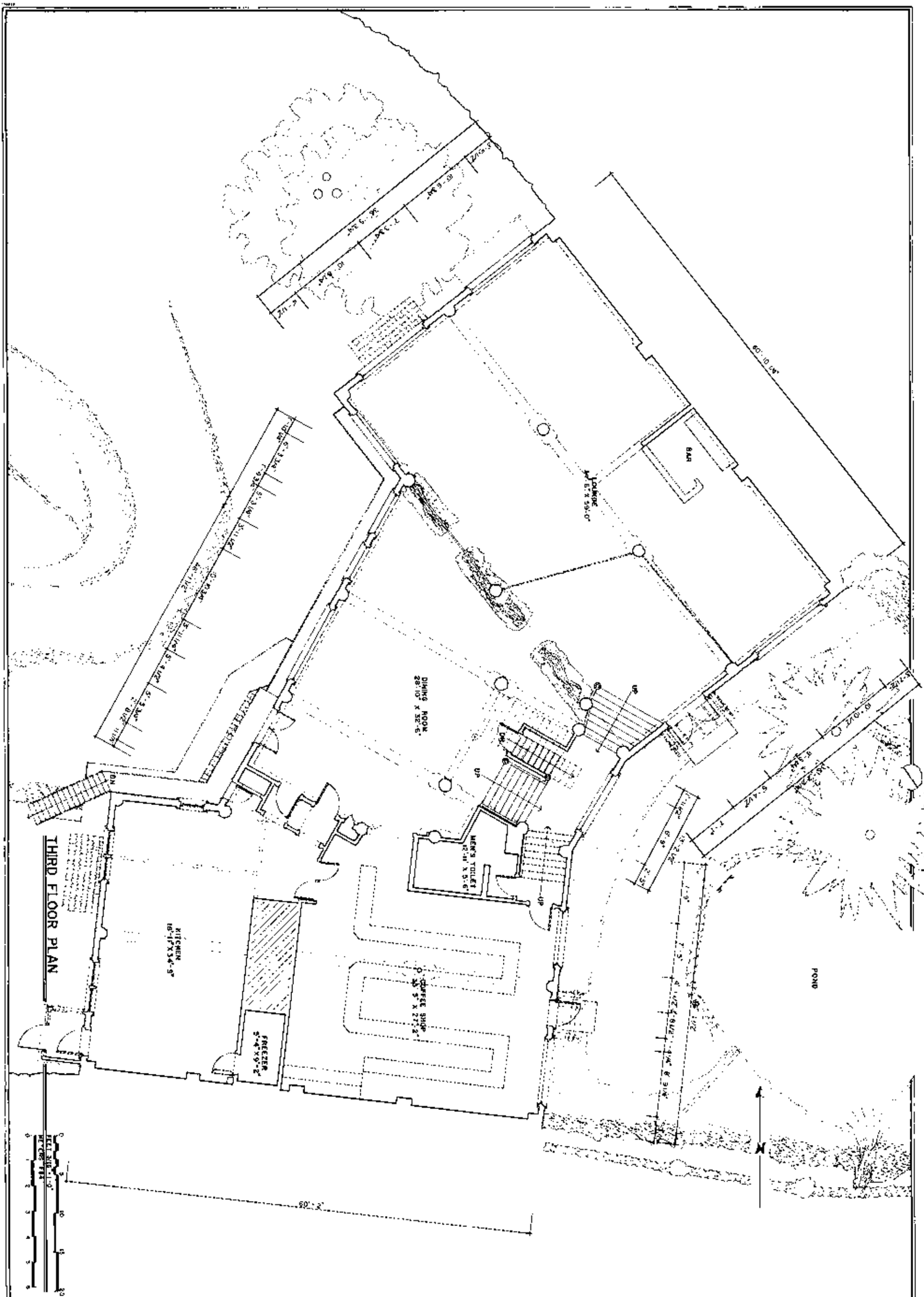
60' - 7 1/2"

3' - 5 1/2"
3' - 3 3/4"
6' - 1 3/4"
6' - 8"
3' - 5"
3' - 10"
6' - 9 3/4"
5' - 9 3/4"
9' - 10"

5' - 9"
6' - 6 1/2"
5' - 9 3/4"
5' - 11 1/2"

FEET 3/16" = 1'-0"
METERS 1:64

Surveyed by CHRISTIAN L. YADEN
PACIFIC NORTHWEST REGION PROJECT
1989



drawn by KURT KLIMT

PACIFIC NORTHWEST REGION PROJECT

1993

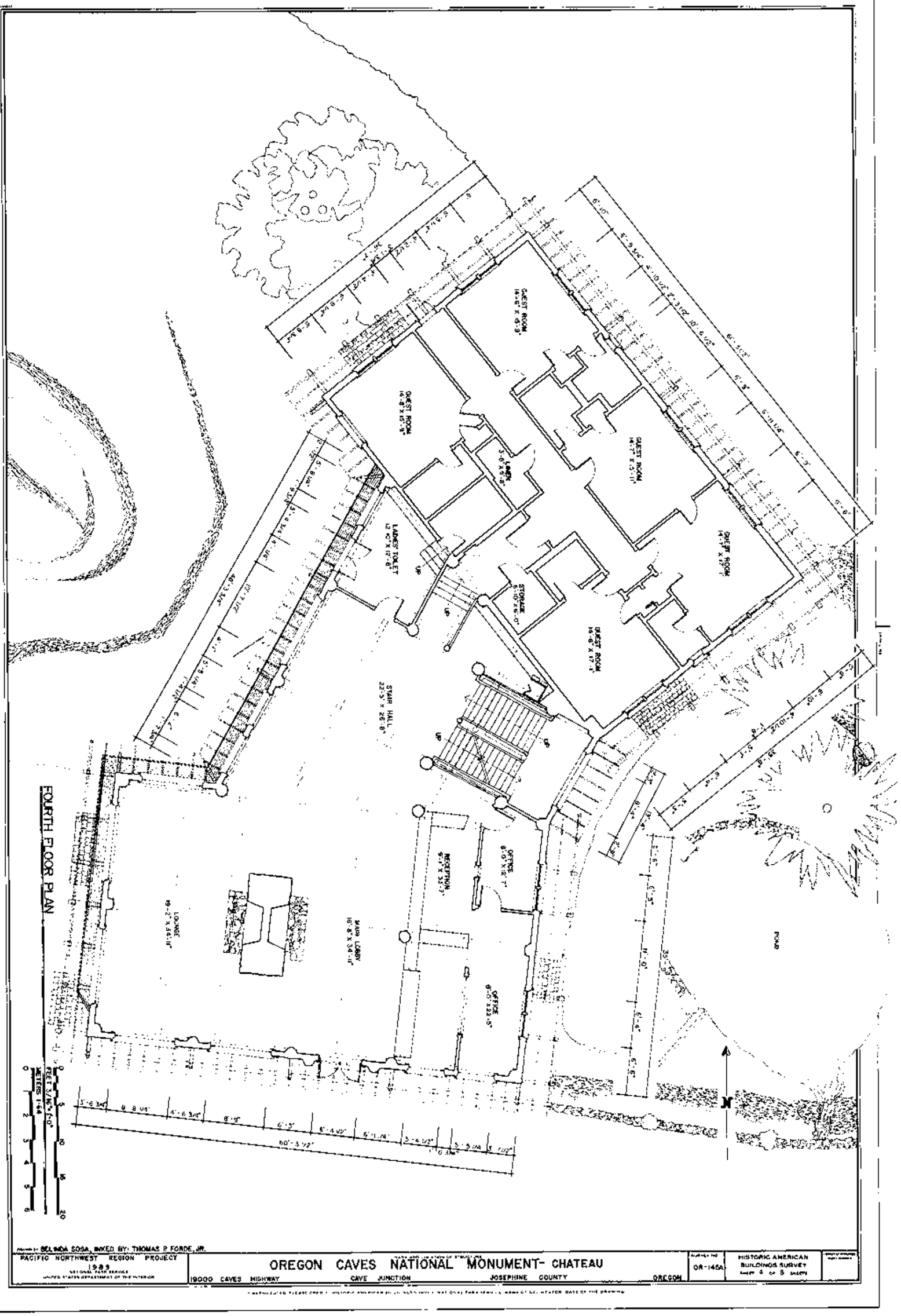
OREGON CAVES NATIONAL MONUMENT - CHATEAU

19000 CAVES HIGHWAY CAVE JUNCTION JOSEPHINE COUNTY OREGON

OR-145A

HISTORIC AMERICAN BUILDINGS SURVEY

sheet 3 of 6 sheets



DELINEATED BY: BELINDA SOSA, INKED BY: THOMAS P. FORDE, JR.

PACIFIC NORTHWEST REGION PROJECT
1989
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

OREGON CAVES NATIONAL MONUMENT- CHATEAU

19000 CAVES HIGHWAY — CAVE JUNCTION — JOSEPHINE COUNTY — OREGON

HABS NO. OR-145A

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 4 OF 5 SHEETS

POND

GUEST ROOM
16'-9" X 13'-3"

GUEST ROOM
16'-0" X 13'-3"

GUEST ROOM

GUEST ROOM
16'-0" X 13'-6"

GUEST ROOM
13'-8" X 11'-9"

GUEST ROOM
13'-8" X 11'-6"

GUEST ROOM
8'-8" X 11'-6"

GUEST ROOM
8'-8" X 6'-

GUEST ROOM
16'-9" X 3'-6"

GUEST ROOM
15'-6" X 13'-6"

GUEST ROOM
6'-2" X 13'-6"

GUEST ROOM
16'-3" X 13'-6"

FIFTH FLOOR PLAN

FEET 3/16"=1'-0"

METERS 1:64

OREGON CAVES NATIONAL MONUMENT - CHATEAU

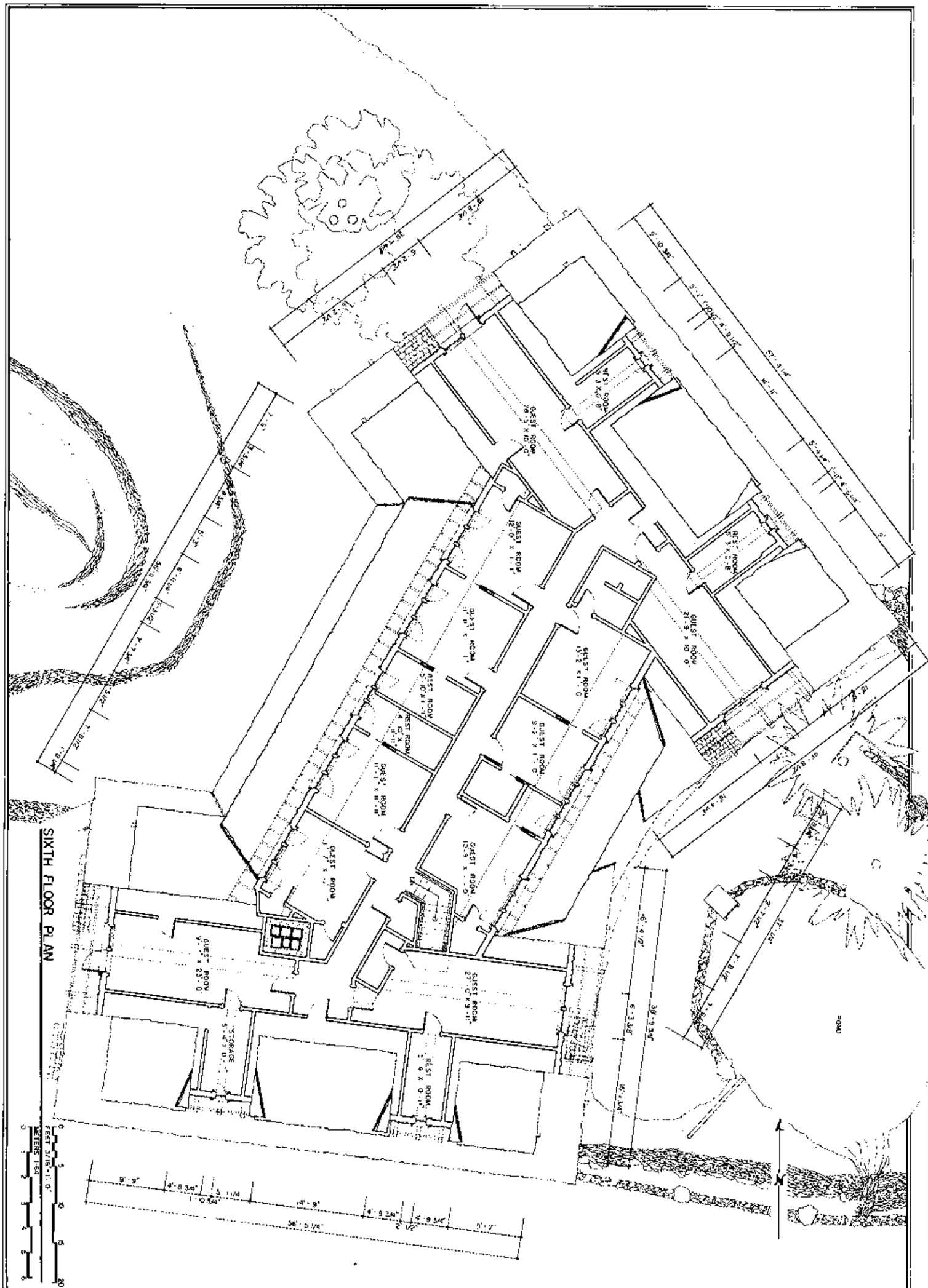
JOSEPHINE COUNTY OREGON

19000 CAVES HIGHWAY CAVE JUNCTION

HISTORIC AMERICAN BUILDINGS SURVEY

OR-1484

DRAWN BY BELINDA SOSA
PACIFIC NORTHWEST REGION PROJECT
1989



drawn by BELINDA SOSA

PACIFIC NORTHWEST REGION PROJECT 1989

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

OREGON CAVES NATIONAL MONUMENT - CHATEAU

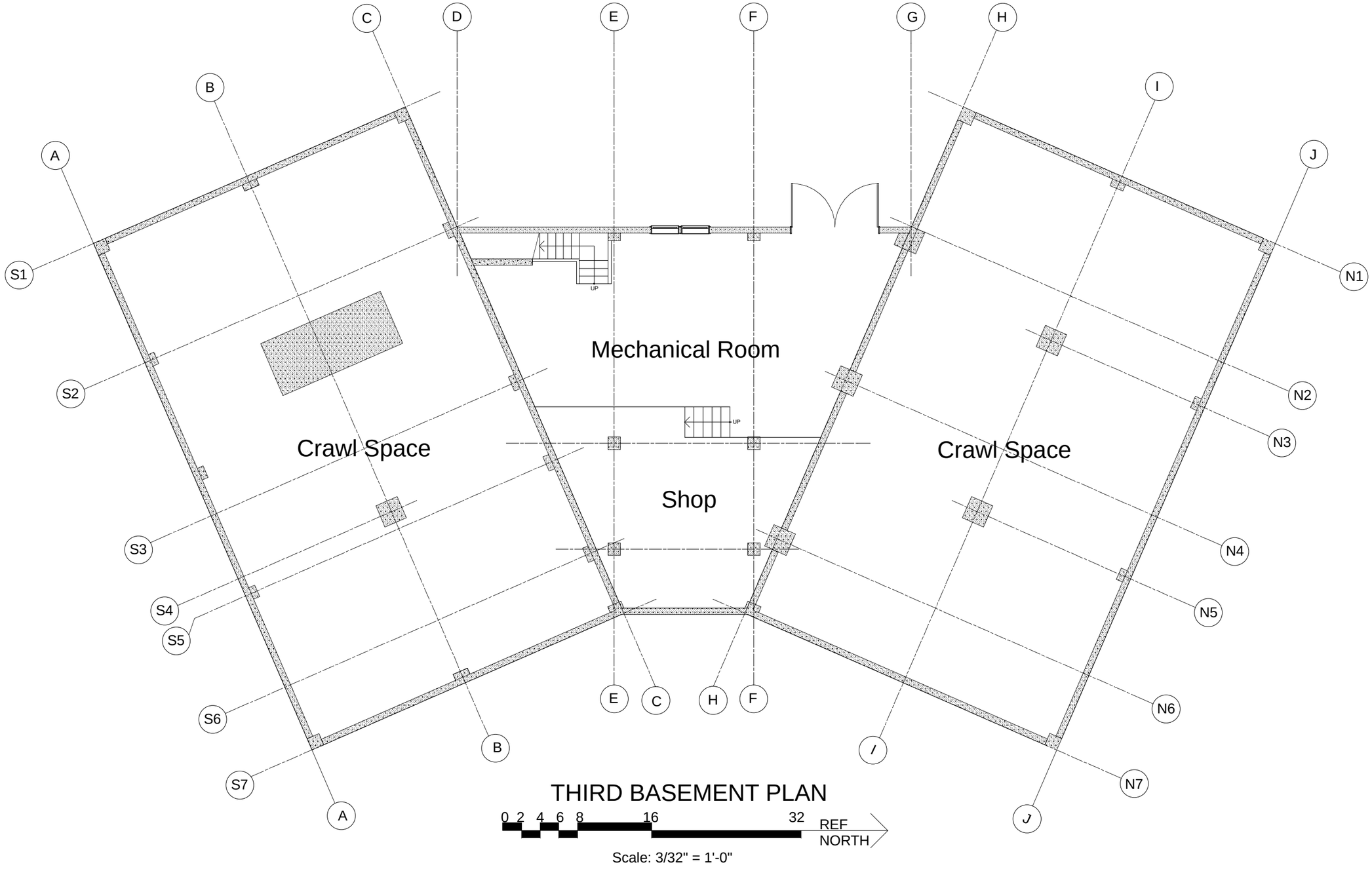
19000 CAVES HIGHWAY CAVE JUNCTION JOSEPHINE COUNTY OREGON

HABS OR-165A

HISTORIC AMERICAN BUILDINGS SURVEY
sheet 6 of 8 sheets

APPENDIX B

OREGON CAVES NATIONAL MONUMENT CHATEAU
EXISTING CONDITIONS DRAWINGS



THIRD BASEMENT PLAN

0 2 4 6 8 16 32 REF NORTH

Scale: 3/32" = 1'-0"

ARCHITECTURAL RESOURCES GROUP

NOTES:
1. Existing Conditions Drawings are based on original design drawings and HABS Drawings provided by NPS.

