

Exhibit # 2a

BOE
architects

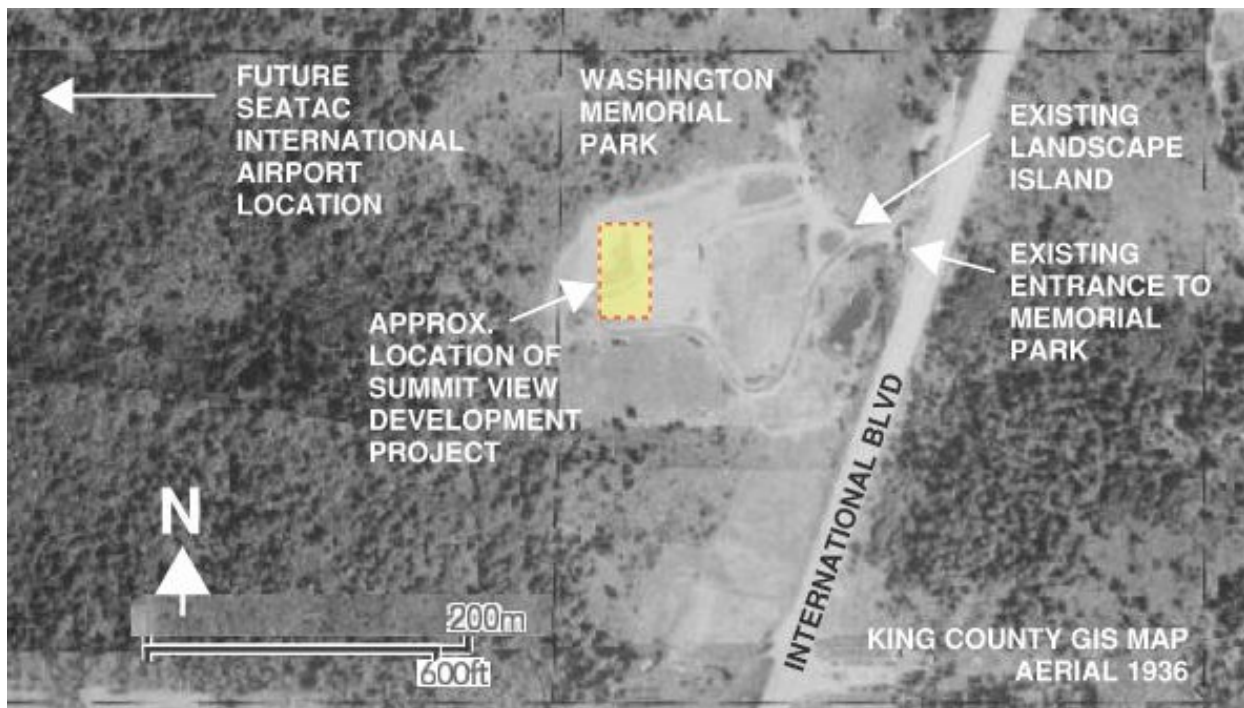
PROJECT SCOPE DESCRIPTION

BONNEY WATSON | Washington Memorial Park, 16445 International Boulevard, SeaTac, WA

**RE: Major Conditional Use Permit Application for the Summit View Development
within the Washington Memorial Park | BONNEY WATSON
16445 International Boulevard, SeaTac, WA 98188
Parcel No.: 2823049054 plus 2823049052 & 2823049080**

The Project is for the continued internal property development of the Washington Memorial Park with the proposed Summit View Development Project. This project will include the construction of a 7,500 square foot Celebration of Life Pavilion, relocation of the existing POW/MIA Memorial, extending site utility infrastructure (including providing Fire Flow to the Washington Memorial Park), a stacked parking arrangement for 54 vehicles, and the creation of a variety of interment memorial options.

The Washington Memorial Park has been in continuous operation since 1931 and predates the construction of the SeaTac International Airport which occurred in 1944 (please see below). Per the Revised Code of Washington Chapter 68.24, the existing cemetery use is required to be maintained for perpetuity on the property. In 1990 when the City of SeaTac incorporated as a municipal government, it designated the existing Funeral Home and Cemetery property under a 'Park' zoning designation, resulting in making the pre-existing 57-year old use and operations into an Allowed Conditional Use. Even though the proposed Summit View Development is a continuation of the previously approved use as a Funeral Home and Cemetery, the City of SeaTac has interpreted the scope of work – including the interment of human remains and cremains – as an 'expansion' of the existing previously approved use within the Washington Memorial Park and thus triggering a Major Conditional Use Permit process.



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Since the current property is not served by an approved system of fire hydrants to provide the required 'Fire Flow' for any new building construction and/or the remodel of any of the existing buildings, a fire line extension will be necessary to provide the required 'Fire Flow' to the Summit View Development (the preliminary engineering of this fire line has been reviewed by the Puget Sound Fire Authority and Highline Water District to assure its feasibility – the Preliminary Fire Line Diagram is included in this application). The cost to bring this required site infrastructure to the property is significant with the financing needing to be allocated over multiple projects within the Washington Memorial Park. Upon completion of the proposed Summit View Development project, the long-range plans for the Washington Memorial Park includes the remodel of their existing 1957 Chapel and Funeral Home, the remodel of the 1937 Flower Shop and Office Building, the incorporation of a sustainable alkaline hydrolysis system as an alternative to cremation, the creation of additional parking to support the Funeral Home and Flower Shop/Office Building, and the addition of entrance canopies to their existing Mausoleum – all of which appear to trigger additional Conditional Use Permits.

Description of the Current Property

Washington Memorial Park is a 70-acre property whose layout reflects the design tenets of the Garden Cemetery Movement of John Claudius Loudon (please see attached historical excerpt and news article). Landscaping materials are limited in size and location to keep the open expanse of the lawns and allow for long-range views across the park. There are no critical areas within 200-feet of the proposed Summit View Development.



View of Project Site looking SE within the Washington Memorial Park. Rear elevation of the existing Mausoleum is to the left with the existing POW-MIA Memorial is to the right.



View of Project Site looking North within the Washington Memorial Park. Existing POW-MIA Memorial with the existing Columbarium beyond.



View of Project Site looking North within the Washington Memorial Park. Existing Columbarium is on the left.

Scope of the Proposed Project Scope

Summit View Development: This development is centrally located within the Washington Memorial Park directly West of the Existing Mausoleums along the main N/S Driveway connecting S. 160th Street to S. 170th Street. This existing lawn area is proposed to include:

1. POW/MIA Memorial Relocation: The existing POW/MIA Memorial at the SW Corner of the site will be relocated to the NW Corner of the site so it will have closer proximity to the Military Gravesite Areas of the Memorial Park.
2. Memorial Lawn: Regrading of the existing Memorial Lawn area to achieve improved and controlled surface water drainage. This lawn area will incorporate future gravesite and cremation interment memorials (this lawn area is currently used for exterior memorial services).
3. Stacked Parking: Development of a 'stacked parking area' for serving the existing mausoleums, the existing and new gravesites and the new Celebration of Life Pavilion. This stacked parking surface area is proposed to be located along the back of the existing mausoleums in order to visually screen the parked cars from within the Washington Memorial Park. Total designated parking spaces will exceed 67 parking spaces > 58 parking spaces required by the City of SeaTac (2,300 sf chapel space/40 sf per space = 58 spaces). Employee parking is existing and is located adjacent to the existing Funeral Home and Office Building. The cemetery layout also allows for unstripped parking along the crisscrossing driveways within the Memorial Park (with an estimated parking capacity of over 600-vehicles).
4. Celebration of Life Pavilion: To allow for greater flexibility in types of ceremonial rites and to allow additional time for family and friends to commune before and after a service, a new Celebration of Life Pavilion is proposed. Currently there is only one enclosed assembly space to have funeral or memorial services within the Memorial Park. Having a singular assembly space puts undue time burdens and limitations on the services being held for family and friends. With the development of an additional assembly space within the Washington Memorial Park, funeral and memorial services can be held on an alternating schedule. This new assembly space will be designed for greater flexibility in the type of services to be held allowing BONNEY WATSON to meet the needs of a wider ethnic and religiously diverse community. Upon completion and occupancy of this new assembly space, the existing Chapel can then be renovated to incorporate improved accessibility and restroom provisions without having to suspend indoor funeral services at the Memorial Park during the renovation.

Summit View Development Area: 56,800 sf (1.86% of the WA Memorial Park.)

Existing Lot Coverage: 1350 sf (2.3% of the Summit View Development Area).

Proposed Lot Coverage: 8,850 sf (15.6% of the Summit View Development Area).

Existing Impervious Coverage: 4,842 sf (8.5% of the Summit View Development Area).

Proposed Impervious Coverage: 22,205 sf (39% of the Summit View Development Area).

Proposed Use: Continuation of the existing Cemetery and Funeral Home Use.

Landscaping: The City of SeaTac Municipal Code Chapter 15.445 Landscaping Standards Chart specially exempts Cemetery uses from having to comply with all landscaping requirements except for street frontage locations. Since none of the

proposed Summit View Development is within 200-feet of the street frontage, there are no applicable landscaping requirements for the project. The site will have landscaping around the building and to screen the stacked parking area from the West.

Property Infrastructure Improvements: Some of the proposed site improvements are required to be developed simultaneously with items above while others can be phased-in over time. The infrastructure improvements include:

1. Fire Flow: Bringing a Fire Flow Water System to the property from the East side of International Boulevard to the Funeral Home and up the hillside to the Summit View Development. This effort will also provide Fire Flow to the existing Funeral Home, Chapel and Crematorium.
2. Surface Water System: Developing an underground Surface Water Collection System for the Summit View Development tied into the existing City of SeaTac Storm Drainage System through an easement previously provided to the City of SeaTac by BONNEY WATSON.
3. Electrical System Upgrades: Provide an improved site electrical system to support the Summit View Development.
4. Funeral Home Parking: Reconfiguration of the Visitor and Staff Parking Area adjacent to the existing Funeral Home.
5. Driveway Improvements: Enhancement of the Existing Driveway Access to provide greater clarity and improved safety.

BONNEY WATSON | Washington Memorial Park appreciates the consideration of this request for a Major Conditional Use Permit. Such an approval will allow BONNEY WATSON to offer improved service accommodations for families within the Washington Memorial Park

End of Project Scope Description

Attachments:

1. John Claudius Loudon and the Garden Cemetery Movement

Exhibit # 2b

RESPONSE TO MAJOR CUP CRITERIA

BONNEY WATSON | Washington Memorial Park, 16445 International Boulevard, SeaTac, WA 98188

RE: Response to Major Conditional Use Permit Criteria

Summit View Development @ BONNEY WATSON | Washington Memorial Park

16445 International Boulevard, SeaTac, WA 98188

Parcel Numbers: 2823049052, 2823049054 & 2823049080

The Summit View Development Project is for the continued internal property development of the Washington Memorial Park and meets all of the specific Criteria for a Major Conditional Use Permit Approval per the City of SeaTac Municipal Code Section 15.115.020(D) as follows:

1. *The proposed use is a listed as a conditional used under SMC 15.205.040, Use Chart.*

Response: Please see the attached excerpt from Section 15.205.040 of the SeaTac Municipal Code where the Use Table designates a Cemetery Land Use as an Allowed Use within a Park Zoning Designation subject to a Conditional Use Permit.

2. *The site is adequate in size and shape for the proposed project and the use conforms to the general character of the neighborhood.*

Response: The proposed Summit View Development area will comprise less than 2% of the 70-acre Washington Memorial Park. The proposed use at the Summit View Development area is a continuation of the existing use as a cemetery and funeral home. This continuation of the existing use will not alter the character of the neighborhood (a general character that is defined by the open space of the Washington Memorial Park).

3. *The unique character of the topography, arterial streets and adjacent land use complement the proposed conditional use.*

Response: There will be no negative impact to the existing character of the topography, arterial streets, or the adjacent land use complement upon the approval of this conditional use. Since the proposed use is a continuation of the existing use of the Washington Memorial Park and the development is completely within the park, the existing character of the surrounding neighborhood will be maintained.

4. *The conditional use would not be detrimental to the surround land use.*

Response: As the proposed project is a continuation of the existing use as a cemetery and funeral home of the Washington Memorial Park, and the development site is completely within the Washington Memorial Park, granting of a conditional use will not be detrimental to the surrounding land uses.

5. *Modification to standards are limited to those which will mitigate impacts in a manner equal to or greater than the standards of this code.*

Response: The only proposed modification to standards is related to the proposed stacked parking configuration adjacent to the Celebration of Life Pavilion. Stacked parking is unique to cemetery operations as it allows for services held within the Washington Memorial Park to have a controlled movement of vehicles through the grounds to the memorial site(s). The proposed stacked parking arrangement allows for vehicles to be screened from view within the Washington Memorial Park as it is to be located between the existing Mausoleums and the proposed new Pavilion (stacked parking is also significantly more efficient for reducing the total area of impervious surfaces within the park setting). The City of SeaTac Zoning Code does not include standards specifically for stacked parking supporting a cemetery use; therefore, the proposed parking utilizes the configuration and dimensional standard found in the SeaTac Zoning code for valet and parallel parking.

6. *The conditional use is such that pedestrian and vehicular traffic associated with the use will not be hazardous or conflict with existing and anticipated traffic in the neighborhood.*

Response: As noted previously, the proposed Summit View Development is the continuation of the existing use and not an 'expansion' of the funeral home and cemetery use. The Celebration of Life Pavilion is designed to accommodate a wider variety of memorial service options for families – not to increase the number of services to be held within the Memorial Park. Currently there is no location within the Washington Memorial Park to have a catered reception following a memorial service thus service attendees need to travel to an off-site venue to hold such a reception. With the Summit View Development, service attendees can retire to the Celebration of Life Pavilion following a chapel or gravesite service. This use will be a continuation of the existing funeral home and cemetery use and will not be hazardous or conflict with existing traffic in the neighborhood as no increase in traffic will be generated.

7. *The conditional use will be supported by adequate public facilities or services and will not adversely affect public services to the surrounding area unless conditions can be established to mitigate adverse impacts.*

Response: As noted previously, the proposed Summit View Development is the continuation of the existing use and not an 'expansion' of the funeral home and cemetery use. Public services will not be adversely impacted to the surrounding area by the granting of the conditional use. With the installation of the fire flow line from International Boulevard to the project location, the construction of the Summit View Development will improve the life safety of the Washington Memorial Park.

The proposed Summit View Development meets all of the Criteria for a Major Conditional Use Permit Approval per the City of SeaTac Municipal Code Section 15.115.020(D) as outlined above.

City of SeaTac Comprehensive Plan Support

Further to satisfying the Criteria for Major Conditional Use Approval, the City's own Comprehensive Plan has many elements that directly support the approval of a Major Conditional Use Permit for the Summit View Development and future Improvement Projects at the Washington Memorial Park. These elements include, but are not limited to, the following:

Land Use Element Policy 2.5E: Encourage land uses adjacent to the Airport that are compatible with Airport operations. The Federal Aviation Administration's standards (under the Part 150 Program) identify compatible land uses for areas immediately adjacent to an airport. Improving land use compatibility in areas near the Airport enables the City of SeaTac to take better advantage of the job and tax revenue benefits of the Airport, maintain and enhance the Airport's role as an essential public facility, and help reduce the negative impacts to City residents. Some appropriate land uses near airports include open space and passive park land, parking, transportation-related activities, and some manufacturing or business park uses.

Land Use Element Policy 2.6A: This designation identifies publicly funded park and open space areas to be used for outdoor passive and active recreation uses, conservation and protection of municipal watersheds, and wildlife corridors and habitats. Also included are private open space facilities such as cemeteries.

Economic Vitality Policy 8.2D: Utilize the planned action process to reduce permit processing time and increase predictability for projects compatible with City plans. Priority should be given to the development of planned actions that support the Plan's economic development priorities.

Economic Vitality Policy 8.4A: Recognize the City's current mix of business and industry and encourage the diversity necessary to maintain or achieve employment growth. Business diversity reduces the negative effects of cyclical economic fluctuations.

Economic Vitality Policy 8.4E: Encourage a job mix that improves the City's economic strength and stability, prioritizes living wage jobs, and increases the tax base. A healthy job mix provides opportunities for residents' economic success and maintains high-quality public services.

Economic Vitality Policy 8.8B: Create consistent identity and community design elements to ensure SeaTac is recognizable and distinguished from other communities. A coordinated approach to establish a consistent City identity and image can help promote SeaTac as a memorable and recognizable destination

to visitors and travelers, including those from different regions, cultures and languages. This approach also promotes pride among residents and businesses and can be achieved through consistent physical communication (art, architecture, landscaping), promotion (digital, print, written word) and event programming.

Economic Vitality Policy 8.8C: Promote programming, open spaces and physical connections that enhance the visitor experience. Providing activities and amenities like shuttle service, connected sidewalks, bike paths and open space, can simplify access for hotel guests and other visitors to amenities in SeaTac. This expanded access enables visitors to contribute to local tax revenue and job creation.

Environmental Element Policy 9.3B: Protect and enhance natural drainage systems to maintain and improve water quality, reduce public costs, and prevent environmental degradation by using best management construction practices and current stormwater treatment and flow control standards on new and redevelopment projects.

Environment Element Policy 9.5C: Reduce energy use in existing buildings, and limit emissions growth in new buildings.

Parks, Recreation and Open Space Policy 10.6C: Encourage cooperative planning and use of recreational facilities with private businesses, nonprofit organizations, and other groups in the City. The City has active volunteer groups, private community clubs, and businesses that operate facilities and recreation programs. Cooperating with these groups extends opportunities for local residents and employees, reduces duplication, increases the success of grant applications, and provides funding and staffing in addition to City sources.

Parks, Recreation and Open Space Policy 10.7G: Retain significant historical and archaeological resources. Historical and archaeological resources contribute to community character and maintain ties to the past.

Public Benefit

BONNEY WATSON and the Washington Memorial Park has provided, and continues to provide, a wealth of benefits to City of SeaTac residents, businesses, public utilities and directly to the city municipality itself. The public benefits are both physical in nature as well as program operations provided on-site by BONNEY WATSON. There public benefits include:

1. Hosting an annual Memorial Day ceremony at the Memorial Park in honor of those in the military who have paid the ultimate sacrifice in service to their country.

2. Donating 100% of their funeral home and cemetery goods and services to anyone killed in the line of duty as a police officer, fire official, or military personnel.
3. Developed within the Memorial Park the first, and only, POW/MIA Living Memorial Plaza in the United States.
4. Developed within the Memorial Park, in partnership with the TEARS Foundation, an Angel of Hope Monument dedicated children gone too soon due to miscarriage, stillbirth, or infant death.
5. Providing assistance to families experiencing financial limitations when providing funeral home and cemetery goods and services.
6. Developed within the Memorial Park dedicated memorial gardens recognizing ethnic populations within the community including the Samoan/Pacific Islander, Korean, and East African cultures.
7. For over 30-years, Bonney Watson has hosted the Highline Community College Psychology 130 Class on 'Death and Dying'.
8. Maintains a 70-acre open green space amid the high intensity surroundings of International Boulevard and SeaTac Airport. The Memorial Park is open every day and is enjoyed by residents and visitors alike.
9. Bonney Watson continues to provide financial, leadership, and staff volunteerism to non-profit organizations throughout the greater Seattle area. Organizations include the St. Anne Hospital Foundation, Seattle Southside Chamber, Behind the Badge Foundation, the Highline Schools Foundation, Sons of Italy, and the TEARS Foundation.
10. Executed a 40-year lease with MPark for 6-acres North of the existing Funeral Home that subsequently generates significant tax revenue for the City of SeaTac through car rental fees.
11. Since November 1930, BONNEY WATSON has provided easements across the Memorial Park to the benefit of a wide range of municipal and utility corporations. These easements have benefited the Washington Department of Transportation, the Valley View Sewer District, the Port of Seattle, Puget Sound Energy and the City of SeaTac. A significant easement is a Storm Drainage Easement across the property with the City of SeaTac dated May 15, 2007. The language of this Storm Drainage Easement recognizes that BONNEY WATSON, 'for and in consideration of the public good and other valuable considerations, does by these presents, convey and warrant unto the Grantee and easement for the purpose of conveying, storing, managing and facilitating storm and surface water through a public storm drainage facility with necessary appurtenances over, through, across and upon' the Washington Memorial Park (a copy of this easement is attached).

As outlined above, BONNEY WATSON and the Washington Memorial Park has historically provided, and continues to provide today, a wealth of Public Benefits to the citizens of the City of SeaTac.

BONNEY WATSON | Washington Memorial Park appreciates the consideration of this request for a Major Conditional Use Permit. Such an approval will allow BONNEY WATSON to offer improved accommodations for families within the beautifully landscaped open space that is the Washington Memorial Park

End of Response to Major Conditional Use Criteria

Attachments:

1. Excerpt from SMC Section 15.205.040
2. Copy of Storm Drainage Easement – 5.15.2007

Chapter 15.205 Land Use Chart

Sections:

15.205.010 Establishment of Uses/Interpretation of Land Use Chart

15.205.020 Classification of Unlisted Uses and Clarification

15.205.030 Use Chart Guide

15.205.040 Use Chart

15.205.050 Hazardous Waste Use Requirements

15.205.010 Establishment of Uses/Interpretation of Land Use Chart

A. The use of a property means the purpose or activity for which the building or lot is intended, designed, arranged, occupied or maintained. All applicable requirements of this code, or other applicable State or Federal requirements, shall govern a use located in the City of SeaTac, except within the areas delineated as overlay districts, in which case the land use charts contained within Chapters [15.300 SMC](#), City Center Overlay District, 15.305 SMC, South 154th Street Station Area Overlay District, and 15.310, Angle Lake Station Area Overlay District, shall apply.

B. The land use charts in this chapter and other chapters in this code determine whether a specific use is permitted in a zone classification. (Ord. 16-1009 § 9; Ord. 15-1018 § 1)

15.205.020 Classification of Unlisted Uses and Clarification

A. In creating use charts, the City has considered the characteristics of uses which make them comparable, compatible or similar to each other. The City recognizes that it is not possible to enumerate and classify every use to which land may be devoted, either now or in the future, and that ambiguity may exist with reference to the appropriate and consistent use definition and applicable standards. Therefore:

1. When any known and identifiable use is not listed as a permissible use in any classification; or
2. When any use has now come into existence by reason of any technical development in the trades, sciences and equipment; or
3. When any use already listed in the use charts which, because of any process, equipment or materials used, possesses different performance standards than those which are usually associated with the uses in the classification as presently classified and which, therefore, makes it reasonable that such a use should be placed in the more restrictive classification, it shall be the responsibility and duty of the Department to ascertain all pertinent facts relating to any such use and make what it deems to be the appropriate process on a case-by-case basis for locating the use in the compatible zone classification.

B. Based on the above situations, the Director shall review the findings of facts and conclusions, and issue a decision of one (1) of the following actions:

1. Approve or deny the use as a similar and compatible use for that zone classification;
2. Require approval or denial through the conditional use process; or
3. Begin the process for review of an amendment to the land use charts.

C. The purpose of the review shall be to determine that the characteristics of any such use shall not be unreasonably incompatible with the type of uses permitted in surrounding areas, and for the further purpose of determining the need for stipulating such conditions that would mitigate potential impacts and reasonably assure that the basic purpose of this code shall be served.

D. Any administrative decision issued by the Director can be appealed to the City Hearing Examiner, as stated in SMC [15.115.070](#), Appeal Process.

E. On an annual basis, the Director shall review and bring forward any recommended revisions or interpretations for uses to the Planning Commission. Additionally, every five (5) years, the Director shall present a comprehensive review of the code to the Planning Commission for consideration of necessary revisions due to lack of specificity or ambiguity in the adopted standards and their impacts. (Ord. 15-1018 § 1)

15.205.030 Use Chart Guide

A. **About the Use Chart.** The following chart lists all of the permitted and conditional land uses allowed in each zone.

B. **How the Use Chart is Organized.** The uses are generally alphabetical within the following category headings:

[illegible]

LAND USE	UL	UM	UH	UH-UCR	T	MHP	NB	O/C/MU	O/CM	CB	CB-C	RBX	I	P
Veterinary Clinic							P	C	P(1)	P	P	P(2)	P	
BUSINESS SERVICES														
Airport Support Facility												P		
Cargo Containers	P(1,2)	P(1,2)	P(1,2)	P(1,2)	P(1,2)	P(1,2)	P(1,2)	P(1,2)	P(1,2)	P	P(3)	P	P	P(1,2)
Commercial/Industrial Accessory Uses							P		C	P	P	P	P	
Conference/Convention Center							P		P	P	P	P	P	
Construction/Trade									C	C	C	P(1)	P	
Distribution Center/Warehouse							C		C	C		P	P	
Equipment Rental, Large												C	P	
Equipment Rental, Small							C		P(1)	P	P		P	
Equipment Repair, Large													P	
Equipment Repair, Small							P		P(1)	P	P	P(2)	P	
Helipad/Airport and Facilities													P	
Landscaping Business										P	P	P	P	
Professional Office			P	P			P	P	P	P	P	P	P	
Storage, Self-Service										P	P	C	P	
Truck Terminal									C	C		P(1)	P	
CIVIC AND INSTITUTIONAL														
Cemetery		C	C	C			C			P	P	P		C

LAND USE	UL	UM	UH	UH-UCR	T	MHP	NB	O/C/MU	O/CM	CB	CB-C	RBX	I	P
Crisis Diversion Interim Facility (CDIF)												C	C	
Day Care I	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	P(1,2)	P(1,2)			P(1,3)		
Day Care II	C(1)	P	P	P		C	P	P(2)	P(2)	P	P	P		
Emergency Housing	P(1)	P(1)	P(1)/C(2)	P(1)/C(2)	P(1)	P(1)	P(1)/C(2)	P(1)/C(2)	P(1)/C(2)	P(1)/C(2)	P(1)/C(2)	P(1)/C(2)		
Emergency Shelters	P(1)	P(1)	P(1)/C(2)	P(1)/C(2)	P(1)	P(1)	P(1)/C(2)	P(1)/C(2)	P(1)/C(2)	P(1)/C(2)	P(1)/C(2)	P(1)/C(2)		
Hospital							P		C	P	P	P		

[illegible]

LAND USE	UL	UM	UH	UH-UCR	T	MHP	NB	O/C/MU	O/CM	CB	CB-C	RBX	I	P
Food Processing							P		C	P	P		P	
Furniture/Fixtures													P	
Laboratories, Research, Development and Testing							C		C	C	C	P	P	
Manufacturing, Light Misc.													P	
Winery/Brewery/Distillery								C(1)	P(1)	P	P	P(1)	P	
Off-Site Hazardous Waste Treatment and Storage Facilities													C	
Paper Products													P	
Primary Metal Industry													P	
Printing/Publishing										P	P	C	P	
Recycling Processing													C	
Rubber/Plastic/Leather/Mineral Products													P	
Textile Mill										C			P	
Wood Products	C(1)												P	
MOTOR VEHICLES														
Auto/Boat Dealer									C(1)	P	P		P	
Auto Service Center							P			P	P	P(1)	P	
Auto Supply Store							P	C(1)	C(1)	P	P		P	
Auto Wrecking													C	
Commercial Marine Supply							C			P	P		P	
Electric Vehicle Infrastructure	P(1)	P(1)	P(2)	P(2)	P(1)	P(1)	P	P(3)	P	P	P	P	P	P(1)
Fueling/Service Station							P			P	P		P	
Mobile Refueling Operations	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	P	P	P	P	P(1)

LAND USE	UL	UM	UH	UH-UCR	T	MHP	NB	O/C/MU	O/CM	CB	CB-C	RBX	I	P
Public/Private Parking							C		C(1)	P	P	P	P	
Tire Retreading													P	
Towing Operation													C	
Vehicle Rental/Sale									C(1)	P	P	P(1)	P	
Vehicle Repair, Large													P	
Vehicle Repair, Small							C			P	P		P	
RECREATIONAL AND CULTURE														
Amusement Park									C	C	C			C(1)
Community Center		C	C	C			P	P	P	P	P	P(1)		P
Drive-In Theater										P				
Golf Course	C									C				P
Health Club			C(1)	C(1)			P	P	P	P	P	P	P(1)	
Library	P	P	C	C	C		P	P	P	P	P	P		
Museum		C	C	C			P		P	P	P	P		
Nonprofit Organization	P(1)/C(2)	P(1)/C(2)	P	P			P	P	P	P	P	P		P(1)/C(2)
Park	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Recreational Center	P(1)	P(1)	P(1)	P(1)			C	P	P	P	P	P(2)	P	P

LAND USE	UL	UM	UH	UH-UCR	T	MHP	NB	O/C/MU	O/CM	CB	CB-C	RBX	I	P
Religious Use Facility	C	C	P	P	C		P	P	P	P	P	P		P(1)/C(2)
Religious Use Facility Accessory	C(1,2)	C(1,2)	C(2)	C(2)	C(1)		P(2)	P	P(2)	P(2)	P(2)	P(2)		P(3)/C(4)
Sports Club	P(1)/C(2)						C			P	P	P	P	
Stadium/Arena									C	C	C		C	C
RESIDENTIAL														
College Dormitory							C	P(1)	P	P	P	P		
Duplex		P(1)	P(1)	P(1)	P(1)									
Dwelling Unit, Caretaker/Manager										P	P	P		

LAND USE	UL	UM	UH	UH-UCR	T	MHP	NB	O/C/MU	O/CM	CB	CB-C	RBX	I	P
Dwelling Unit, Detached	P(1)	P(1) (2)	P(2)	P										
Manufactured/Modular Home	P	P				P								
Mobile Home						P								
Mobile Home Park	C(1)	C(1)	C(1)	C(1)		P								
Multi-Family		P	P	P			C	P	P(1)	P(1)	P(1)	C(1)		
Townhouse		P	P	P	P			P						
RESIDENTIAL, RETIREMENT AND ASSISTED LIVING														
Assisted Living Facility			P	P			C	P	P	P	P			
Community Residential Facility I	P	P	P	P			P	P		P	P	P		
Community Residential Facility II			P	P			C	P(1)	P	P	P	P		
Continuing Care Retirement Community			P	P			C	P	P	P	P			
Convalescent Center/Nursing Home			P	P			P		P	P	P	P		
Retirement Apartments		P	P	P			C	P	P	P	P			
RESIDENTIAL, ACCESSORY														

LAND USE	UL	UM	UH	UH-UCR	T	MHP	NB	O/C/MU	O/CM	CB	CB-C	RBX	I	P
Accessory Dwelling Unit	P	P												
Home Occupation	P	P	P	P	P	P	P	P	P	P	P	P	P	
Shed/Garage	P	P	P	P	P									
Tent Structure	P													
Tent Structure, Canopy	P													
RETAIL AND COMMERCIAL														
Agricultural Crop Sales (Farm Only)	P(1)						P			P	P	P	P	
Arcade (Games/Food)			P(1)	P(1)			P	P(1)	P(1)	P(1)	P(1)	P(1)		P
Beauty Salon/Personal Grooming Service			C(1)	C(1)			P	P(2)	C(2)	P	P	P		
Coffee Shop/Retail Food Shop			P(1)	P(1)			P	P(2)	P	P	P	P		
Concession Sales							P	P	P	P	P	P	P	P
Dry Cleaner			P(1,2)	P(1,2)			P	P(1)	P(1)	P	P	P(2)		

LAND USE	UL	UM	UH	UH-UCR	T	MHP	NB	O/C/MU	O/CM	CB	CB-C	RBX	I	P
Espresso Stand			P(1)	P(1)			P	P(2)	P	P	P	P	P	
Financial Institution							P	P	P	P	P	P	P	
Forest Products							P(1)		P(2)	(P1)	P(1)		C(3)	
Laundromat		P(1)	P	P			P			P	P		P	
Mobile Food Vending							P	P	P	P	P	P	P	P
Produce Stand							P		C	P	P	P	P	
Restaurant			C(1,2)	C(1,2)			P(2)	P(2,3)	P(3)	P	P	P	P	
Restaurant, Fast Food									P(1)	P	P	P	P	

LAND USE	UL	UM	UH	UH-UCR	T	MHP	NB	O/C/MU	O/CM	CB	CB-C	RBX	I	P
Retail, Big Box								P(1)	C(1)	C	C	C	P	
Retail, General			P(1)	P(1)			P	P(2)	P(2)	P	P	P(3)		
Sexually Oriented Business										C	C	C	C	
Tavern							P(1)	C	P	P	P			
Theater/Entertainment Club														
Theater, Movie							P		P	P	P	P(1)	P	P(1)
RETAIL AND COMMERCIAL, LODGING														
Bed and Breakfast	P	P	P	P			P	P	C					
Hostel		C	C	C			P	C	P	P	P	P		
Hotel/Motel and Associated Uses			C	C			P	C	P	P	P	P		
Short-Term Rental	P	P	P	P	P	P	P	P	P	P	P	P		
UTILITIES														
Utility Substation	C	C	C	C			C	C	C	P	P	P	P	
Utility Use	C	C	C	C			C	C	C	C	C	P	P	
Wireless Communications Facilities	C/P	C/P	C/P	C/P	C/P	C/P	C/P	C/P	C/P	C/P	C/P	C/P	C/P	C/P

(Ord. 23-1003 §§ 3, 5; Ord. 22-1002 § 7 (Exh. A); Ord. 21-1031 § 13 (Exh. A); Ord. 21-1008 § 10; Ord. 20-1026 § 8; Ord. 18-1029 § 1; Ord. 18-1009 § 3; Ord. 18-1001 § 4; Ord. 17-1023 § 1; Ord. 17-1013 § 1; Ord. 15-1018 § 1)

15.205.050 Hazardous Waste Use Requirements

- A. On-site hazardous waste treatment and storage activity generating hazardous waste is considered an accessory use to permitted uses within this land use chapter; provided, that such facilities meet the State siting criteria adopted pursuant to the requirements of RCW [70.105.210](#).
- B. Off-site hazardous waste treatment and storage may be permitted as a major conditional use in the industrial (I) zone district; provided, that such facilities meet the State siting criteria adopted pursuant to the requirements of RCW [70.105.210](#).
- C. For the purposes hereof the following terms and definitions shall apply:

1. "Hazardous waste" means all dangerous and extremely hazardous waste as defined in RCW [70.105.010](#)(15), except for moderate risk waste as set forth in RCW [70.105.010](#)(17).
2. "Hazardous waste generator" means any person or site whose act first causes a dangerous waste to become subject to regulation under the Dangerous Waste Regulations, Chapter [173-303](#) WAC.
3. "Hazardous waste storage" means the holding of hazardous waste for a temporary period, as regulated by the State Dangerous Waste Regulations, Chapter [173-303](#) WAC.
4. "Hazardous waste treatment" means the physical, chemical, or biological processing of hazardous waste for the purpose of rendering these wastes nondangerous or less dangerous, safer for transport, amenable for energy or material resource recovery, amenable for storage, or reduced in volume, as regulated by the State Dangerous Waste Regulations, Chapter [173-303](#) WAC.
5. "Off-site hazardous waste treatment and storage" means hazardous waste treatment and storage facilities that treat and store waste from generators on properties other than those on which the off-site facility is located.
6. "On-site hazardous waste treatment and storage" means hazardous waste treatment and storage facilities that treat and store wastes generated on the same property.
7. "State siting criteria" means criteria for the siting of hazardous waste treatment and storage facilities adopted pursuant to the requirements of RCW [70.105.210](#). (Ord. 15-1018 § 1)

The SeaTac Municipal Code is current through Ordinance 23-1022, passed September 26, 2023.

Disclaimer: The City Clerk's office has the official version of the SeaTac Municipal Code. Users should contact the City Clerk's office for ordinances passed subsequent to the ordinance cited above.

City Website: <https://www.seatacwa.gov/>

City Telephone: (206) 973-4800

[Code Publishing Company](#)

**When Recorded Return to:**

CITY OF SEATAC

CITY CLERK'S OFFICE

4800 S. 188th St.

SEATAC, WASHINGTON 98188-8605

STORM DRAINAGE EASEMENT

Grantor(s): — Washington Memorial Park & Mortuary, Inc.

Grantee: City of SeaTac

Abbreviated Legal Description:

That portion of Section 2 and 7, Washington Memorial Park, according to the plat thereof recorded in Volume 33 of Plats, page 46, in King County, Washington.

Full Legal Description is on page 2 hereof.

Assessor's Property Tax Parcel Account Number(s): 282304-9052 and 282304-9080

Reference Numbers of Documents Assigned or Released, if Applicable: N/A

THIS INSTRUMENT, made this 15th day of May, 2007, by and between

hereinafter called the "Grantor", and the CITY OF SEATAC, a municipal corporation of the State of Washington, hereinafter called the "Grantee",

WITNESSETH:

The Grantor, for and in consideration of the public good and other valuable consideration, does by these presents, convey and warrant unto the Grantee an easement for the purpose of conveying, storing, managing and facilitating storm and surface water through a public storm drainage facility with necessary appurtenances over, through, across and upon the following described real estate situated in the County of King, State of Washington:

SEE PAGE 2

EXCISE TAX NOT REQUIRED

By [Signature] King Co. Records Deputy**COPY**

Marsorie L. Graham
Printed Name: MARSORIE L. GRAHAM
Notary Public in and for the State of Washington,
residing at Kirkland
My appointment expires 2-28-11

Exhibit A

That portion of Section 2 and 7, Washington Memorial Park, according to the plat thereof recorded in Volume 33 of Plats, page 46, in King County, Washington described as follows:

Commencing at the northeast corner of said Section 2, said northeast corner lying 50.00 feet westerly of the right of way center line of State Road No. 1, as shown on said plat, and being on the westerly margin of said road, thence southwesterly along said westerly margin of State Road No. 1, South $18^{\circ}40'54''$ West, 710.42 feet to the True Point of Beginning; thence continuing along said westerly margin South $18^{\circ}40'54''$ West, 10.00 feet; thence perpendicular to said westerly margin North $71^{\circ}19'06''$ West, 18.73 feet; thence North $26^{\circ}34'39''$ West, 33.70 feet; thence North $17^{\circ}27'47''$ East, 17.28 feet; thence North $9^{\circ}15'34''$ East, 75.32 feet; thence South $71^{\circ}19'06''$ East, 8.11 feet; thence South $9^{\circ}11'49''$ West, 70.77 feet; thence South $18^{\circ}40'54''$ West, 14.71 feet; thence South $26^{\circ}34'39''$ East, 29.54 feet; thence South $71^{\circ}19'06''$ East, 14.62 feet to the True Point of Beginning, containing 1,188 square feet, more or less.

June 7, 2024

Exhibit # 2c

To: David Boe
Boe Architects

From: Linda Cuadra
Heath and Associates

Subject: Trip Generation and Parking Memo - Bonney Watson SeaTac Major CUP

The memorandum addresses comments from the City of SeaTac on the proposed Bonney Watson SeaTac Major CUP. It discusses trip generation and parking for the proposed changes at the SeaTac location. A project description is provided below.

PROJECT DESCRIPTION

- Bonney Watson is proposing construction of a 7,500 square foot Celebration of Life Pavilion (Pavilion), as well as relocating the existing POW/MIA Memorial, at the existing cemetery in the City of SeaTac.
- The project would include creation of an area for parking vehicles in a cortege arrangement, a common arrangement for cemeteries. Vehicles will parallel park alongside internal one-way roadways. These would be adjacent to the Pavilion.
- The Pavilion is intended as an alternative location for end-of-life celebrations that now take place in other areas of the cemetery.

Figure 1 shows the site vicinity of the project. Access to the Bonney Watson facility will continue to be via three existing access points: at S 170th Street on the south, at International Boulevard/Hwy 99 on the east, and at Host Road on the west. **Figure 2** illustrates the concept for site usage and cortege parking.



Figure 1: Vicinity Map

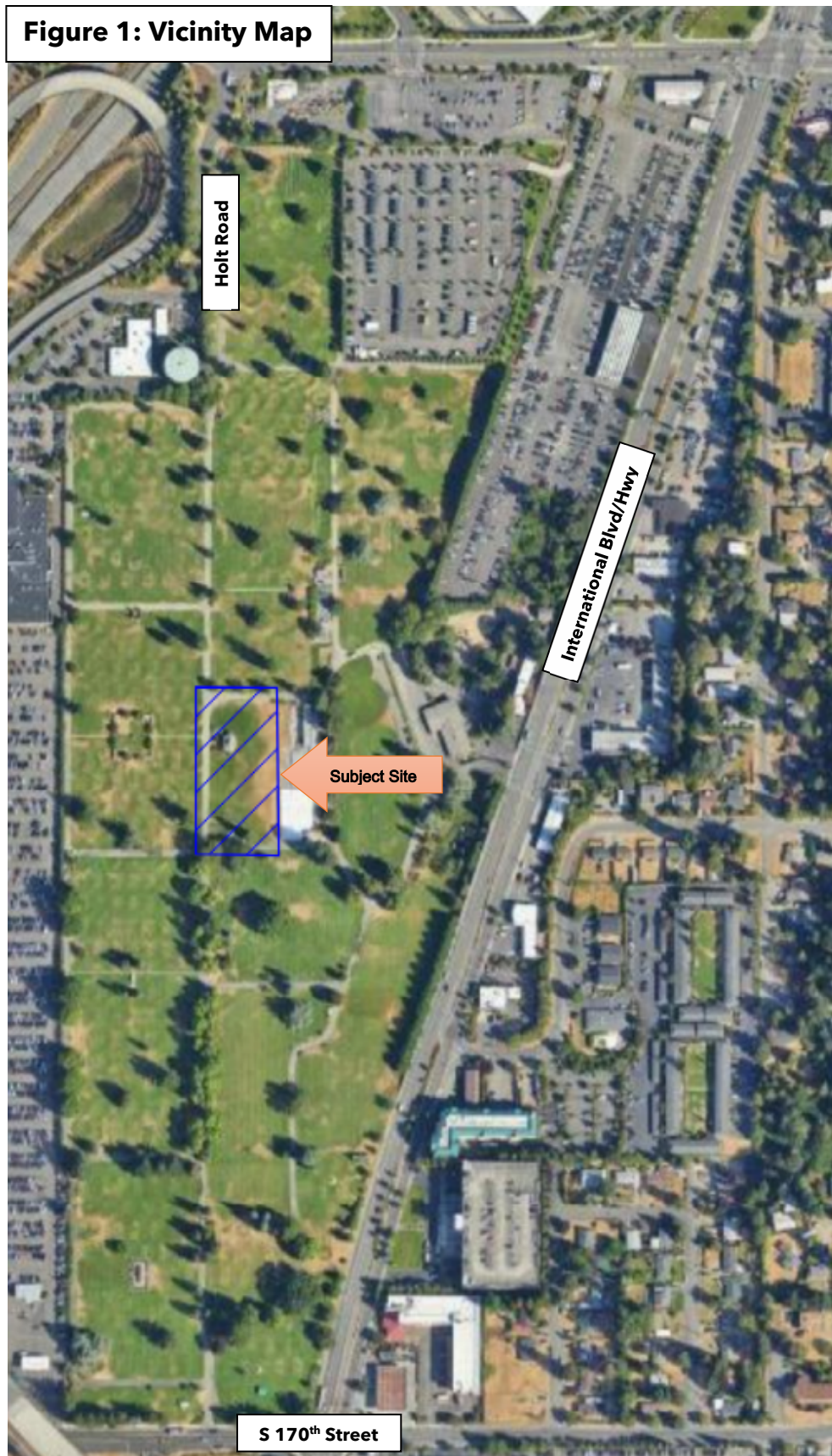


Figure 2: Site Plan

Figure 2: Site Plan

The site plan illustrates the proposed improvements for the Master Plan at the Plushington Memorial Park. Key features and improvements include:

- 1. SUMMIT VIEW DEVELOPMENT SITE EXTENT:** The overall boundary of the development site.
- 2. ELECTRICAL SERVICE EXTENSION TO SUPPORT SUMMIT VIEW DEVELOPMENT:** Proposed electrical service extension.
- 3. RELOCATED PORVIKA MEMORIAL:** The location of the relocated memorial.
- 4. REGRADE LAWN FOR PLACEMENT OF INTERMENT MONUMENTS:** The area for lawn regrading.
- 5. CELEBRATION OF LIFE BUILDING:** The location of the new building.
- 6. EXPAND LOBBY WITH ENTRY CANOPY:** The proposed expansion of the lobby.
- 7. ACCESSIBLE PATHWAYS BETWEEN FUNERAL HOME AND MAUSOLEUM TERRACE LEVEL:** The proposed accessible pathways.
- 8. FIRE FLOW EXTENSION FROM EAST SIDE OF INTERNATIONAL BOULEVARD TO SUMMIT VIEW DEVELOPMENT SITE:** The proposed fire flow extension.
- 9. ENHANCEMENT OF EXISTING DRIVEWAY ENTRANCE:** The proposed driveway entrance improvement.
- 10. EXISTING SIGNALLED SITE ENTRANCE AND EXPRESS - NO CHANGE PROPOSED:** The existing entrance and express.
- 11. EXISTING ORNAMENTAL LAKE - PART OF THE CITY OF SEATTLE'S STORM DRAINAGE SYSTEM THROUGH EASTBENT PULSONNET NATSON:** The existing lake and drainage system.
- 12. EXISTING COLUMBARIUM:** The existing columbarium.
- 13. EXISTING MAUSOLEUM:** The existing mausoleum.
- 14. EXISTING FUNERAL HOME:** The existing funeral home.
- 15. EXISTING SITE ACCESS - NO CHANGE:** The existing site access.
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MASTER PLAN IMPROVEMENTS - SITE PLAN

TRIP GENERATION

Trip generation is used to determine the level of traffic related to a specific development or redevelopment. This is usually denoted by the number of new trips that enter and exit a project during a designated time period, such as a specific peak hour (AM or PM) or an entire day. Data presented in this memo was derived from the Institute of Transportation Engineer's publication *Trip Generation Manual*, 11th Edition.

The proposed improvements are referred to as the Summit View Development Site. The subject area measures 56,800 square feet, or ~1.3 acres. The designated land use for this project in the *Trip Generation Manual* is defined as Cemetery (LUC 556). Acres were used as the input variable and average rates used to determine trip ends. **Table 1** summarizes the estimated project trip generation. Included are the average weekday daily traffic (AWDT) and the AM and PM peak hour vehicle trips. Refer to the appendix for trip generation specifics.

Table 1: Project Trip Generation

Land Use	Acres	AWDT	AM Peak-Hour Trips			PM Peak-Hour Trips		
			In	Out	Total	In	Out	Total
Cemetery (LUC 566)	1.3	8	0	0	0	0	1	1

Based on the data presented in Table 1, if the project actually resulted in additional services on weekdays, it is anticipated to generate 8 average weekday daily trips. No trips would occur in the AM peak hour and 1 trip (0 inbound, 1 outbound) during the PM peak hour.

It should be noted that Bonney Watson does not intend to add to their daily services, but rather offer an alternative location for services. Consequently, no new trips to or from the site are expected. Therefore, the ITE data, while nominal, could be considered conservative.

Generally, cemeteries offer services later in the morning (starting at 10:00 AM) or early in the afternoon (starting before 2:00 PM). Afternoon services are more common because they allow attendees to leave work for the latter part of the day rather than the full day. An earlier afternoon service allows private drivers and the funeral cortege to avoid peak traffic time (the same is true for morning services). In the Pacific Northwest, it is not practical to have late afternoon services during many months of the year due to early sunset.

A review of one year of service data from Bonney Watson supports a very low midweek activity rate. Data from 2019 shows an average of 64 services per year on a midweek day (Tuesday, Wednesday, or Thursday)¹. This equates to a little more than one event per midweek day. As stated above, the proposed changes are not intended to increase the level of activity at the cemetery, but rather to offer an alternative location for services within the grounds. As shown by ITE data and the information on existing cemetery practices, assuming one new PM peak hour trip is reasonable.

¹ Data from 2020 - 2023 were not used due to pandemic influences.

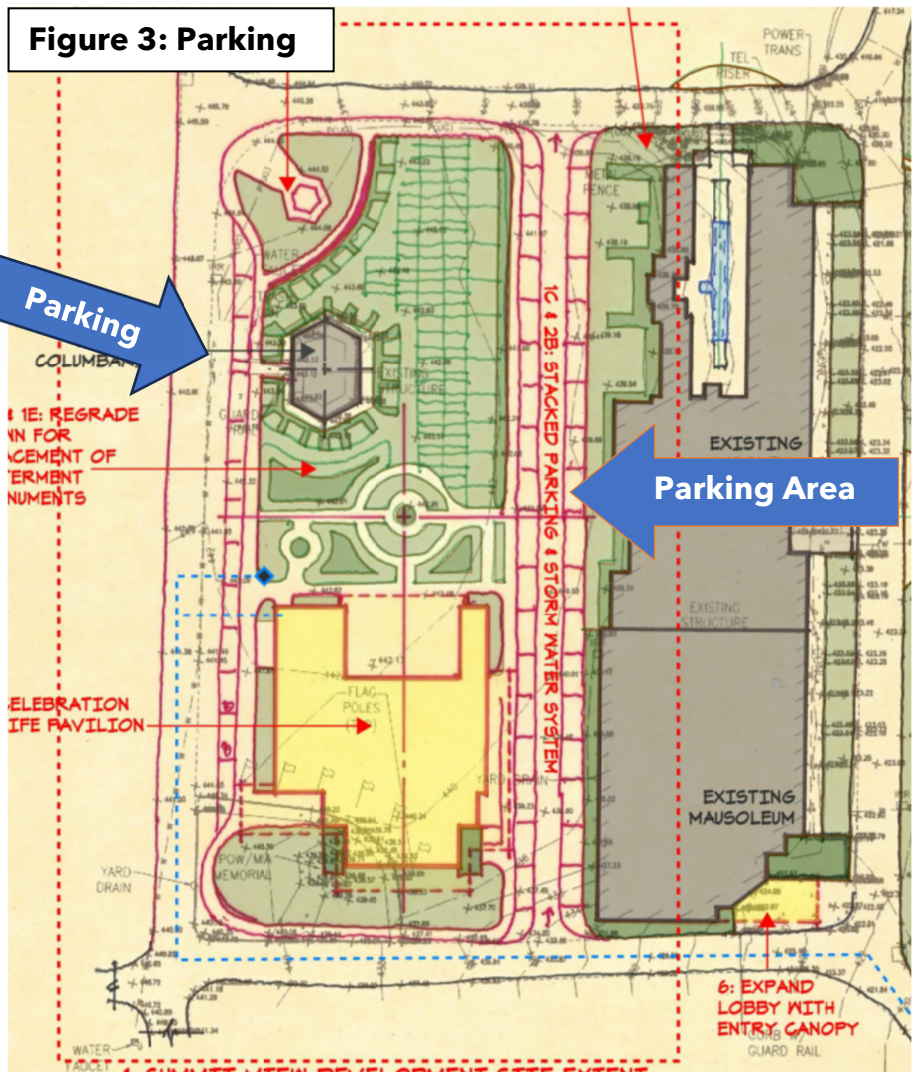
PARKING

The City of SeaTac does not have parking standards for cemeteries. Parking is commonly accommodated along the internal roadways near the service area in cemeteries. Therefore, parking requirements should rely on the proposed internal use at the cemetery, typical practice at cemeteries, and minimizing roadways and paved parking.

Cemeteries rely on cortege, or internal roadside verge parking, for many services. This allows for minimizing nonporous surfaces and is in keeping with the parklike setting often desired in cemeteries. This also allows visitors to park near their intended visiting location. The US Department of Veteran's Affairs recommends this type of parking in their *Design Guidelines* (2024). This is a long-standing practice for both National and private cemeteries.

In fact, cemeteries are largely empty for much of the day. Even when there are services, the area used for a service and parking is quite small compared to the overall size of the cemetery.

Those attending services will travel along internal roadways until reaching the designated parking strips along the one-way circulation aisles. Drivers will then parallel park on both sides of the drive aisle. **Figure 3** shows the location of the proposed parking near the Pavilion.



CONCURRENCY

Per the City of SeaTac Municipal Code (11.50.040), if a change of use does not occur, no concurrency evaluation shall be required. Further, this project would result in one PM peak hour trip. This very low level would not be expected to impact operations at any off-site locations.

CITY OF SEATAC STAFF COMMENTS

According to comments from City of SeaTac staff, a traffic study would be required as part of the project. However, with only one and possible no additional PM peak hour trips, no additional analyses are identified at this time. Although the City has no specific code provisions for cemeteries, parallel parking along internal roadways is a common practice that maximizes the use of available space. Since parking needs are temporary and only required during services, creating additional designated parking areas would result in spaces that remain unused most of the time.

SUMMARY

The Bonney Watson SeaTac Major CUP project would alter an existing area of the cemetery to provide a Pavilion space for services. The new space is not intended to create additional daily services, but rather to provide an alternative location for services. Applying ITE data for the subject area around the Pavilion space (~1.3-acres), an additional 8 daily trips and 1 PM peak hour trip is anticipated.

Please contact me should you have any question or require anything further,

Linda Cuadra, Transportation Planner

BONNEY WATSON SEATAC MAJOR CUP TRIP GENERATION AND PARKING MEMO

APPENDIX ITE TRIP GENERATION DATA



Cemetery (566)

Vehicle Trip Ends vs: Acres
On a: Weekday

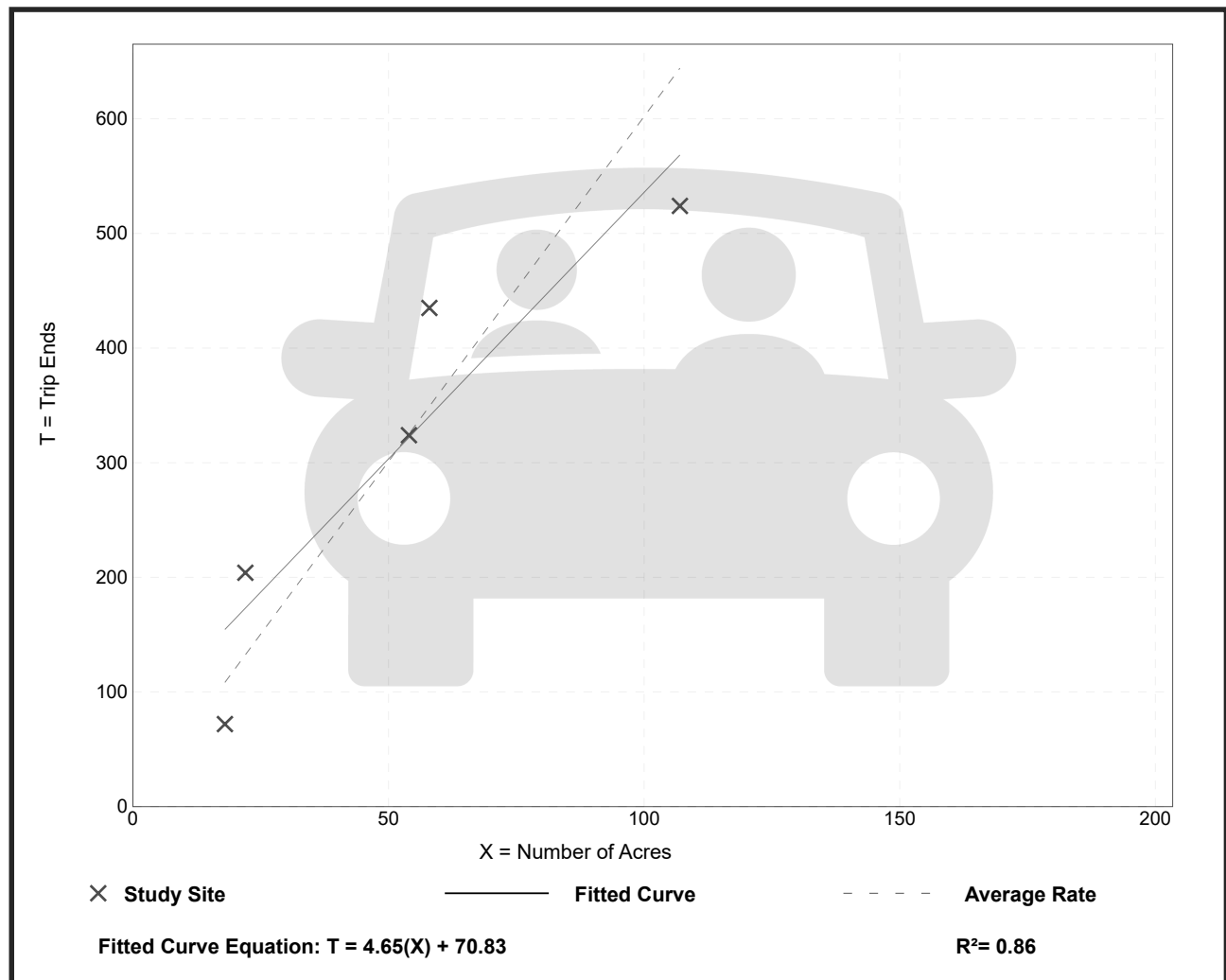
Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Acres: 52
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
6.02	4.00 - 9.27	1.66

Data Plot and Equation

Caution – Small Sample Size



Cemetery (566)

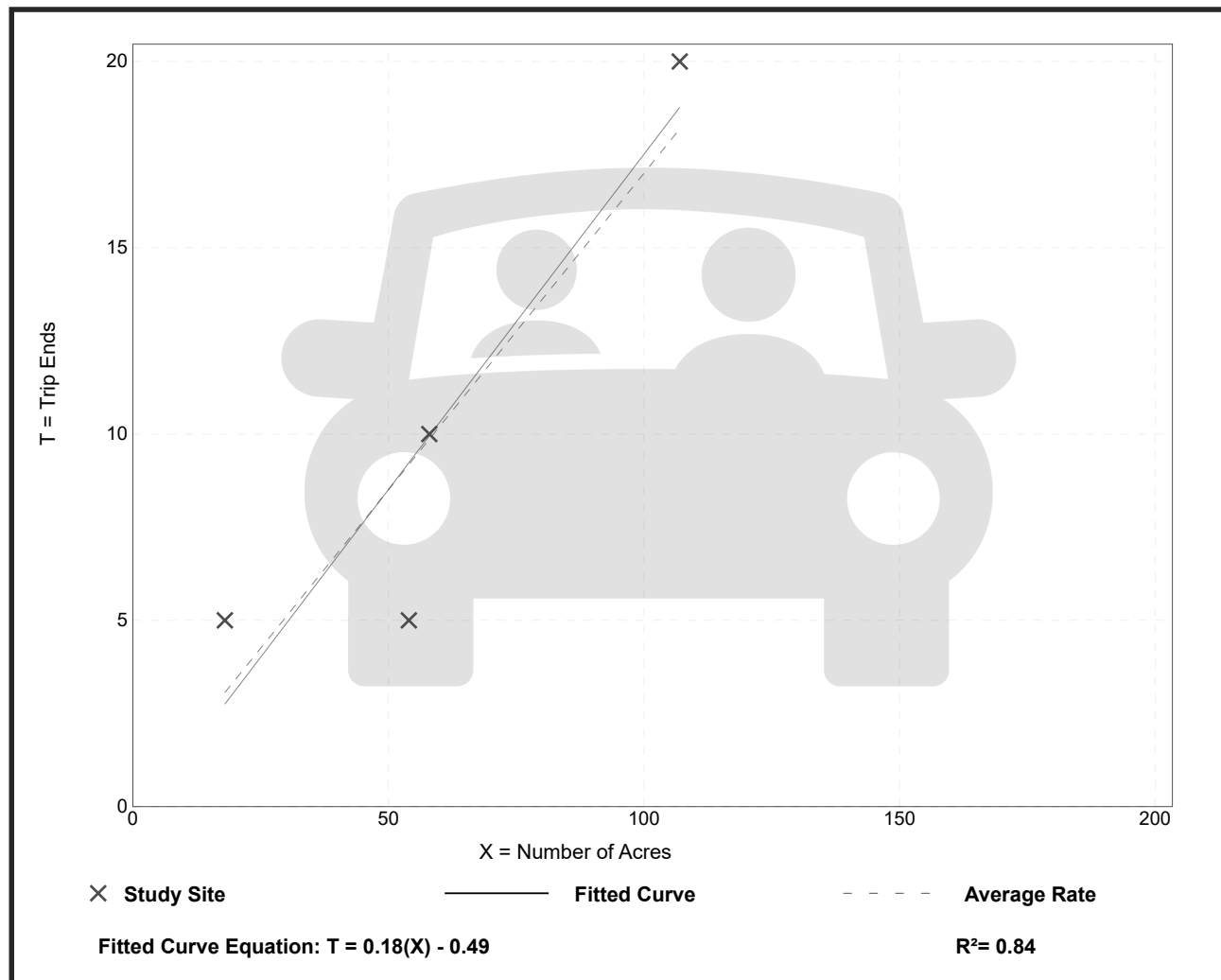
Vehicle Trip Ends vs: Acres
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 4
 Avg. Num. of Acres: 59
 Directional Distribution: 80% entering, 20% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.17	0.09 - 0.28	0.06