OREGON CAVE NATIONAL MONUMENT CHATEAU LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW:
DATE: 12/28/04

SUB SHEET NO. EC1

TITLE OF SHEET: EXISTING CONDITIONS

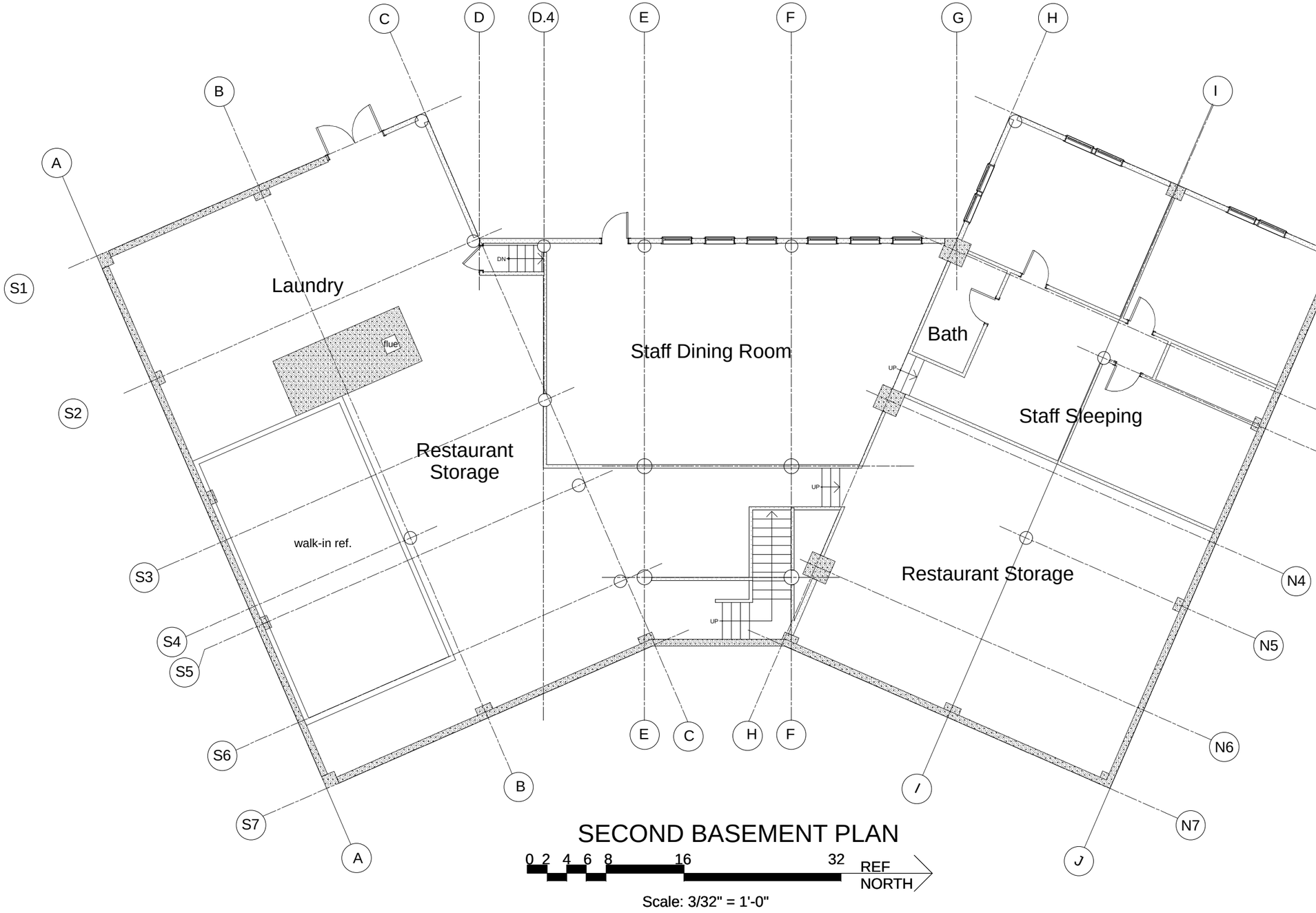
OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET

of



SECOND BASEMENT PLAN

0 2 4 6 8 16 32

REF NORTH

Scale: 3/32" = 1'-0"

ARCHITECTURAL RESOURCES GROUP

NOTES:
1. Existing Conditions Drawings are based on original design drawings and HABS Drawings provided by NPS.

OREGON CAVE NATIONAL MONUMENT CHATEAU LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW:
DATE: 12/28/04

SUB SHEET NO. EC2

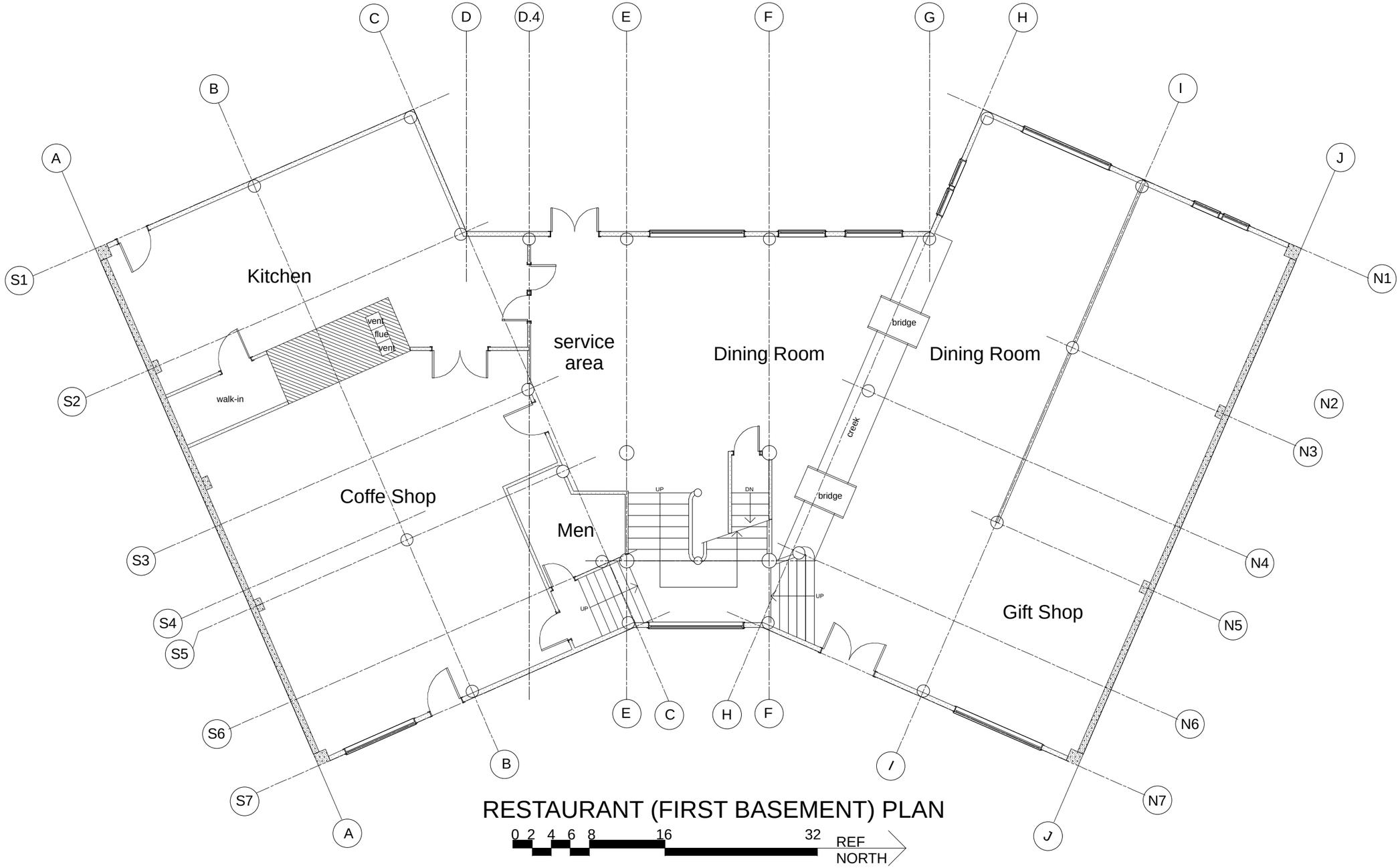
TITLE OF SHEET: EXISTING CONDITIONS

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET of



RESTAURANT (FIRST BASEMENT) PLAN

0 2 4 6 8 16 32

REF NORTH

Scale: 3/32" = 1'-0"

ARCHITECTURAL RESOURCES GROUP

NOTES:
1. Existing Conditions Drawings are based on original design drawings and HABS Drawings provided by NPS.

OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW:
DATE: 12/28/04

SUB SHEET NO. EC3

TITLE OF SHEET: EXISTING CONDITIONS

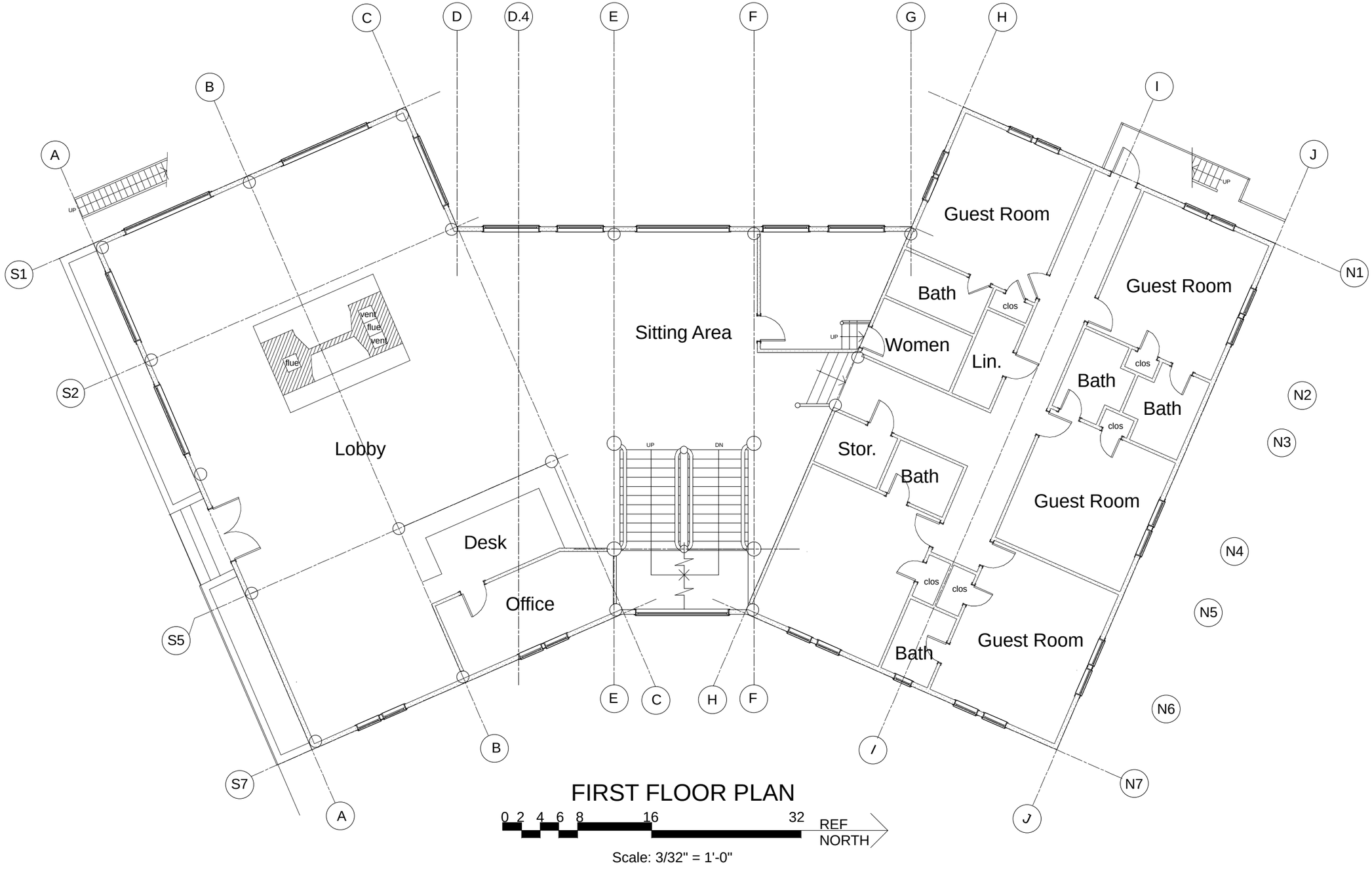
OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET

of



ARCHITECTURAL RESOURCES GROUP

NOTES:
1. Existing Conditions Drawings are based on original design drawings and HABS Drawings provided by NPS.

OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW:
DATE: 12/28/04

SUB SHEET NO. EC4

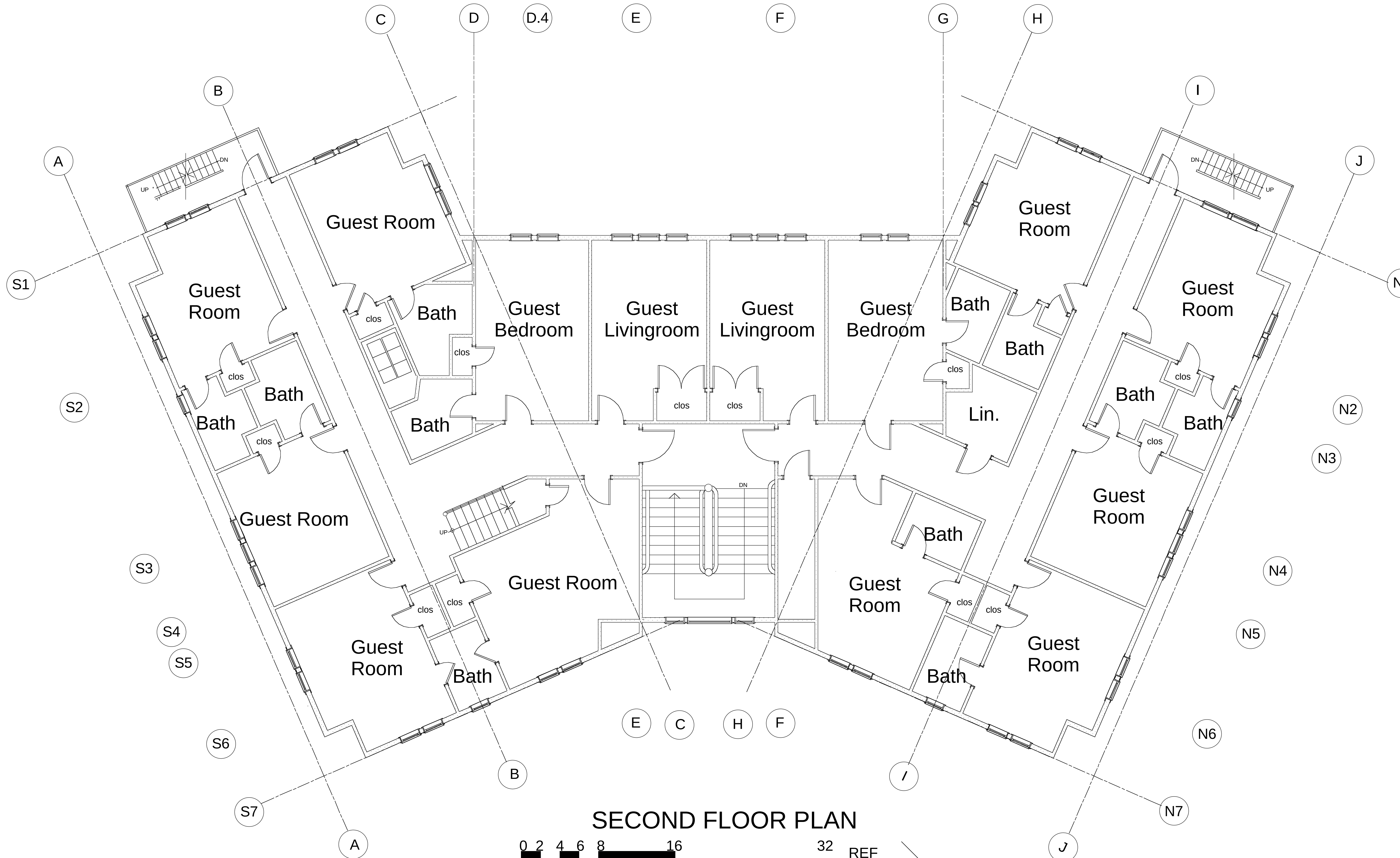
TITLE OF SHEET: EXISTING CONDITIONS

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET of



SECOND FLOOR PLAN

0 2 4 6 8 16 32 REF NORTH

Scale: 3/32" = 1'-0"

ARCHITECTURAL RESOURCES GROUP

NOTES:
1. Existing Conditions Drawings are based on original design drawings and HABS Drawings provided by NPS.

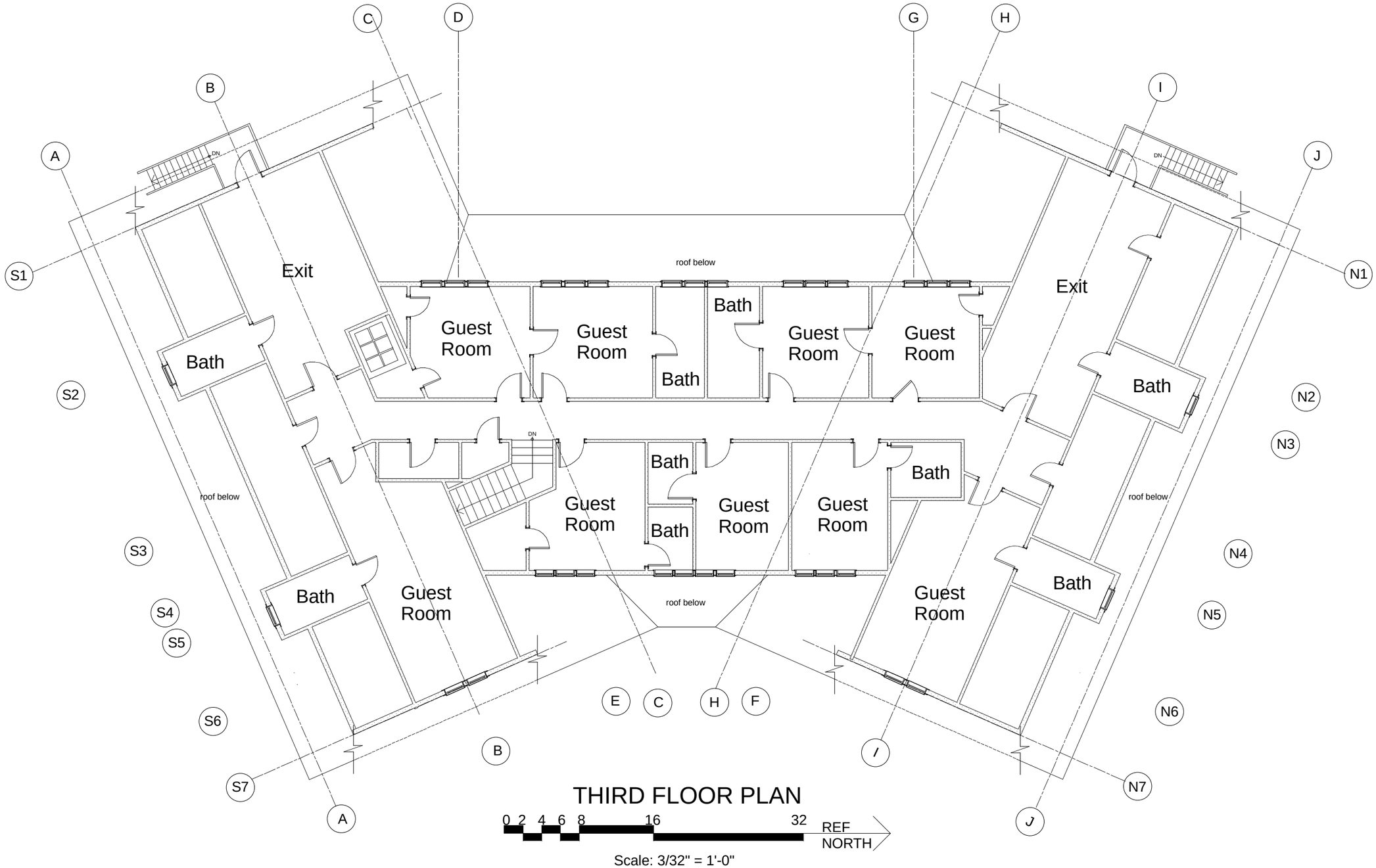
OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW:
DATE: 12/28/04

SUB SHEET NO. EC5

TITLE OF SHEET
EXISTING CONDITIONS
OREGON CAVE NATIONAL MONUMENT

DRAWING NO.
PKG. NO.
SHEET
of



THIRD FLOOR PLAN

0 2 4 6 8 16 32

REF NORTH

Scale: 3/32" = 1'-0"

ARCHITECTURAL RESOURCES GROUP

NOTES:
1. Existing Conditions Drawings are based on original design drawings and HABS Drawings provided by NPS.

OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED:	K JOHNSON
DRAWN:	K JOHNSON
TECH REVIEW:	
DATE:	12/28/04

SUB SHEET NO.: EC6

TITLE OF SHEET: EXISTING CONDITIONS

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET

of

APPENDIX C

OREGON CAVES NATIONAL MONUMENT CHATEAU
HYDRAULIC ANALYSIS

A hydraulic analysis of three areas of the existing sprinkler system, representing the assumed highest water demand spaces, was conducted to determine how much water may be required and the necessary operating pressure for fire suppression. The three areas evaluated are:

- Area #1: Third Floor guest rooms
- Area #2: Second Basement in the vicinity of the refrigerators and laundry areas.
- Area #1 First Basement Kitchen and Coffee Shop

The analysis revealed that a relatively high quantity of water may be expected to flow if the system operates. This delivery is approximately 100% greater than encountered in a contemporary structure of similar occupancy and geometry. The primary reasons for this include:

- A higher required application rate due to the combustibility of the wall and ceiling materials. If a fire occurs the sprinkler discharge must be substantial in attempt to prevent fire spread and prevent entry into concealed spaces. Modern hotel rooms are designed to NFPA Light Hazard criteria rather than the present Ordinary Group I requirement, which would apply water at an approximate 50% lower volume per sprinkler head (0.10 GPM/ft² versus 0.15 GPM/ft²).
- The sprinkler head spacing is relatively close, resulting in approximately twice the number of sprinklers that would be used in a contemporary property. Subsequently a greater number of sprinklers can be expected to operate with twice the rate of discharge in a given floor area. For example a modern hotel room fire is usually controlled with two sprinklers. In the Chateau the same dimension room has 4-5 sprinklers, all of which will be expected to operate.
- The system is a dry-pipe arrangement, which, due to the longer response rate, increases the required water application by approximately 30%.

Table 5.1 summarizes the results of the hydraulic analysis.

Table 5.1 Sprinkler Demand Summary (Existing System)

Area Designation	Area 1, Third Floor Guest Rooms, Center Section	Area 2, Second Basement	Area 3, First Basement Kitchen/Coffee Shop
NFPA Hazard Designation	OH-1	OH-1	OH-1
System Type	Dry-pipe	Dry-pipe	Dry-pipe
Operating Area	1950 ft²	1950 ft²	1950 ft²
Density	0.150 GPM/ft²	0.150 GPM/ft²	0.150 GPM/ft²
Number of operating sprinklers	50	34	41
Sprinkler total flow	1041 GPM	633 GPM	878 GPM
Hose Allowance	250 GPM	250 GPM	250 GPM
Total Flow	1291 GPM	883 GPM	1128 GPM
Required Pressure	102 PSI	49.9 PSI	162.7 PSI

Evaluating the required water flow and pressure rates to the existing water supply the following information was determined:

- *Area #1 with interior hose allowance*: The water system will be able to adequately supply the maximum sprinkler flow for approximately 58 minutes. The supply pressure at maximum flow will be inadequate by approximately 9.6-12.8 psi depending on the supply pipe condition.
- *Area #1 without interior hose allowance*: The water system will be able to adequately supply the maximum sprinkler flow for approximately 72 minutes. The supply pressure at maximum flow will be inadequate by approximately 3.6-7.3 psi depending on the supply pipe condition.
- *Area #2 with interior hose allowance*: The water system will be able to adequately supply the maximum sprinkler flow for approximately 85 minutes. The supply pressure at maximum flow will be adequate by approximately 47.8-49.3 psi.
- *Area #2 without interior hose allowance*: The water system will be able to adequately supply the maximum sprinkler flow for approximately 118 minutes. The supply pressure at maximum flow will be adequate by approximately 52.3-53.3 psi.
- *Area #3 with interior hose allowance*: The water system will be able to adequately supply the maximum sprinkler flow for approximately 66 minutes. The supply pressure at maximum flow will be inadequate by approximately 67.6-69.9 psi depending on the supply pipe condition.
- *Area #3 without interior hose allowance*: The water system will be able to adequately supply the maximum sprinkler flow for approximately 85 minutes. The supply pressure at maximum flow will be adequate by approximately 63.3-65.0 psi.

Tables 5.2 through 5.7 summarize the required sprinkler demand and compare it to the available water supply.

Table 5.2: Sprinkler Demand and Available Water Pressure Summary
Area 1 Third Floor NFPA OH 1 Dry-Pipe System with Hose Allowance

Area Designation	Area 1, Third Floor Guest Rooms, Center Section	Area 2, Second Basement	Area 3, First Basement Kitchen/Coffee Shop
NFPA Hazard Designation	OH-1	OH-1	OH-1
System Type	Dry-pipe	Dry-pipe	Dry-pipe
Operating Area	1950 ft²	1950 ft²	1950 ft²
Density	0.150 GPM/ft²	0.150 GPM/ft²	0.150 GPM/ft²
Number of operating sprinklers	50	34	41
Sprinkler total flow	1041 GPM	633 GPM	878 GPM
Hose Allowance	250 GPM	250 GPM	250 GPM
Total Flow	1291 GPM	883 GPM	1128 GPM
Required Pressure	102 PSI	49.9 PSI	162.7 PSI

Table 5.3: Sprinkler Demand and Available Water Pressure Summary
Area 1 Third Floor NFPA OH 1 Dry-Pipe System without Hose Allowance

Water Quantity	1041 GPM	1041 GPM
Pipe Coefficient (C)	C=90	C=80
Total friction loss 8" and 6"	7.6 psi	15.5 psi
Static pressure at base of riser	106 psi	106 psi
Residual pressure at base of riser	98.4 psi	94.7 psi
Flow at base of riser	1041 GPM	1041 GPM
Sprinkler demand pressure	102.0 psi	102.0 psi
Tank Duration (maximum level)	72 minutes	72 minutes
Pressure safety margin	(-3.6 psi)	(-7.3 psi)

Table 5.4: Sprinkler Demand and Available Water Pressure Summary
Area 2 Second Basement NFPA OH 1 Dry-Pipe System with Hose Allowance

Water Quantity	883 GPM	883 GPM
Pipe Coefficient (C)	C=90	C=80
Total friction loss 8" and 6"	6.8 psi	7.7 psi
Static pressure at base of riser	106 psi	106 psi
Residual pressure at base of riser	99.2 psi	97.7 psi
Flow at base of riser	883 GPM	883 GPM
Sprinkler demand pressure	49.9 psi	49.9 psi
Sprinkler flow demand (including 250 gpm interior hose)	883 GPM	883 GPM
Tank Duration (maximum level)	85 minutes	85 minutes
Pressure safety margin	49.3 psi	47.8 psi

Table 5.5: Sprinkler Demand and Available Water Pressure Summary
Area 2 Second Basement NFPA OH 1 Dry-Pipe System without Hose Allowance

Water Quantity	633 GPM	633 GPM
Pipe Coefficient (C)	C=90	C=80
Total friction loss 8" and 6"	2.8 psi	3.8 psi
Static pressure at base of riser	106 psi	106 psi
Residual pressure at base of riser	103.2 psi	102.2 psi
Flow at base of riser	633 GPM	883 GPM
Sprinkler demand pressure	49.9 psi	49.9 psi
Sprinkler flow demand	633 GPM	633 GPM
Tank Duration (maximum level)	118 minutes	118 minutes
Pressure safety margin	53.3 psi	52.3 psi

Table 5-6: Sprinkler Demand and Available Water Pressure Summary
Area 3 First Basement NFPA OH 1, Dry-Pipe System with Hose Allowance

Water Quantity	1128 GPM	1128 GPM
Pipe Coefficient (C)	C=90	C=80
Total friction loss 8" and 6"	10.9 psi	13.2 psi
Static pressure at base of riser	106 psi	106 psi
Residual pressure at base of riser	95.1 psi	92.8 psi
Flow at base of riser	1128 GPM	1128 GPM
Sprinkler demand pressure	162.7 psi	162.7 psi
Sprinkler flow demand (including 250 gpm interior hose)	1128 GPM	1128 GPM
Tank Duration (maximum level)	66 minutes	66 minutes
Pressure safety margin	(-67.6 psi)	(-69.9 psi)

Table 5-7: Sprinkler Demand and Available Water Pressure Summary
Area 3 First Basement NFPA OH 1, Dry-Pipe System without Hose Allowance

Water Quantity	878 GPM	878 GPM
Pipe Coefficient (C)	C=90	C=80
Total friction loss 8" and 6"	6.6 psi	8.3 psi
Static pressure at base of riser	106 psi	106 psi
Residual pressure at base of riser	99.4 psi	97.7 psi
Flow at base of riser	878 GPM	878 GPM
Sprinkler demand pressure	162.7 psi	162.7 psi
Sprinkler flow demand (including 250 gpm interior hose)	878 GPM	878 GPM
Tank Duration (maximum level)	85 minutes	85 minutes
Pressure safety margin	(-63.3 psi)	(-65.0 psi)

APPENDIX D

OREGON CAVES NATIONAL MONUMENT CHATEAU
INFRARED THERMOGRAPHIC INSPECTION OF SELECTED ELECTRO-MECHANICAL EQUIPMENT

Prepared by Colbert Infrared Services, 2004

Colbert Infrared Services

Thermal Trend

Infrared Thermographic Inspection
Of
Selected Electro-Mechanical Equipment

Provided For
Tres West Engineers, Inc. - Chateau at the Oregon Caves
12/2/2004

Summary:

An Infrared Electrical / Mechanical inspection was preformed on 12/2/2004 for Tres West Engineers, Inc. - Chateau at the Oregon Caves.

All of the items inspected are listed in the inventory section of this Thermal Trend report. Any anomalies that were found at the time of the inspection (if any) are documented in the Problem Detail section of this report with there appropriate associated data, i.e. Thermograms, Photos, comments, measurements, etc. And are also listed in the Prioritized list of problems section, in there order of priority based on the components temperature rise, as compared to a similar reference component of equal type, loading, and environmental influences, at the time of the inspection. The final decision as to the repair priority of any and all problems in this report rests on the owners, management, facilities engineering team. The IR Thermographer assumes no liability directly or indirectly as a result of this inspection or the decisions made as to establishing the priority and timeline of repair decisions made by the owners, management, facilities engineering team.

Executive Overview:

# of locations in the database:	19
# of pieces of equipment in the database:	23
# of problems (open and closed covering all inspections):	
all acute and chronic:	5
all acute:	5
all chronic:	0
# of problems, acute and chronic:	
all closed (covering all inspections):	0
all open (tested or not tested in this inspection):	5

I herby certify that the above project was inspected by myself or under my direction and that the enclosed data is the direct result of this inspection.

_____

Professional Thermographers Association

Colbert Infrared Services, Inc. 929 19th Ave. Seattle, WA 98122 Phone 206.568.4431 Fax 206.568.4437

Prioritized List by Temperature Rise

Site Tres West Engineers, Inc. - Chateau at the Oregon Caves
Database Oregon Caves.mdb
Inspection # 1

Problem # 3 **Barcode:** **Temp. Rise** 36 **% Load:** 44%

Location INSIDE OF BUILDING \ 1st Floor \ BOILER RM

Equipment 400-AMP ZINSCO DISC. (Roughly 180amps on circuit @ time of insp.)

Component Right phase line side wire lug connection or internal problem in circuit breaker.

Picture IMG_2382.JPG

IR Filename fhcr0080.sit

	Temp	Phase	Load
Component	109	LEFT	175
Reference	70	Right	185
Ambient	55		
Wind Speed	-1		
Rat. Load:	400		
Severity Code	3		

Problem # 5 **Barcode:** **Temp. Rise** 14 **% Load:** 55%

Location INSIDE OF BUILDING \ 2nd FLOOR \ LAUNDRY / WALK-IN COOLER AREA

Equipment PNL #4 (Roughly 80amps on pnl @ time of insp.)

Component Upper phase heating possible internal problem in circuit breaker #24,26,28,30 sub pnl upstairs

Picture IMG_2385.JPG

IR Filename fhcr0090.sit

	Temp	Phase	Load
Component	97	Top phase	62
Reference	83	Bttom phas	81
Ambient	55		
Wind Speed	-1		
Rat. Load:	150		
Severity Code	4		

Problem # 4 **Barcode:** **Temp. Rise** 7 **% Load:** N/A

Location INSIDE OF BUILDING \ 1st Floor \ BOILER RM

Equipment 30-AMP BOILER DISC. (Unable to check amperage)

Component Load side red wire nut connetion on purple wire below fused disconnect switch

Picture IMG_2383.JPG

IR Filename fhcr0083.sit

	Temp	Phase	Load
Component	89	N/A	
Reference	82	N/A	
Ambient	55		
Wind Speed	-1		
Rat. Load:	25		
Severity Code	4		

Problem # 1 **Barcode:** **Temp. Rise** 6 **% Load:** N/A

Location OUTSIDE OF BUILDING

Equipment West side of building

Component Small temp difference around north 2nd floor mounting bracket of fire escape, possible moisture problem or other anomalie.

Picture IMG_2371.JPG

IR Filename fhcr0068.sit

	Temp	Phase	Load
Component	30	N/A	
Reference	24	N/A	
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity Code	0		

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Prioritized List by Temperature Rise

Site: Tree West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Inspection #: 1

Problem #: 2 **Barcode:** **Temp. Rise:** 0 **% Load:** N/A

Location: INSIDE OF BUILDING

Equipment: North mounting bracket area of south west fire escape.

Component: Same problem as item #1 just taken form the inside instead of the outside.

Picture: IMG_2381.JPG

IR Filename: fliri0078.sit

	Temp	Phase	Load
Component	20	N/A	
Reference	20	N/A	
Ambient	20		
Wind Speed	-1		
Rat. Load:			
Severity Code:	0		

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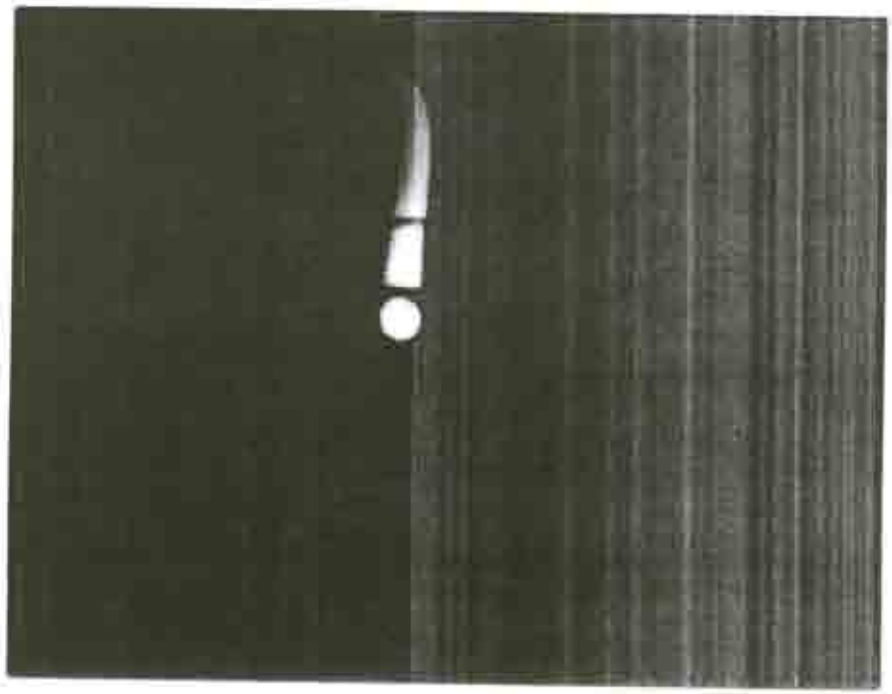
No Visual Anomalies



Documented During This Inspection

Baseline List by Temperature Rise

Site: Tree West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Problem # 15 **Barcode:** **Temp. Rise** 0 **Inspection #** 1

Location: OUTSIDE OF BUILDING

	% Load: N/A	Temp	Phase	Load
	Component	24	N/A	
	Reference	24	N/A	
	Threshold	-1		
	Ambient	22		
	Wind Speed	1		
	Rat. Load:			
	Severity	0		

Equipment: West side of building

Component: Center south lower shot

Picture: IMG_2366.JPG

IR Filename: fhcr0064.sit

Problem # 1 **Barcode:** **Temp. Rise** 0

Location: OUTSIDE OF BUILDING

	% Load: N/A	Temp	Phase	Load
	Component	24	N/A	
	Reference	24	N/A	
	Threshold	1		
	Ambient	22		
	Wind Speed	1		
	Rat. Load:			
	Severity	0		

Equipment: East side of building

Component: North end upper shot

Picture: IMG_2355.JPG

IR Filename: FHCR0051.sit

Problem # 2 **Barcode:** **Temp. Rise** 0

Location: OUTSIDE OF BUILDING

	% Load: N/A	Temp	Phase	Load
	Component	24	N/A	
	Reference	24	N/A	
	Threshold	-1		
	Ambient	22		
	Wind Speed	-1		
	Rat. Load:			
	Severity	0		

Equipment: East side of building

Component: Center lower shot

Picture: IMG_2356.JPG

IR Filename: fhcr0052.sit

Problem # 3 **Barcode:** **Temp. Rise** 0

Location: OUTSIDE OF BUILDING

	% Load: N/A	Temp	Phase	Load
	Component	24	N/A	
	Reference	24	N/A	
	Threshold	-1		
	Ambient	22		
	Wind Speed	-1		
	Rat. Load:			
	Severity	0		

Equipment: East side of building

Component: Center upper shot

Picture: IMG_2356.JPG

IR Filename: fhcr0053.sit

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Baseline List by Temperature Rise

Site: Tree West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Inspection # 1

Problem # 4 **Barcode** **Temp. Rise** 0 **% Load:** N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: East side of building

Component: South end lower shot

Picture: IMG_2357.JPG

IR Filename: fhcr0054.sit

Problem # 5 **Barcode** **Temp. Rise** 0 **% Load:** N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: East side of building

Component: East side south upper shot

Picture: IMG_2357.JPG

IR Filename: fhcr0055.sit

Problem # 7 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: South side of building

Component: East end lower shot

Picture: IMG_2358.JPG

IR Filename: fhcr0056.sit

Problem # 8 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: South side of building

Component: East end upper shot

Picture: IMG_2359.JPG

IR Filename: fhcr0057.sit

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Baseline List by Temperature Rise