Data Plot and Equation

Caution – Small Sample Size



Cemetery (566)

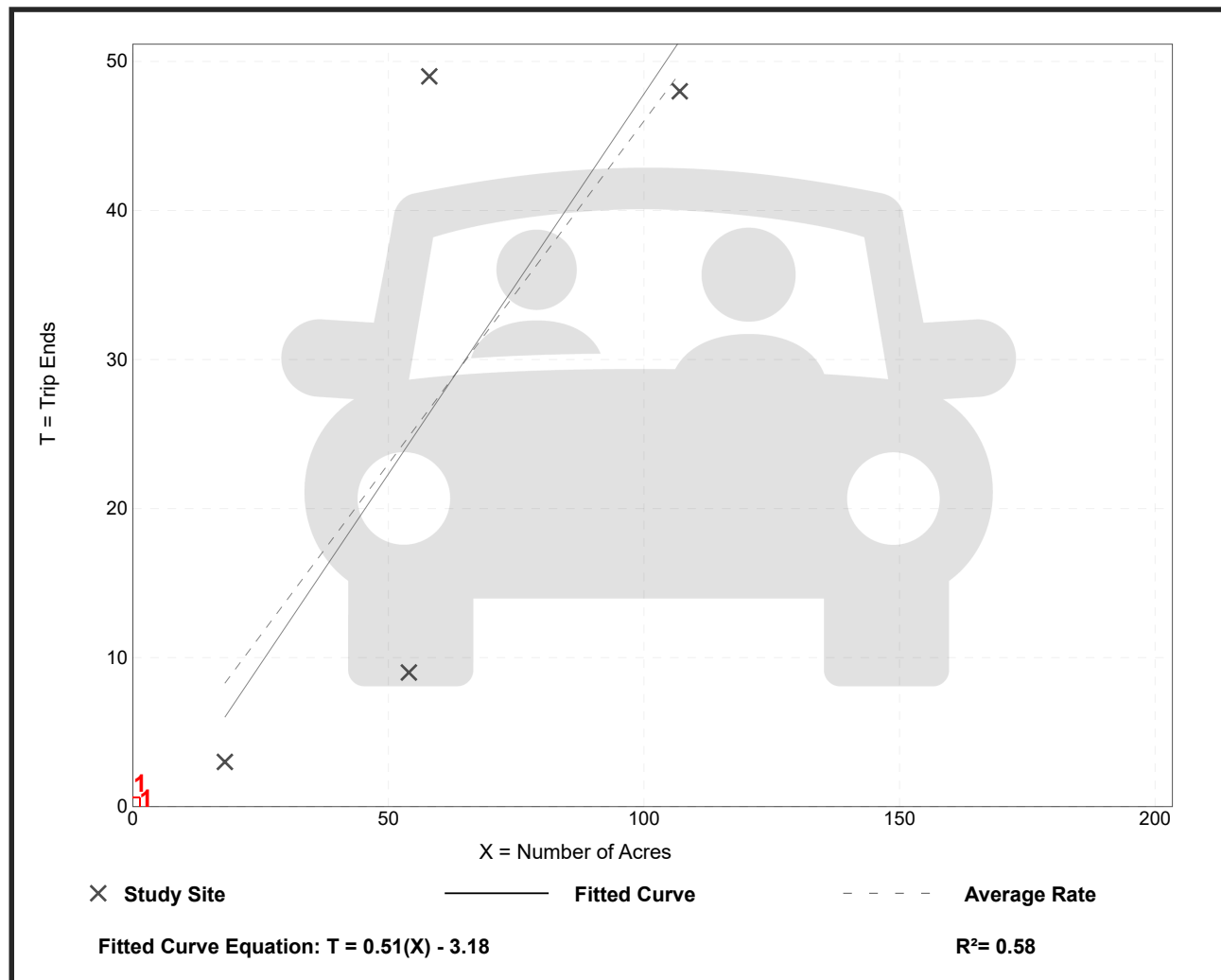
Vehicle Trip Ends vs: Acres
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 4
 Avg. Num. of Acres: 59
 Directional Distribution: 31% entering, 69% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.46	0.17 - 0.84	0.29

Data Plot and Equation

Caution – Small Sample Size



BONNEY WATSON SEATAC MAJOR CUP TRIP GENERATION AND PARKING MEMO

APPENDIX SITE PLAN



BOE architects

180 Broadway
Suite 207
Tacoma, WA 98402
253.383.7762
www.boearc.com

PROJECT: SUMMIT VIEW DEVELOPMENT

WITHIN THE
WASHINGTON
MEMORIAL PARK
1644B INTL BLVD.,
SEATAC, WA
FOR
BONNEY WATSON
FUNERAL HOME

GENERAL NOTES:
PARCEL NUMBERS:
2823044052, 2823044054, &
2823044060

REVISIONS:

DRAWING ISSUED FOR
MAJOR C.U.P.
REVIEW
DATE: 2/23/2024

PROJECT NO: 2302.00
FILE NAME:
XREFS:
DRAWN BY:
CHECKED BY:
PLOT SCALES:
DRAWING SCALES:
AS NOTED

DRAWING CONTENTS:
MASTER PLAN
IMPROVEMENTS
SITE PLAN

DRAWING NO:

SKA-1

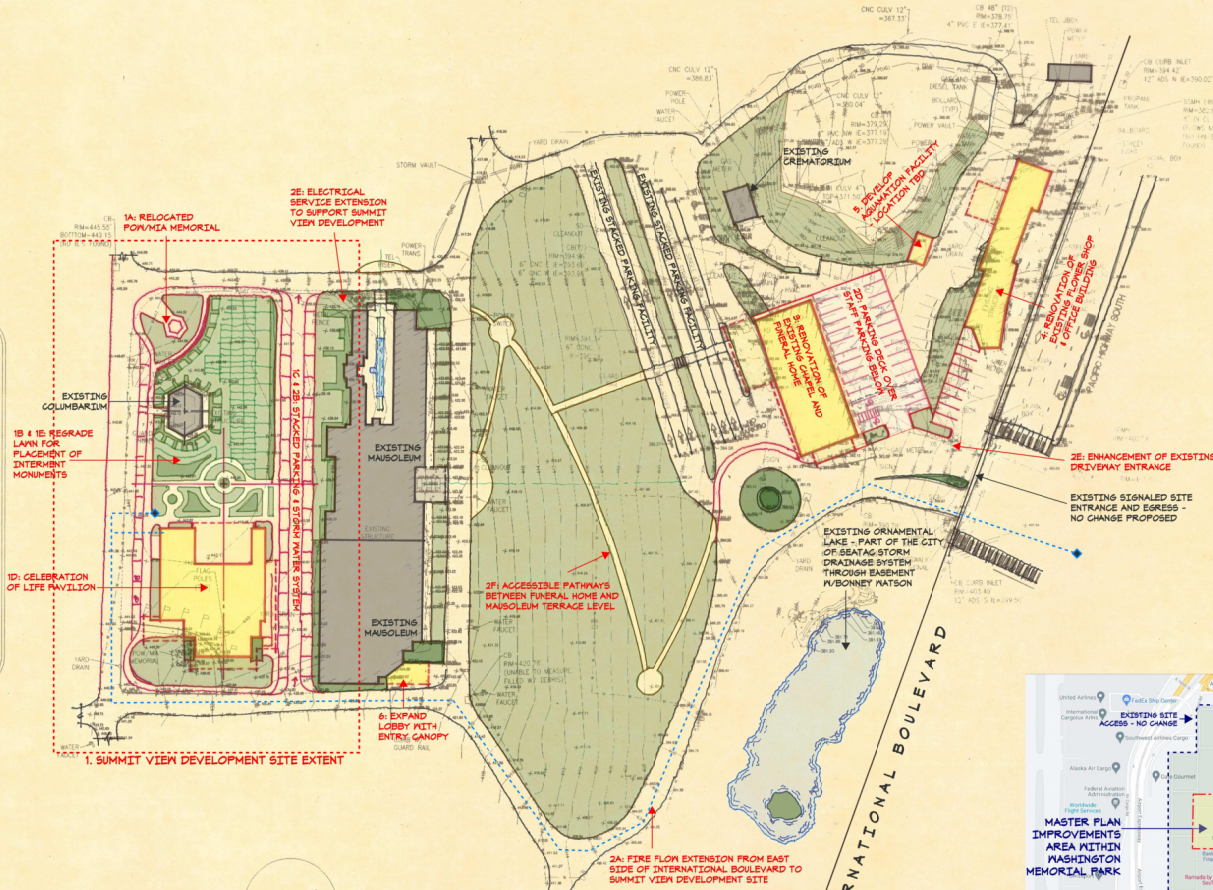


Exhibit # 3a

BOE
architects

1130 Broadway
Suite 207
Tacoma, WA 98402
253.383.7762
www.boearc.com

PROJECT:
SUMMIT VIEW DEVELOPMENT
WITHIN THE
WASHINGTON
MEMORIAL PARK
16445 INTL. BLVD.
SEATAC, WA
FOR
BONNEY WATSON
FUNERAL HOME

GENERAL NOTES:
PARCEL NUMBERS:
2823049052, 2823049054, &
2823049080

REVISIONS:

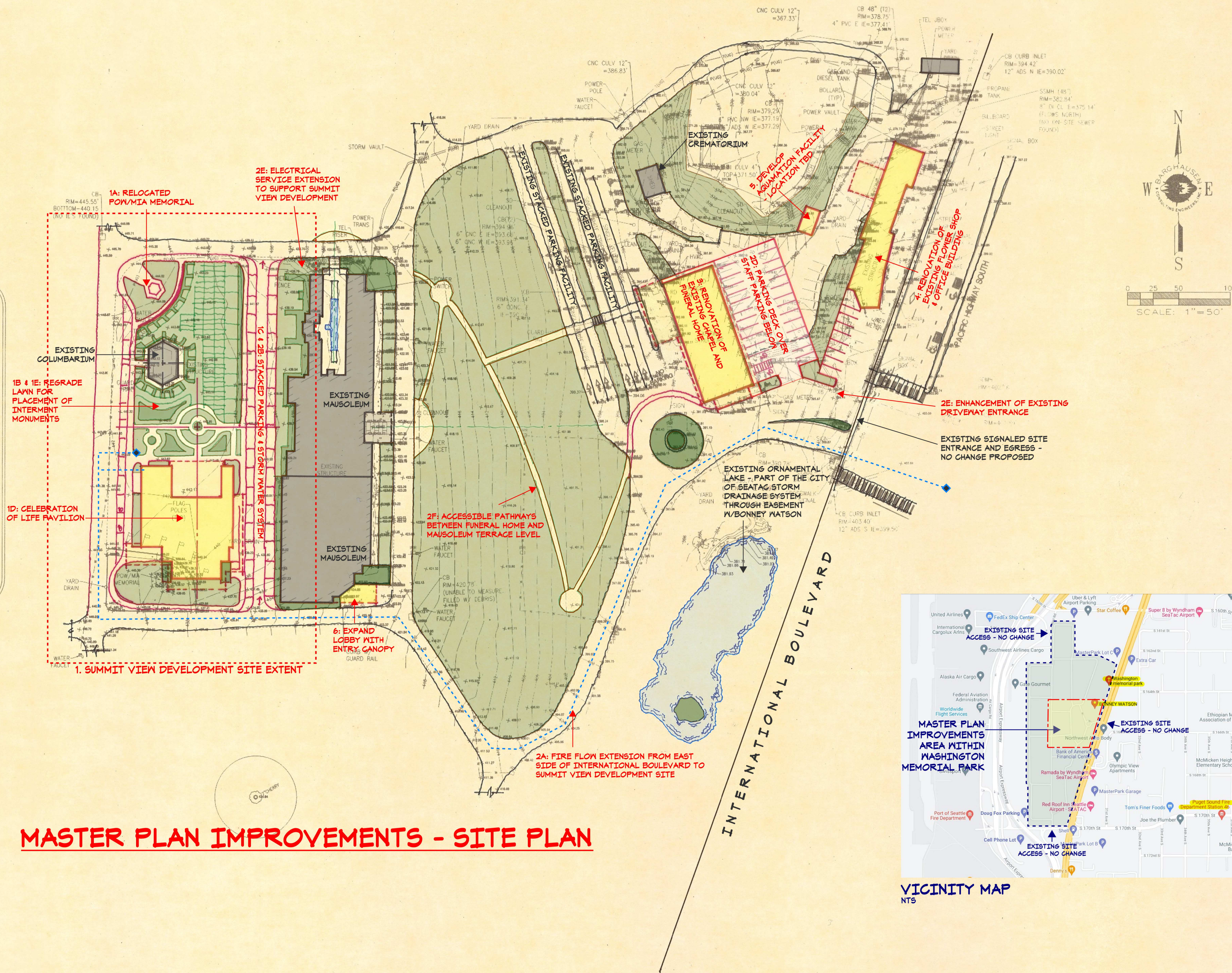
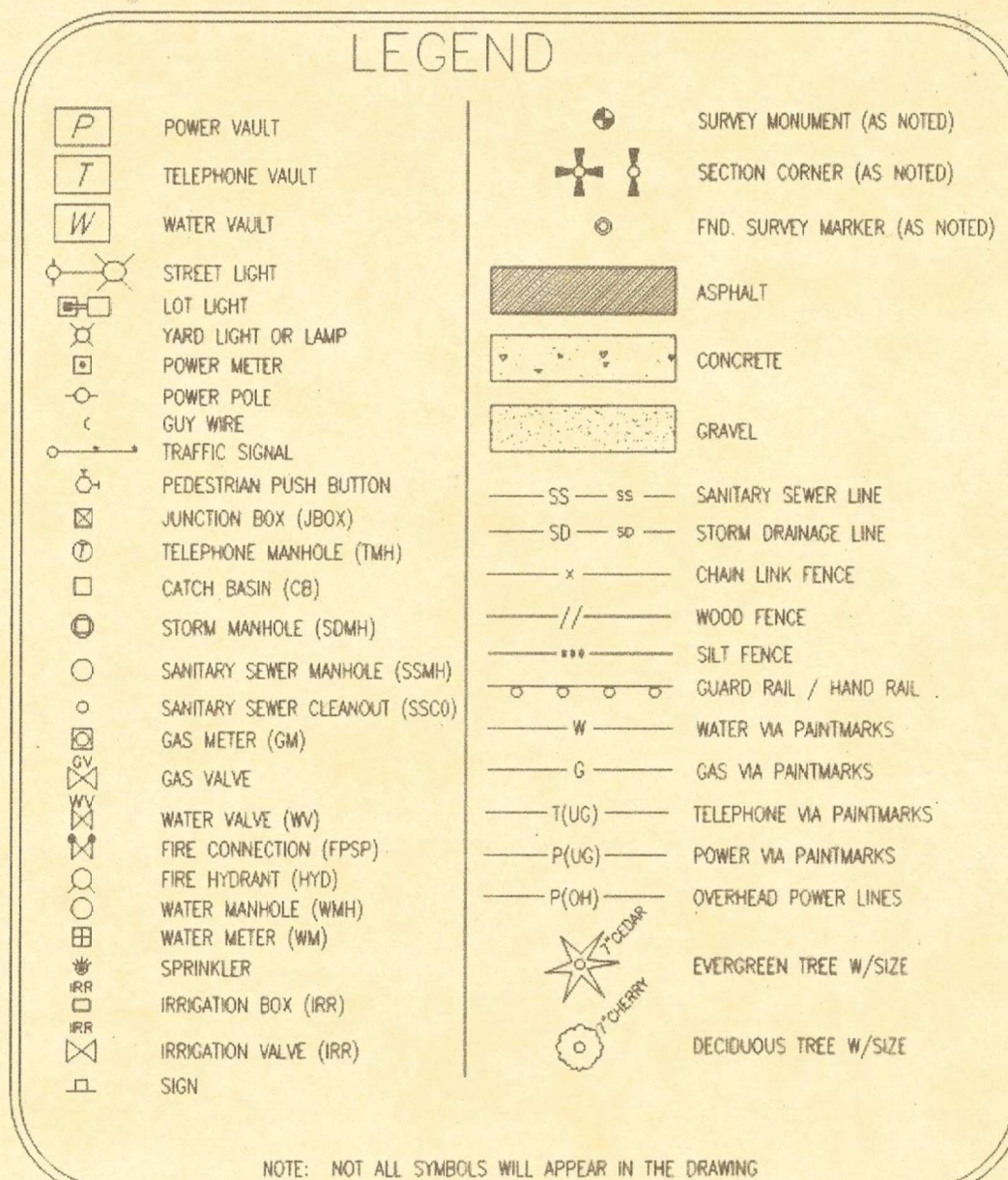
DRAWING ISSUED FOR:
**MAJOR C.U.P.
REVIEW**
DATE: 2.09.2024

PROJECT NO: 2302.00
FILE NAME:
XREFS:
DRAWN BY:
CHECKED BY:
PLOT SCALE:
DRAWING SCALES:
AS NOTED

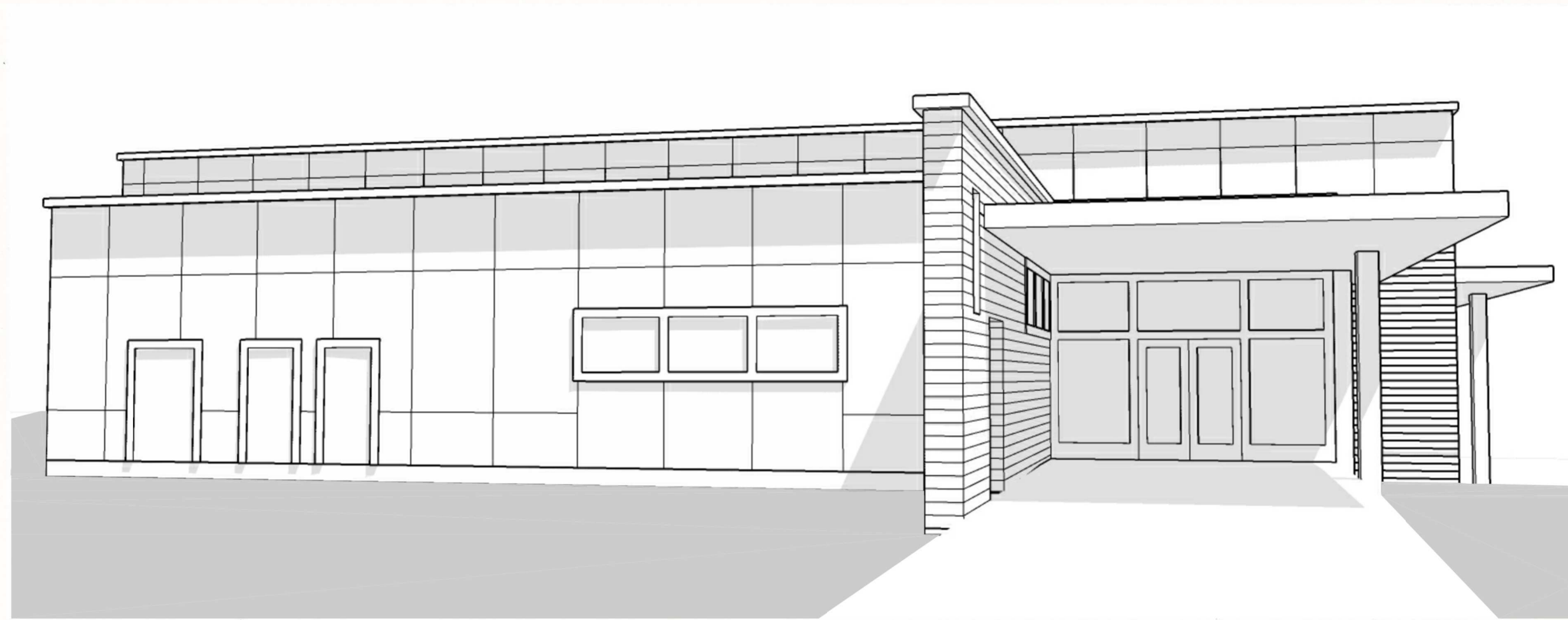
DRAWING CONTENTS:
**MASTER PLAN
IMPROVEMENTS
SITE PLAN**

DRAWING NO:

SKA-1



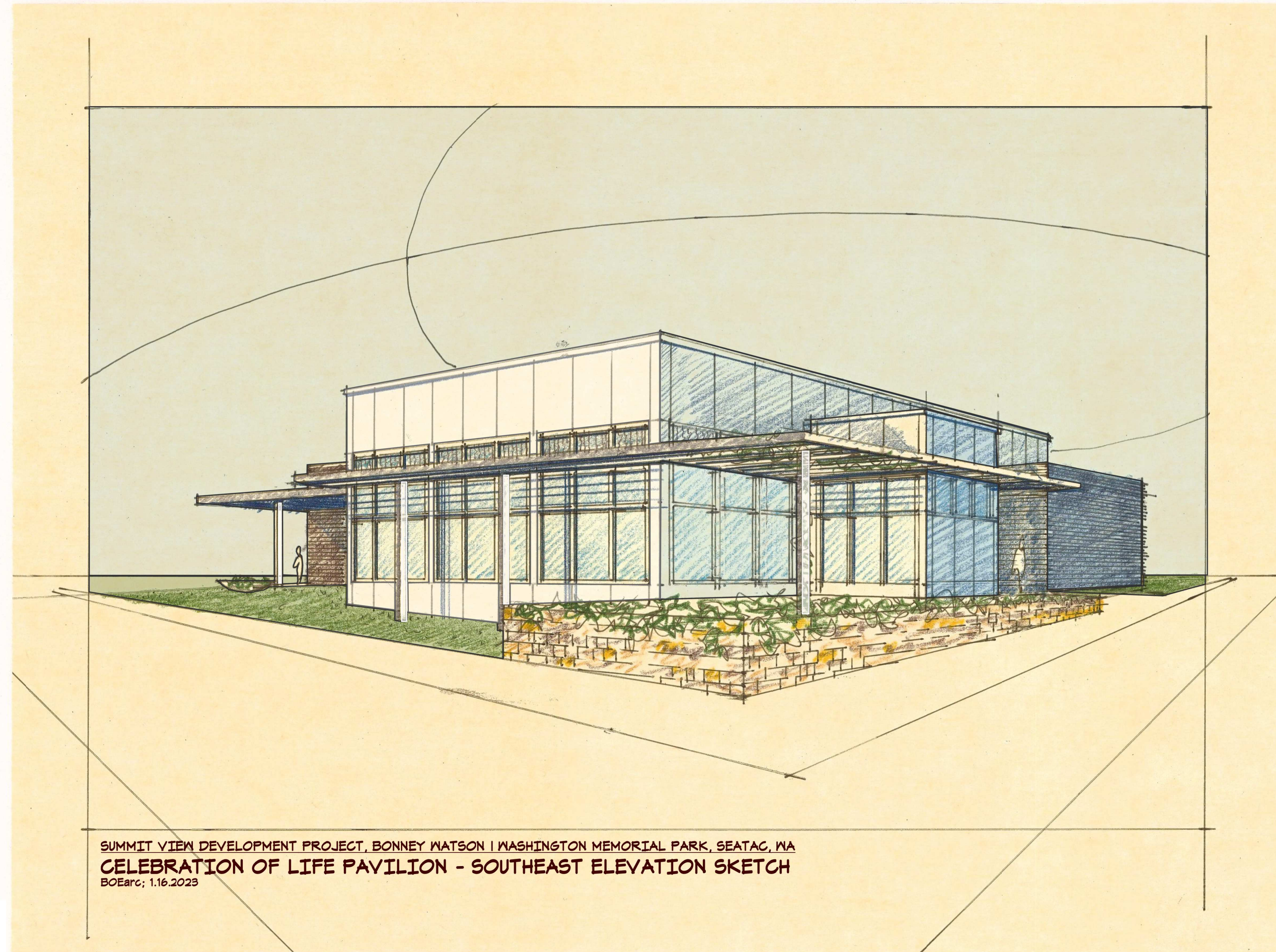
BACKGROUND TOPOGRAPHIC SURVEY FROM
BARGHAUSEN CONSULTING ENGINEERS, INC.
DATED 3/02/21 - OWEN B. HILLE - SURVEYOR



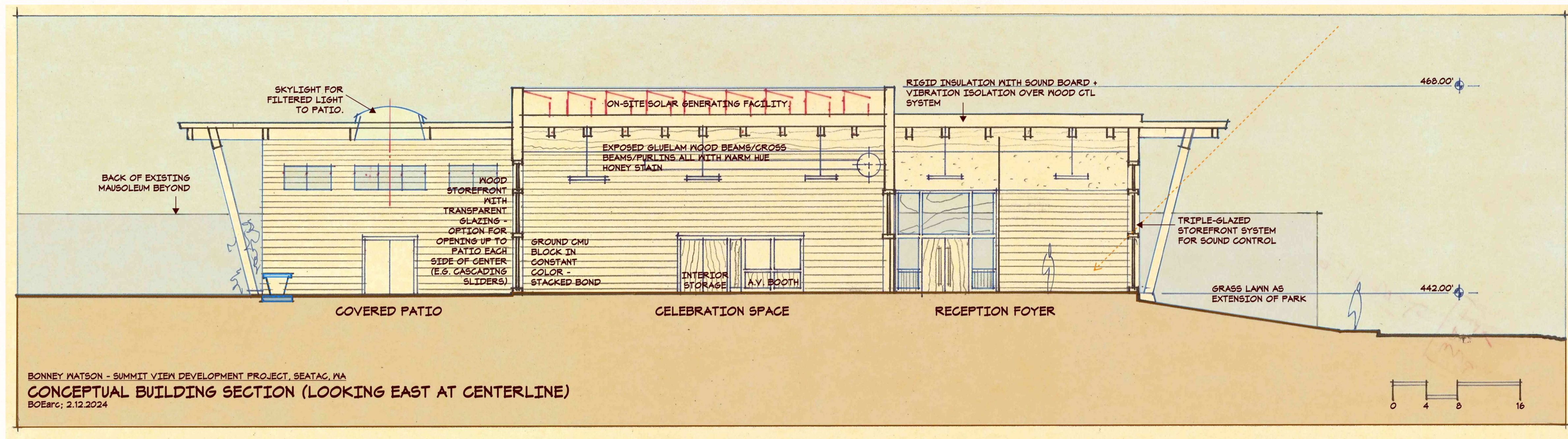
WEST ENTRY APPROACH STUDY



NORTH COVERED CANOPY STUDY



SUMMIT VIEW DEVELOPMENT PROJECT, BONNEY WATSON | WASHINGTON MEMORIAL PARK, SEATAC, WA
CELEBRATION OF LIFE PAVILION - SOUTHEAST ELEVATION SKETCH
BOEarc; 1.16.2023



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PROJECT:

SUMMIT VIEW
DEVELOPMENT

WITHIN THE

WASHINGTON
MEMORIAL PARK
16445 INTL. BLVD.
SEATAC, WA

FOR

BONNEY WATSON
FUNERAL HOME

GENERAL NOTES:

REVISIONS:

DRAWING ISSUED FOR:

MAJOR C.U.P.
REVIEW

DATE: 2.09.2024

PROJECT NO: 2115.01

FILE NAME:

XREFS:

DRAWN BY:

CHECKED BY:

PLOT SCALE:

DRAWING SCALES:

AS NOTED

DRAWING CONTENTS:

BUILDING
ELEVATION
STUDIES

DRAWING NO:

SKA-5

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PROJECT:
**SUMMIT VIEW
DEVELOPMENT**
WITHIN THE
WASHINGTON
MEMORIAL PARK
16445 INTL. BLVD.
SEATAC, WA
FOR
BONNEY WATSON
FUNERAL HOME

GENERAL NOTES:

REVISIONS:
RESPONSE TO SEATAC 1ST
REVIEW COMMENT LETTER
5.14.2024

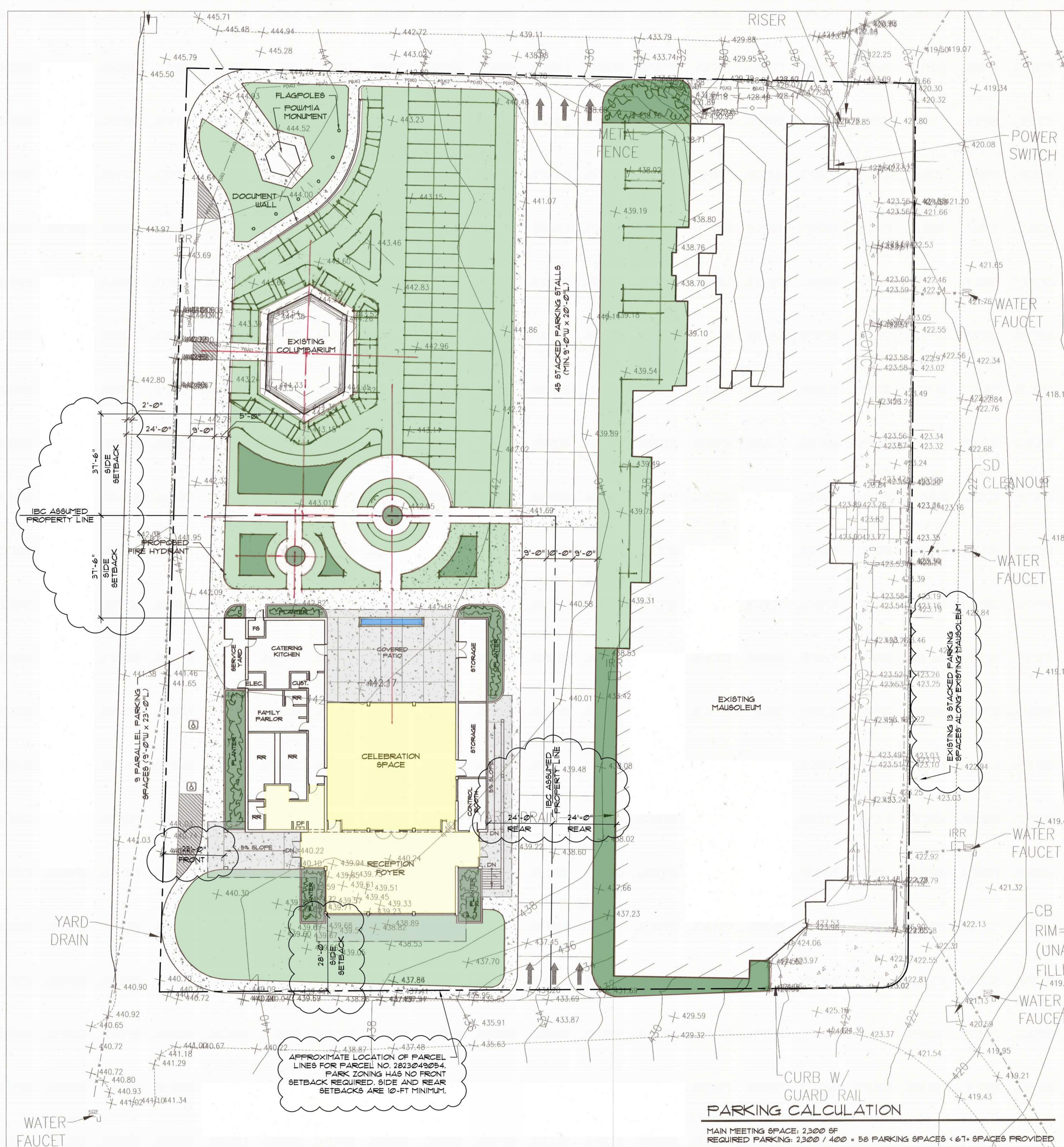
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**MAJOR C.U.P.
REVIEW**
DATE: 2.09.2024

PROJECT NO: 2303.00
FILE NAME:
XREFS:
DRAWN BY: MZ
CHECKED BY: DB
PLOT SCALE: 1:1
DRAWING SCALES: AS NOTED

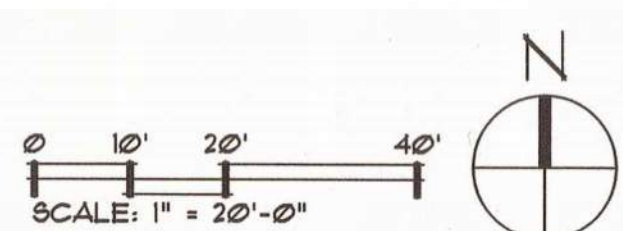
DRAWING CONTENTS:
**ARCHITECTURAL
SITE PLAN**

DRAWING NO:

A1.1



PARKING CALCULATION
MAIN MEETING SPACE: 2,300 SF
REQUIRED PARKING: 2,300 / 400 = 58 PARKING SPACES < 61+ SPACES PROVIDED



PRELIMINARY COVER SHEET
FOR
CELEBRATION OF LIFE PAVILION
A PORTION OF SE 1/4 OF THE NE 1/4, SEC. 28, T 23 N, R 4 E, W.M.
CITY OF SEA-TAC, KING COUNTY, WASHINGTON

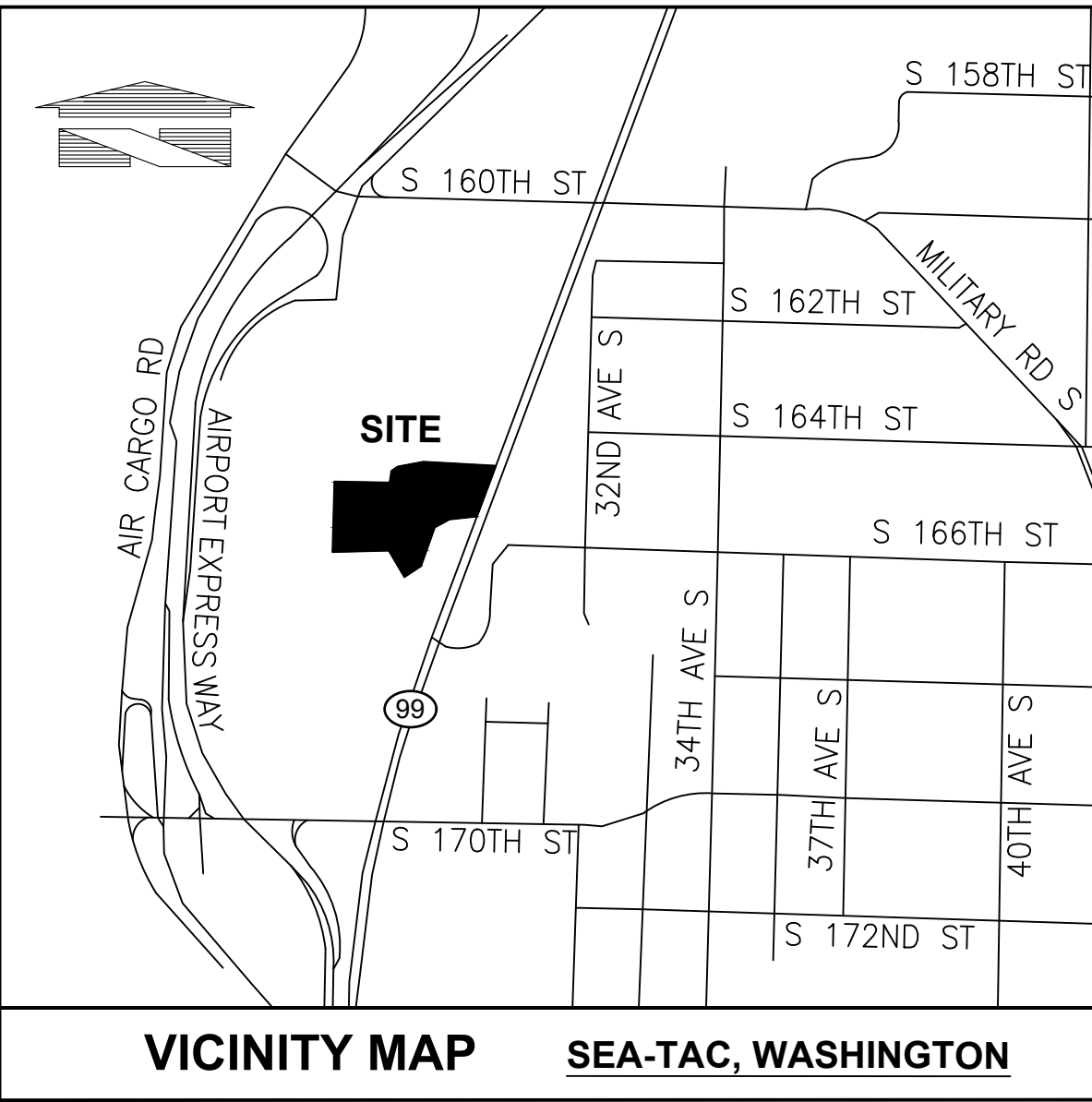
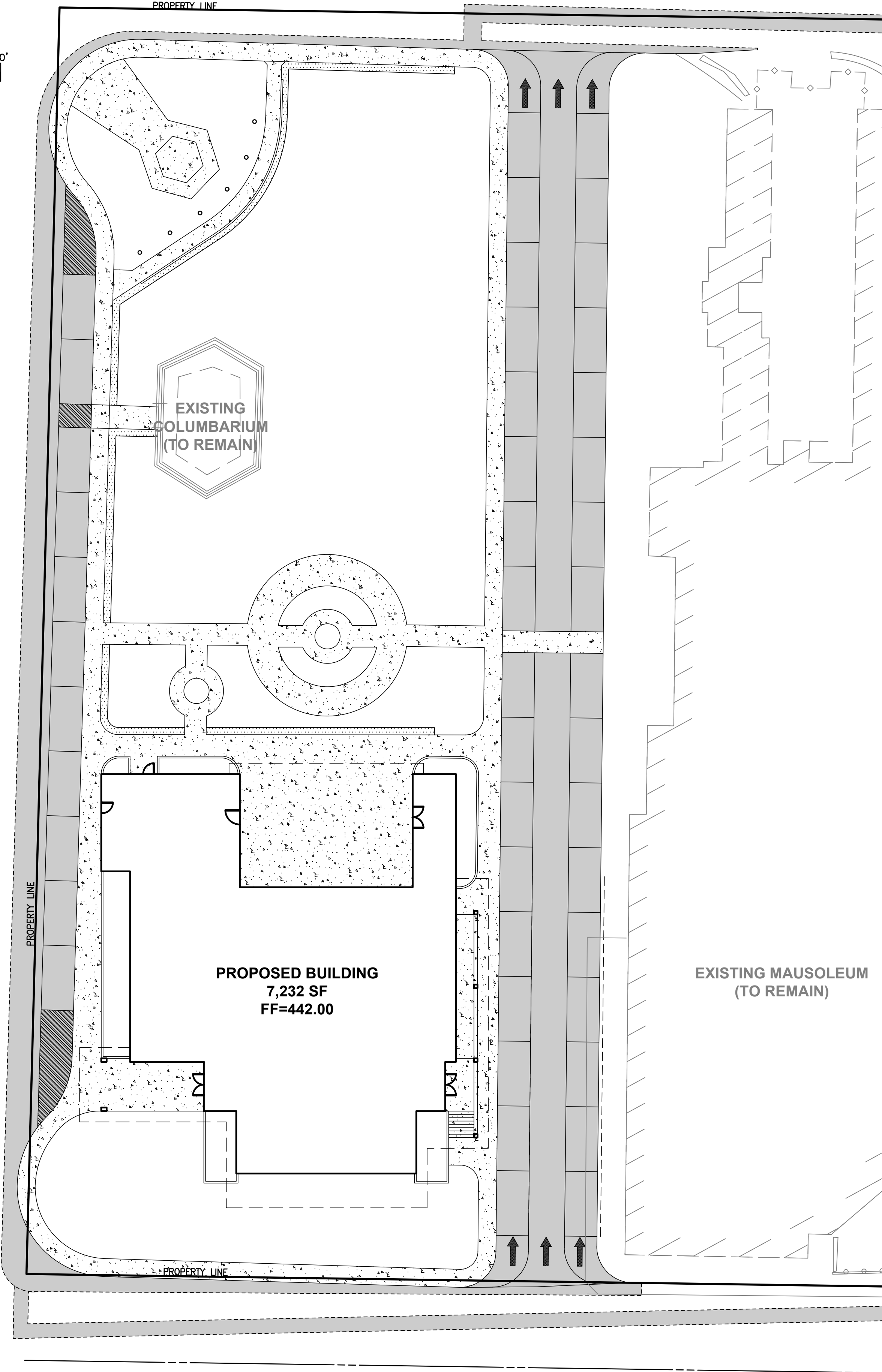
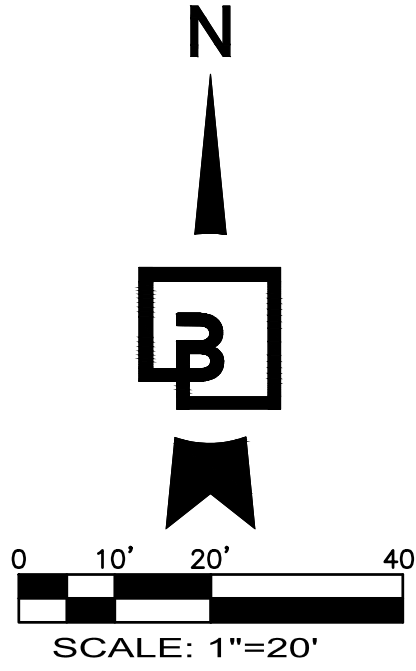
GENERAL SITE DEVELOPMENT NOTES:

- THE GENERAL CONTRACTOR SHALL OBTAIN AND HAVE AVAILABLE COPIES OF THE APPLICABLE GOVERNING AGENCY STANDARDS AT THE JOB SITE DURING THE RELATED CONSTRUCTION OPERATIONS.
- GENERAL CONTRACTOR SHALL ASSURE THAT ALL NECESSARY PERMITS HAVE BEEN OBTAINED PRIOR TO COMMENCING WORK.
- THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION AND DEPTH OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION WHETHER SHOWN ON THESE PLANS OR NOT. UTILITIES OTHER THAN THOSE SHOWN MAY EXIST ON THIS SITE. ONLY THOSE UTILITIES WITH EVIDENCE OF THEIR INSTALLATION VISIBLE AT GROUND SURFACE OR SHOWN ON RECORD DRAWING PROVIDED BY OTHERS ARE SHOWN HEREON. EXISTING UNDERGROUND UTILITY LOCATIONS SHOWN ARE APPROXIMATE ONLY AND ARE SUBJECT TO A DEGREE OF UNKNOWN VARIATION. SOME UNDERGROUND LOCATIONS SHOWN HEREON MAY HAVE BEEN TAKEN FROM PUBLIC RECORDS. BARGHAUSEN CONSULTING ENGINEERS, INC. ASSUMES NO LIABILITY FOR THE ACCURACY OF PUBLIC RECORDS OR RECORDS OF OTHERS. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT BARGHAUSEN CONSULTING ENGINEERS, INC., TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW ALL OF THE DRAWINGS AND SPECIFICATIONS ASSOCIATED WITH THE PROJECT WORK SCOPE PRIOR TO THE INITIATION OF CONSTRUCTION. SHOULD THE CONTRACTOR FIND A CONFLICT WITH THE DOCUMENTS RELATIVE TO THE SPECIFICATIONS OR THE RELATIVE CODES, IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE PROJECT ENGINEER OF RECORD IN WRITING PRIOR TO THE START OF CONSTRUCTION. FAILURE BY THE CONTRACTOR TO NOTIFY THE PROJECT ENGINEER SHALL CONSTITUTE ACCEPTANCE OF FULL RESPONSIBILITY BY THE CONTRACTOR TO COMPLETE THE SCOPE OF WORK AS DEFINED BY THE DRAWINGS AND IN FULL COMPLIANCE WITH LOCAL REGULATIONS AND CODES.
- IT SHALL BE THE GENERAL CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE APPROPRIATE UTILITIES INVOLVED PRIOR TO CONSTRUCTION.
- INSPECTION OF SITE WORK WILL BE THE RESPONSIBILITY OF THE ENGINEER. INSPECTION OF PRIVATE FACILITIES WILL BE ACCOMPLISHED BY A REPRESENTATIVE OF THE OWNER. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE INSPECTOR 24 HOURS IN ADVANCE OF BACKFILLING ALL CONSTRUCTION.
- PRIOR TO ANY CONSTRUCTION OR DEVELOPMENT ACTIVITY THE CONTRACTOR SHALL CONTACT THE AGENCY AND/OR UTILITY INSPECTION PERSONNEL AND ARRANGE ANY REQUIRED PRE-CONSTRUCTION MEETING(S). CONTRACTOR SHALL PROVIDE 72 HRS MIN. ADVANCE NOTIFICATION TO OWNER, FIELD ENGINEER AND ENGINEER OF PRE-CONSTRUCTION MEETINGS.
- THE GENERAL CONTRACTOR IS RESPONSIBLE FOR WORKER AND SITE SAFETY AND SHALL COMPLY WITH THE LATEST OSHA STANDARDS AND REGULATIONS, OR ANY OTHER AGENCY HAVING JURISDICTION FOR EXCAVATION AND TRENCHING PROCEDURES. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE "MEANS AND METHODS" REQUIRED TO MEET THE INTENT AND PERFORMANCE CRITERIA OF OSHA, AS WELL AS ANY OTHER ENTITY THAT HAS JURISDICTION FOR EXCAVATION AND/OR TRENCHING PROCEDURES.
- THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE SAFEGUARDS, SAFETY DEVICES, PROTECTIVE EQUIPMENT, FLAGGERS, AND ANY OTHER NEEDED ACTIONS TO PROTECT THE LIFE, HEALTH, AND SAFETY OF THE PUBLIC, AND TO PROTECT PROPERTY IN CONNECTION WITH THE PERFORMANCE OF WORK COVERED BY THE CONTRACTOR. ANY WORK WITHIN THE TRAVELED RIGHT-OF-WAY THAT MAY INTERRUPT NORMAL TRAFFIC FLOW SHALL REQUIRE AT LEAST ONE FLAGGER FOR EACH LANE OF TRAFFIC AFFECTED.
- PROTECTIVE MEASURES SHALL BE TAKEN BY THE CONTRACTOR TO PROTECT ALL ADJACENT PUBLIC AND PRIVATE PROPERTIES AT ALL TIMES DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ALL EXISTING UTILITY SERVICES THAT ARE TO REMAIN OPERATIONAL WITHIN THE CONSTRUCTION AREA WHETHER SHOWN OR NOT SHOWN ON THE PLANS.
- TWO (2) COPIES OF THESE APPROVED PLANS MUST BE ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS. ONE (1) SET WITH RECORDS OF AS-BUILT INFORMATION SHALL BE SUBMITTED TO BARGHAUSEN CONSULTING ENGINEERS, INC. AT COMPLETION OF PROJECT.
- GENERAL CONTRACTOR SHALL OBTAIN SERVICES OF A LICENSED LAND SURVEYOR TO STAKE HORIZONTAL CONTROL FOR ALL NEW IMPROVEMENTS. STAKING CONTROL SHALL BE TAKEN FROM ELECTRONIC PLAN FILES PROVIDED BY BCE.

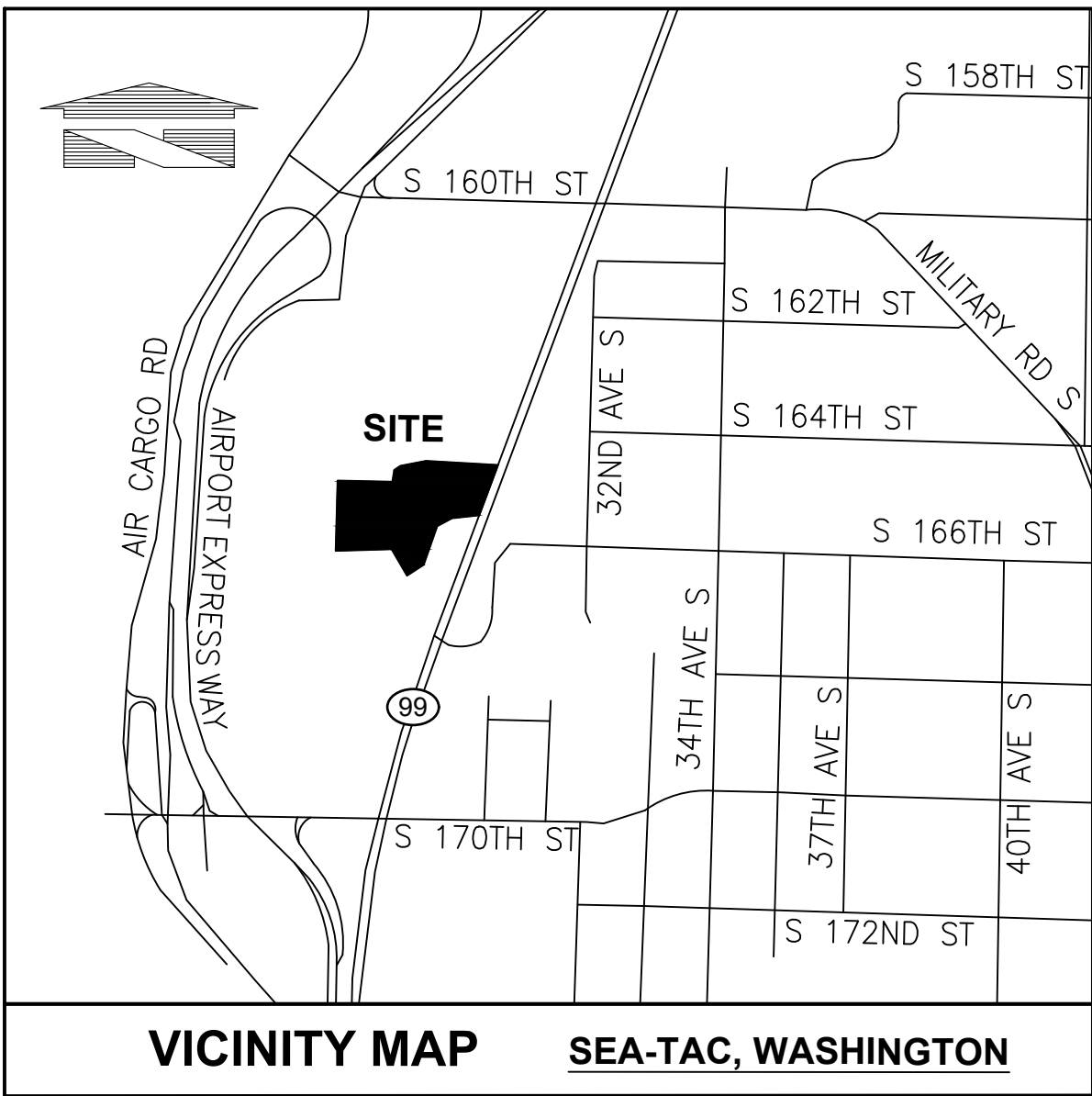
LEGEND	
EXISTING	PROPOSED
CURB AND GUTTER	
BARRIER CURB	
CONCRETE	
GRAVEL	
ASPHALT	
PAINT STRIPING	
DIRECTIONAL ARROW	
SAWCUT	
BOLLARD	
SIGN	
BUILDING LINE	
CONTOURS	
WATER LINE	
FIRE HYDRANT	
WATER METER	
WATER VALVE	
FIRE DEPARTMENT CONN.	
POST INDICATOR VALVE	
STORM LINE	
CATCH BASIN TYPE 1	
CATCH BASIN TYPE 2	
SANITARY SEWER LINE	
SANITARY SEWER MANHOLE	
CLEANOUT (AS NOTED)	
POWER OVERHEAD	
POWER UNDERGROUND	
POWER METER	
UTILITY POLE	
JUNCTION BOX (TYPE 1,2,3)	
LUMINAIRE	
YARD LIGHT	
TELEPHONE	
GAS	
GAS METER	
GAS VALVE	

VERTICAL DATUM:
VERTICAL DATUM FOR THIS SURVEY IS NAVD83 ESTABLISHED BY GPS OBSERVATION UTILIZING THE WASHINGTON STATE REFERENCE NETWORK (WSRN) USING NGS GEOID 2018.

HORIZONTAL DATUM:
HORIZONTAL DATUM FOR THIS SURVEY IS NAD 83/2011, WASHINGTON STATE COORDINATE SYSTEM, SOUTH ZONE, ESTABLISHED BY GPS OBSERVATION UTILIZING THE WASHINGTON STATE REFERENCE NETWORK (WSRN).



EXISTING CONDITIONS
FOR
CELEBRATION OF LIFE PAVILION
A PORTION OF SE 1/4 OF THE NE 1/4, SEC. 28, T 23 N, R 4 E, W.M.
CITY OF SEA-TAC, KING COUNTY, WASHINGTON



VICINITY MAP SEA-TAC, WASHINGTON

LEGEND

- | | | | |
|--|--------------------------------|--|----------------------------------|
| | POWER VAULT | | SURVEY MONUMENT (AS NOTED) |
| | TELEPHONE VAULT | | SECTION CORNER (AS NOTED) |
| | WATER VAULT | | FND. SURVEY MARKER (AS NOTED) |
| | STREET LIGHT | | ASPHALT |
| | LOT LIGHT | | CONCRETE |
| | YARD LIGHT OR LAMP | | GRAVEL |
| | POWER METER | | SS — SANITARY SEWER LINE |
| | POWER POLE | | SD — STORM DRAINAGE LINE |
| | GUY WIRE | | x — CHAIN LINK FENCE |
| | TRAFFIC SIGNAL | | // — WOOD FENCE |
| | PEDESTRIAN PUSH BUTTON | | — SIL FENCE |
| | JUNCTION BOX (JBOX) | | — GUARD RAIL / HAND RAIL |
| | TELEPHONE MANHOLE (TMH) | | W — WATER VIA PAINTMARKS |
| | CATCH BASIN (CB) | | G — GAS VIA PAINTMARKS |
| | STORM MANHOLE (SDMH) | | T(UG) — TELEPHONE VIA PAINTMARKS |
| | SANITARY SEWER MANHOLE (SSMH) | | P(UG) — POWER VIA PAINTMARKS |
| | SANITARY SEWER CLEANOUT (SSCO) | | P(CH) — OVERHEAD POWER LINES |
| | GAS METER (GM) | | — EVERGREEN TREE W/SIZE |
| | GAS VALVE | | — DECIDUOUS TREE W/SIZE |
| | WATER VALVE (WV) | | |
| | FIRE CONNECTION (FPSP) | | |
| | FIRE HYDRANT (HYD) | | |
| | WATER MANHOLE (WMH) | | |
| | WATER METER (WM) | | |
| | SPRINKLER | | |
| | IRRIGATION BOX (IRR) | | |
| | IRRIGATION VALVE (IRR) | | |
| | SIGN | | |

NOTE: NOT ALL SYMBOLS WILL APPEAR IN THE DRAWING

HORIZONTAL DATUM: NAD 83/91

BASIS OF BEARINGS:
SOUTH 02°33'34" WEST, AS MEASURED BETWEEN WSDOT MONUMENTS 3698 (GP17518-259) AND 3161 (GP17099-226).

VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988.

BENCHMARK: WSDOT MONUMENTS 3698 (GP17518-259), BEING THE TOP OF A FOUND 3" BRASS DISK W/ PUNCH MARKED "GP17518-259" IN PIPE CASING IN FLUSH WITH NORTHERLY SIDE OF SR518 OVERPASS BRIDGE DECK.
ELEVATION = 412.48 U.S. FEET (NAVD 88)

DATES OF SURVEY:
FIELD SURVEY BY BARGHAUSEN CONSULTING ENGINEERS, INC. CONDUCTED IN SEPTEMBER, 2016. (POND AREA ON 2/19/21)

PROCEDURE / NARRATIVE:
A FIELD TRAVERSE USING A TOPCON GT 1000 TOTAL STATIONS, TOPCON HYPER HR SUPPLEMENTED WITH DELI TABLET, MAGNET FIELD SOFTWARE AND FIELD NOTES, WAS PERFORMED, ESTABLISHING THE ANGULAR, VERTICAL AND DISTANCE RELATIONSHIPS BETWEEN THE MONUMENTS, PROPERTY LINES AND IMPROVEMENTS. THE RESULTING DATA MEETS OR EXCEEDS THE STANDARDS FOR LAND BOUNDARY SURVEYS AS SET FORTH IN WAC 332-130-090.

SURVEY NOTES:
1. UNDERGROUND UTILITIES AND FEATURES DEPICTED HEREON ARE BASED ON FIELD OBSERVATION, MARKINGS, DEVELOPMENT PLANS, AND/OR AVAILABLE RECORD DOCUMENTS ONLY. THE TRUE LOCATION, NATURE AND/OR EXISTENCE OF BELOW GROUND FEATURES, DETECTED OR UNDETECTED, SHOULD BE VERIFIED.

3. ALL DISTANCES ARE IN US FEET

4. THIS IS NOT A BOUNDARY SURVEY. NO BOUNDARY RELATED MONUMENTATION WAS LOCATED DURING THIS SURVEY.

5. NO TITLE REPORT WAS RECEIVED OR REVIEWED FOR THIS SURVEY.

6. ELEMENTS AND FEATURES DEPICTED HEREON SATISFY THE REQUIREMENTS STATED WITHIN W.A.C. 332-130-145 FOR TOPOGRAPHIC MAPS, INCLUDING THE FOLLOWING: THE SOURCE OF THE CONTOURS SHOWN HEREON ARE BASED UPON DIRECT FIELD OBSERVATIONS. THE CONTOUR ACCURACY IS PER NATIONAL MAPPING STANDARDS, ONE HALF OF THE CONTOUR INTERVAL (2'). THE PURPOSE OF THIS SURVEY IS TO MAP THE CURRENT CONDITIONS FOR ARCHITECTURAL/ENGINEERING DESIGN.

SURVEYOR'S CERTIFICATE:

THIS IS TO CERTIFY THAT THIS MAP AND THE SURVEY UPON WHICH IT IS BASED WERE MADE BY ME OR UNDER MY DIRECTION AND CORRECTLY REFLECTS THE CONDITIONS OF THIS SITE AS OF THE DATE OF THE FIELD SURVEY.