Site: Tims West Engineers, Inc. - Chairman of the Oregon Caves

Database: Oregon Caves.mdb

Inspection # 1

Problem # 9 **Barcode:** **Temp. Rise** 0

Location: OUTSIDE OF BUILDING

Equipment: South side of building

Component: Center lower shot

Picture: IMG_2360.JPG

IR Filename: fhcr0058.sit

% Load: N/A	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Problem # 10 **Barcode:** **Temp. Rise** 0

Location: OUTSIDE OF BUILDING

Equipment: South side of building

Component: Center upper shot

Picture: IMG_2361.JPG

IR Filename: fhcr0059.sit

% Load: N/A	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Problem # 11 **Barcode:** **Temp. Rise** 0

Location: OUTSIDE OF BUILDING

Equipment: South side of building

Component: West end lower shot

Picture: IMG_2362.JPG

IR Filename: fhcr0060.sit

% Load: N/A	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Problem # 12 **Barcode:** **Temp. Rise** 0

Location: OUTSIDE OF BUILDING

Equipment: South side of building

Component: West end upper shot

Picture: IMG_2363.JPG

IR Filename: fhcr0061.sit

% Load: N/A	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

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Baseline List by Temperature Rise

Site Tina West Engineers, Inc. - Chateau at the Oregon Caves

Database Oregon Caves.mdb

Inspection # 1

Problem # 1 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

Location	OUTSIDE OF BUILDING		Temp	Phase	Load
Equipment	East side of building	Component	24	N/A	
Component	North end lower shot	Reference	24	N/A	
		Threshold	-1		
		Ambient	22		
Picture	IMG_2365.JPG	Wind Speed	-1		
IR Filename	FHCR0050.SIT	Rat. Load:			
		Severity	0		

Problem # 14 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

Location	OUTSIDE OF BUILDING		Temp	Phase	Load
Equipment	West side of building	Component	24	N/A	
Component	South end upper shot	Reference	24	N/A	
		Threshold	-1		
		Ambient	22		
Picture	IMG_2365.JPG	Wind Speed	-1		
IR Filename	fhcr0063.sit	Rat. Load:			
		Severity	0		

Problem # 27 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

Location	OUTSIDE OF BUILDING		Temp	Phase	Load
Equipment	North side of building	Component	24	N/A	
Component	East end upper shot	Reference	24	N/A	
		Threshold	-1		
		Ambient	22		
Picture	IMG_2380.JPG	Wind Speed	-1		
IR Filename	fhcr0077.sit	Rat. Load:			
		Severity	0		

Problem # 16 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

Location	OUTSIDE OF BUILDING		Temp	Phase	Load
Equipment	West side of building	Component	24	N/A	
Component	Center south upper shot	Reference	24	N/A	
		Threshold	-1		
		Ambient	22		
Picture	IMG_2367.JPG	Wind Speed	-1		
IR Filename	fhcr0065.sit	Rat. Load:			
		Severity	0		

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Baseline List by Temperature Rise

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Inspection # 1

Problem # 17 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: West side of building

Component: Center north lower shot

Picture: IMG_2368.JPG

IR Filename: fhcr0068.sit

Problem # 18 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: West side of building

Component: Center north upper shot

Picture: IMG_2369.JPG

IR Filename: fhcr0067.sit

Problem # 19 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: West side of building

Component: North end lower shot

Picture: IMG_2372.JPG

IR Filename: fhcr0069.sit

Problem # 20 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: West side of building

Component: North end upper shot

Picture: IMG_2373.JPG

IR Filename: fhcr0070.sit

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Baseline List by Temperature Rise

Site: Tree West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Inspection # 1

Problem # 21 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

Location: OUTSIDE OF BUILDING

Equipment: West side of building

Component: North end upper shot two

Picture: IMG_2374.JPG

IR Filename: thcr0071.sit

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Problem # 22 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

Location: OUTSIDE OF BUILDING

Equipment: North side of building

Component: West end lower shot (note west or north window

Picture: IMG_2375.JPG

IR Filename: thcr0072.sit

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Problem # 23 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

Location: OUTSIDE OF BUILDING

Equipment: North side of building

Component: West end upper shot

Picture: IMG_2376.JPG

IR Filename: thcr0073.sit

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Problem # 24 **Barcode:** **Temp. Rise** 0 **% Load:** N/A

Location: OUTSIDE OF BUILDING

Equipment: North side of building

Component: Center lower shot

Picture: IMG_2377.JPG

IR Filename: thcr0074.sit

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Baseline List by Temperature Rise

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Inspection # 1

Problem # 25 Barcode: Temp. Rise 0 % Load: N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: North side of building

Component: Center upper shot

Picture: IMG_2378.JPG

IR Filename: lhcr0075.sit

Problem # 26 Barcode: Temp. Rise 0 % Load: N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: North side of building

Component: East end tower shot

Picture: IMG_2379.JPG

IR Filename: lhcr0076.sit

Problem # 13 Barcode: Temp. Rise 0 % Load: N/A

	Temp	Phase	Load
Component	24	N/A	
Reference	24	N/A	
Threshold	-1		
Ambient	22		
Wind Speed	-1		
Rat. Load:			
Severity	0		

Location: OUTSIDE OF BUILDING

Equipment: West side of building

Component: South end tower shot

Picture: IMG_2364.JPG

IR Filename: lhcr0062.sit

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Inventory Report

Site: Tiax West Engineers, Inc. - Chateau at the Oregon Caves **Inspection #:** 1

Database: Oregon Caves.mdb

Open Problem	Status	Barcode	Location \ Equipment
No	Tested		INSIDE OF BUILDING
No	Tested		1st Floor
No	Tested		BOILER RM
No	Tested		200-AMP SQUARE D DISC. (Roughly 20amps on circuit @ time of ins
Yes	Tested		30-AMP BOILER DISC. (Unable to check amperage)
No	Tested		400-AMP TRUMBULL DISC. (Roughly 170amps on circuit @ time of in
Yes	Tested		400-AMP ZINSCO DISC. (Roughly 180amps on circuit @ time of insp.)
No	Not Tested		BREAKER SWITCH FOR GENERATOR
No	Tested		UNMARKED PNL (Roughly 4amps on pnl @ time of insp.)
No	Tested		2nd FLOOR
No	Tested		LAUNDRY / WALK-IN COOLER AREA
No	Tested		FIRE ALARM DISCONNECT
No	Tested		FIRE SUPPRESSION CONTACTOR PNL BETWEEN PNL #1 & #2
No	Tested		GENERATOR TRANSFER SWITCH (Roughly 15amps on circuit @ ti
No	Not Tested		GENERATOR POWER
No	Tested		NORMAL POWER
No	Tested		GUTTER ABOVE PNL #3 & #4
No	Tested		PNL #1 (Roughly 20amps on pnl @ time of insp.)
No	Tested		PNL #2 (Roughly 175amps on pnl @ time of insp.)
No	Tested		PNL #3 (Roughly 83amps on pnl @ time of insp.)
Yes	Tested		PNL #4 (Roughly 80amps on pnl @ time of insp.)
No	Tested		PNL GENERATOR (Roughly 15amps on pnl @ time of insp.)
No	Not Tested		UNDER REFFER COMPRESSORS
No	Not Tested		BEER COOLER COFFEE SHOP
No	Not Tested		BREAKER - FOUNTAIN
No	Not Tested		BREAKER - KITCHEN WALK-IN
No	Not Tested		DISC. UNDER COUNTER UNIT
No	Tested		LITTLE D'S
No	Tested		UNMARKED PNL BY OVEN (Roughly 3amps on pnl @ time of insp.)
No	Tested		3rd FLOOR
No	Tested		GIFT SHOP
No	Tested		PNL UNMARKED (Roughly 81amps on pnl @ time of insp.)
No	Tested		4th FLOOR - MAIN FLOOR
No	Tested		5th FLOOR
No	Tested		HALLWAY BY RM 214
No	Tested		PNL UNMARKED (Roughly 25amps on pnl @ time of insp.)
Yes	Tested		North mounting bracket area of south west fire escape
No	Tested		OUTSIDE OF BUILDING
No	Tested		East side of building
No	Tested		North side of building
No	Tested		South side of building
Yes	Tested		West side of building

Colbert Infrared Services

Thermal Trend

Reconciliation Matrix

Site Tree West Engineers, Inc. - Chateau at the Oregon Caves
Database Oregon Caves.mdb

	Insp#1
# of Locations that were tested	18
# of Locations that were not tested	1
# of pieces of equipment that were tested	17
# of pieces of equipment that were not tested	6
Total # of all open problems (tested or not) acute & chronic	5
# of open acute & chronic problems documented	5
# of open acute & chronic problems not tested	0
# of problems closed	0

Professional Thermographers Association

Historical Test Status Matrix

Site Tree West Engineers, Inc. - Chateau at the Oregon Caves
Database Oregon Caves.mdb

Location \ Equipment	Insp#1 12/2/2004 *Open Status Prob
INSIDE OF BUILDING	Tested
1st Floor	Tested
BOILER RM	Tested
200-AMP SQUARE D DISC (Roughl	Tested
30-AMP BOILER DISC (Unable to v	*Tested
400-AMP TRUMBULL DISC (Roughl	Tested
400-AMP ZINSCO DISC (Roughly 1	*Tested
BREAKER SWITCH FOR GENERAT	Not Tested
UNMARKED PNL (Roughly 4amps o	Tested
2nd FLOOR	Tested
LAUNDRY / WALK-IN COOLER AREA	Tested
FIRE ALARM DISCONNECT	Tested
FIRE SUPPRESSION CONTACTOR	Tested
GENERATOR TRANSFER SWITCH	Tested
GENERATOR POWER	Not Tested
NORMAL POWER	Tested
GUTTER ABOVE PNL #3 & #4	Tested
PNL #1 (Roughly 20amps on pnl @ ti	Tested
PNL #2 (Roughly 175amps on pnl @	Tested
PNL #3 (Roughly 83amps on pnl @ ti	Tested
PNL #4 (Roughly 80amps on pnl @ ti	*Tested
PNL GENERATOR (Roughly 15amps	Tested
UNDER REFFER COMPRESSORS	Not Tested
BEER COOLER COFFEE SH	Not Tested
BREAKER - FOUNTAIN	Not Tested
BREAKER - KITCHEN WALK-	Not Tested
DISC UNDER COUNTER UNI	Not Tested
LITTLE D'S	Tested
UNMARKED PNL BY OVEN (Roughl	Tested
3rd FLOOR	Tested
GIFT SHOP	Tested
PNL UNMARKED (Roughly 81amps	Tested
4th FLOOR - MAIN FLOOR	Tested
5th FLOOR	Tested
HALLWAY BY RM 214	Tested
PNL UNMARKED (Roughly 25amps	Tested
North mounting bracket area of south west fire es	*Tested
OUTSIDE OF BUILDING	Tested
East side of building	Tested
North side of building	Tested
South side of building	Tested
West side of building	*Tested

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Colbert Infrared Services

Thermal Trend

Thermal Problem Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment West side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Problem Status OPEN **Severity Code** 0

Inspection # 1	**Problem #** 1
Problem Date/Time	12/2/2004 10:16:30 AM
Indirect Temp. Measureme	No
Component Temp	30 @ N/A
Reference Temp	24 @ N/A
Temp Rise	6 @ N/A

IR Image File fhcr0068.sit

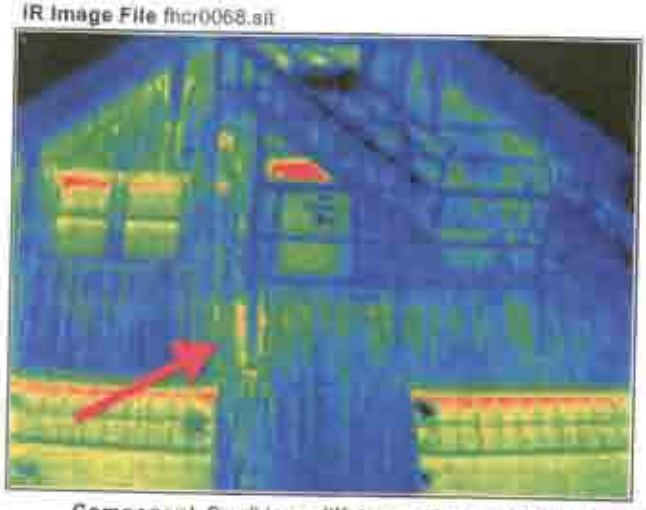


Photo File: IMG_2371.JPG

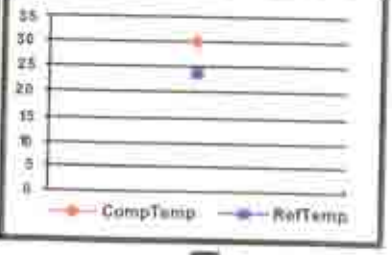
Component Small temp difference around north 2nd floor mounting bracket of fire escape, possible moisture problem or other an

Probable Cause Possible moisture or other anomolie

Recommendation Investigate

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Sev. Code	Load	%Load	Wind Spd.	Amb. Temp
1	1	12/2/2004	30	24	6	0	N/A	N/A		22



Problem Status: ☐ Not repaired ☐ Repair made, but needs IR recheck ☐ Closed

Repair assigned to: Repair target date:

Repair assigned by: Date:

Repaired by: Date:

Type of defect found:

Corrective action taken:

Professional Thermographers Association

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Colbert Infrared Services

Thermal Trend

Thermal Problem Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: INSIDE OF BUILDING

Equipment North mounting bracket area of south west fire escape

Voltage

Rated Load Amps

Barcode:

Asset ID:

GPS:

Problem Status OPEN **Severity Code** 0

Inspection # 1	**Problem #** 2
Problem Date/Time	12/2/2004 10:21:09 AM
Indirect Temp. Measureme	No
Component Temp	20 @ N/A
Reference Temp	20 @ N/A
Temp Rise	0 @ N/A

IR Image File fhcr0078.sit

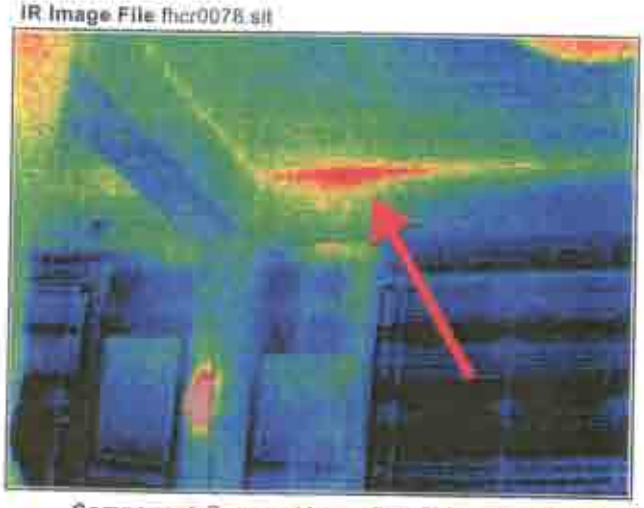


Photo File IMG_2381.JPG

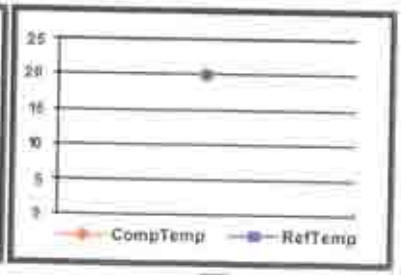
Component Same problem as item #1 just taken form the inside instead of the outside.

Probable Cause Possibly moisture or other anommolie

Recommendation Investigate

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Sev. Code	Load	%Load	Wind Sod.	Amb. Temp
1	2	12/2/2004	20	20	0	0	N/A	N/A		20



Problem Status: ☐ Not resolved ☐ Repair made, but needs IR recheck ☐ Closed

Repair assigned to: Repair target date:

Repair assigned by: Date:

Repaired by: Date:

Type of defect found:

Corrective action taken:

Professional Thermographers Association

Colbert Infrared Services, Inc. 929 19th Ave. Seattle, WA 98122 Phone 206.568.4431 Fax 206.568.4437

Colbert Infrared Services

Thermal Trend

Thermal Problem Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: INSIDE OF BUILDING \ 1st Floor \ BOILER RM

Equipment 400-AMP ZINSCO DISC. (Roughly 180amps on circuit @ time of insp.)

Voltage 208

Rated Load 400 Amps

Barcode

Asset ID:

GPS:

Problem Status OPEN **Severity Code** 3

Inspection # 1	**Problem #** 3
Problem Date/Time	12/2/2004 11:11:49 AM
Indirect Temp. Measureme	No
Component Temp	106 @ 44%
Reference Temp	70 @ 46%
Temp Rise	36 @ 44%

IR Image File fhcr0080.sit

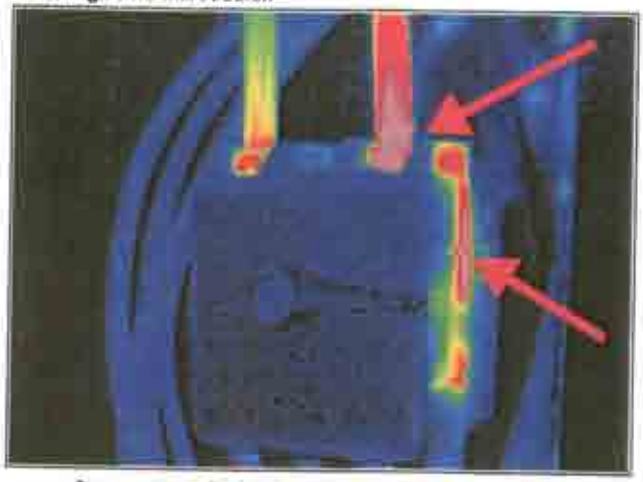


Photo File: IMG_2382.JPG

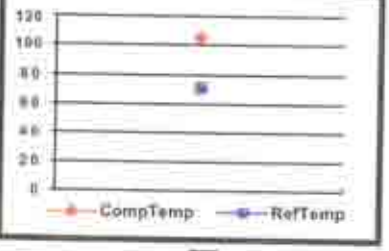
Component Right phase line side wire lug connection or internal problem in circuit breaker

Probable Cause Loose corroded or internal problem

Recommendation Clean inspect retorque or replace breaker if needed.

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Sev. Code	Load	%Load	Wind Spd.	Amb. Temp
1	3	12/2/2004	106	70	36	3	175	44%		55



Problem Status: ☐ Not repaired ☐ Repair made, but needs IR recheck ☐ Closed

Repair assigned to: Repair target date:

Repair assigned by: Date:

Repaired by: Date:

Type of defect found:

Corrective action taken:

Professional Thermographers Association

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Colbert Infrared Services

Thermal Trend

Thermal Problem Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: INSIDE OF BUILDING \ 1st Floor \ BOILER RM

Equipment 30-AMP BOILER DISC. (Unable to check amperage)

Voltage 120

Rated Load 25 Amps

Barcode

Asset ID:

GPS:

Problem Status OPEN **Severity Code** 4

Inspection # 1	**Problem #** 4
Problem Date/Time	12/2/2004 11:22:11 AM
Indirect Temp. Measureme	No
Component Temp	89 @ N/A
Reference Temp	82 @ N/A
Temp Rise	7 @ N/A

IR Image File thcr0083.sit

Photo File: IMG_2383.JPG

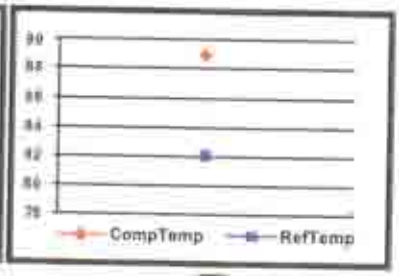
Component Load side red wire nut connetion on purple wire below fused disconnect switch

Probable Cause Loose or corroded wire nut

Recommendation Clean inspect & replace wire nut.