OWEN B. HILLE P.L.S.
WASHINGTON REGISTRATION NO. 40016

DATE



EXISTING CONDITIONS

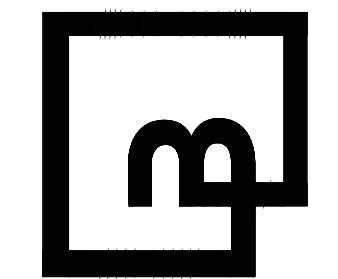
Title:

For: BONNEY WATSON FUNERAL HOME
16445 INTERNATIONAL BLVD
SEATAC, WA 98188



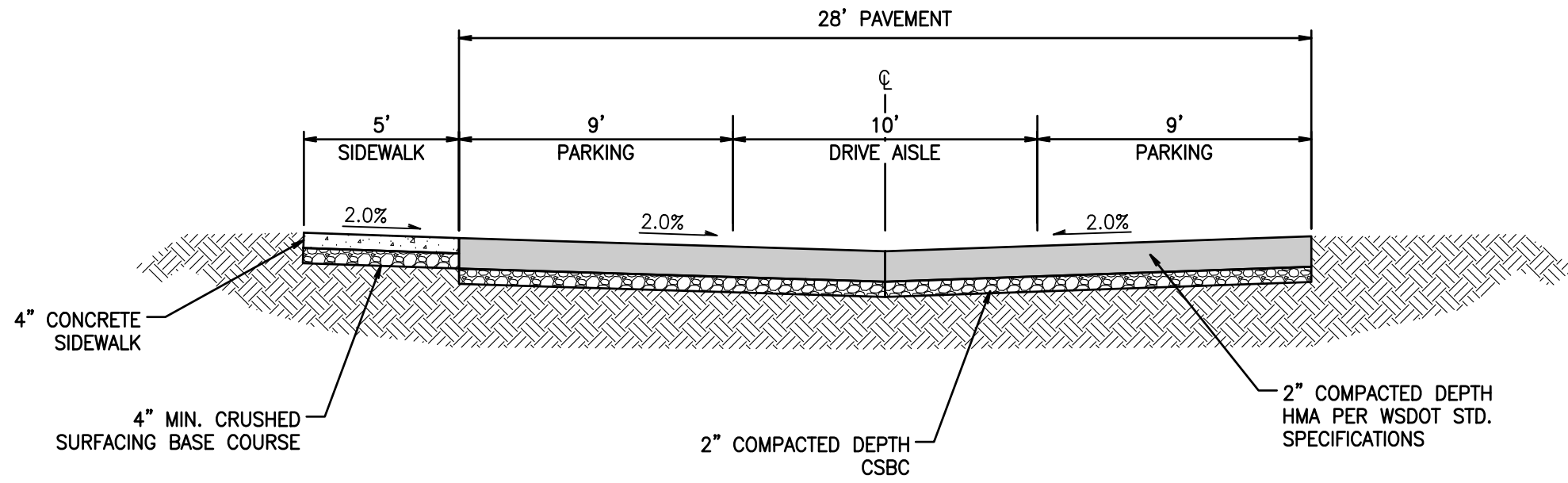
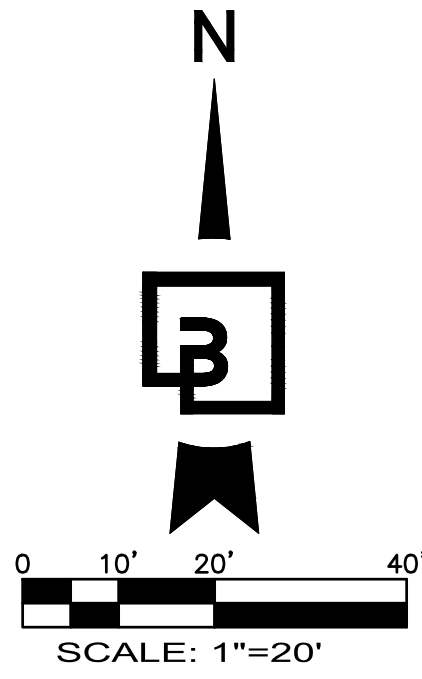
Scale: Horizontal 1"=20' Vertical N/A
Designed LRP Drawn LRP Checked CMV Approved CMV Date 6/5/2024

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 barghausen.com

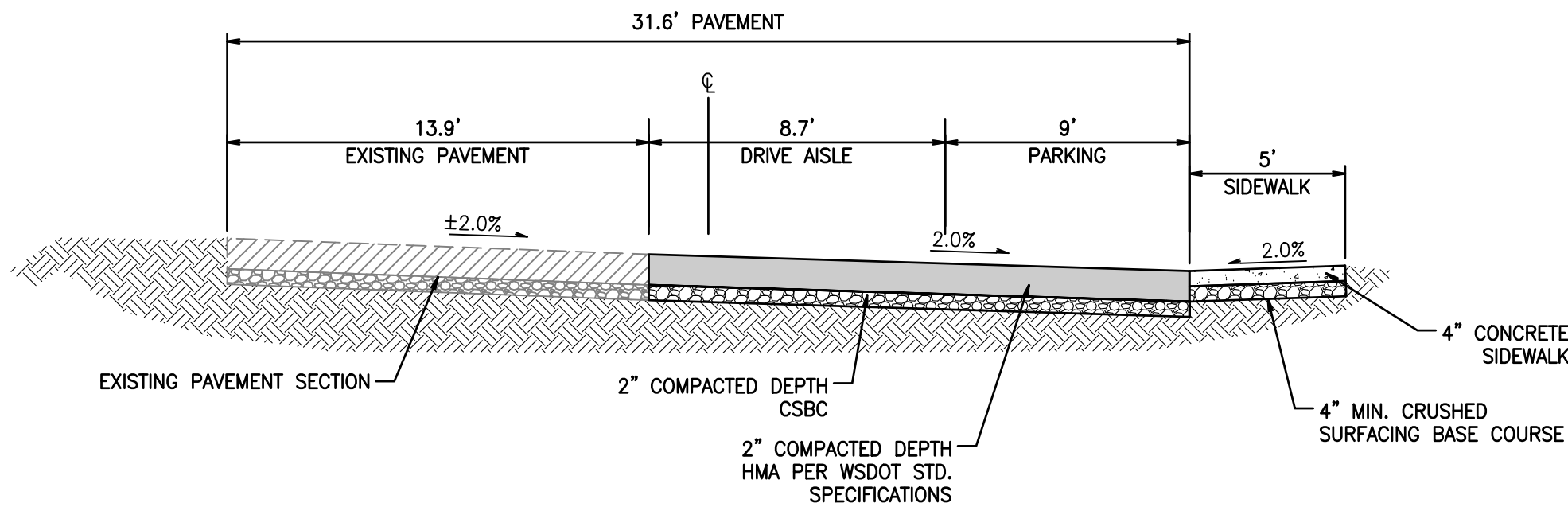


Job Number 20413
Sheet 2 of 2

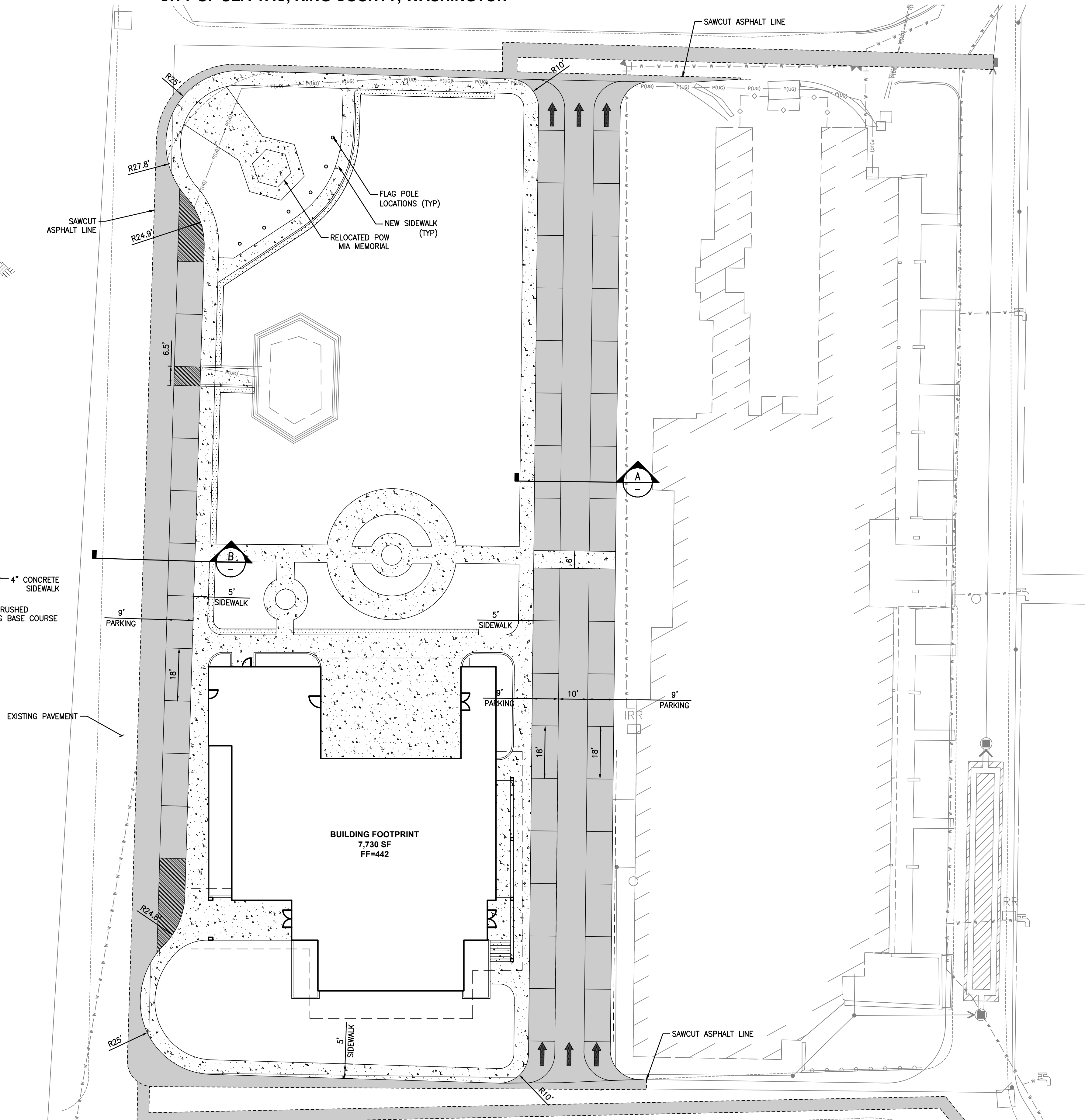
PRELIMINARY SITE PLAN
FOR
CELEBRATION OF LIFE PAVILION
A PORTION OF SE 1/4 OF THE NE 1/4, SEC. 28, T 23 N, R 4 E, W.M.
CITY OF SEA-TAC, KING COUNTY, WASHINGTON



A DRIVE AISLE
SCALE: NOT TO SCALE



B DRIVE AISLE
SCALE: NOT TO SCALE

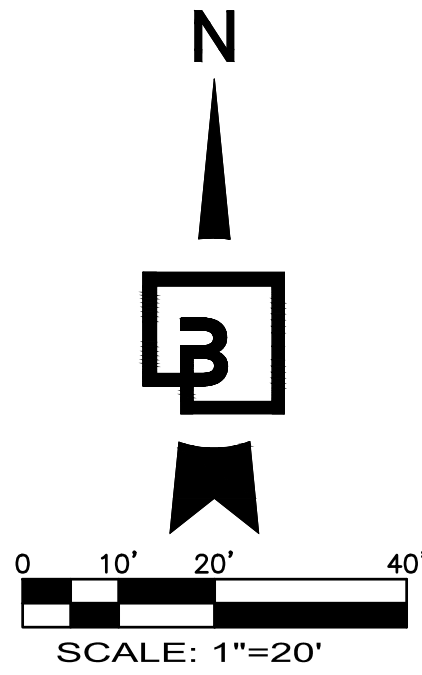


CALL BEFORE YOU DIG:
1-800-424-5555

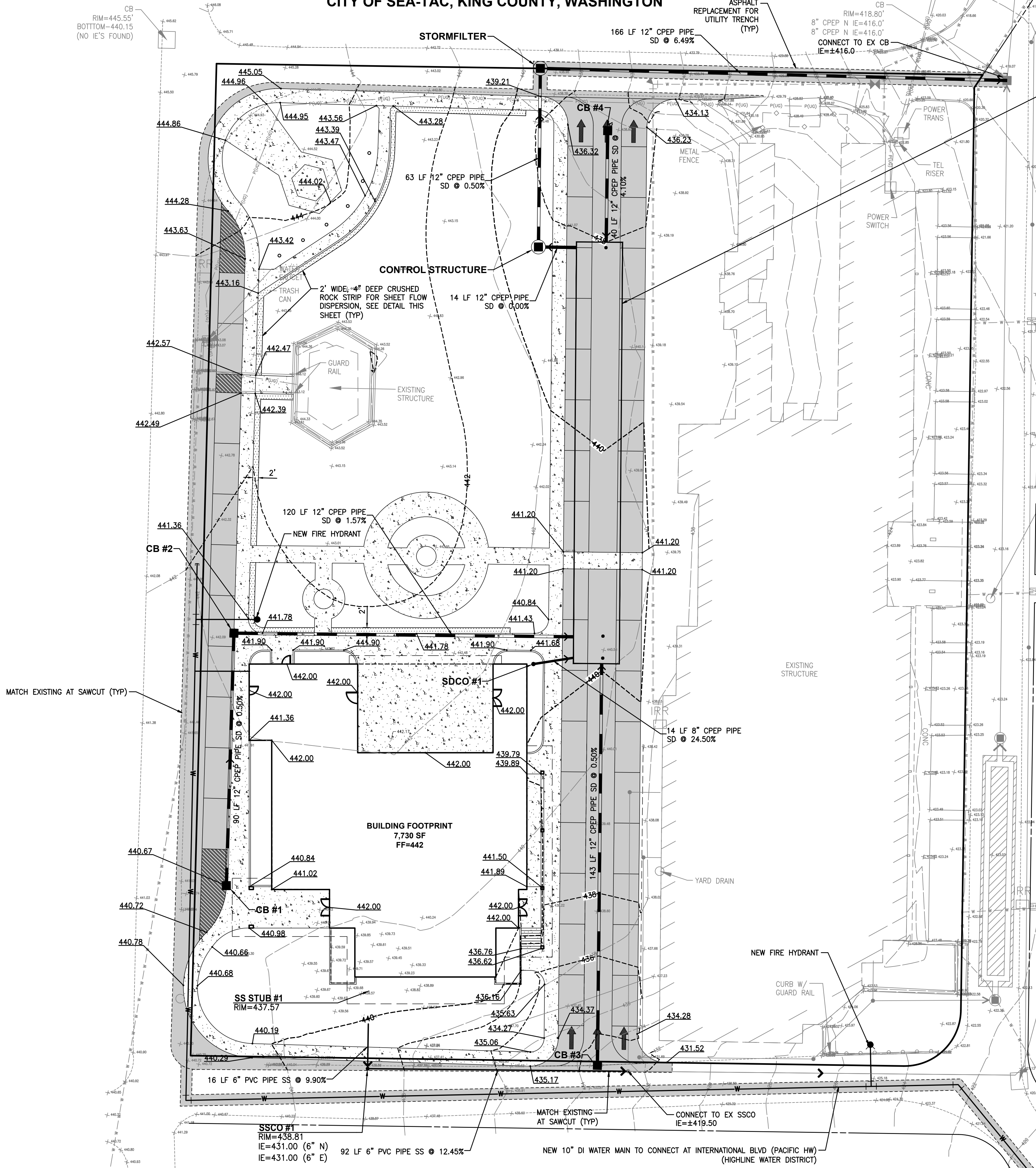
UTILITY CONFLICT NOTE:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT BY POT-HOLING THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING UTILITY LOCATE @ 1-800-424-5555 AND THEN POT-HOLING ALL OF THE EXISTING UTILITIES AT LOCATIONS OF NEW UTILITY CROSSINGS TO PHYSICALLY VERIFY WHETHER OR NOT CONFLICTS EXIST. LOCATIONS OF SAID UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT BARGHAUSEN CONSULTING ENGINEERS, INC. TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.

Revision					
No.	Date	By	Chd.	Appr.	
Title:					
PRELIMINARY SITE PLAN					
For:					
BONNEY WATSON FUNERAL HOME 16445 INTERNATIONAL BLVD SEATAC, WA 98188					
Scale:					
Horizontal 1"=20'					
Vertical N/A					
Designed LRP					
Drawn LRP					
Checked CMV					
Approved CMV					
Date 6/5/2024					
Barghausen Consulting Engineers, Inc. 18215 72nd Avenue South Kent, WA 98032 425.251.6222 barghausen.com					
Job Number 20413					
Sheet 3 of 3					
P:\200000\20413\engineering\Civil\20413-pa.dwg 5/29/2024 10:25 AM CVISINTAINER					

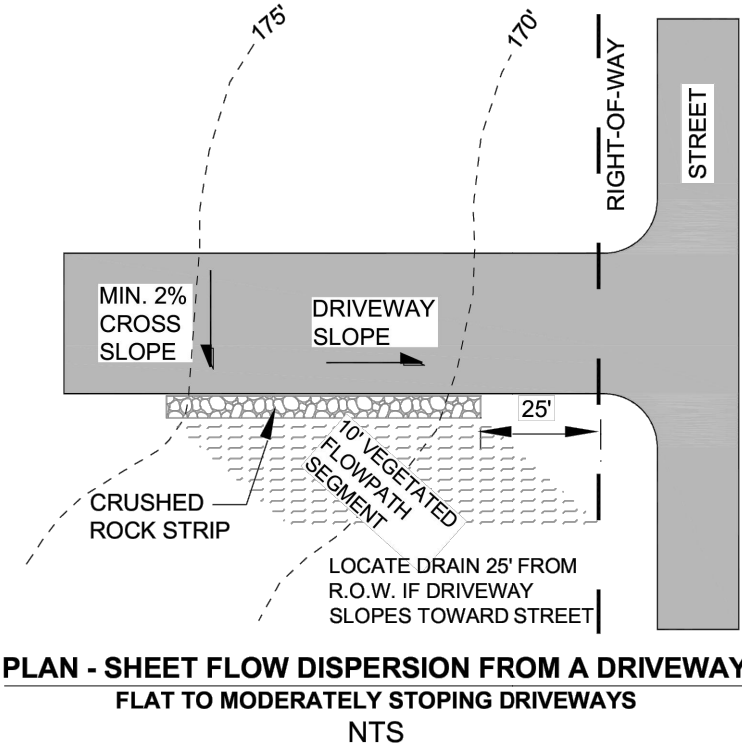


PRELIMINARY GRADING AND UTILITY PLAN
FOR
CELEBRATION OF LIFE PAVILION
A PORTION OF SE 1/4 OF THE NE 1/4, SEC. 28, T 23 N, R 4 E, W.M.
CITY OF SEA-TAC, KING COUNTY, WASHINGTON



R TANK DETENTION SYSTEM	
±805 R-TANK HD (PENTA) MODULES	
TOP EL = 436.33'	
DESIGN WATER SURFACE EL = 435.83'	
BOTTOM OF DETENTION EL = 429.37'	
VOLUME REQUIRED = 17,468 CF	
VOLUME PROVIDED = ±17,842 CF	

CATCH BASINS	
CB #1, TYPE 1, W/STANDARD GRATE RIM=440.67 IE=437.67 (12" N)	
CB #2, TYPE 1, W/STANDARD GRATE RIM=441.41 IE=437.22 (12" S) IE=437.22 (12" E)	
CB #3, TYPE 1, W/STANDARD GRATE RIM=433.61 IE=430.61 (12" N)	
CB #4, TYPE 1, W/STANDARD GRATE RIM=436.03 IE=433.71 (12" S)	
CONTROL STRUCTURE, TYPE 2 RIM=438.82 IE=429.37 (12" E) IE=429.37 (12" N)	
SDCO #1, ROOF DRAIN CONNECTION RIM=440.04 IE=439.00 (8" E)	
STORMFILTER, RIM=432.31 IE=429.05 (12" S) IE=426.75 (12" E)	



CALL BEFORE YOU DIG:
1-800-424-5555

UTILITY CONFLICT NOTE:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT BY POT-HOLING THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING UTILITY LOCATE @ 1-800-424-5555 AND THEN POT-HOLING ALL OF THE EXISTING UTILITIES AT LOCATIONS OF NEW UTILITY CROSSINGS TO PHYSICALLY VERIFY WHETHER OR NOT CONFLICTS EXIST. LOCATIONS OF SAID UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT BARGHAUSEN CONSULTING ENGINEERS, INC. TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.

Revision		Title: PRELIMINARY GRADING AND UTILITY PLAN	
No.	Date	By	Appr.
For: BONNEY WATSON FUNERAL HOME 16445 INTERNATIONAL BLVD SEATAC, WA 98188		CELEBRATION OF LIFE PAVILION	
Scale: Horizontal 1"=20' Vertical N/A			
Designed LRP Drawn LRP Checked CMW Approved CMW Date 6/5/2024		Barghausen Consulting Engineers, Inc. 18215 72nd Avenue South Kent, WA 98032 425.251.6222 barghausen.com	
Job Number 20413		Sheet 4 of X	

SEATAC FIRE CODE REFERENCES:
(SEATAC MUNICIPAL CODE CHAPTER 13.150, FIRE CODE AMENDMENTS TO 2018 IFC)

B105.2 Buildings other than one- and two-family dwellings. The minimum fire-flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table B105.1(2).

Exception: A reduction in required fire-flow of 50 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system. The resulting fire-flow shall not be less than 1,500 gallons per minute for the prescribed duration as specified in Table B105.1(2).

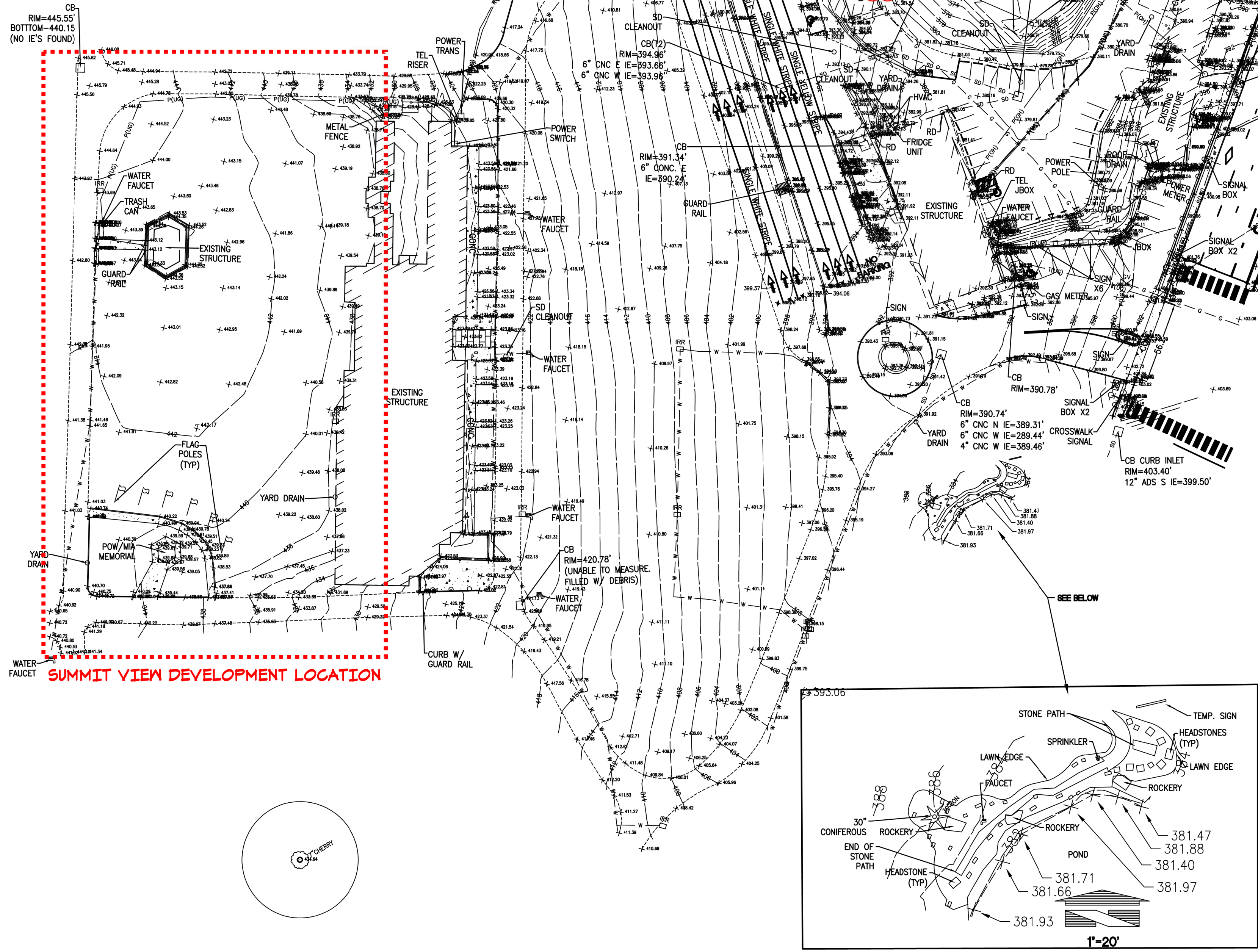
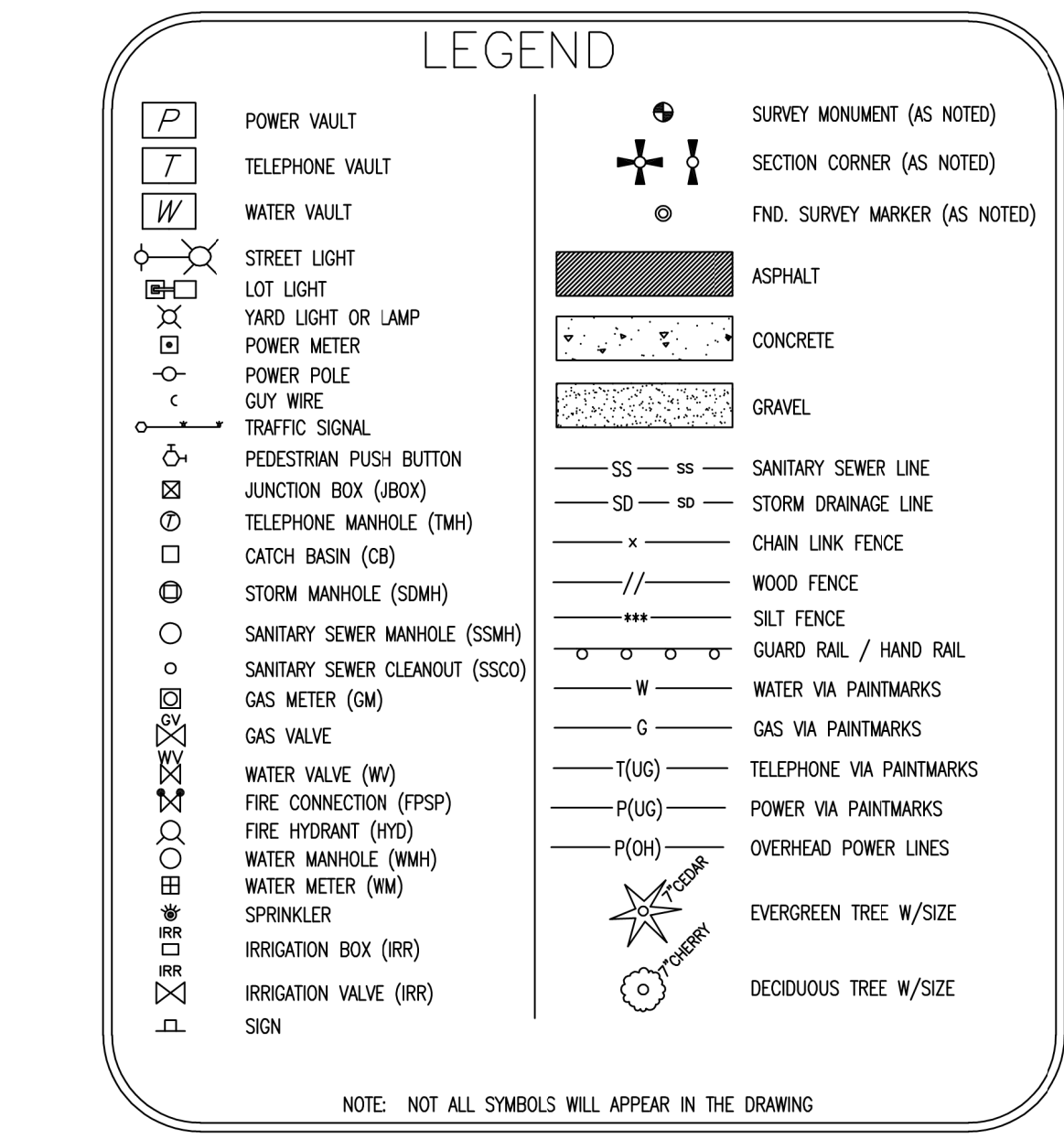
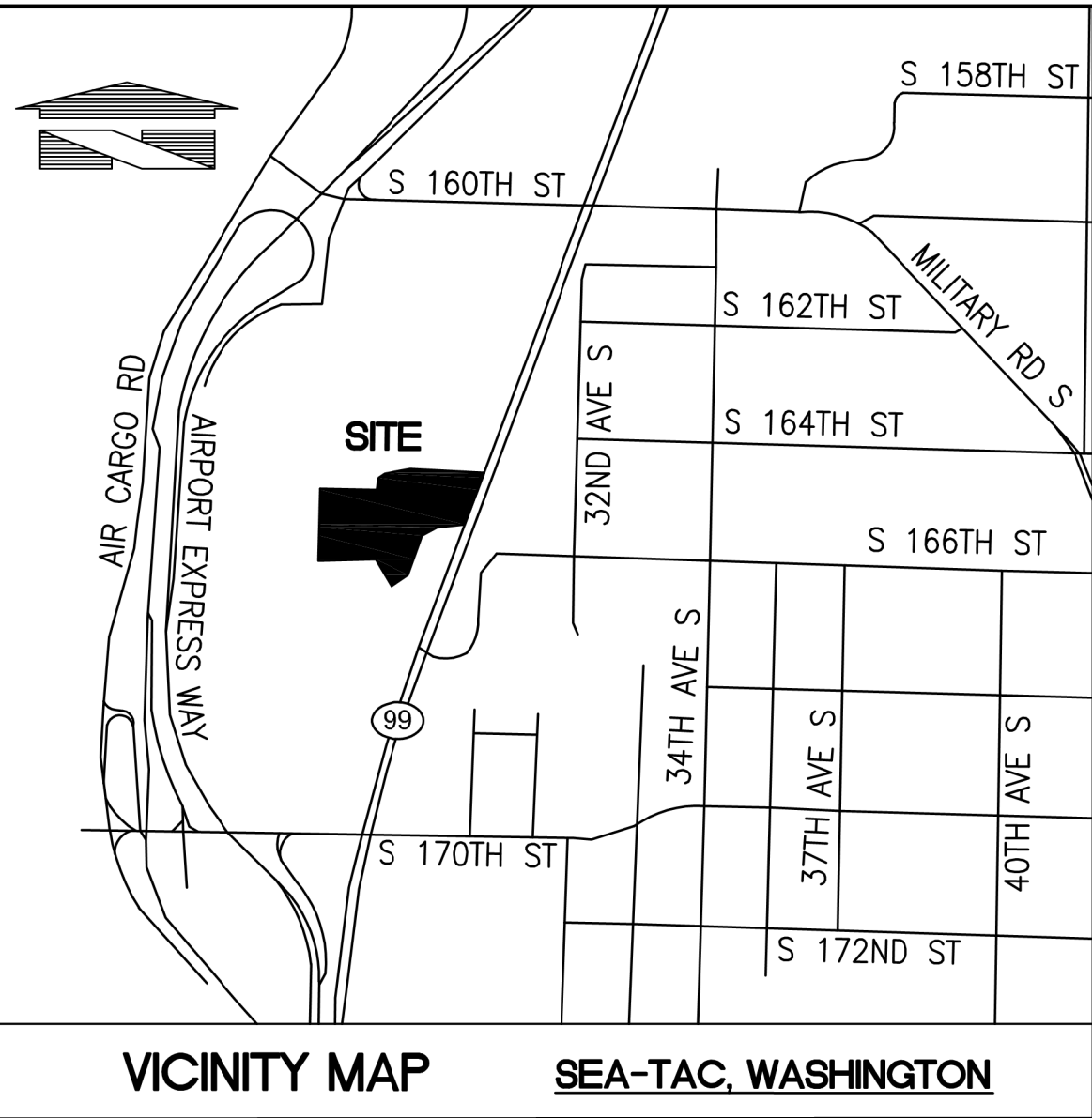
TABLE B105.1(2)
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE FLOW (gallons per minute) ^b	FLOW DURATION (hours)
Type IA and IB ^a	Type IIA and IIIA ^a	Type IV and V-A ^a	Type IIB and IIIB ^a	Type V-B ^a		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m², 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. Types of construction are based on the *International Building Code*.

b. Measured at 20 psi residual pressure.