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Sev. Code	Load	%Load	Wind Spd.	Amb. Temp
1	4	12/2/2004	89	82	7	4	N/A	N/A		55



Problem Status: ☐ Not repaired ☐ Repair made, but needs IR recheck ☐ Closed

Repair assigned to: Repair target date:

Repair assigned by: Date:

Repaired by: Date:

Type of defect found:

Corrective action taken:

Professional Thermographers Association

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Colbert Infrared Services

Thermal Trend

Thermal Problem Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location INSIDE OF BUILDING \ 2nd FLOOR \ LAUNDRY / WALK-IN COOLER AREA

Equipment PNL #4 (Roughly 80amps on pnl @ time of insp.)

Voltage 120/208

Rated Load 150 Amps

Barcode

Asset ID:

GPS:

Problem Status OPEN **Severity Code** 4

Inspection #	1
Problem #	5
Problem Date/Time	12/2/2004 11:45:53 AM
Indirect Temp. Measureme	Yes
Component Temp	97 @ 55%
Reference Temp	83 @ 54%
Temp Rise	14 @ 55%

IR Image File fhcr0090.sit

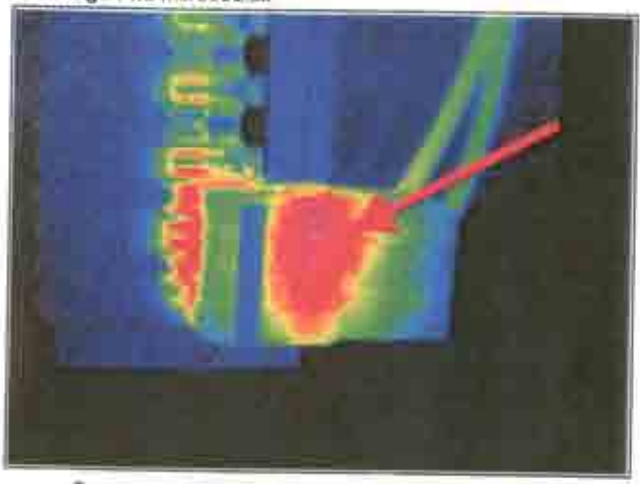


Photo File: IMG_2385.JPG

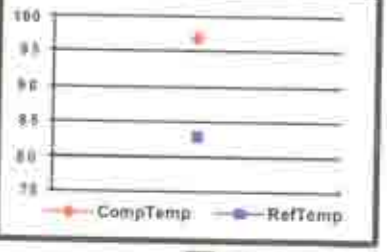
Component Upper phase heating possible internal problem in circuit breaker #24,26,28,30 sub pnl upstairs

Probable Cause Internal problem

Recommendation Inspect, test breaker and replace if needed.

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Sev. Code	Load	%Load	Wind Spd.	Amb. Temp
1	5	12/2/2004	97	83	14	4	82	55%		55



Problem Status: ☐ Not repaired ☐ Repair made, but needs IR recheck ☐ Closed

Repair assigned to: Repair target date:

Repair assigned by: Date:

Repaired by: Date:

Type of defect found:

Corrective action taken:

Professional Thermographers Association

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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres Wesl Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment East side of building

Voltage

Rated Load Amps

Barcode

Asset ID

GPS:

Inspection # 1	**Item #** 1
Problem DateTim	12/2/2004 8:53:50 AM
Indirect Temp. Measureme	No
Component Tem	24 @ N/A
Reference Tem	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

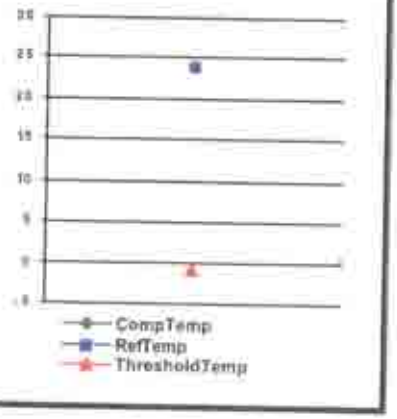
IR Image File FHCR0051.sit

Photo File: IMG_2355.JPG

Component North end upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd	Amb. Temp	Thresh Temp
1	1	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tree West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment East side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	**Item #** 1
Problem DateTime	12/2/2004 8:53:46 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File FHCR0060.SIT

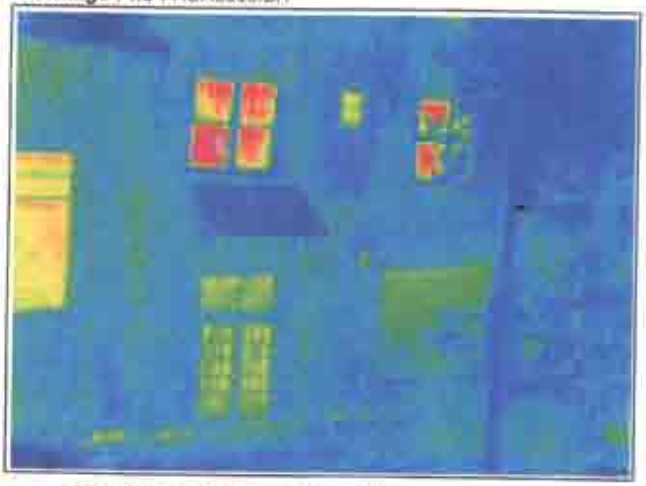
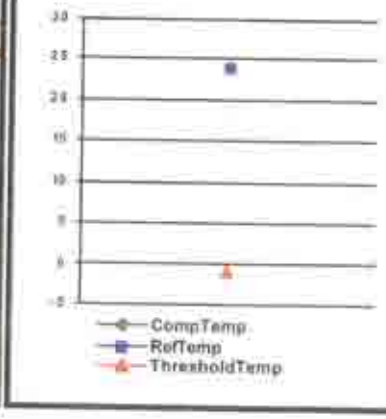


Photo File: IMG_2355.JPG

Component North end lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Threst Temp
1	1	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment East side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	Item # 2
Problem DateTime	12/2/2004 8:53:55 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

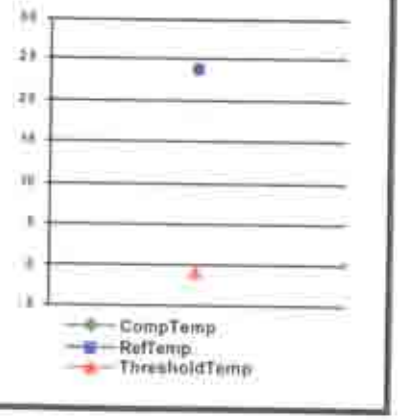
IR Image File fhcr0052.sit

Photo File: IMG_2356.JPG

Component Center lower shot.

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Threshl Temp
1	2	12/2/2004	24	24	0	N/A	N/A	0	22	0



Professional Thermographers Association

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Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment East side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	**Item #** 3
Problem DateTime	12/2/2004 8:54:00 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0053.sit

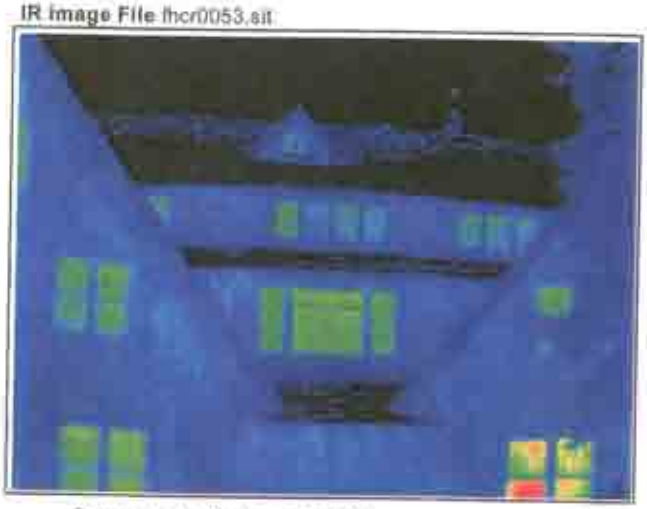
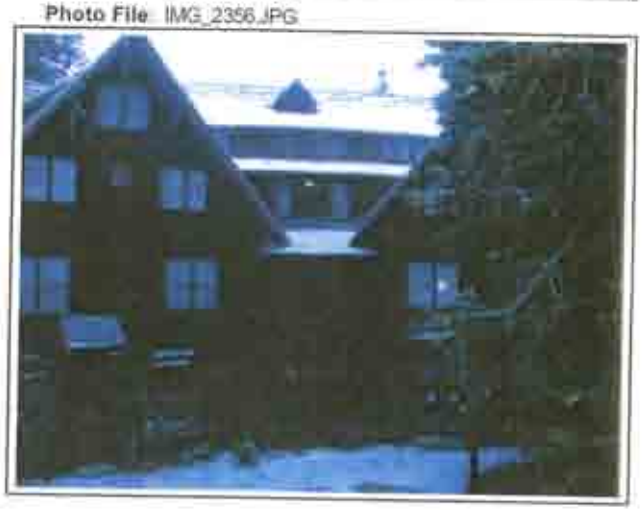


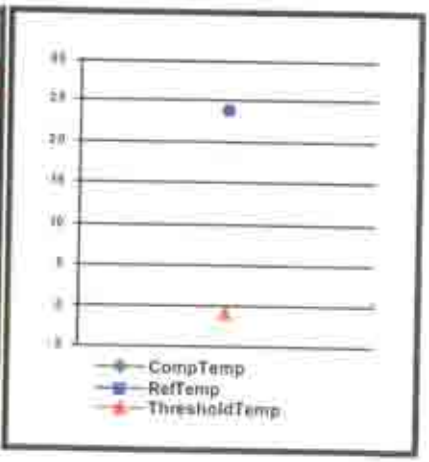
Photo File IMG_2356.JPG



Component Center upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	3	12/2/2004	24	24	0	N/A	N/A	0	22	0



Colbert Infrared Services, Inc. 929 19th Ave. Seattle, WA 98122 Phone 206.568.4431 Fax 206.568.4437

Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tree West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment: East side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	**Item #** 4
Problem DateTime	12/2/2004 8:54:06 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

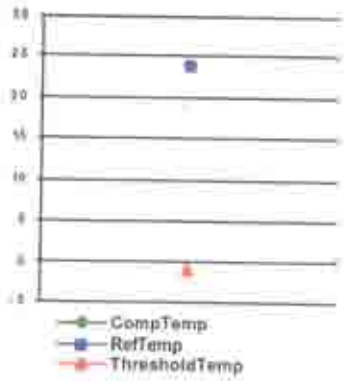
IR Image File fhcr0054.sit

Photo File: IMG_2357.JPG

Component: South end lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd	Amb. Temp	Thresh Temp
1	4	12/2/2004	24	24	0	N/A	N/A	0	22	0



Professional Thermographers Association

Colbert Infrared Services, Inc. 929 19th Ave. Seattle, WA 98122 Phone 206.568.4431 Fax 206.568.4437

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment East side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	Item # 5
Problem DateTime	12/2/2004 8:54:11 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0055.sit

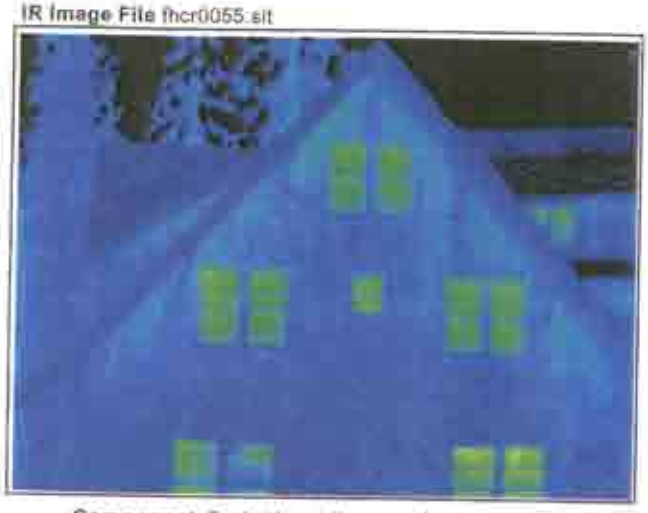
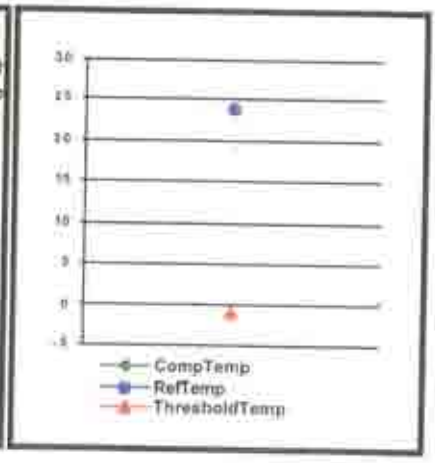


Photo File: IMG_2357.JPG

Component East side south upper shot.

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp	Thresh Temp
1	5	12/2/2004	24	24	0	N/A	N/A	0	22	0



Colbert Infrared Services, Inc. 929 19th Ave. Seattle, WA 98122 Phone 206.568.4431 Fax 206.568.4437

Baseline Details Report

Site: Tree West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment South side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	Item # 7
Problem DateTime	12/2/2004 10:00:45 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0056.sit

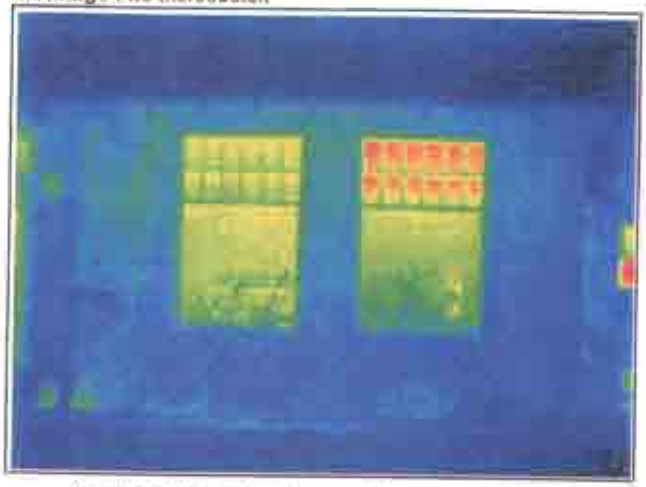
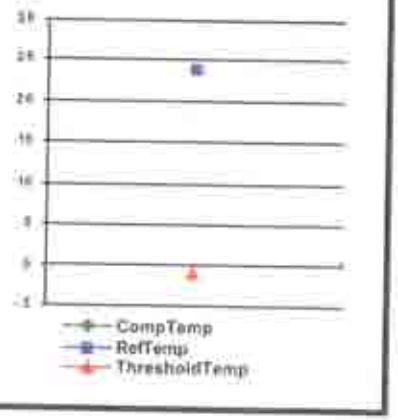


Photo File: IMG_2358.JPG

Component East end lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	7	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment South side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	Item # 8
Problem DateTime	12/2/2004 10:00:46 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

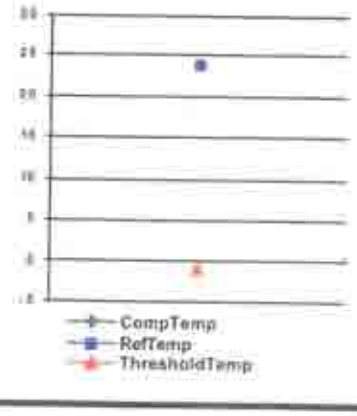
IR Image File fhcr0057.sit

Photo File: IMG_2359.JPG

Component East end upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	8	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location OUTSIDE OF BUILDING

Equipment South side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	Item # 9
Problem DateTime	12/2/2004 10:00:47 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fncr0058.sit

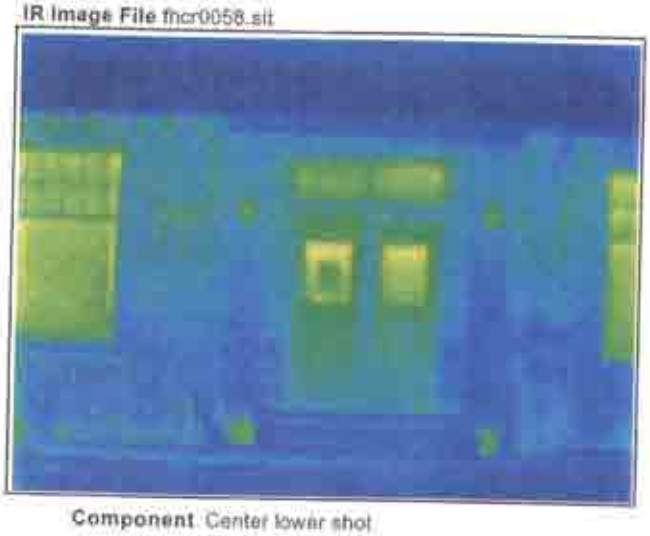
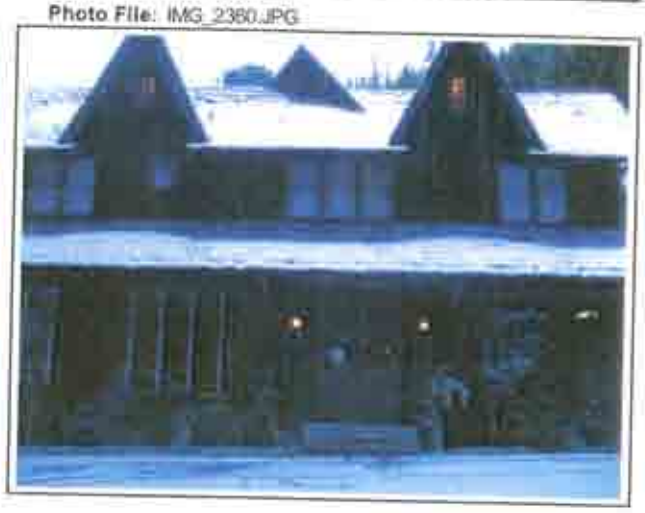


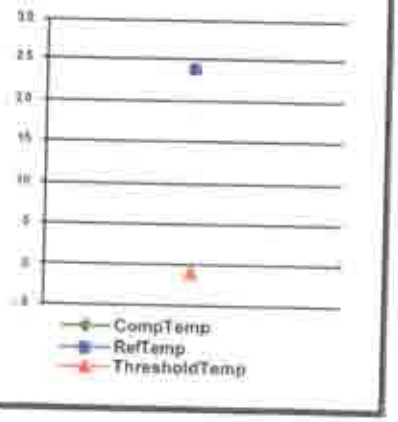
Photo File: IMG_2380.JPG



Component Center lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd	Amb. Temp	Thresh Temp
1	9	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location OUTSIDE OF BUILDING

Equipment South side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	**Item #** 10
Problem DateTime	12/2/2004 10:00:48 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