HORIZONTAL DATUM: NAD 83/91

BASIS OF BEARINGS:
SOUTH 02°33'34" WEST, AS MEASURED BETWEEN WSDOT MONUMENTS 3698 (GP17518-259) AND 3161 (GP17099-226).

VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988.

BENCHMARK: WSDOT MONUMENTS 3698 (GP17518-259), BEING THE TOP OF A FOUND 3" BRASS DISK W/ PUNCH MARKED "GP17518-259" IN PIPE CASING IN FLUSH WITH NORTHERLY SIDE OF SR518 OVERPASS BRIDGE DECK.
ELEVATION = 412.48 U.S. FEET (NAVD 88)

DATES OF SURVEY:
FIELD SURVEY BY BARGHAUSEN CONSULTING ENGINEERS, INC. CONDUCTED IN SEPTEMBER, 2018. (POND AREA ON 2/19/21)

PROCEDURE / NARRATIVE:
A FIELD TRAVEL SURVEY USING A TOPCON HT-1000 TOTAL STATION, TOPCON HYPER HR SUPPLEMENTED WITH DELL TABLET, MAGNET FIELD SOFTWARE AND FIELD NOTES, WAS PERFORMED, ESTABLISHING THE ANGULAR, VERTICAL AND DISTANCE RELATIONSHIPS BETWEEN THE MONUMENTS, PROPERTY LINES AND IMPROVEMENTS. THE RESULTING DATA MEETS OR EXCEEDS THE STANDARDS FOR LAND BOUNDARY SURVEYS AS SET FORTH IN WAC 332-130-090.

SURVEY NOTES:
1. UNDERGROUND UTILITIES AND FEATURES DEPICTED HEREON ARE BASED ON FIELD OBSERVATION, WARNINGS, DEVELOPMENT PLANS, AND/OR AVAILABLE RECORD DOCUMENTS ONLY. THE TRUE LOCATION, NATURE AND/OR EXISTENCE OF BELOW GROUND FEATURES, DETECTED OR UNDETECTED, SHOULD BE VERIFIED.
2. ALL DISTANCES ARE IN US FEET
3. THIS IS NOT A BOUNDARY SURVEY. NO BOUNDARY RELATED MONUMENTATION WAS LOCATED DURING THIS SURVEY.
4. NO TITLE REPORT WAS RECEIVED OR REVIEWED FOR THIS SURVEY.
5. ELEMENTS AND FEATURES DEPICTED HEREON SATISFY THE REQUIREMENTS STATED WITHIN W.A.C. 332-130-145 FOR TOPOGRAPHIC MAPS, INCLUDING THE FOLLOWING: THE SOURCE OF THE CONTOURS SHOWN HEREON ARE BASED UPON DIRECT FIELD OBSERVATIONS. THE CONTOUR ACCURACY IS PER NATIONAL MAPPING STANDARDS, ONE HALF OF THE CONTOUR INTERVAL (2'). THE PURPOSE OF THIS SURVEY IS TO MAP THE CURRENT CONDITIONS FOR ARCHITECTURAL/ENGINEERING DESIGN.

SURVEYOR'S CERTIFICATE:

THIS IS TO CERTIFY THAT THIS MAP AND THE SURVEY UPON WHICH IT IS BASED WERE MADE BY ME OR UNDER MY DIRECTION AND CORRECTLY REFLECTS THE CONDITIONS OF THIS SITE AS OF THE DATE OF THE FIELD SURVEY.

OWEN B. HILLE P.L.S.
WASHINGTON REGISTRATION NO. 40016

DATE



Exhibit # 3e

No.	Date	By	Chd.	Appr.	Revision
Title: TOPOGRAPHIC SURVEY					
PTN OF THE SE 1/4 OF THE NE1/4 OF SEC. 28, TWP. 23 N, RGE 4 E, W. M. CITY OF SEA-TAC, KING COUNTY, STATE OF WASHINGTON					
For: BONNEY-WATSON FUNERAL HOME					
Scale:	Horizontal 1"=50'	Vertical			
Designed	Drawn	Checked	Approved	DBL	Date
					3/02/21
18215 72ND AVENUE SOUTH KENT, WA 98032 (425)251-6222 FAX (425)251-8782 CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES					
Job Number	20413	Sheet	1 of 1		



Summit View Development

Address:

16445 International Blvd

Project Site

2823049052

2823049080

2823049054

LOCATION IN SEATAC

Date Prepared: 3/12/2024
Source: City of SeaTac, King County Sound Transit. Prepared by the City of SeaTac GIS. All rights reserved. This product has been compiled from the best available data. No warranty is expressed or implied as to accuracy, completeness, or fitness for any specific use. Not to be used for purposes of legal description or definition. Not a substitute for a professional survey.

\\...Working\SEA-CED\Planning\Projects\20240312\2402-3004-Mailer

0 2,000 Feet



Zoning Classification

Urban Low Density Residential

- UL-15,000
- UL-9,600
- UL-7,200

Townhouse

- Townhouse (T)

Urban Medium Density Residential

- UM-3,600
- UM-2,400
- Mobile Home Park (MHP)

Urban High Density Residential

- UH-1,800
- UH-900
- UH-UCR

Other Zones

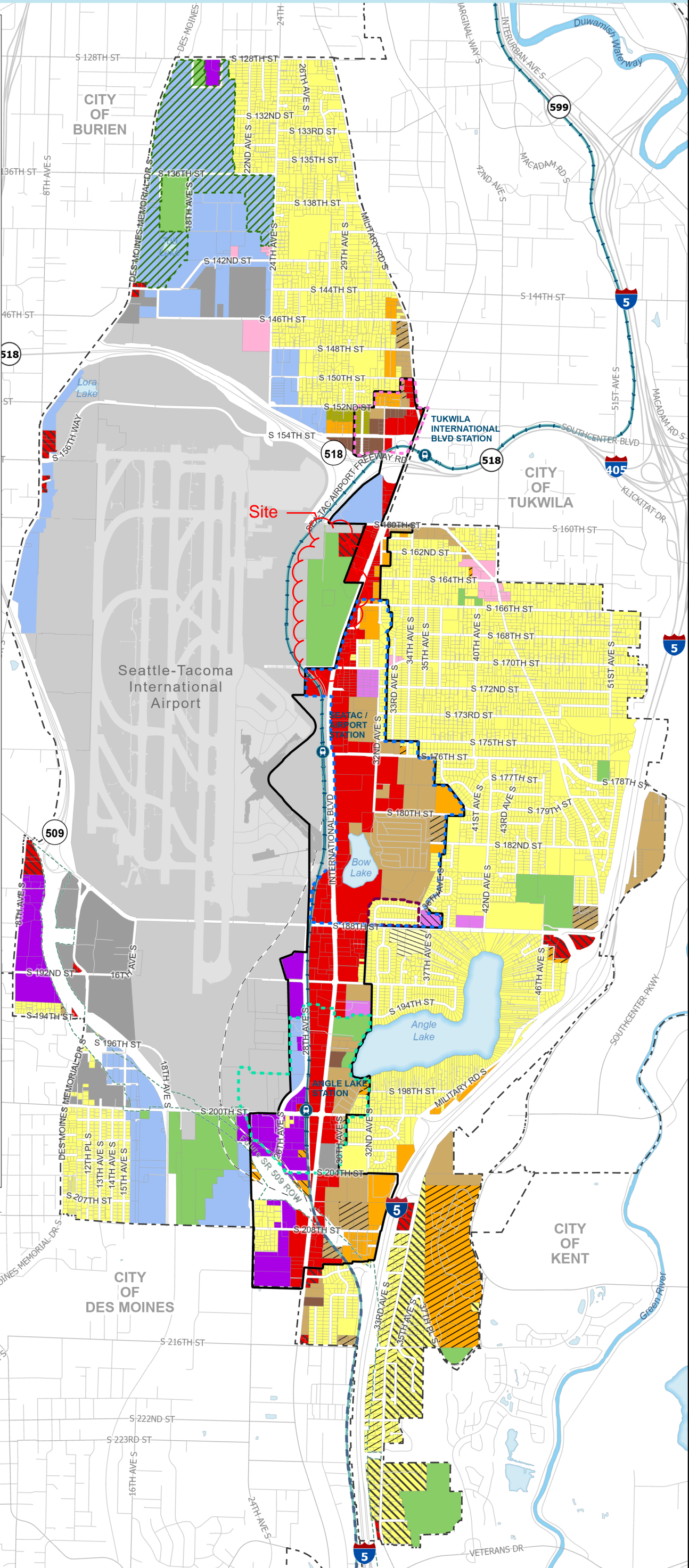
- Neighborhood Business (NB)
- Office/Commercial/Mixed Use (O/C/MU)
- Office/Commercial Medium (OCM)
- Community Business (CB)
- Community Business in Urban Center (CB-C)
- Regional Business Mix (RBX)
- Industrial (I)
- Aviation Commercial (AVC)
- Aviation Operations (AVO)
- Park (P)

Overlay Zone

- High Density Single Family Overlay Zone (HDS-OZ)

Overlay Districts & Special Boundaries

- City Center Boundary
- Angle Lake Station Area Boundary
- S 154th St Station Area
- Bow Vista Neighborhood
- Urban Center Boundary
- North SeaTac Park is covered under the "Tri-Party Agreement" between King County, the City of SeaTac, and the Port of Seattle, dated July 9, 1991, that provides for its use as a park until January 21, 2045
- Future SR-509 Right-of-Way
- Future South Access Expressway
- Light Rail Station
- Light Rail
- Light Rail Proposed
- City Boundary



Date Prepared: 7/28/2022
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Exhibit # 4c

Comprehensive Plan

City of SeaTac

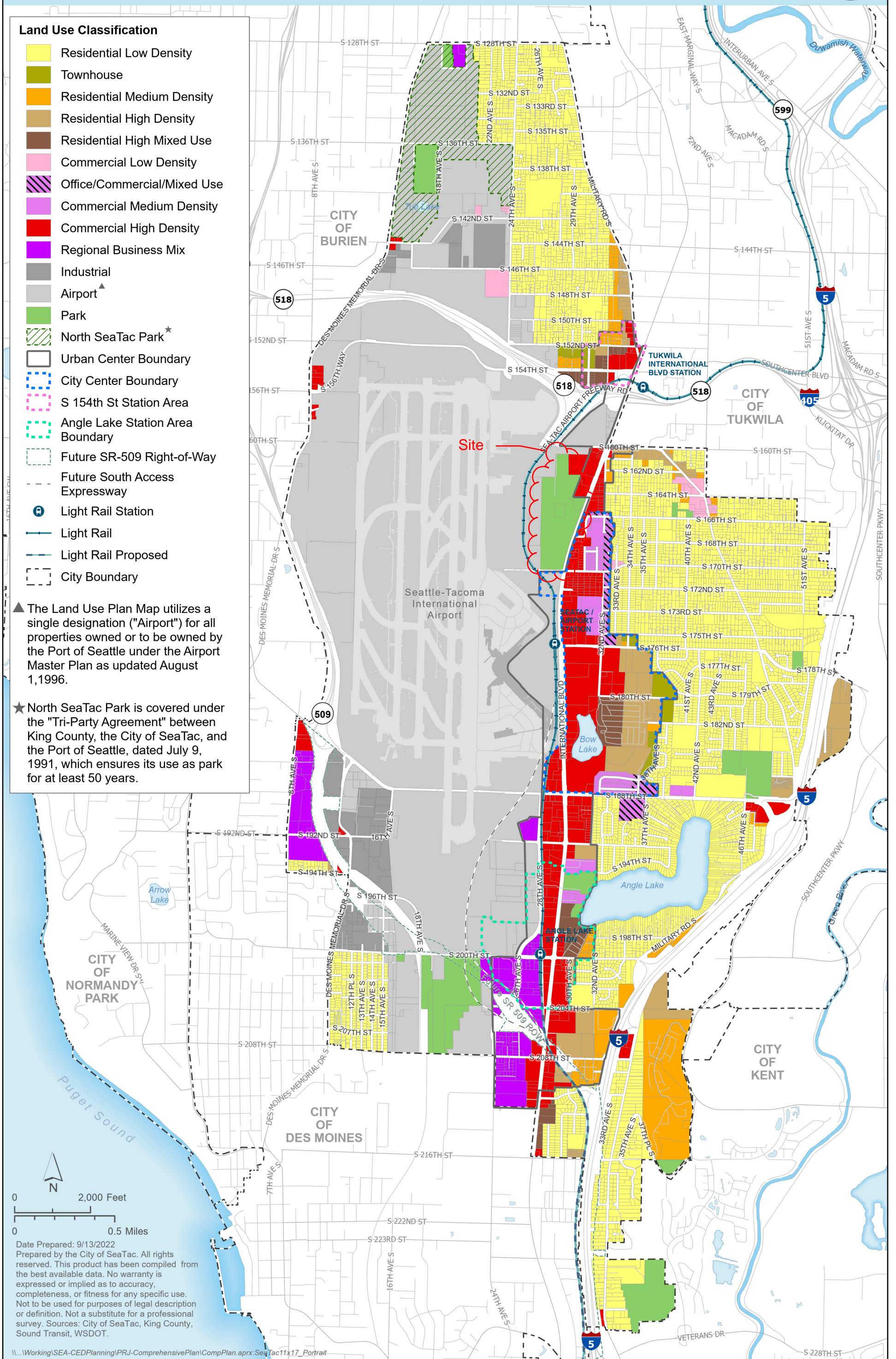


Land Use Classification

- Residential Low Density
- Townhouse
- Residential Medium Density
- Residential High Density
- Residential High Mixed Use
- Commercial Low Density
- Office/Commercial/Mixed Use
- Commercial Medium Density
- Commercial High Density
- Regional Business Mix
- Industrial
- Airport
- Park
- North SeaTac Park
- Urban Center Boundary
- City Center Boundary
- S 154th St Station Area
- Angle Lake Station Area Boundary
- Future SR-509 Right-of-Way
- Future South Access Expressway
- Light Rail Station
- Light Rail
- Light Rail Proposed
- City Boundary

▲ The Land Use Plan Map utilizes a single designation ("Airport") for all properties owned or to be owned by the Port of Seattle under the Airport Master Plan as updated August 1, 1996.

★ North SeaTac Park is covered under the "Tri-Party Agreement" between King County, the City of SeaTac, and the Port of Seattle, dated July 9, 1991, which ensures its use as park for at least 50 years.



Date Prepared: 9/13/2022
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DETERMINATION OF COMPLETENESS

TYPE OF ACTION: Major Conditional Use, SEPA Determination

FILE NUMBER: 2402-3004

PROJECT NAME: Summit View Development

PROJECT LOCATION:

Address: 16445 International Blvd., SeaTac, WA 98188

Parcel Number: 2823049054, 2823049052, 2823049080

PROJECT DESCRIPTION: Summit View Development consists of internal site improvements and additions to Washington Memorial Park, a pre-existing Funeral Home and Cemetery property zoned Park (P). The proposed project will include the construction of a 7,500 square foot Celebration of Life Pavilion, relocation of the existing POW/MIA Memorial, extending site utility infrastructure (fire line extension, electrical service extension, surface water management), an additional stacked parking arrangement for 54 vehicles, and the creation of a variety of interment memorial options for human remains and cremains. An estimated 1,500 CY cut, and 2,000 CY fill are needed to prepare the site for development.

APPLICANT: Bonney Watson c/o Cameron Smock; 16445 International Blvd., SeaTac, WA 98188; (206) 242-1787; csmock@bonneywatson.com

CONTACT: David Boe; 1130 Broadway, Suite 207, Tacoma, WA 98402; (253) 383-7762; dboe@boearc.com

DATE APPLICATION RECEIVED: 2/13/2024

The application is complete and is being reviewed for compliance with City Codes. This is not a preliminary approval. Pursuant to RCW 36.70B.070 and adopted SeaTac Municipal Codes, if an application is determined to be complete, it does not preclude the City from requesting additional information.

Alena Tuttle, *Senior Planner*

3/12/2024

Date Issued

Department of Community and Economic Development
4800 South 188th Street
SeaTac, WA 98188
atuttle@seatacwa.gov
(206) 973-4841



City of SeaTac

Community and Economic Development

Exhibit # 6a

NOTICE OF APPLICATION

TYPE OF ACTION: Major Conditional Use, SEPA Determination

FILE NUMBER: 2402-3004

PROJECT NAME: Summit View Development

PROJECT LOCATION: Address: 16445 International Blvd., SeaTac, WA 98188 **Parcel Number:** 2823049054, 2823049052, 2823049080

ZONING CLASSIFICATION: Park (P)

PROJECT DESCRIPTION: Summit View Development consists of internal site improvements and additions to Washington Memorial Park, a pre-existing Funeral Home and Cemetery property zoned Park (P). The proposed project will include the construction of a 7,500 square foot Celebration of Life Pavilion, relocation of the existing POW/MIA Memorial, extending site utility infrastructure (fire line extension, electrical service extension, surface water management), an additional stacked parking arrangement for 54 vehicles, and the creation of a variety of interment memorial options for human remains and cremains. An estimated 1,500 CY cut, and 2,000 CY fill are needed to prepare the site for development.

PERMITS INCLUDED WITH THIS APPLICATION: None

STUDIES REQUESTED BY THE CITY: Geotechnical Report (with STE permit)

PERMITS REQUIRED BUT NOT INCLUDED WITH THIS APPLICATION: Grading and Drainage Permit (STE), Right-of-Way (ROW) if applicable, Building Permit (BLD), Concurrency Application, Fire Permit.

EXISTING ENVIRONMENTAL DOCUMENTS: SEPA threshold Determination of Nonsignificance (SEP03-00013), draft geotechnical report (Terra Associates, Inc. April 26, 2023) submitted with application.

APPLICANT: Bonney Watson c/o Cameron Smock; 16445 International Blvd., SeaTac, WA 98188; (206) 242-1787; csmock@bonneywatson.com

CONTACT: David Boe; 1130 Broadway, Suite 207, Tacoma, WA 98402; (253) 383-7762; dboe@boearc.com

DATE APPLICATION RECEIVED: 2/13/2024

DATE APPLICATION COMPLETE: 3/12/2024

COMMENT PERIOD: Persons wishing to comment on this application should submit comments within fourteen (14) days of the date of this notice, by email, mail, or letter handed in to the Permit Counter. **All comments must be submitted by 5:00 p.m. on April 9, 2024.** Comments sent after such time will not be considered or made party of record. Application materials are available for review at this website (www.seatacwa.gov/LandUseNotices). For those without access to the internet, please contact the staff listed below for accommodations.



City of SeaTac

Community and Economic Development

DECISION: A written decision will be issued following the comment period. A copy of the decision will be provided upon request. The decision is appealable to the King County Superior Court. Details of the appeal process will be included in the decision.

STAFF CONTACT: Alena Tuttle, *Senior Planner*, Department of Community and Economic Development; 4800 South 188th Street, SeaTac, WA 98188; atuttle@seatacwa.gov; (206) 973-4841

DATE ISSUED: 3/26/2024

The seal of the City of Seatac is a circular emblem. It features a blue outer ring with the words "CITY OF" at the top and "SEATAC" at the bottom in white capital letters. The center of the seal depicts a stylized landscape with a mountain range, a body of water, and a sun or moon rising over the horizon.

16445 International Blvd

2823049054

Seattle-Tacoma
International
Airport

LOCATION IN SEATAC

Source: City of Seattle King County Sound Transit, prepared by the City of Seattle GIS. All rights reserved. This product has been compiled from the best available data. No warranty is expressed or implied as to accuracy, completeness, or reliability for any specific use. Not to be used for purposes of legal description or definition, nor a substitute for a professional survey.

0 1.000 Feet

The Seattle Times

AFFIDAVIT OF PUBLICATION

Kristina Gregg
City of Seatac
4800 S 188th St
Seatac WA 98188

STATE OF WASHINGTON, COUNTIES OF KING AND SNOHOMISH

The undersigned, on oath states that he/she is an authorized representative of The Seattle Times Company, publisher of The Seattle Times of general circulation published daily in King and Snohomish Counties, State of Washington. The Seattle Times has been approved as a legal newspaper by orders of the Superior Court of King and Snohomish Counties.

The notice, in the exact form annexed, was published in the regular and entire issue of said paper or papers and distributed to its subscribers during all of the said period.

03/26/2024

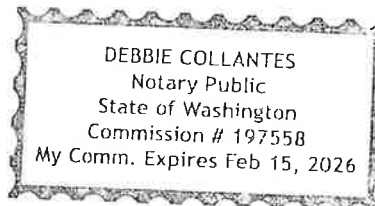
Agent Sharon Seligman Signature Sharon Seligman

Subscribed and sworn to before me on 03/26/2024

Debbie Collantes Debbie Collantes

(Notary Signature) Notary Public in and for the State of Washington, residing at Seattle

Publication Cost: \$205.00
Order No: 75092
Customer No: 212
PO #:



CITY OF SEATAC
NOTICE OF APPLICATION
 TYPE OF ACTION: Major Conditional Use, SEPA Determination FILE NUMBER: 2402-3004
 PROJECT NAME: Summit View Development PROJECT LOCATION: Address: 16445 International Blvd., SeaTac, WA 98188 Parcel Number: 2823049054, 2823049052, 2823049080 ZONING CLASSIFICATION: Park (P) PROJECT DESCRIPTION: Summit View Development consists of internal site improvements and additions to Washington Memorial Park, a pre-existing Funeral Home and Cemetery property zoned Park (P). The proposed project will include the construction of a 7,500 square foot Celebration of Life Pavilion, relocation of the existing POW/MIA Memorial, extending site utility infrastructure (fire line extension, electrical service extension, surface water management), an additional stacked parking arrangement for 54 vehicles, and the creation of a variety of interment memorial options for human remains and cremains. An estimated 1,500 CY cut, and 2,000 CY fill are needed to prepare the site for development. PERMITS INCLUDED WITH THIS APPLICATION: None STUDIES REQUESTED BY THE CITY: Geotechnical Report (with STE permit) PERMITS REQUIRED BUT NOT INCLUDED WITH THIS APPLICATION: Grading and Drainage Permit (STE), Right-of-Way (ROW) if applicable, Building Permit (BLD), Concurrency Application, Fire Permit. EXISTING ENVIRONMENTAL DOCUMENTS: SEPA threshold Determination of Non-significance (SEP03-00013), draft geotechnical report (Terra Associates, Inc. April 26, 2023) submitted with application. APPLICANT: Bonney Watson c/o Cameron Smock; 16445 International Blvd., SeaTac, WA 98188; (206) 242-1787; csmock@bonneywatson.com CONTACT: David Boe; 1130 Broadway, Suite 207, Tacoma, WA 98402; (253) 383-7762; dboe@boearc.com DATE APPLICATION RECEIVED: 2/13/2024 DATE APPLICATION COMPLETE: 3/12/2024 COMMENT PERIOD: Persons wishing to comment on this application should submit comments within fourteen (14) days of the date of this notice, by email, mail, or letter handed in to the Permit Counter. All comments must be submitted by 5:00 p.m. on April 9, 2024. Comments sent after such time will not be considered or made party of record. Application materials are available for review at this website (www.seatacwa.gov/LandUseNotices). For those without access to the internet, please contact the staff listed below for accommodations. DECISION: A written decision will be issued following the comment period. A copy of the decision will be provided upon request. The decision is appealable to the King County Superior Court. Details of the appeal process will be included in the decision. STAFF CONTACT: Alena Tuttle, Senior Planner; Department of Community and Economic Development; 4800 South 188th Street, SeaTac, WA 98188; atuttle@seatacwa.gov; (206) 973-4841
 DATE ISSUED: 3/26/2024

Publication Cost: \$205.00
 Order No: 75092
 Customer No: 212
 PO #:



PUBLIC HEARING NOTICE

Pursuant to SMC 16A.13.010, notice is hereby given that the SeaTac Hearing Examiner will hold a virtual public hearing on September 25, 2024, at 4:00 pm, or soon thereafter. The purpose of this hearing will be to receive verbal and written public comment on the following actions:

FILE NUMBER: 2402-3004

PROJECT NAME: Summit View Development

PROJECT LOCATION: Address: 16445 International Blvd., SeaTac, WA 98188 **Parcel Number:** 2823049054, 2823049052, 2823049080

PROJECT DESCRIPTION: Summit View Development consists of internal site improvements and additions to Washington Memorial Park, a pre-existing Funeral Home and Cemetery property zoned Park (P). The proposed project will include the construction of a 7,500 square foot Celebration of Life Pavilion, relocation of the existing POW/MIA Memorial, extending site utility infrastructure (fire line extension, electrical service extension, surface water management), an additional stacked parking arrangement for 54 vehicles, and the creation of a variety of interment memorial options for human remains and cremains. An estimated 1,500 CY cut, and 2,000 CY fill are needed to prepare the site for development.

APPLICANT: Bonney Watson c/o Cameron Smock; 16445 International Blvd., SeaTac, WA 98188; (206) 242-1787; csmock@bonneywatson.com

AGENT/CONTACT: David Boe; 1130 Broadway, Suite 207, Tacoma, WA 98402; (253) 383-7762; dboe@boearc.com

PERMITS REQUIRED BUT NOT INCLUDED WITH THIS APPLICATION: Grading and Drainage Permit (STE), Right-of-Way (ROW) if applicable, Building Permit (BLD), Concurrency Application, Fire Permit.

SEPA THRESHOLD DETERMINATION: The City of SeaTac acting as SEPA Lead Agency, issued a Determination of Nonsignificance (DNS) for this proposal on August 5, 2024.

PUBLIC HEARING DATE/TIME: September 25, 2024, at 4:00 pm

LOCATION: This meeting will be conducted virtually via Zoom. Meeting ID: 863 5248 7295 Passcode: 020480
The web address is: <https://us06web.zoom.us/j/86352487295?pwd=SE9T7B3ah7rSks5ZgLFWhQWguYbkdb.1>

OR join by phone: 253-205-0468

PUBLIC HEARING COMMENTS: The Hearing Examiner will not hear any in-person comments. The Hearing Examiner is providing remote oral and written public comment opportunities via the Zoom meeting. Please contact the staff contact to provide written comments or sign-up for oral comments at the hearing.