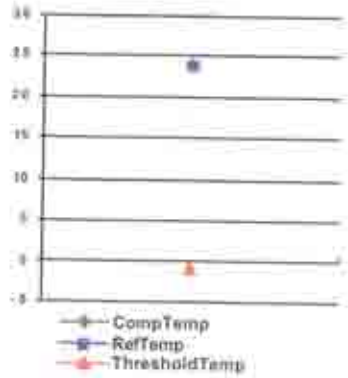
IR Image File fhcr0059.sit

Photo File: IMG_2361.JPG

Component Center upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp	Thresh Temp
1	10	12/2/2004	24	24	0	N/A	N/A	0	22	0



Professional Thermographers Association

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Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment South side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection #	1
Item #	11
Problem DateTime	12/2/2004 10:03:09 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0060.sit

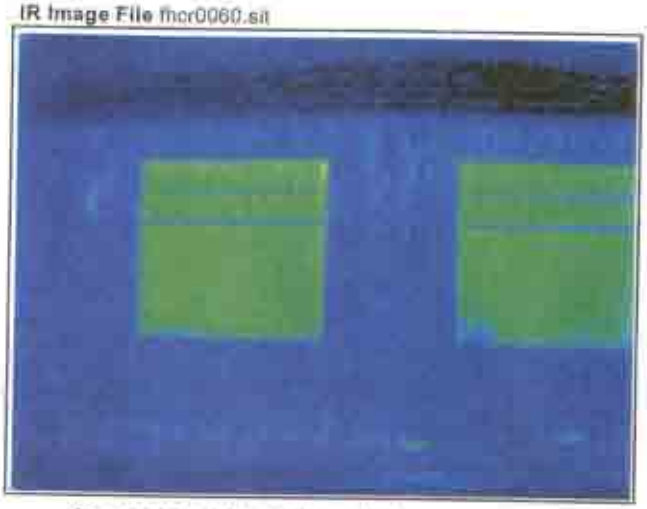
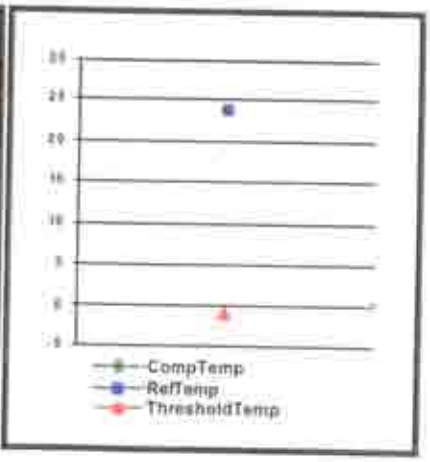


Photo File IMG_2362.JPG

Component West end lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	11	12/2/2004	24	24	0	N/A	N/A	0	22	0



Colbert Infrared Services, Inc. 929 19th Ave. Seattle, WA 98122 Phone 206.568.4431 Fax 206.568.4437

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment South side of building

Voltage

Rated Load Amps

Barcode

Asset ID

GPS:

Inspection # 1	**Item #** 12
Problem DateTime	12/2/2004 10:03:10 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

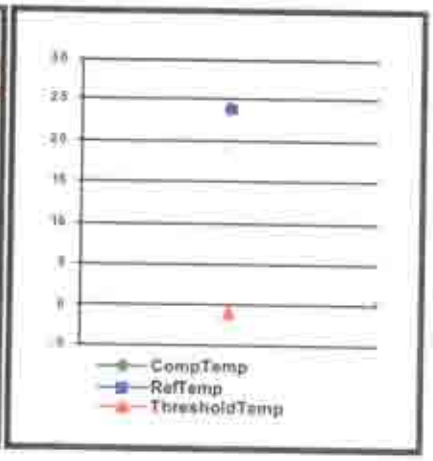
IR Image File fhcr0061.sil

Photo File IMG_2363.JPG

Component West end upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	12	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location OUTSIDE OF BUILDING

Equipment West side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	**Item #** 13
Problem DateTime	12/2/2004 10:04:37 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File thcr0062.sit

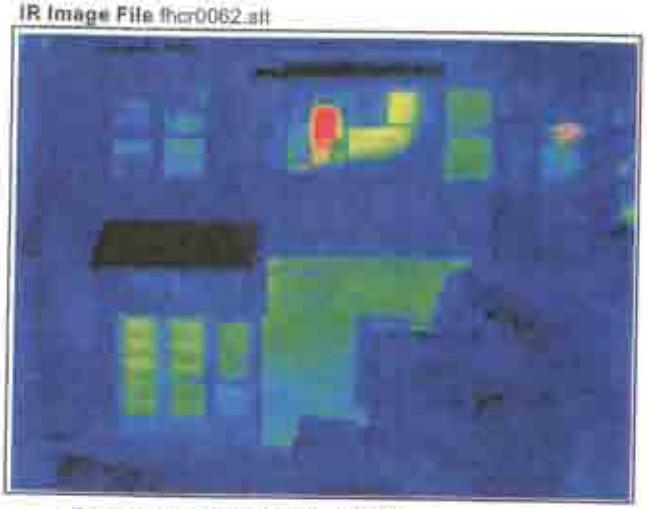
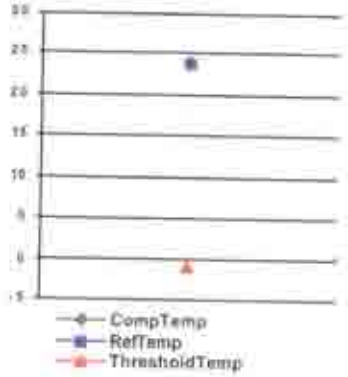


Photo File: IMG_2364.JPG

Component South end lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp	Thresh Temp
1	13	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment West side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	**Item #** 14
Problem DateTime	12/2/2004 10:04:37 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0063.sit

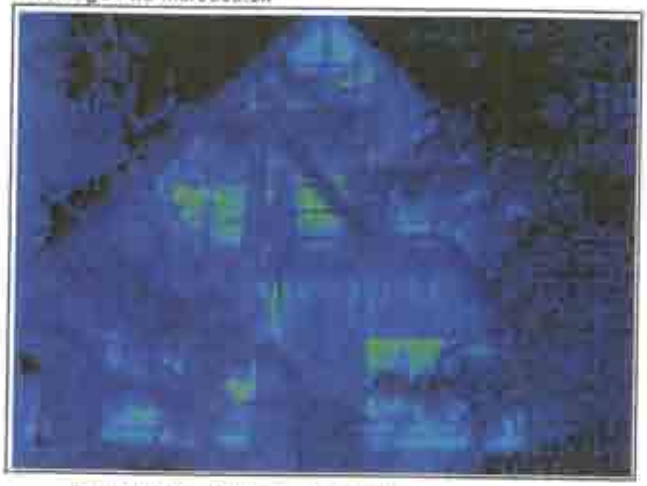
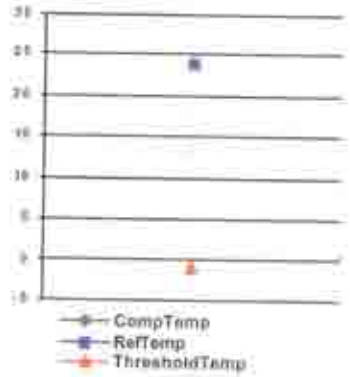


Photo File: IMG_2365.JPG

Component South end upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	14	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location OUTSIDE OF BUILDING

Equipment West side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	**Item #** 15
Problem DateTime	12/2/2004 10:04:38 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0064.sit

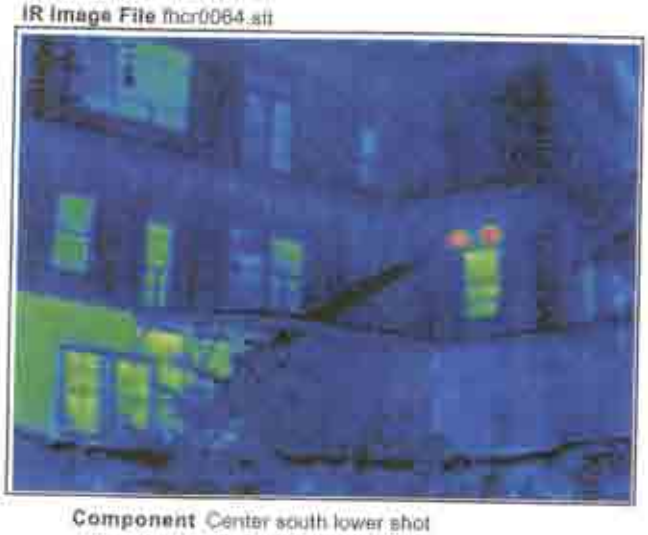
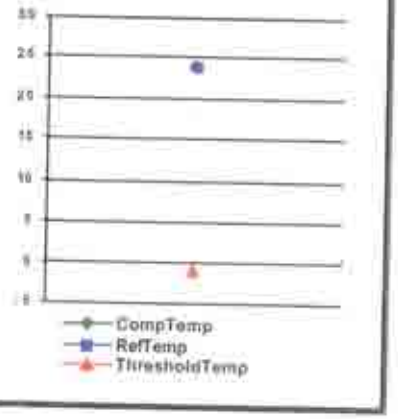


Photo File: IMG_2366.JPG

Component Center south lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp	Thresh Temp
1	15	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment West side of building

Voltage

Rated Load Amps

Barcode

Asset ID

GPS:

Inspection # 1	**Item #** 16
Problem DateTime	12/2/2004 10:04:39 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0065.sit

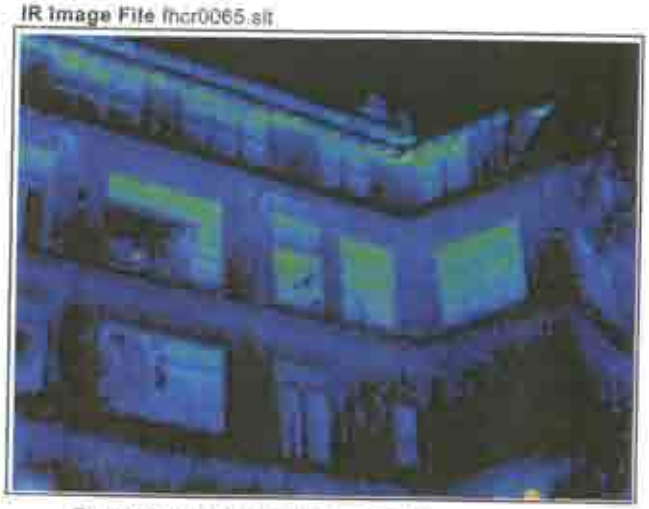
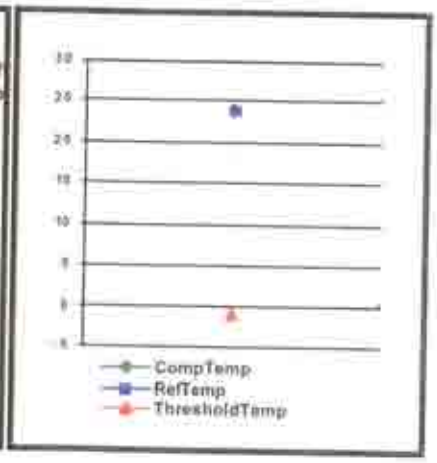


Photo File: IMG_2367.JPG

Component Center south upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	16	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment West side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection #	1
Item #	17
Problem DateTime	12/2/2004 10:04:40 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

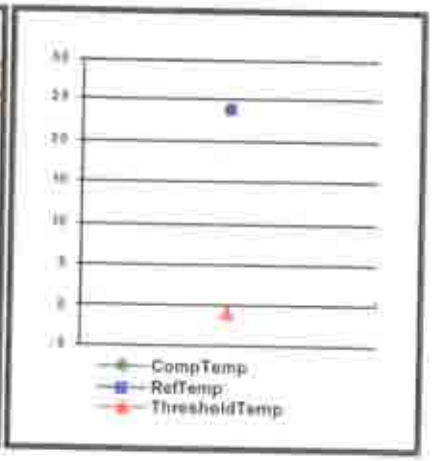
IR Image File fhor0066.sit

Photo File IMG_2368.JPG

Component Center north lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	17	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment: West side of building

Voltage:

Rated Load: Amps

Barcode:

Asset ID:

GPS:

Inspection # 1	Item # 18
Problem DateTime	12/2/2004 10:04:42 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

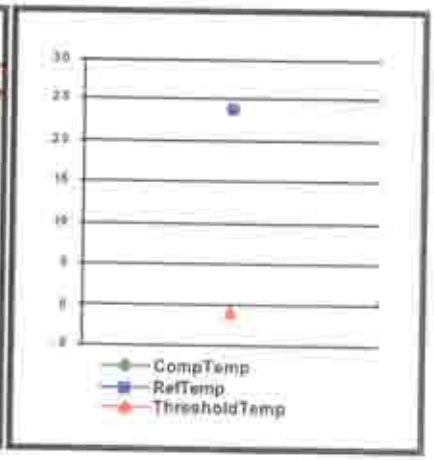
IR Image File: Ihcr0067.sit

Photo File: IMG_2369.JPG

Component: Center north upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp	Thresh Temp
1	18	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location OUTSIDE OF BUILDING

Equipment West side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	Item # 19
Problem DateTime	12/2/2004 10:08:30 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0069.sit

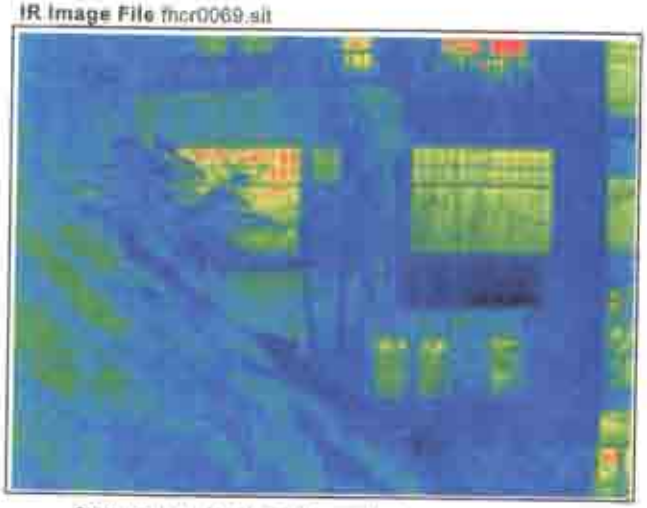
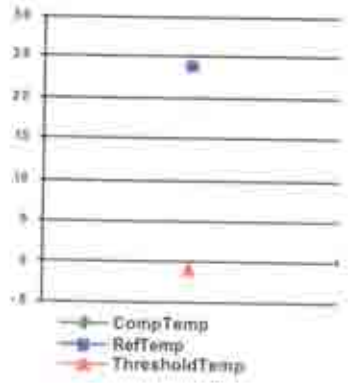


Photo File: IMG_2372.JPG

Component North end lower shol

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	19	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment West side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection #	1
Item #	20
Problem DateTime	12/2/2004 10:08:31 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0070.sit

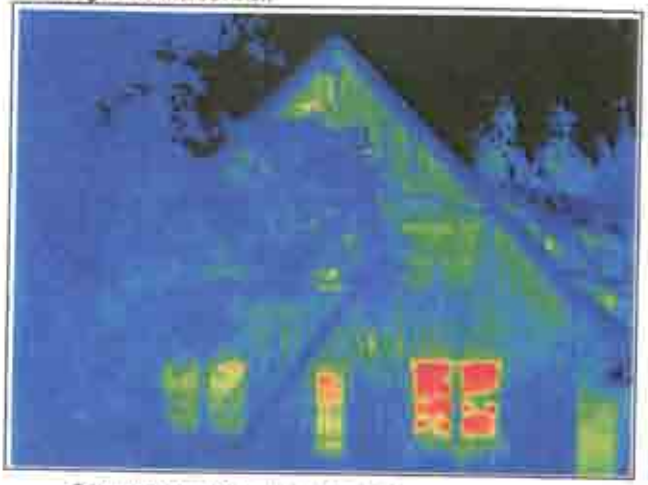
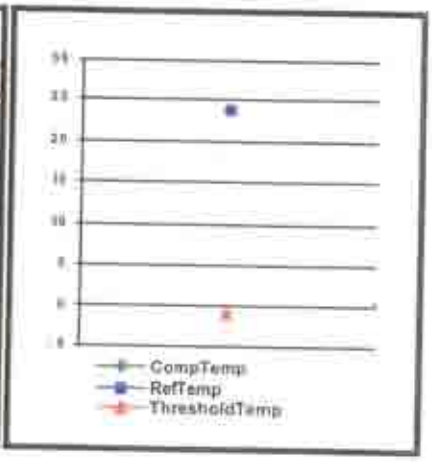


Photo File IMG_2373.JPG

Component North end upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	20	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment West side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	Item # 21
Problem DateTime	12/2/2004 10:10:04 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0071.sit

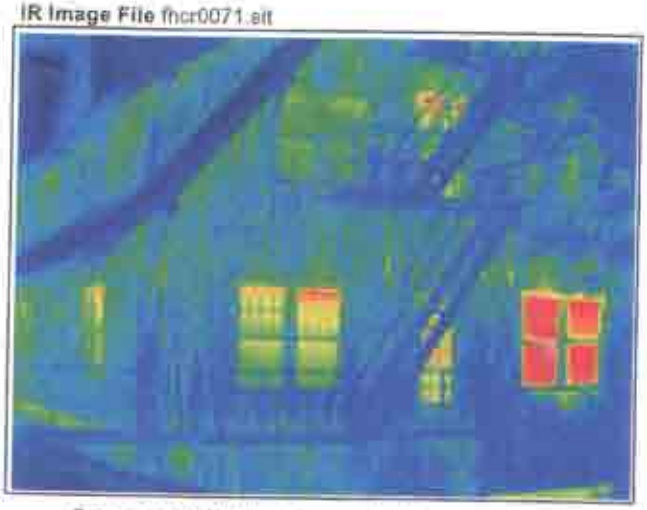
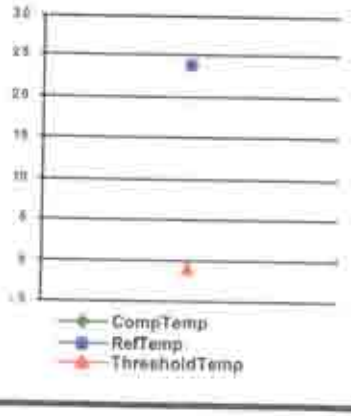


Photo File: IMG_2374.JPG

Component North end upper shot two

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd	Amb. Temp	Threst Temp
1	21	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tree West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment North side of building

Voltage

Rated Load Amps

Barcode

Asset ID

GPS:

Inspection # 1	**Item #** 22
Problem DateTime	12/2/2004 10:10:57 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code 0	
Temp Rise 0 @ N/A	

IR Image File thcr0072.sit

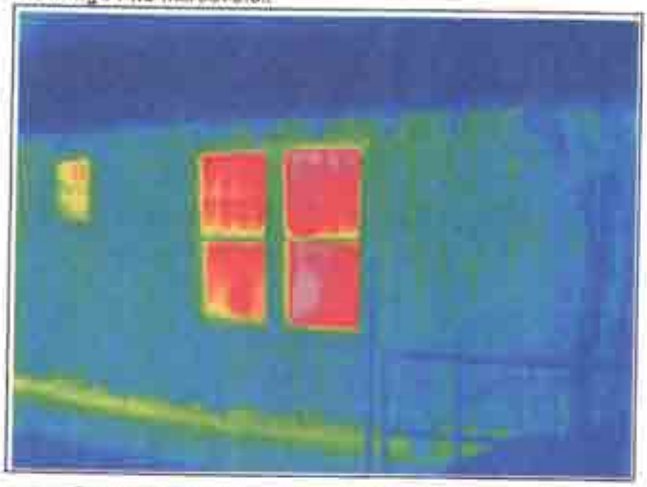
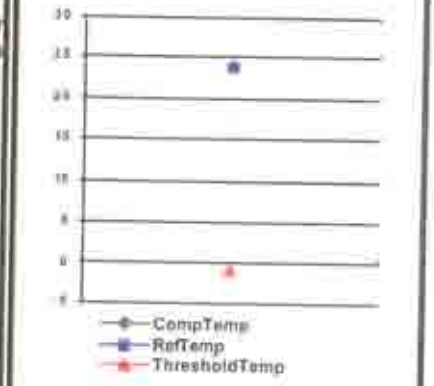


Photo File: IMG_2375.JPG

Component West end lower shot (note west or north window.