ADDITIONAL INFORMATION: The staff report on the proposal will be available one week prior to the hearing. Materials will be available for review at this website (<https://www.seatacwa.gov/government/city-departments/community-and-economic-development/planning-division/land-use-notices>). If you have questions on how to access the meeting or if you need assistance in accessing the meeting or staff report, please contact Gillian Sayer Mudd, Clerk of the Hearing Examiner, gsayermudd@seatacwa.gov, 206-973-4768, 24-hours in advance of the hearing.



City of SeaTac

Community and Economic Development

STAFF CONTACT: Ramon Rodriguez, *Senior Planner*; Department of Community and Economic Development; 4800 South 188th Street, SeaTac, WA 98188; rrodriguez@seatacwa.gov; 206-973-4837

DATE ISSUED: September 11, 2024

VICINITY MAP 2402-3004

City of SeaTac



Summit View Development

Address:

16445 International Blvd

Project Site

2823049052

2823049080

2823049054

LOCATION IN SEATAC

Date Prepared: 3/12/2024
Source: City of SeaTac, King County Sound Transit. Prepared by the City of SeaTac GIS. All rights reserved. This product has been compiled from the best available data. No warranty is expressed or implied as to accuracy, completeness, or fitness for any specific use. Not to be used for purposes of legal description or definition. Not a substitute for a professional survey.

\\...Working\SEA-CED\Planning\Projects\20240312\2402-3004-Mailer

0 1,000 Feet



City of SeaTac

Community and Economic Development

DETERMINATION OF NONSIGNIFICANCE (DNS)

FILE NUMBER: 2402-3004

PROJECT NAME: Summit View Development

PROJECT LOCATION: Address: 16445 International Boulevard, SeaTac, WA 98188; **Parcel Number:** 2823049054, 2823049052 and 2823049080

PROJECT DESCRIPTION: Summit View Development consists of internal site improvements and additions to Washington Memorial Park, a pre-existing Funeral Home and Cemetery property zoned Park (P). The proposed project will include the construction of a 7,500 square foot Celebration of Life Pavilion, relocation of the existing POW/MIA Memorial, extending site utility infrastructure (fire line extension, electrical service extension, surface water management), an additional stacked parking arrangement for 54 vehicles, and the creation of a variety of interment memorial options for human remains and cremains. An estimated 1,500 CY cut, and 2,000 CY fill are needed to prepare the site for development.

PROPONENT: BOE architects, PLLC; 1130 Broadway, Suite 207; Tacoma, WA 98402; (253) 383-7762; dboe@boearc.com.

LEAD AGENCY: City of SeaTac

STAFF CONTACT: Ramon Rodriguez, *Senior Planner*; Department of Community and Economic Development; 4800 South 188th Street, SeaTac, WA 98188; rrodriguez@seatacwa.gov; 206-973-4837

RESPONSIBLE OFFICIAL: Jennifer Kester, *Planning Manager*; Department of Community and Economic Development; 4800 South 188th Street, SeaTac, WA 98188; 206-973-4750

The City of SeaTac, as lead agency for this proposal, has determined that the proposal will not have a probable significant adverse impact on the environment, and an environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed Environmental Checklist and other information on file with the City of SeaTac.

COMMENT PERIOD: This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for **14 days** from the date of issuance. Comments must be submitted by **5:00 P.M. on Monday, August 19, 2024**. Detailed information is available to the public upon request.

APPEAL PERIOD: Any person wishing to appeal this determination may file such an appeal to the SeaTac City Clerk within **10 days** from the end of the comment period. All appeals of the above determination must be filed by **5:00 P.M. on Thursday, August 29, 2024**. There is a fee to appeal this determination (see City of SeaTac fee schedule).



City of SeaTac

Community and Economic Development



Jennifer Kester, *Planning Manager*

08/05/2024

Date Issued

VA



U.S. Department of Veterans Affairs

Office of Construction & Facilities Management

Office of Facilities Planning

Facilities Standards Service

Exhibit # 9



National Cemetery Administration

February 1, 2024

designguide

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1.0 INTRODUCTION

1.1. FOREWORD

The goal of the Design Guide is to facilitate the design process and ensure excellent quality, effectiveness, efficiency, and consistency of VA facilities while controlling the construction and operating costs of the National Cemetery Administration (NCA).

This Design Guide supplements current VA guides, technical manuals, and other VA criteria with specific NCA criteria. The use of this Design Guide does not preclude the need for a tailor-made functional and physical design program for each particular project. The Project Architect / Project Engineer's responsibility is to develop a complete and accurate project design that best meets the users' needs and applicable VA NCA standards, criteria, and applicable code requirements.

The material contained in the NCA Design Guide is the culmination of a partnering effort within the National Cemetery Administration, Design and Construction Service (DCS) and Department of Veterans Affairs, Construction & Facilities Management (CFM).

This document replaces the National Cemetery Design Guide, Chapters 1-4 dated June 1999 and Chapter 5 dated November 2016.



1.2. DESIGN GUIDE INTRODUCTION

The National Cemetery Administration Design Guide was developed as the master reference document for planning and designing Department of Veteran's Affairs, National Cemetery Administration (NCA) facilities. NCA's facilities are of significant importance to our nation. NCA's mission is to honor Veterans and their eligible family members by providing final resting places in national shrines. VA NCA National Cemeteries commemorate veterans' service and sacrifice to our nation. The development of national cemeteries dates back to the civil war, and a significant number of cemeteries are listed in the Nation Register of Historic Places.

This Design Guide is not intended to be project-specific. It addresses the general functional and technical requirements of the facilities required to support NCA operations. While this Guide incorporates strategies to address adaptability, it is not possible to foresee all future needs. The project-specific Program for Design (PFD) is the basis for an individual project design.

The NCA Design Guide includes graphic consolidation of data from existing VA standards and criteria. Refer to *PG-18-3 Design and Construction Procedures, Topic 1* (<https://www.cfm.va.gov/TIL/cPro.asp>) for the latest editions of the codes and standards adopted by VA as a minimum for all projects performed, including the modernization, alteration, addition, or improvement of its real property and the construction of new structures. VA Design Manuals and Master Specifications specify other codes and standards that VA follows on its projects.

The project A/E shall read and be familiar with the most current editions of the applicable codes, standards, guides, and manuals. This Design Guide refers to the sources mentioned above for more detail on VA NCA design standards and criteria. These sources can be accessed at the VA Office of Construction and Facilities Management's *Technical Information Library (TIL)* (<https://www.cfm.va.gov/TIL/>).

This Design Guide does not supersede the project A/E's responsibilities to develop a complete and accurate design that meets the user needs and applicable code requirements.



2.0 GENERAL PLANNING CONSIDERATIONS

2.1. MISSION AND BACKGROUND

The mission of the National Cemetery Administration (NCA) is as follows: to provide burial space for veterans at Department of Veterans Affairs national cemeteries; to provide headstones and markers for veteran graves; to provide Presidential Memorial Certificates; to administer the State Cemetery Grants Program assisting states in building or improving state-owned cemeteries for veterans.

2.2. NCA TRENDS

Service Area Expansion: NCA aims to expand the existing service area to a national cemetery within a 1-hour drive of major populated centers.

2.3. OPERATIONAL ASPECTS

Each National Cemetery is managed by VA National Cemetery Administration (NCA) personnel conforming with national and area office policies, priorities, goals, and objectives. At most cemeteries, there is a staff of administrative and maintenance personnel under the supervision of a cemetery director.

National cemeteries commonly open from 8:00 a.m. to 5:00 p.m. daily and on Memorial Day from 8:00 a.m. to 7:00 p.m. Generally, Interment Service corteges are received from 9:00 a.m. to 3:00 p.m., Monday through Friday. Burials at national cemeteries do generally not occur on weekends or Federal holidays.

Many national cemeteries are remotely located from the people they serve, requiring Interment Service visitors to travel long distances. A Public Information Center with Cortege Assembly Area may be situated near the main cemetery entrance to provide a central point for vehicles joining an Interment Service procession to assemble and receive final instructions before proceeding to a Committal Service Shelter for an Interment service. The Public Information Center is usually occupied by cemetery personnel or volunteers. Cemetery visitors can obtain gravesite locator information there, and Public Rest Rooms are also often located there.

The Public Information Center and Rest Rooms should be near the main entrance to the cemetery and adjacent to the Cortege Assembly Area. Committal Service Shelters and Administration/Maintenance Complex should be centrally located on the site.

Contractors providing miscellaneous services to the cemetery usually require storage space within the Administration/Maintenance Complex. This complex should be located away from burial areas or shielded from view.



2.4. FUNCTIONAL CONSIDERATIONS

The functions of a national cemetery include the operation and maintenance of all aspects of the cemetery. National cemetery directors and staff verify eligibility for burial and schedule the time and date of Interment Services. They attend funerals, gravesite care, overall cemetery appearance and host ceremonies on Memorial Day, Veterans Day, and other special occasions. Cemetery facility users are typical:

- Interment Service attendees,
- Visitors,
- Cemetery staff, and visiting VA staff,
- Volunteers, who provide honors at interment services and assist cemetery staff in administration and maintenance activities,
- Contractors who provide maintenance and construction, sales representatives, and vendors

2.4.1. SPACE PLANNING

Program for Design: Refer to *VA Space Planning Criteria (PG-18-9), Chapter 701 & 703 - National Cemetery Administration* (<https://www.cfm.va.gov/til/space.asp>) for net square footages. The Program for Design (PFD) for a specific project varies according to facility Net Square Feet (NSF), Facility Management Systems (FMS) systems and equipment, and the size and scope of the cemetery mission. The design A/E is responsible for accommodating the project's specific program for design and functional requirements.

Space planning criteria have been developed based on cemetery activities in functional areas. These criteria are predicated on established and anticipated best practice standards.

Quantities and sizes of spaces required in the Reception Area, Administrative Areas, Staff Lounge, Lockers, Restrooms, and other functional areas are determined by working with on-site staff and VA NCA stakeholders.

Gravesite Planning: NCA Cemetery Operations track cemetery gravesite usage numbers on a cemetery-by-cemetery basis. The numbers identify when each gravesite type is depleted. Cemetery capacity should be analyzed during the master planning process. Specific information may be obtained from the Project Manager.

2.5. FUNCTIONAL AREAS

A Functional Area is the grouping of rooms and spaces based on their function within the cemetery. There are seven (7) Functional Areas, identified as follows:

- FA1, Entrance Area
- FA2, Public Information Center Area



- FA3, Administrative Area
- FA4, Interment Areas
- FA5, Memorial / Donations Area(s)
- FA6, Maintenance Area(s)
- FA7, Honor Guard Area

All functional areas are critical to the cemetery's mission. All functional areas include specific criteria and requirements such as roads, utilities, landscaping/ irrigation, and site furnishings. Refer to the Technical Requirements section of this guide for additional information.

2.5.1. FA1, ENTRANCE AREA

The Entrance area is located at the entry to the cemetery to accommodate visitors and staff. It includes:

- Entrance Road
- Main Entrance Gateway
- Main Cemetery Signage
- Decorative Fence
- Decorative Gate
- Wayfinding
- Avenue of Flags

2.5.2. FA2, PUBLIC INFORMATION CENTER AREA

The Information Center Area includes the necessary support functions to receive visitors and stage Interment Service processions. This functional area shall consist of:

- Public Information Center
- Public Rest Rooms
- Visitor Parking (Pull-off)
- Cortège Assembly Area (Parallel Parking Lanes)
- Gravesite Locator

Smaller National Cemeteries may not have a physical Public Information Center (PIC). Whether a PIC is needed should be determined at the planning/design stage. If there is no physical PIC, a standalone gravesite locator is required for cemeteries lacking a Public Information Center Building. This gravesite locator must be protected from the weather and updated as interments occur.



A. Public Information Center

The following spaces are to be located within the Public Information Center.

- Lobby
- Telephone Reception/ Cortege Control
- Public Restrooms
- Storage
- IT Server Room
- HVAC and Electrical Equipment
- Gravesite Locator

2.5.3. FA3, ADMINISTRATIVE AREA

Administrative areas are combined or distinct areas for cemetery operations, NCA staff, and services contractors.

Commonly, a combined Public Information Center and Administration Complex have been used to accommodate staff workstations (in offices or cubicles), Staff conference and workrooms, multipurpose areas for training classroom or conference room, spaces for office equipment, and storage of files, forms, supplies, training materials, and housekeeping aides. This functional area may include:

- Lobby
- Multipurpose Room
- Office, Cemetery Director
- Office, Assistant Cemetery Director (as required)
- Office, General
- Operations Center
- Staff and Public Toilets
- Copy Room
- General Storage
- File Storage
- IT Server Room
- Lunchroom / Lounge & Vending
- HVAC and Electrical Equipment
- Staff and Operations Vehicle Parking

2.5.4. FA4, INTERMENT AREA

The interment area serves as the primary function of the cemetery. This functional area may include:



- Casketed Remains
 - Traditional Gravesites
 - Pre-placed Crypts
- Cremated Remains
 - Columbarium
 - In-ground Cremains
- Memorial Walls with or without ossuaries
- Committal Service Shelter
- Green burial sites (at some cemeteries)
- Scatter garden (at some cemeteries)

2.5.5. FA5, DONATIONS & ASSEMBLY AREA

A separate and distinct area from interment areas for reflection, ceremony, and the collective display of memorials donated by various recognized veterans' groups. This functional area may include:

- Memorial Walkway / Donations Area
 - Veterans Memorials (Private Organizations)
 - Carillon Tower
 - Rostrum
- Flag/ Assembly Area

2.5.6. FA6, MAINTENANCE AREA(S)

Maintenance areas are separate for cemetery maintenance operations. These areas may need to be separated or duplicated in multiple locations due to each cemetery's unique size, layout, and function.

A. Maintenance and Storage Area

Maintenance and Storage Area accommodates staff work areas and activities related to all cemetery operations. Areas shall be provided to accommodate staff breakroom, toilets, and lockers. This functional area may include:

- Lounge
- Locker Rooms with shower
- Restrooms
- Boot Vestibule
- Maintenance Office
- Mechanic's / Clerk's Desk
- Workshop(s)



- Vehicle & Equipment Maintenance
 - Routine Maintenance Bay
 - Heavy Maintenance Bay
- Parts and Tools storage
- Maintenance Yard
- Vehicle Wash
- Loading Dock
- Fuel Storage Tanks & Pumps
- Hazardous Material Storage
- Pesticide Storage, Mixing, & Loading
- Vehicle, Equipment, and Materials Storage
 - Unsheltered
 - Sheltered
 - Enclosed
- Headstone Storage
- Grave Liner storage
- Sand, Gravel, and Materials Storage

Special Requirements: Special requirements must be evaluated and applied on a per-project basis.

2.5.7. FA7, HONOR GUARD AREA

The Honor Guard area accommodates volunteer honor guard members and equipment. This functional area may be provided in the Public Information Center, within the Administrative Area, or as a standalone building, as specified per planning factors. Space includes:

- Locker rooms
- Firearms storage
- Lounge area

2.6. FUNCTIONAL RELATIONSHIPS

Organizational Concepts: The Functional Diagrams in Section 23 of this document respond to functional, organizational, adjacency, and operational issues. They should not be interpreted as preliminary floor plans or site plans.



2.7. FUNCTIONAL AREA PLANNING DESCRIPTIONS / CONSIDERATIONS

2.7.1. FA1, ENTRANCE AREA

A. Main Entrance

The primary objective of a national cemetery's main entrance area is to create a sense of arrival at a national shrine. The Main Entrance shall include hardscape and landscape features that portray the significance and dignity of the national cemetery. The design shall incorporate trees and include colorful plantings. The entrance area design and use of materials shall align with the historical context and elements of the existing cemetery and the character of regional architectural features, and the current cultural landscape.

Main cemetery entrances typically provide a means to restrict vehicle access during certain times. Depending on the location and size of the cemetery, gates or chains are used to control vehicle access. A median is typically included in the main entrance gate design and may continue down the roadway. Curbs or other barriers are to be provided to keep cars on the roadway. Changes in color and texture of paving are encouraged to provide a feeling of transition for visitors arriving at or departing from the cemetery.

B. Entrance Road

The entrance "boulevard" is a road divided by a median; the median length varies depending on available space. Preferably, the median runs the entire length of the entrance boulevard. Each side of the boulevard supports one-way traffic and includes a passing lane. When entrance boulevards are used as Interment Service Cortege Assembly Areas, they must be long and wide enough to accommodate parked cars cued up for Interment Services without blocking access to the cemetery.

C. Avenue of Flags

Cemeteries shall include an "avenue of flags" where donated American burial flags are displayed on special days. The entrance boulevard is typically utilized for the avenue of flags.

2.7.2. FA2, PUBLIC INFORMATION CENTER

A. Public Information Center

The Public Information Center is for Visitors, includes public restrooms, has a sheltered outdoor area and committal service orientation. Public rest rooms shall be directly accessible from the outside and separate from the general indoor reception area. A gravesite locator may be placed indoors or in a sheltered outdoor area. The building includes a public reception area



occupied by cemetery staff or volunteers to assist visitors. The reception area shall consist of securable counter space or desk for personnel. Veteran and cemetery-related historical items are displayed in the reception area. The reception area must include a telephone for visitors and staff to communicate directly with the administrative office. The Public Information Center must also be connected to the Administration and Maintenance Complex IT network.

Visibility and accessibility of the Public Information Center from the main entrance boulevard are required. The Public Information Center is a visitor orientation and information facility and should serve the public before cemetery activities. The facility must be located adjacent to the Cortège Assembly Area. The building and outdoor space should be constructed of durable materials and finishes that require little maintenance. The structure shall have a residential scale and a non-institutional character.

(1.) Lobby

Provides public reception, waiting, and information for visitors and Interment Service parties; Receptionist(s) greets visitors, Interment Service parties; Dispenses information, handout maps

Users – Interment Service Parties; Cemetery Visitors; Receptionist (Personnel assigned to this area as needed; may be staffed by volunteers).

Interior Design / Furniture – Minimal visitor seating, in small grouping(s); Lounge seating should not be crossed with major circulation routes; Circulation control for all building functions; Character of the space should be non-institutional. Receptionist workstation at 750 mm (30") desk height with the surface for visitors at a 1050 mm (42") height; workstation may be free-standing or built-in.

Special Requirements – Provide a public image for the cemetery and the National Cemetery Administration. The scale, volume, and parts must create a significant space that invites and welcomes the public. Walls and display cases for veteran memorabilia. Possible display location of Great Seal of the U.S. and possible display location of service seals, if not in assembly area or committal service shelter.

(2.) Reception / Cortège Control

The reception area provides temporary administrative space for the public reception and cortège lane control.

Users – Interment Service Directors, Interment Service Parties, and Cemetery Visitors.

Interior Design / Furniture – Counter height writing surface.

Special Requirements –Telephone having direct connections to the Administrative/Maintenance Complex as well as a public telephone in the vicinity.



B. Public Rest Rooms

The public restrooms are part of the Public Information Center. The rest rooms should have durable, easy to clean and maintain interior finishes for heavy public use. Provide separate male and female facilities also provide a family restroom where space and budget permit. The capacity of the rest rooms, i.e., how many persons are accommodated in a specified time, is determined on an individual project basis. Future expansion of this area is a possibility. The location should provide easy pedestrian access to vehicle pull-off used for cortege assembly.

Users – Interment Service Parties; Cemetery Visitors.

Interior Design / Furniture – Housekeeping aids closet adjacent to rest rooms; Ceiling hung toilet partitions preferred.

Special Requirements – Lighting operated by motion detector switches (occupancy sensors).

C. Visitor Parking

Public Information Center visitors park in an area adjacent to the main entrance to the building; this parking must be distinctly separate from the Cortege Assembly Area.

Users – Cemetery Visitors

Special Requirements – Parallel pull-off along Entrance Boulevard; Flush curbing and walkway along pull-off; Location of Site Directory sign; Location of Floral Regulation/Visitor Information sign

D. Cortege Assembly Area

The Cortege Assembly Area is located adjacent to the Public Information Center, on or near the entrance road. It consists of one or more lanes for vehicles to line up before proceeding to a Committal Service Shelter. Access to the Public Information Center and rest rooms from the Cortege Assembly Area is imperative. Interment Service corteges average 30 vehicles with three (3) persons per vehicle.

Planning Factors:

The quantity of cortege lanes aligns with the number of committal service shelters; however, the number of committal service shelters shall not be the only determining factor. Factors such as future expansion projects and other elements shall be considered. Recently NCA designs have exceeded the criteria below to allow for future growth and accommodate areas with high veteran populations.



- One (1) cortege lane area is the preferred minimum. Older historic cemeteries may not meet this requirement due to space limitations. However, space should be analyzed to prevent the need to use the existing road system for assembly.
- Two (2) cortege lane areas are the preferred minimum for cemeteries, with two (2) or more committal service shelters allowing simultaneous services in the same time slot.
- Three (3) cortege lane areas are the preferred minimum for cemeteries with three (3) committal service shelters.
- Four or more cortege lane areas are reserved for large and active cemeteries with four or more committal service shelters.

Users – Interment Service Parties

Special Requirements – Location of Committal Service Status Board sign; Flush curbing and walkway along pull-off at Public Information Building; Separate from Visitor Parking

E. Gravesite Locator

One type of gravesite locator is a book stand that holds an 8-1/2" x 11" book-type listing of individuals interred in the cemetery and the corresponding gravesite numbers; this stand should accommodate public use of the document and protect it from the elements.

Another type of gravesite locator is an ATM-style electronic database that includes a keyboard and monitor. This gravesite locator is mounted in an interior or exterior wall or a free-standing cabinet in a lobby or reception area. Gravesite Locator is typically accessible at all times.

Typically, the gravesite locator is located within the layout of the Public Information Center; however, it may be a standalone kiosk if a building does not exist. The location varies based on the configuration of each cemetery.

Users – Cemetery Visitors

Special Requirements – Area sheltered from the weather, screened or shielded from glare / direct sunlight.

Book / Electronic Locator Equipment and Stand, if applicable, are provided by the NCA.

2.7.3. FA3, ADMINISTRATIVE AREA

The staff and administrative area house the offices, workspaces, and a personnel area for cemetery support staff and contractors involved in direct and indirect services to veterans, families, and other cemetery visitors. This function may be combined with the Public Information Center (PIC). When required, the building should have fire detection and security



systems. It should be constructed of durable building materials and have finishes that require little maintenance.

There are essential functional aspects that are common to all national cemetery administrative facilities. The design of cemetery structures shall align with regional architectural uniqueness and the local cultural landscape.

Flexibility is an essential consideration in the design. Changing workload can require additional or reconfigured administrative space. Personnel changes may also generate changes in office layout. The interior design should permit adaptation to change needs at minimal cost, without large-scale remodeling. The facility footprint design and siting of administration space should allow future expansion, primarily in the general office area.

The Public Information Center and Administration operations areas are viewed as complex and situated to encourage their interaction. They may be physically attached or located close to each other on the site in a way that facilitates the necessary exchange. Total integration of the building with the site is essential to keep the building from being a dominant cemetery feature. However, the administration area is not a place of regular visitor contact.

A. Staff and Administrative Area

Visitors enter the building through the "front door" and are greeted in the office adjacent to the general office. Areas open to the public include the director's office, the General Office, and the Multipurpose Room. A unisex toilet to serve the Administrative staff also serves infrequent use by visitors. The Operations Center is the hub of the office, containing shared office equipment and files. The staff and volunteers enter the administration building through the "back door," or employee entrance, adjacent to the employee parking lot. The Lunchroom should be isolated from public view and serve as the connector for Administration and Maintenance "wings."

Space planning criteria for National Cemetery administration buildings are addressed below. It provides the net square footage recommended to meet the needs of national cemetery buildings. The scope of work for a particular project should include the building program based on the cemetery workload staffing and the space planning criteria.

Cemeteries having less than one burial/day must be planned on an individual project basis.

Administrative Offices

Office, Director

- 1-6 burials/day 13.9 NSM (150 NSF)
- Over 6 burials/day 18.6 NSM (200 NSF)

Office, Secretary (When staffed, workstation) 5.2 NSM (56 NSF)



General Office

**Office, Assistant Director/Administrative Officer
or Assistant (When staffed)** 9.3 NSM (100 NSF)

Workstations - Cemetery Representative, Clerk, Receptionist 5.2 NSM (56 NSF)
per person

(The receptionist workstation should be contiguous to the lobby. If a receptionist is not provided, one of the other workstations should be contiguous to the lobby to serve as a receptionist.)

IT Closet - Min. 10'x14' 13 NSM (140 NSF)

Operational Center (includes ADP capability)

Consolidated center for communications filing, reference, reproduction, and storage supporting the administrative and general office staff requires.

- **1-6 burials/day** 18.6 NSM (200 NSF)

NOTE: 2.3-3.7 NSM (35-40 NSF) of the 18.6 NSM (200 NSF) may be allocated as a storage closet.

- **7-15 burials/day** 22.3 NSM (240 NSF)

NOTE: 7.4-9.3 NSM (80-100 NSF) of the 22.3 NSM (240 NSF) may be allocated as a storage closet.

- **Over 15 burials/day** 26.0 NSM (280 NSF)

NOTE: 7.4-9.3 NSM (80-100 NSF) of the 26 NSM (280 NSF) may be allocated as a storage closet.

Lunch Area with Kitchen Unit

- **1-6 burials/day** 4.2 NSM (45 NSF)

(Space is provided for a kitchen unit only.)

For cemeteries with 1-3 burials/day, the kitchen unit may be combined with the operational center, increasing the space to 22.8 NSM (245 NSF).

For cemeteries with 4-6 burials/day, the kitchen unit may be combined with the multipurpose room increasing the space to 18.1 NSM (195 NSF).

- **Over 6 burials/day** 15.3 NSM (165 NSF)

Storage - Cemetery Representatives' Uniforms 001.0 NSM (1 NSF) per
Cemetery
representative
(Minimum = 0.2 NSM
(2 NSF))

Provide a closet for Government-issued blazers, pants, and skirts for cemetery representatives.

Housekeeping Aides Closet 3.7 NSM (40 NSF)



Multipurpose Room

(Conference room, family room)

- **1-3 burials/day**

NOTE: The need for the room and the space required is determined on an individual project basis.

- **4-6 Burials/Day** 13.9 NSM (150 NSF)

(Will also function as lunchroom)

- **Over 7-15 Burials/Day** 18.6 NSM (200 NSF)

- **Over 15 Burials/Day**..... 26.0 NSM (280 NSF)

Lobby

- **1-6 Burials/Day** 22.3 NSM (240 NSF)

- **7-15 Burials/Day** 29.7 NSM (320 NSF)

- **Over 15 Burials/Day** 37.2 NSM (400 NSF)

Toilet (Wheelchair) 4.8 NSM (52 NSF)
(Minimum 1,
Maximum 2)

NOTE: The number of toilets required is determined on an individual project basis depending on the proximity of public toilet facilities to the administration building. These facilities are for use by staff and visitors as required.

(1.) Lobby

Users – Cemetery Visitors (non-Public); NCA Administrative Personnel

Interior Design / Furniture – Lounge seating

Special Requirements – Lounge seating should not be crossed with major circulation routes; Circulation control for all building functions; Provides a public image for the cemetery and the National Cemetery Administration; Character of the space should be non-institutional

(2.) Multipurpose Room

Users – Cemetery Visitors (non-Public); NCA Administrative Personnel

Interior Design / Furniture – Informal lounge seating, or combination (if large enough) of a conference table with seating and separate lounge seating; Storage for supplies, VCR, television, and projection equipment is required - may be provided by built-in credenza or storage unit



Special Requirements – Writing, tack, and projection surface; If windows are provided, light control is necessary for operating video equipment; Will be used for public functions at night

(3.) Director

Receives visitors, dignitaries and meets with one or more employees or family members

Users – Director, General Public, Dignitaries

Interior Design / Furniture – Workstation (desk/table and credenza); Worksurfaces (2); 2 file drawers; 2 box drawers; 1 pencil drawer; keyboard drawer; Conference seating for four (4) at desk/table; Lounge seating for four (4) to six (6); Shelving and wall surface for display of mementos and awards; Credenza may be used as a worksurface 600 mm (24") deep and may be built-in; Desk may be a conference table

Special Requirements – Built-in fire-proof safe for ADP backup tapes, checks, and other essential items

(4.) Assistant Director

Users – Assistant Director; General Public

Interior Design / Furniture – Guest seating for two (2) at a desk; Workstation; Worksurface; File drawer; Box drawer; Reference shelves/cabinet; Typing return or keyboard drawer

Special Requirements –

(5.) General Office

The general office is the center for filing and reference and shared use of office equipment.

Users – Clerk, Program Assistant, Cemetery Representative, Visitors

Interior Design / Furniture – Systems furniture preferred, providing semi-privacy; Workstation; File drawer; Box drawers, pencil drawer; Reference shelves/cabinets; Visitor seating at a desk for one; two at cemetery representative workstation(s)

Special Requirements – Windows should not interfere with efficient workstation planning; Administrative Assistant requires partial audio and visual privacy; Coat closet for users



(6.) Operations Center

Users – Administrative Personnel, Maintenance Foreman.

Interior Design / Furniture – Below counter lateral file cabinets are included as construction contractor-furnished equipment; interment file drawers are government-furnished, but enclosure built-in in the building contract; adjustable shelving above; Interment records (drawers for 125 mm x 200 mm (5" x 8") cards); Personnel files; Correspondence files; Supplies (locked storage base cabinets or full height closets); Work surfaces - 600 mm (24") deep, at least 1200 (48") length to be 750 mm (30") deep for drawing reference surface; Paper cutter, hole punches, stapler, and other office items; Wall-mounted or other flat file systems for 750 mm x 1050 mm (30" x 42") cemetery maps; Tack board.