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp	Thresh Temp
1	22	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment North side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	Item # 23
Problem DateTime	12/2/2004 10:10:59 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

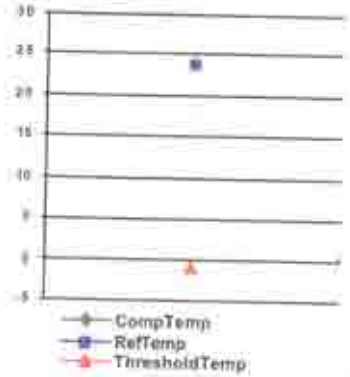
IR Image File fhcr0073.sit

Photo File: IMG_2376.JPG

Component West end upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	23	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment North side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	Item # 24
Problem DateTime	12/2/2004 10:11:00 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

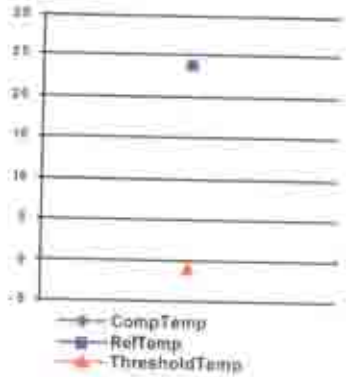
IR Image File fhcr0074.sit

Photo File IMG_2377.JPG

Component Center lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	24	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment North side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection # 1	**Item #** 25
Problem DateTime	12/2/2004 10:11:01 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

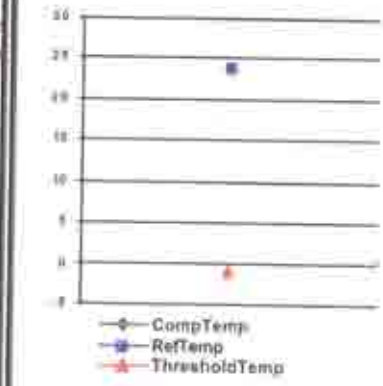
IR Image File fhcr0075.sit

Photo File: IMG_2378.JPG

Component Center upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp	Thresh Temp
1	25	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Colbert Infrared Services

Thermal Trend

Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment North side of building

Voltage

Rated Load Amps

Barcode

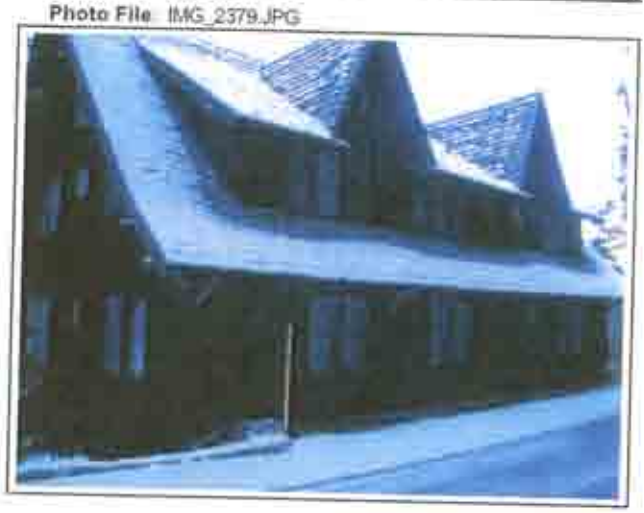
Asset ID:

GPS:

Inspection # 1	Item # 26
Problem DateTime	12/2/2004 10:14:45 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0076.sit

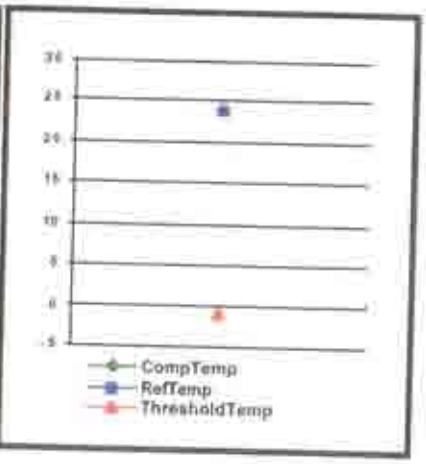
Photo File IMG_2379.JPG



Component East end lower shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Thresh Temp
1	26	12/2/2004	24	24	0	N/A	N/A	0	22	0



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Baseline Details Report

Site: Tres West Engineers, Inc. - Chateau at the Oregon Caves

Database: Oregon Caves.mdb

Location: OUTSIDE OF BUILDING

Equipment North side of building

Voltage

Rated Load Amps

Barcode

Asset ID:

GPS:

Inspection #	1
Item #	27
Problem DateTime	12/2/2004 10:14:46 AM
Indirect Temp. Measureme	No
Component Temp	24 @ N/A
Reference Temp	24 @ N/A
Severity Code	0
Temp Rise	0 @ N/A

IR Image File fhcr0077.sit

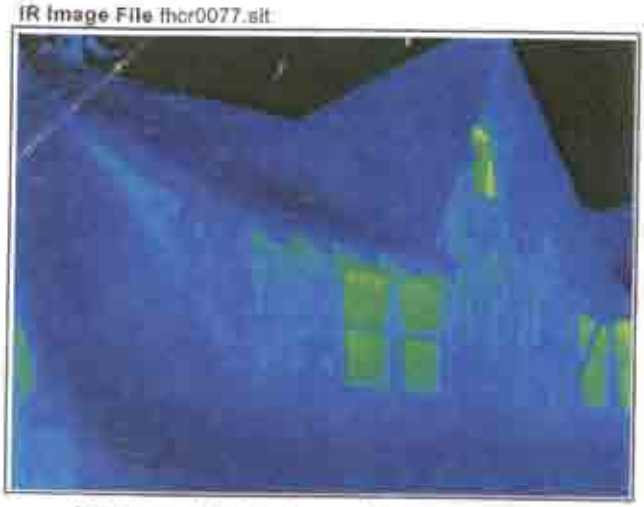
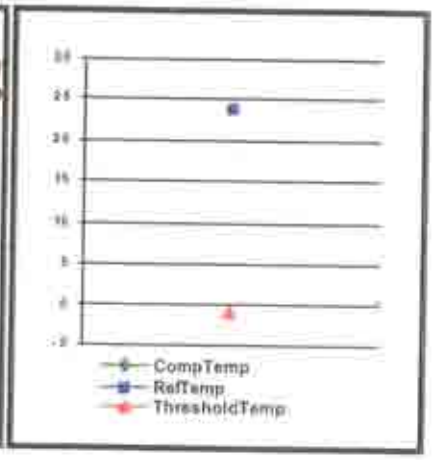


Photo File: IMG_2380.JPG

Component East end upper shot

Instances Subreport

Insp #	Prob #	Date	Comp Temp	Ref. Temp	Temp Rise	Load	%Load	Wind Spd.	Amb. Temp.	Threst Temp
1	27	12/2/2004	24	24	0	N/A	N/A	0	22	0



Colbert Infrared Services, Inc. 929 19th Ave. Seattle, WA 98122 Phone 206.568.4431 Fax 206.568.4437

APPENDIX E

OREGON CAVES NATIONAL MONUMENT CHATEAU
SUBSEQUENT MEETINGS & DEVELOPMENT

VALUE ANALYSIS WORKSHOP - MARCH 8-9, 2005

A value analysis workshop was held at the Chateau on March 8-9, 2005 to review the alternatives for the building outlined in this report. The workshop was led by Stephen Kirk, FAIA, CVS, of Kirk Associates. (See list of participants below.) See the final Value Analysis Report for a more comprehensive review of the process and recommendations. A number of the options listed in this report were selected or modified for study in the next phase of work.

Of particular note were:

- Elevator location: a hybrid scheme utilizing an elevator located behind the reception desk was recommended. The elevator would service the First Floor and First and Second Basement levels. Accessible guest rooms would be located on the First Floor, accessed by lift. Stairway, restroom, and lower level meeting rooms are all affected by this scheme. Further study regarding the fit of elevator with the office area and overrun requirements is needed. (See attached Option C plans for description of this proposal.)
- The proposal in this report to add an internal stair between the Second and Third Floors on the north wing was recommended (as shown in Option A of this report).
- The reconstruction of the west porch and heavy timber exterior stairs at the north and south wings was recommended.
- Provision for a comprehensive fire alarm, pull station, horn and strobe and smoke detection was recommended. Final smoke detection method to be determined in the design phase.
- A fire sprinkler system combining new wet and dry systems with concealed piping in primary historic spaces and exposed piping in less sensitive areas was recommended.
- Exterior deluge sprinkler options will be studied further with NPS structural and wildland fire specialists.
- The recommended treatment for Nu-wood interior finishes was to replace the Nu-wood material in secondary spaces using a new fire-rated finish assembly to match as closely as possible the appearance of the Nu-wood. This treatment will require further study and sample mock-ups to assure a reasonable match to the original appearance. In significant spaces, the Nu-wood panels would be removed, a gypsum board subfinish installed, and the Nu-wood panels reinstalled. This treatment will require further study at door and trim conditions.

FIRE MARSHALL REVIEW MEETING - MAY 24, 2004

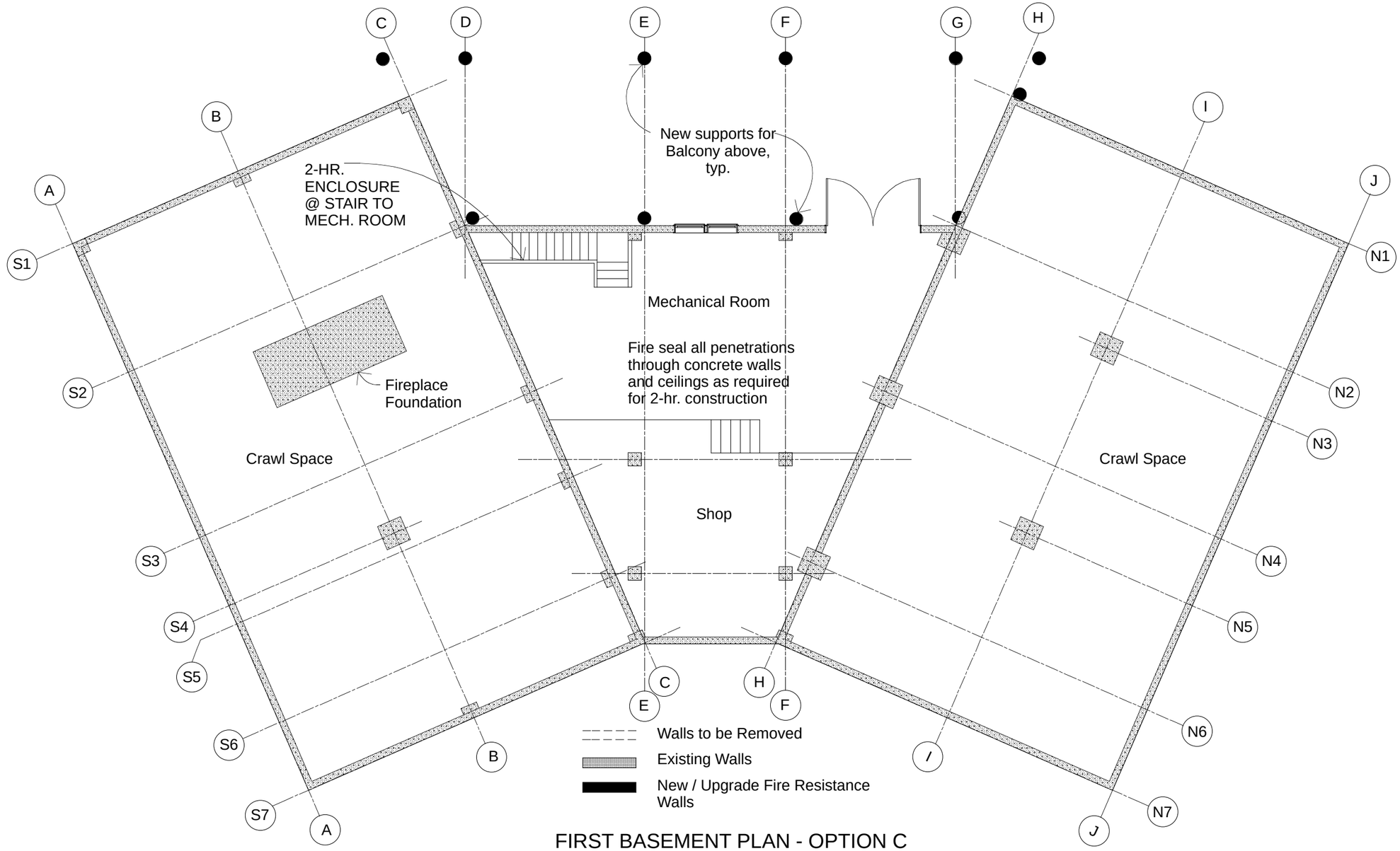
A meeting of architects and engineers with NPS structural and wildfire specialists was held at the Chateau on May 24, 2005. The purpose of the meeting was to review the recommendations of the Value Analysis Workshop with NPS fire authorities.

Attending the meeting were:

- Laurin Huffman: NPS/PWR Regional Historic Architect
- Nick Artim: Fire Safety Engineer, Heritage Protection Group
- Wayne Moore: Fire Safety Engineer, Hughes Associates
- Loring Wylie: Degenkolb Engineers
- Curtis Trout: NPS Structural Fire Specialist
- Nelson Siefkin: NPS Wildfire Specialist
- Michael Hankinson: NPS Pacific West Region
- Brian Olson: NPS Structural Fire Specialist, Denver Service Center
- Kate Johnson, AIA: Architectural Resources Group

A number of decisions regarding design standards and approach were made at the meeting, including:

1. The applicability of NFPA 914 as an appropriate fire code standard for the Chateau was discussed, and NPS fire authorities agreed that it was the applicable standard.
2. Recognition was made that the building must be designed to stand on its own in a fire. Fire department response will be too long to be effective in stopping the fire. This approach applies both to wildland and interior-generated fire.
3. The first priority for the design will be to assure that people get out of the building safely. Administrative training and emergency procedures must be developed and understood by staff. Evacuation procedures for the site must be developed.
4. Fire and egress modeling for the building are studies which should be developed to better understand the potential fire and egress performance of the building.
5. Wall assembly alternatives will need to be developed in conjunction with the State Office of Historic Preservation. Mock-ups of alternatives should be developed.
6. Natural resources modifications to the areas around the building in order to reduce and manage potential fuels should be planned. These changes are justified in order to protect this National Historic Landmark Structure.



FIRST BASEMENT PLAN - OPTION C

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32 REF

NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly. Repair as required.
2. Confirm that existing water supply piping is not constricted and is operating properly. Repair as required.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
1. This illustration is for concept evaluation only and is not intended to serve as a detailed design.

OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW: S FARNETH
DATE: 6/20/06

SUB SHEET NO. A1.C

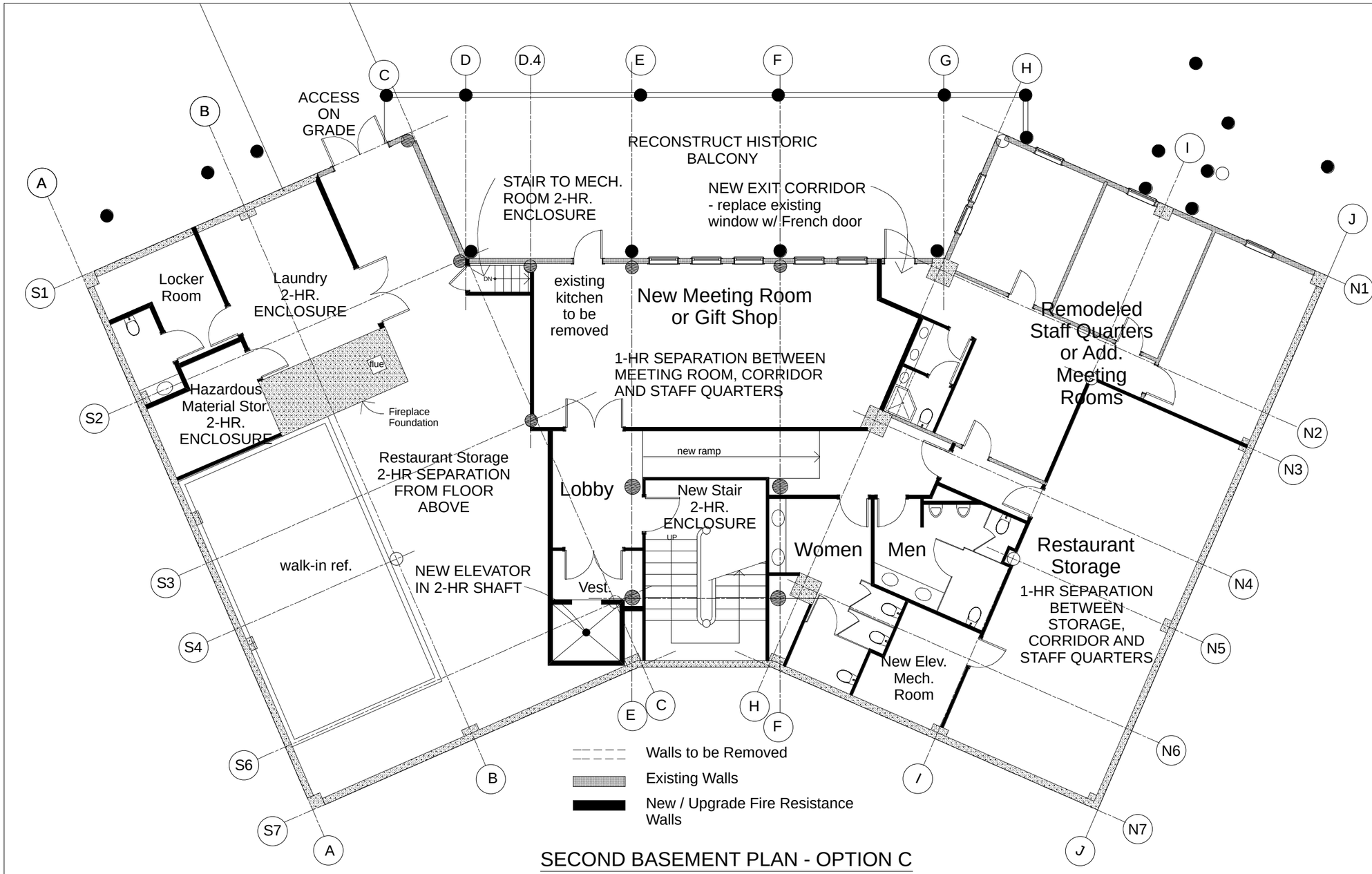
TITLE OF SHEET: ACCESS / EGRESS OPTION C

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET of



SECOND BASEMENT PLAN - OPTION C

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32 REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting in sleeping areas.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly. Repair problem areas.
2. Confirm that existing water supply piping is not constricted and is operating properly. Repair problem areas.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
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OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW: S FARNETH
DATE: 6/20/06

SUB SHEET NO. A2.C

TITLE OF SHEET: ACCESS / EGRESS OPTION C

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

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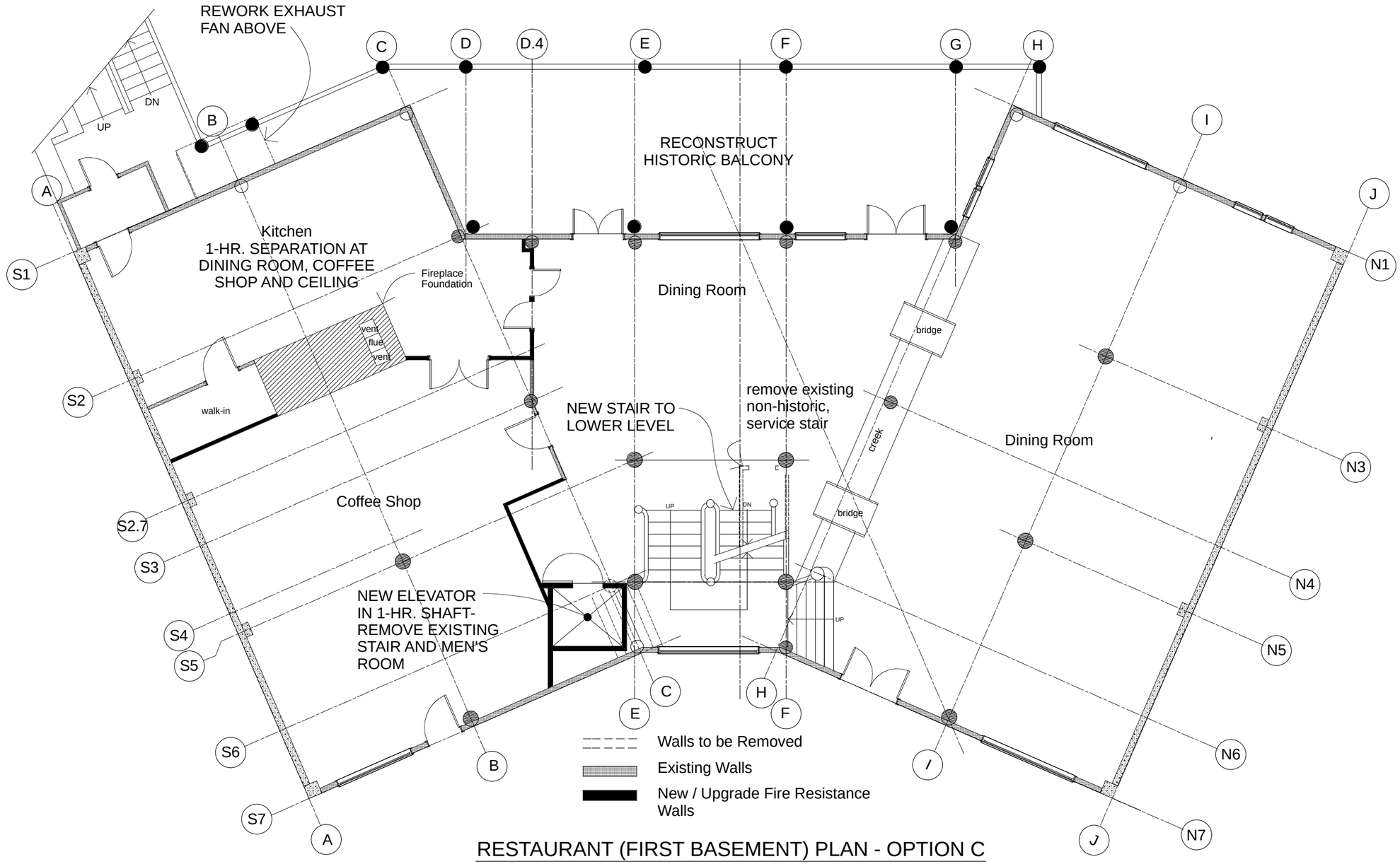
SHEET of



RESTAURANT (FIRST BASEMENT) PLAN - OPTION C

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32

REF
NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly. Repair as required.
2. Confirm that existing water supply piping is not constricted and is operating properly. Repair as required.
3. Modify existing kitchen exhaust fan and housing to meet code.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
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CHATEAU
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DESIGNED: K JOHNSON
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SUB SHEET NO. A3.C

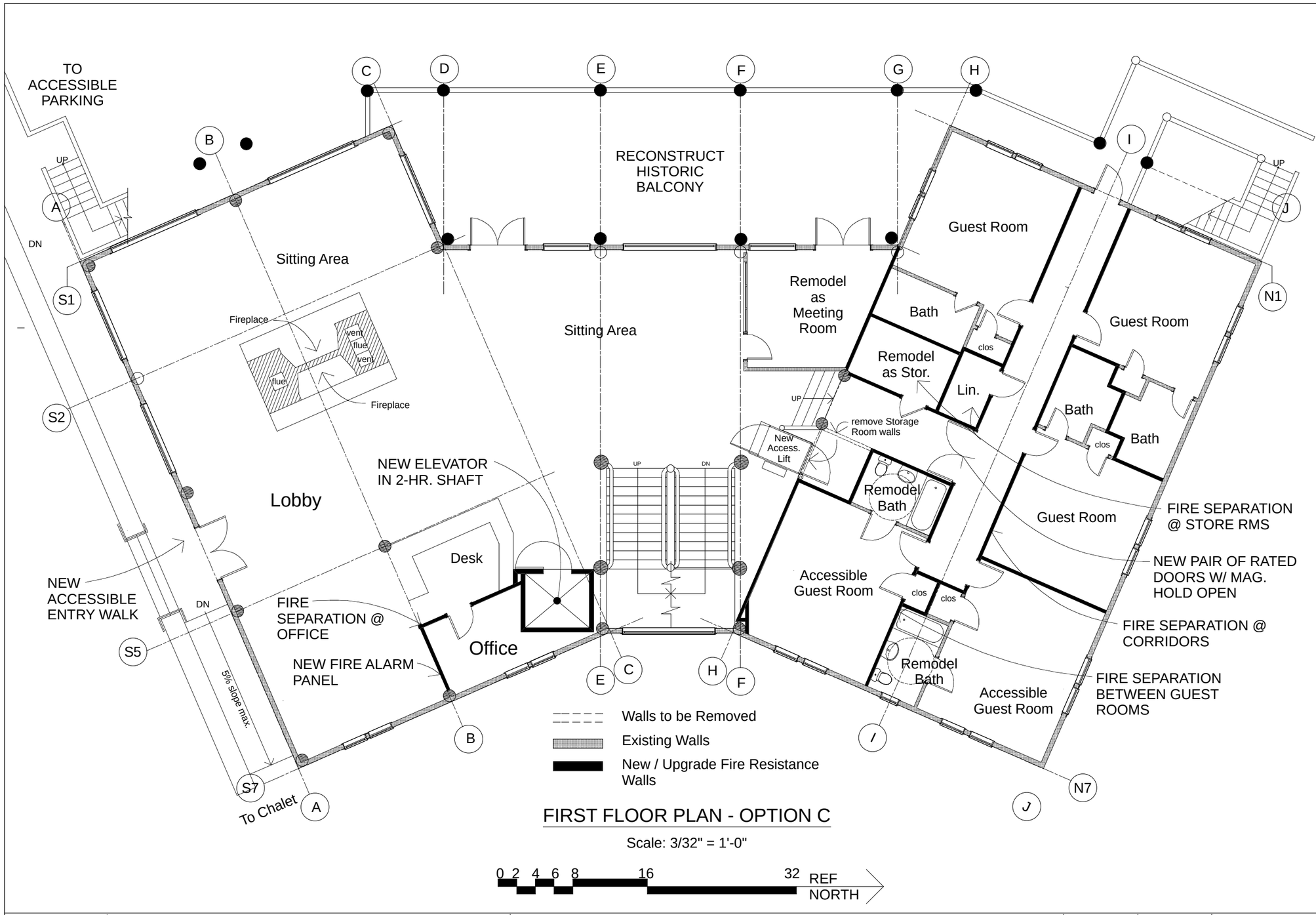
TITLE OF SHEET: ACCESS / EGRESS OPTION C

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET of



FIRST FLOOR PLAN - OPTION C

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32 REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting for exit path.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install new access lift as noted.
3. Install lever hardware at doors to public spaces along path of travel.
4. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly.
2. Confirm that existing water supply piping is not constricted and is operating properly.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
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OREGON CAVE NATIONAL MONUMENT
CHATEAU
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DATE: 6/20/06

SUB SHEET NO. A4.C

TITLE OF SHEET: ACCESS / EGRESS OPTION C

OREGON CAVE NATIONAL MONUMENT

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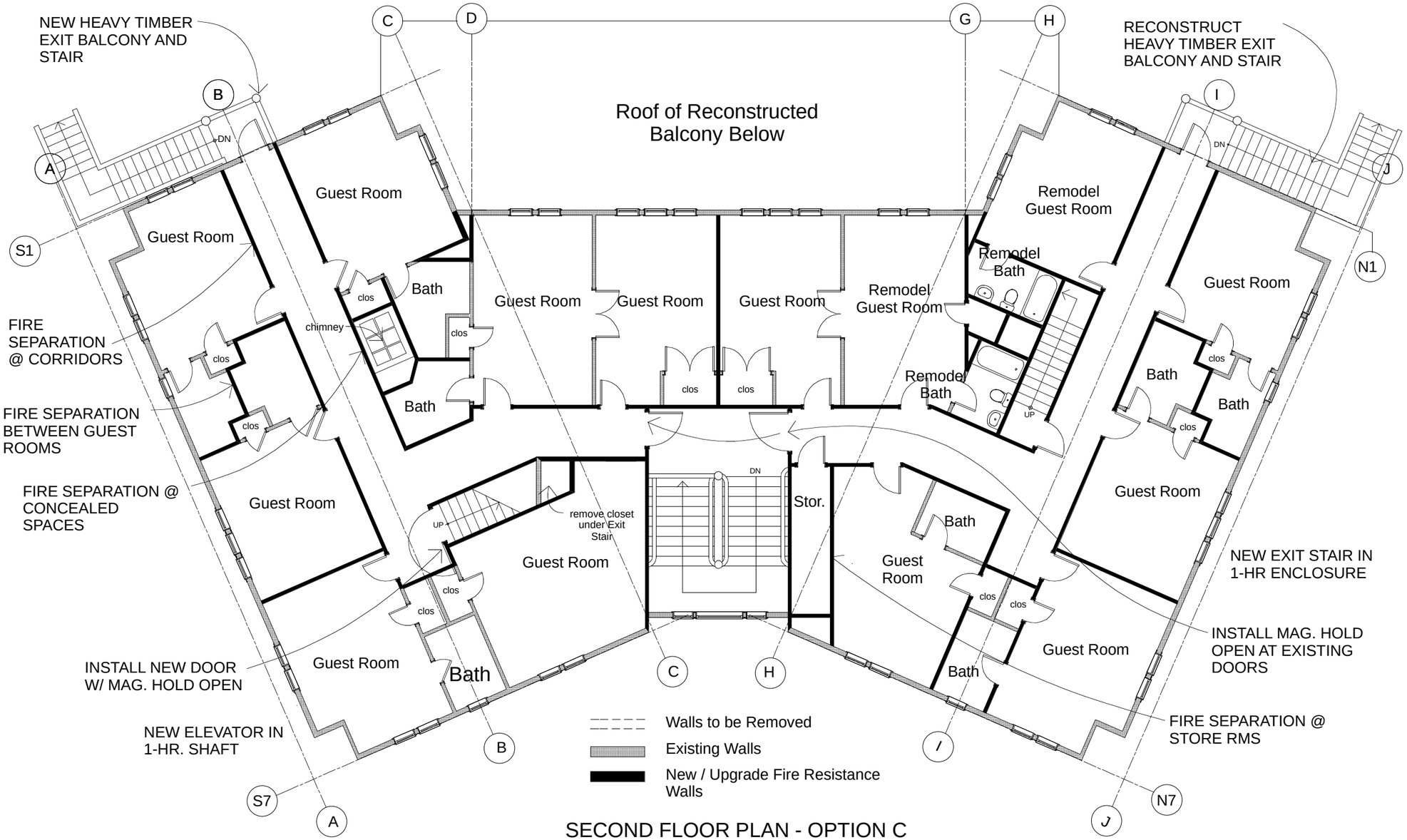

SECOND FLOOR PLAN - OPTION C

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32 REF

NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly.
2. Confirm that existing water supply piping is not constricted and is operating properly.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
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OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW: S FARNETH
DATE: 6/20/06

SUB SHEET NO. A5.C

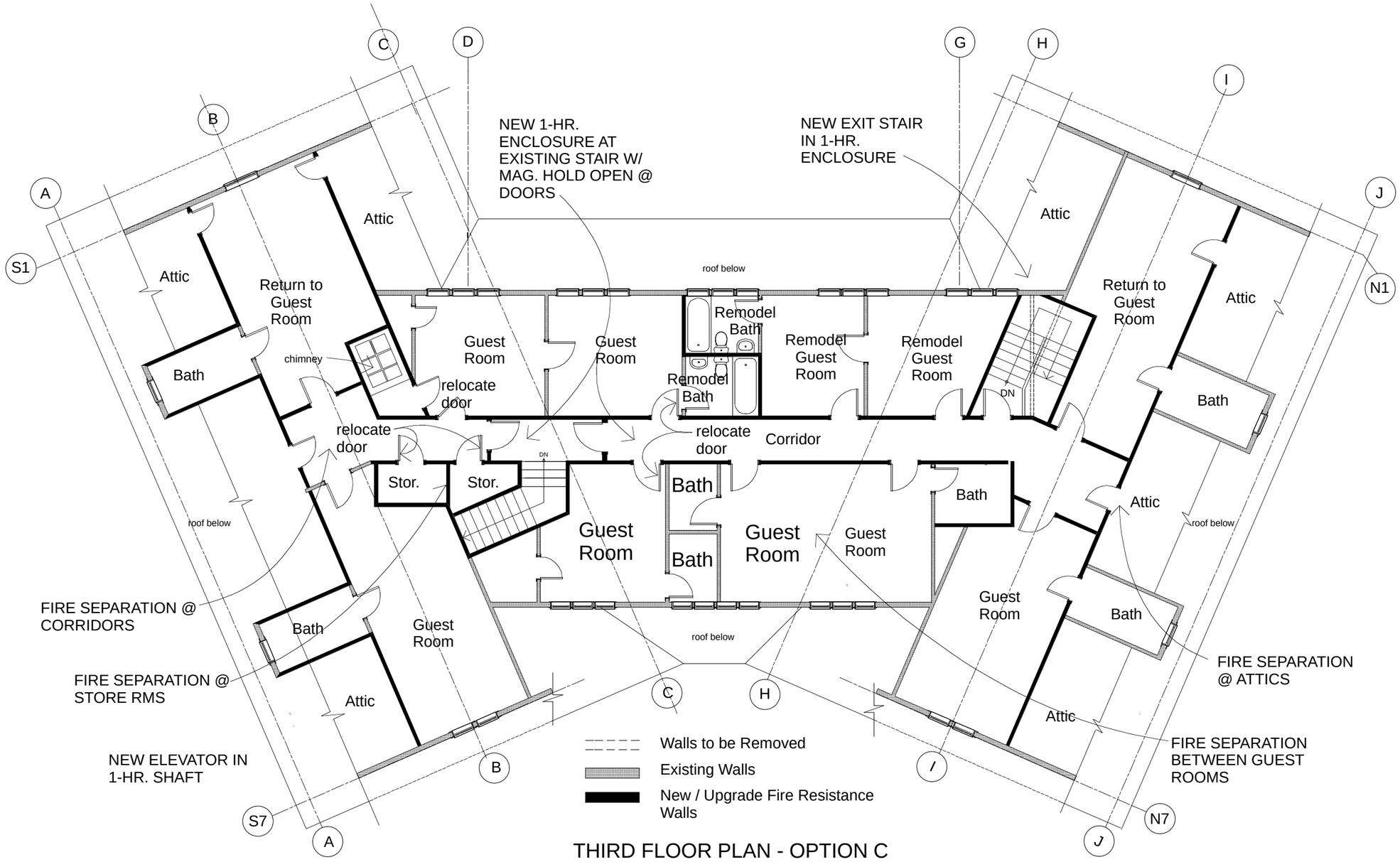
TITLE OF SHEET: ACCESS / EGRESS OPTION C

OREGON CAVE NATIONAL MONUMENT

DRAWING NO.

PKG. NO.

SHEET of



THIRD FLOOR PLAN - OPTION C

Scale: 3/32" = 1'-0"

0 2 4 6 8 16 32 REF NORTH

TYPICAL SCOPE:

LIFE SAFETY:
1. Install New Fire Alarm System including smoke detectors, pull stations, horns and strobes.
2. Install additional exits paths including stairs / doors as noted.
3. Install fire separtion and enclosures as noted.
4. Upgrade sprinkler system.
5. Install illuminated exit signs per code.
6. Install emergency lighting per code.
7. Install low level emergency lighting.

DISABLED ACCESS
1. Install new elevator as noted.
2. Install lever hardware at doors to public spaces along path of travel.
3. At designated accessible Guest Room(s) modify Bathrooms, doors and hardware per code.
5. Install handrails per code at all stairs.

STRUCTURAL
1. Install plywood and blocking for shear strength at walls where finish has been removed for Life Safety Work.
2. Replace deteriorated log eave brackets in kind.

MECHANICAL
1. Confirm that existing steam piping is not constricted and is operating properly.
2. Confirm that existing water supply piping is not constricted and is operating properly.

ELECTRICAL
1. Provide adequate outlets and circuits to ensure against overloading.

INTERIM RECOMMENDATIONS (Work to be done as soon as possible):
1. Confirm structural stability of existing Fire Escapes.
2. Address electrical "hots spots" identified by infra-red testing.
3. Confirm fire sprinkler line flow.
4. Upgrade exit signage and emergency lighting.

ARCHITECTURAL RESOURCES GROUP

NOTES:
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OREGON CAVE NATIONAL MONUMENT
CHATEAU
LIFE SAFETY / ACCESS STUDY

DESIGNED: K JOHNSON
DRAWN: K JOHNSON
TECH REVIEW: S FARNETH
DATE: 6/20/06

SUB SHEET NO. A6.C

TITLE OF SHEET: ACCESS / EGRESS OPTION C

OREGON CAVE NATIONAL MONUMENT

DRAWING NO. ____

PKG. NO. ____ ____ ____

SHEET ____ of ____