Special Requirements – Maximum use of volume for storage and work surfaces with minimum but efficient circulation; Most components built-in. Floor to ceiling enclosure may be required to contain equipment noise; in any case, walls should be not less than 1800 mm (72") high; Single 120 V (volt) receptacles (plug strips) are required above all work counters (Space receptacles 300 mm (12" on center); Conduit and outlets as are necessary for all ADP and telecommunications equipment located here; Supplies (locked storage base cabinets or full height closets).

(7.) Lunchroom / Lounge & Vending

Provides space for cemetery staff meetings, training sessions (in person and on video)

Users – All Administrative and Maintenance Staff.

Interior Design / Furniture – Small built-in food preparation center; Overhead storage cabinets; Base cabinet storage with a counter surface; Overhead cabinet-mounted microwave oven; Four-person tables with individual chairs; Tack surface for employee notices (may be located in hallway).

Special Requirements – Maximum natural light: should be bright, relaxing, non-institutional atmosphere; Easy maintenance finishes; Lunchroom may serve as circulation to Locker Room and other areas used by staff; Space does not necessarily require a total enclosure, but should not be remote from Lobby and not visible to the public.

B. Staff and Operations Vehicle Parking

Public parking at the administrative area should include a parking pull-off parallel to the road to accommodate an average of three (3) cars for cemetery visitors.



Employee parking should be in a lot obscured from public view for cemetery employees, official cemetery vehicles, visiting staff, and vendor vehicles. Locate the access drive to the parking lot beyond the public entrance to the building and outside the secured Maintenance Yard. Provide only pedestrian access from the parking lot to the Maintenance Yard. Approximately 3% of employee parking spaces shall be accessible to the physically disabled or a minimum of one parking space.

The parking lot should accommodate all employees, plus one to three cemetery vehicles, one volunteer, one vendor, one visiting staff, and seven honor guard vehicles. The siting of the parking lot must allow for future expansion.

Planning Factors:

Paved Parking

Provide parking space for maintenance and service employees following appropriate Department of Veterans Affairs (VA) standards.

Users – Administration and Maintenance Staff; Vendors/Contractors/Visitors (not Public); Volunteers.

Special Requirements – 3% of spaces must meet ADA accessibility requirements.

2.7.4. FA4, INTERMENT AREAS [BURIAL SECTIONS]

Interment areas are those portions of the cemetery acreage developed for burials of either full casket or cremated remains. Interment areas may be subdivided into Burial Sections of varying sizes and shapes. Burial sections are visually separate, broken by vegetation (woods), roads, walks, and topography.

A single burial section should have one predominant slope. In-ground interment areas for casketed or cremated remains shall generally conform to the existing terrain. Final grades shall range from 2%, the minimum to achieve positive drainage, to a maximum of 10% only when necessary; no more than a 7% slope is preferred. Avoid casket burials on steep slopes. Avoid extensive grading to achieve these criteria where such grading has an adverse impact on adjoining land or where such grading substantially alters or destroys natural features. Define interment areas by natural terrain features like ridges, valleys, or natural breaks in the topography.

Edges of burial sections shall be a minimum of 3 m (10 ft) from edges of roads, drives, and tree lines; a minimum of 6 m (20 ft) from property boundaries or fence lines. The maximum distance from the edge of a road to the farthest gravesite within a burial section shall be no further than 120 m (400 ft) over relatively level land. In areas with steep slopes, the distance



from the road to the farthest gravesite shall be considerably shorter. Generally, for higher than a 5% slope, there should be a decrease of 30 m (100 ft) or more in the distance.

The topography is the primary factor in determining the direction graves face within a burial section. Where the topography is not significant, road layout and accessibility determine the direction graves face. The head of a gravesite is typically higher than the foot of the gravesite. Burial sections should slope upward from front of the section to back or be level from front to back. Headstones shall face in the direction of the road, which accesses the burial section whenever possible. Headstones in adjacent burial sections should align and be in the same orthogonal orientation to the greatest extent possible within terrain limitations.

Section markers indicate the limits of each burial section in the cemetery.

A. Interment of Casketed Remains

The National Cemetery Administration is committed to providing burial benefits to as many veterans as possible and achieving the maximum development of gravesites within national cemeteries. The standard gravesite size is the smallest size practical to accommodate the marker type and ensure appropriate gravesite appearance. Each gravesite is marked with one marker, consistent with the requirements of applicable law and NCA policy. Full-casket remains are accommodated in below-grade burial sites. Casketed remains in new gravesites are placed in an outer container vault or pre-placed crypt/vault to prevent sunken graves. Burial sections for full casket gravesites shall be no larger than 3 acres.

B. Interment of Cremated Remains

As with full casket gravesites, NCA is committed to achieving the maximum development of cremains sites within national cemeteries. NCA intends to provide cremains sites in all cemeteries, including those not available to the interment of casketed remains. The standard cremains site size is the smallest size practical to accommodate the type of marker used to ensure that the cremains site appearance is appropriate and consistent with any adjacent gravesite section. Each gravesite is marked with one marker, consistent with applicable law and NCA policy requirements. Cremated remains are accommodated through in-ground burial, columbarium interment, or designated landscape areas such as scattering gardens. Burial sections for cremated remains shall typically have no more than 999 sites (approximately 1/4 acre). However, this size can be increased subject to design and topography consideration.

C. Memorial Section

A memorial section may be located in areas of a cemetery not otherwise suitable for burial sites. The size and configuration of the memorial section depend on the demand for memorial sites at that particular cemetery, the terrain, road network, and walkways. Memorial sites within the Memorial Section shall be marked with a flat granite marker or bronze or upright



headstones. Bronze memorial plaques may be mounted on walls designated for that purpose instead of placing a marker in a memorial section. These walls may be portions of other features of the Memorial Section, such as retaining walls and terraces appropriate for memorial purposes.

D. Committal Service Shelter

Normal operations at the national cemetery provide for away-from-gravesite interment services. These services are held in a sheltered area visually isolated from the administrative, maintenance, and burial operations. The shelters are dispersed throughout the cemetery to provide privacy when multiple services are held.

A Committal shelter is considered a facility that serves the family and friends of one veteran at any given time and is not intended to be a focal point or a vital visual element of the total cemetery experience. Each shelter should accommodate approximately (60) Interment Service attendees and one (1) casket. More significant numbers of attendees are accommodated by "overflow" areas of paving and adjacent turf areas.

Locate Committal shelters far enough apart to preserve the privacy of committal services. The design of the shelters shall mitigate the impact of surrounding operational procedures that may be occurring during interment services. Utilize the existing terrain, trees, and vegetation to obscure views between shelters and other on-site facilities.

A Committal Shelter should not be the defining feature of burial areas. The burial areas surrounding or near the committal shelters are what is essential. Design the Committal Shelter to be relatively simple and consistent with the style and materials of other structures and elements within the cemetery. The building is a covered structure that is open or partially enclosed on the sides and provides limited shelter from wind, rain, and sun. Provide a lockable storage room at the shelter for a broom, shovel, twelve stacking chairs, and two biers.

Provide a firing area for seven (7) Honor Guard members to stand near the shelter and provide adequate standoff distance to the Honor Guard firing area. Do not provide heating or air conditioning. Some shelters often require electrical power and plumbing if feasible and as required for other considerations.

Site features such as windbreakers for the predominant wind direction and, if authorized, a partially enclosed structure at sites with extreme weather should be provided. Full enclosure, lighting, heating, and other enhancements are not authorized. A wind break berm with landscape buffer might also be considered part of the design in some extreme weather locations.



Planning Factors:

Committal shelters can accommodate six interments per day.

- One shelter equals 1-6 services per day
- Two shelters equal 7-12 services per day
- Three shelters equal 13-18 services per day

Many cemeteries with active burials may require a minimum of two committal service shelters. One is always available if the other needs to be shut down for maintenance or provide greater schedule flexibility, such as accommodating more than one service when necessary. The need for multiple burials should be discussed with the cemetery staff and NCA Operations.

Users – Interment Service Parties, Families, Clergy; Cemetery Representatives and Maintenance Staff; and Volunteer Honor Guard.

Interior Design / Furniture – Provide storage door outside of the view of seating/assembly area, benches.

Special Requirements – Area sheltered from the weather; Hose bib on the exterior of the building; Built-in speakers for a sound system; Lockable closet for storage of equipment containing: Folding bier, 600 mm x 600 mm x 1050 mm (24" x 24" x 42"), Portable bier (Casket carrier), 625 mm x 1800 mm x 625 mm (25" x 72" x 25"), Stacking chairs (12), Broom, shelf for a sound system, 120 V (volt) duplex receptacle.

E. Committal Service Shelter Drive

Dedicated committal service shelter drives or pull-offs provide parallel parking for interment services, where space allows these parking areas are similar to cortege assembly areas. Separate drives should be provided for parking access at each committal shelter. A small loop drive adjacent to the shelter, wide enough for parking three vehicles abreast, works well. The entire drive should accommodate an average of thirty vehicles. The layout of roads and shelters should allow a cortege to proceed to the designated shelter without passing another interment service cortege on the road or driving by active burial operations.

2.7.5. FA5, DONATIONS & ASSEMBLY AREA

A. Memorial Walkway / Donations Area

Each cemetery should have areas separate from interment to display memorials donated by various recognized veterans' groups. The area(s) may consist of a path or terrace and should provide a place for quiet walks and contemplation for cemetery visitors. An established wooded setting provides the best location for the donation area(s) or memorial path to the extent possible. If developed as a walkway, it should have the character of a meandering path,



should originate in the vicinity of the Flag / Assembly Area, and have one other access point. A memorial walkway should have optimal locations designated along the path for donated memorials, plaques, and benches. The donations area may also be the location of the POW/ MIA flag.

Donated memorials are typically 450 mm (18") deep x 600 mm (24") wide x 600 mm (24") high, granite bases, or natural boulders, and are placed in small cleared areas adjacent to a path. The walkway or donations area must appear complete as a feature in its own right while without any donated memorials. As with all cemetery features, the memorial walkway/donations area must be accessible to disabled persons. Although some form of paving is necessary to meet accessibility standards, minimize the visual impact of the paved surface.

B. Veterans Memorial

The cemetery development plan typically includes designing and siting a potential significant memorial donation by a veteran service organization. This memorial to all veterans (for example, a statue or wall) would occupy approximately 72 m² (800 square feet). Select a site in a prominent area, perhaps in the general vicinity of the Flag / Assembly Area or the Memorial Walkway / Donations Area. The location need not be adjacent to a roadway, but pedestrian access to the memorial site is required. The cemetery development plan should show a location for a memorial, ingress and egress to the site, and the memorial's design. The cemetery development must appear complete even if the potential memorial is never installed.

C. Carillon Tower

The cemetery master plan should include a potential site designated for a carillon tower, potentially donated to the national cemetery. The tower would be approximately 13.5 m (45 feet) high and 2.4 m x 2.4 m (8' x 8') at the base.

D. Flag/ Assembly Area

The flag is the single most significant feature and focal point at the cemetery. The flagpole and surrounding areas shall uniquely align with the cemetery's natural surroundings, features, and elements. Provide trees/plantings that enhance the setting and are appropriate to the site (native, low maintenance). Use good quality, durable, and low-maintenance building materials, such as stone, brick, or concrete. Avoid locating the flagpole in conjunction with an operational area or facility such as the Administration Building.

There shall be one primary flagpole (aluminum or stainless steel) with an internal halyard, tall enough to be visible from major adjacent roadways where practical. Provide ample and unobtrusive flag lighting. Do not use in-ground or below-ground light fixtures. The flag is flown every day, 24 hours a day, when illuminated after dark. During interment services, the flag is lowered to half-staff. The flag should remain visible to the maximum extent possible even



when lowered to half-staff. The flagpole shall meet FAA regulations for height and flight safety requirements. Cemetery personnel must be able to easily access the flagpole to raise and lower the flag for services. A shorter flagpole, 4500 mm to 6000 mm (15' to 30'), in another location may display the POW/ MIA flag and is frequently located along the Memorial Walkway.

Artificial turf or enhanced pavement assembly area should be developed for significant gatherings on holidays. Terrain and landscaping should define the space and create a scale that is also comfortable for smaller gatherings. The assembly area should be located to take advantage of views both on and off-site. The immediate surroundings should include a distinct open space for assemblies and ceremonies, an attractive year-round feature. The assembly area should utilize a land area that is not otherwise ideal for burial sections. The design should not include permanent seating. However, it may include seating design elements such as arched walkways for ADA seating accessibility

The assembly area should incorporate a focal point, an architectural, hardscape, or landscape feature used as a speaker's platform. The feature should accommodate portable seating placement for twenty dignitaries. An area adjacent to the speakers' platform should accommodate portable seating placement for a forty-piece band. Provide adequate electrical service to meet ceremonial and maintenance needs. Electrical J-boxes should be out of sight and blend into their surroundings. Provide water supply and hose bibs in this area. Parking for special events and programs is accommodated on roadways and sometimes on the turf in undeveloped interment areas near the flag assembly area.

2.7.6. FA6, MAINTENANCE AREA

The maintenance area houses the offices, workspaces, and a personnel area for cemetery support staff and contractors involved in cemetery operations. Contact with visitors at the Maintenance Complex is usually minimal. When required, the building should have fire detection and security systems. It should be constructed of durable building materials and have finishes that require little maintenance.

There are essential functional aspects that are common to all national cemetery maintenance facilities. The design of cemetery structures shall align with regional architectural uniqueness and the local cultural landscape.

The desired location for the complex is central to the site. Locate the maintenance areas so that they are not readily visible to the public. Maintenance activities that take place at the building must be sheltered from public view. Site the complex optimally for functional operations separate from the Public Information Center and Interment Areas. Utilizing the terrain and landscape in the design should lessen the visual impact of this facility on the cemetery.



Planning Factors:

Space planning criteria for National Cemetery administration and maintenance buildings are addressed below. It provides the net square footage recommended to meet the needs of national cemetery buildings. The scope of work for a particular project should contain the building program based on the cemetery workload staffing and the space planning criteria.

Cemeteries having less than one burial/day must be planned on an individual project basis.

A. Maintenance Personnel Facilities**Office, Foreman**

- **1-6 burials/day** 12.1 NSM (130 NSF)

Includes 2.8 NSM (30 NSF) for the plan file.

- **Over 6 burials/day** 15.8 NSM (170 NSF)

Includes 2.8 NSM (30 NSF) for plan file and 3.7 NSM (40 NSF) for drafting table.

Additional Foremen 5.2 NSM (56 NSF)

Parts and Tools Clerk 5.2 NSM (56 NSF)

(Provided only in cemeteries with over six burials/day.)

Space for this function may be located in Parts and Tools Storage.

Lunchroom 1.4 NSM (15 NSF)
per FTE (Minimum =
16.3 NSM (175 NSF))
(Maximum = 53.5 NSM
(575 NSF))

Space is based on the minimum and the maximum number of employees occupying the room during any one lunch shift.

Kitchen Unit 4.2 NSM (45 NSF)

Vending Machines 4.7 NSM (50 NSF)

Housekeeping Aids Closet 3.7 NSM (40 NSF)

B. Lockers, Toilets, Showers

Lockers 0.8 NSM (9 NSF)
per FTE

The area per locker is based on a locker size of (380 mm x 460 mm) (15" x 18") bench space.

Toilets**1. Male**

Water Closets - One for each 18 FTEs or fraction thereof for the first 40 FTEs; one for each 25 FTEs or fraction thereof for FTEs over 40.



One water closet must be class "B" to accommodate the disabled, except when the Administration Building and Maintenance and Service Building are connected in cemeteries with 1-6 burials/day.

Urinals - One for each 10 FTEs or fraction thereof for the first 20 FTEs; one for each 18 FTEs or fraction thereof over 20.

Lavatories (Cemeteries with 20 or fewer total FTEs). One for each 10 FTEs or a fraction thereof.

Wash Fountains (Cemeteries with over 20 total FTEs). One for each 24 FTEs or fraction thereof.

2. **Female** - One water closet and one lavatory.

3. Area Required

Water Closet, Handicapped (Class B) 3.0 NSM (32 NSF)

Water Closet, Standard; Lavatory or Urinal 2.0 NSM (22 NSF)

Wash Fountain 4.3 NSM (46 NSF)

Shower 2.3 NSM (25 NSF)

(One for males and one for females.)

Boot and Raincoat Holding Area 0.1 NSM (1.5 NSF) per FTE

Boot Wash 2.8 NSM (30 NSF)

(Provide indoors only in cemeteries where the winter climate is too severe to wash boots outside. Otherwise, provided at exterior entry from a service yard to lockers.)

(1.) Locker Room, Toilets, and Shower

Users – Maintenance staff.

Interior Design / Furniture – Easy maintenance finishes; A common entry "vestibule" for male and female facilities is desirable. The "vestibule" may serve as the boot room; Separate locker rooms are provided to accommodate male and female maintenance staff. As the staffing mix changes, separate facilities may not always be required. Therefore, the locker rooms should be designed to accommodate this change. Both rooms are designed the same except for size. A connection between the two should be provided to accommodate the changing staff needs; Lockers 450 mm wide x 525 mm deep x 1800 mm high (18" x 21" x 72").

Special Requirements –

C. Boot Vestibule

Users – Maintenance staff.



Interior Design / Furniture – Easy maintenance finishes; Provide hooks for raincoats and shelves for boots.

Special Requirements – Exterior boot cleaning at the entry to personnel area: Flexible hose, Mud scrape, Floor drain.

D. Maintenance and Storage Area

The Administration/Maintenance Complex includes the building that houses the personnel areas for the cemetery maintenance staff, the workshops, vehicle and equipment maintenance areas, storage areas, and the Maintenance Yard, which contains out-of-doors maintenance activities. Limited space may be available for volunteers engaged in honor guard activities and equipment parking at the cemetery. Portions of the maintenance facility may be categorized for use by contractors. Contractor access to this space should not require passing through VA-controlled space or vice versa. Both the building and the Yard shall be physically secured. The entire complex should have fire detection and security systems.

The building should have durable materials and finishes that require little maintenance. The design and siting of the building should allow for future expansion, primarily in the personnel and equipment storage areas. The Administration/ Maintenance Complex should have separate secured vehicular access from the public road if possible.

(1.) Maintenance Office

Tasks – Supervise maintenance personnel and operations; Meet visitors/vendors; Meet with one or more maintenance staff; May issue parts and tools; Keep equipment inventory; Keep equipment maintenance records; Prepare supply requests; File maps and records; May control fuel pumps remotely if not programmed for Maintenance Bay; May control irrigation remotely.

Users – Foremen / Field Supervisors/ Team Leaders; Clerk if programmed (alternate location in Parts & Tools Storage).

Interior Design / Furniture – Maximum wall storage; Shelves for catalogues; Tack surface for maps, minimum 750 mm x 1050 mm (30" x 42"); Plan file, minimum 750 mm x 1050 mm (30" x 42"), with 1050 mm (42") high work counter; Drafting table, minimum 750 mm x 1050 mm (30" x 42"); File cabinet(s) may be under work counter; Workstation(s): File drawer(s), Box drawer(s), Pencil drawer, Typing surface; Wall mounted (book-type) map rack or flat file; Secured supply cabinets; Lateral file cabinets; Secured key cabinet; Desk chair; Side chair; Drafting stool.



(2.) Mechanics / Clerks Desk

Tasks – Maintenance inventory records; May issue parts and tools; Type, write, and telephone at the workstation; Prepare supply requests

Users – Automotive mechanic, Parts and Tools Clerk (if programmed)

Interior Design / Furniture – Shelves for catalogues and maintenance manuals; File cabinet(s); Workstation(s): File drawer(s), Box drawer(s), Pencil drawer(s), Typing surface

(3.) Maintenance Yard

The development of the Maintenance "Yard" should provide for (1) storage and movement of equipment, supplies, grave liners, and headstones that are kept outdoors, and (2) above-ground fuel tanks and pumps. Provide security fencing to maintenance yard adjacent to maintenance buildings. Provide the ability to separate the yard into NCA/ Contractor storage to accommodate contracted contractor maintenance services changes. Contractor yards shall include electrical, water, and sewer hookup for a job site trailer. The size of the yard must accommodate the unloading of delivery from a tractor-trailer truck.

- Design adequate space for truck maneuverability and parking of facility equipment, including trash dumpsters. NCA provides information on the volume of truck activity and the projection of future activity.
- Stormwater drainage output should include an oil/water separator for environmental compliance.

Special Requirements – Fuel Tanks and Pumps: Above ground storage tank with pumps, 3790 L (1000 gallon) total capacity, divided per program; Compressed air outlet at or near fuel pumps; Loading dock: freestanding platform with a ramp for forklift access to trucks, per program; Vehicle and Equipment Storage, sheltered or open per program; Headstone Storage, per program; Tractor-trailers must be able to negotiate this area; Vehicle wash area for steam cleaning, with oil/water separator drain to meet current EPA regulations or with recycling equipment, per program; Four 3600 mm (12') wide x 10 800 mm (36') deep x 1500 mm (5') high open bins for sand, gravel, and other aggregates. Alternate location may be soil spoils area; Mixing pad/containment area for chemical mixing/loading, if not located within Herbicide/Insecticide/pesticides. Storage Area; space and access for a trash dumpster and oil-water separator required for maintenance yard stormwater runoff.

(4.) Vehicle Maintenance

The Vehicle and Equipment Maintenance Area should have a minimum depth of 9145 mm (30') and be provided with a system to remove vehicle exhaust.



Planning Factors:**Maintenance and Equipment Facilities****Vehicle and Equipment Maintenance and Storage - Enclosed (Heated) Facilities****Vehicle and Equipment Maintenance Area**

(Hydraulic vehicle servicing lifts should be provided on an individual project basis.)

1. Routine Maintenance

Maintenance (oil change, tune-up, lubrication, belt, and hose replacement) that does not require removing a significant vehicle component.

- **Up to 15 burials/day** 44.6 NSM (480 NSF)
- **Over 15 burials/day** 89.2 NSM (960 NSF)

2. Heavy Maintenance

Maintenance that necessitates removing a vehicle's significant components (engine, transmission, and large components).

- **1-6 burials/day** None
- **Over 6 burials/day** 65.0 NSM (700 NSF)

NOTE: Space for this function is not required if the cemetery contracts out heavy maintenance.

a. Routine Maintenance Bay

Tasks – Minor vehicle and equipment service, including oil changes, engine tune-ups, tire changes, small-engine repairs.

Users – Automotive Mechanic; Equipment Operator.

Special Requirements – Work counter with maximum storage and electrical outlets every 900 mm (36"); Hose bibb, air outlet, and 120 V (volt) duplex required on the exterior; Pedestrian access directly to Parts & Tools; Vehicular access to Maintenance Yard; 3600 mm (12') garage door width, 4200 mm (14 ') height; coil type roll-up door preferred with electric opener; vision lights desirable; Air outlet @ 862 kPa (125 psi) and hose bibb required on the interior; Floor drains required which meet EPA standards for waste oil disposal, i.e., oil/water separator; 120 V (volt) duplex receptacles (plug strip) 600 mm (24" on center); minimum two 240 V (volt) receptacles.

b. Heavy Maintenance Bay

Requirements for a hydraulic lift must be coordinated for each project to suit the size and weights of the equipment. The preferred equipment is a surface-mounted 4-post drive-on lift with a rolling jack. Adequate clearances must be provided on all sides of the lift.



Tasks – Major vehicle and equipment service, including tune-up, engine overhauls, standard engine maintenance, and repairs.

Users – Automotive Mechanic; Equipment Operator.

Special Requirements – Where a lubrication distribution system is required. it shall accommodate: hydraulic fluid, 10 weight oil, 30 weight oil, gear oil, grease; Where a vehicle is noted on space requirements, it is to be surface mounted 4-post drive -on the lift, 9.1 - 10.9 metric ton (12-16 ton) capacity and rolling jack; Lubrication distribution system required in conjunction with lift; Work counter with maximum storage and electrical outlets every 900 mm (36"); Hose bibb, Air outlet @ 862 kPa (125 psi) and hose bibb required on the interior; Floor drains required which meet EPA standards for waste oil disposal, i.e., oil/water separator; 120 V (volt) duplex required on the exterior; Pedestrian access directly to Parts & Tools; Vehicular access to Maintenance Yard; 3600 mm (12') garage door width, 4200 mm (14 ') height; coil type roll-up door preferred with electric opener; vision lights desirable; Where hoist is required, provide beam with 1815 kg (4,000 lb.) concentrated load capacity; Waste oil storage area should be incorporated within or adjacent to Maintenance Bay.

(5.) Vehicle Wash

Provide floor drains and hose bibs at the wash rack, as appropriate, so that dirt and mud can be washed off vehicles and equipment after use. Drains shall be sized to accommodate frequent washing without clogging. NCA prefers to use self-contained wash water recycling systems. These are available on Federal Supply Schedule for purchase and installation by the contractor.

Planning Factors:

Wash Rack 22.3 NSM (240 NSF)

Special Requirements – Enclosed, sheltered, or open, per program and equipment requirements: Must accommodate backhoe and dump truck; Space heated to allow for vehicle drying without freezing if enclosed. Must meet EPA standards for wastewater disposal, i.e., oil/water separator or water recycling system.

(6.) Loading Dock

A loading dock is considered on a project-by-project basis. The preferred solution is utilizing natural topography to facilitate off-loading tractor-trailers.

Planning Factors:

Loading Dock 4.7 NSM (50 NSF)



(7.) Fuel Storage Tanks and Pumps

NCA uses above-ground fuel storage tanks and dispensing system. A divided tank is required, one tank for unleaded and one for diesel fuel, with a mounting pad and electrical service for the pumps. These are available on Federal Supply Schedule for purchase and installation by the contractor. Provide security fencing to control access.

Vehicle/Equipment Lift

Planning Factors:

Fuel Island 93.0 NSM (1,000 NSF)

(Three pumps and storage tanks for gasoline and diesel fuel.)

(The requirements for a fuel island and the number of pumps and storage are justified on an individual project basis.)

(8.) Hazardous Material Storage

Provide a prefabricated storage building for flammable materials (fuels, oils, solvents, and other hazardous materials) and non-flammable hazardous materials (fertilizers, pesticides, paints, cleaning products, and other non-flammable materials). The building should be OSHA compliant allow for storage of multiple types of hazards. Coordinate with cemetery Operations on required material classification and quantity for storage.

Planning Factors:

Hazardous Storage - Enclosed (Unheated)

- **1-6 burials/day** 9.3 NSM (100 NSF)
- **Over 6 burials/day** 18.6 NSM (200 NSF)

Special Requirements - May be provided as a standalone commercial off the shelf product; Designed to meet local building codes for flammable storage; Explosion-proof lighting; Appropriate signage; Secondary containment; Positive ventilation; Dry stack sprinkler head.

(9.) Workshops

Provide workshop areas in addition to routine maintenance space.

Planning Factors:

Workshops

- **1-6 burials/day** 9.3 NSM (100 NSF)
(Added to Routine Maintenance space.)
- **7-15 burials/day** 40.2 NSM (432 NSF)



- **Over 15 burials/day** 53.5 NSM (576 NSF)

Tasks – Welding, repair, and fabrication of carpentry, electrical, and plumbing for cemetery operations; limited degree of complexity.

Users – Building Maintenance Worker; Carpenter, Plumber, Electrician, if programmed.

Interior Design / Furniture – Maximum workspace/ counters and storage; 750 mm (30") and 600 mm (24") deep woodwork counters.

Special Requirements – 2400 mm x 3000 mm (8' - 10') wide garage door; Pedestrian access directly to Maintenance Yard and Parts & Tools; Pipe and lumber storage; Covered exterior work area when possible; 120 V (volt) duplex receptacles (plug strip) along work counter 600 mm (24" on center); minimum two 240 V (volt) receptacles; 120 V (volt) GFI duplex receptacle exterior; Compressed air outlet @ 862 kPa (125 psi) required on interior.

(10.) Parts and Tool Storage

Provide storage for parts and tools. Parts and Tools Storage should be easily accessible from the Foreman's office and the Vehicle and Equipment Maintenance Area. The volume of space over 3135 mm (7') high should be utilized to the greatest extent possible mezzanine storage.

Planning Factors:

Parts and Tools Storage

- **1-3 burials/day** 31.2 NSM (336 NSF)
(Includes Insecticide Storage)
- **4-6 burials/day** 41.8 NSM (450 NSF)
(Includes Insecticide Storage)
- **7-15 burials/day** **72.5 NSM (780 NSF)**
- **Over 15 burials/day** **96.3 NSM (1,035 NSF)**

Tasks –Clerk or other maintenance personnel issues supplies, uniforms, equipment, parts, small tools, and insecticides; Tools and field equipment issued and recorded; Orders for parts and tools prepared; Records reports about parts, tools, equipment, supplies, and vehicles prepared.

Users –Parts and Tools Clerk, if programmed; Mechanic, if programmed; Foreman or Maintenance Team Leader.

Interior Design / Furniture – Mechanic may control Parts & Tools; desk may be located in Maintenance Bay rather than in Parts & Tools; Counter, cage enclosure, secured where staff exceeds ten (10). Must have locked cabinet 1500 mm (60") wide x 500 mm



(20") deep x 2100 mm (84") height, with adjustable shelves where staff is ten (10) or less.

Special Requirements – Ice machine at or near pedestrian door if not programmed for Lunchroom; 2400 mm - 3000 mm (8' - 10') wide garage door for loading/unloading trucks; 1800 mm (6') wide double doors may be used instead of garage door and pedestrian door; Pedestrian access directly to Maintenance Yard and Maintenance Bay; Maximum storage utilizing all available volume (loft); metal shelving for parts; storage for supplies and uniforms supplied by the cemetery; Exterior hose bibb; Exterior 120 V (volt) duplex outlet; Requires desk with typing return and telephone where staff exceeds ten (10).

(11.) Pesticide Storage, Mixing, & Loading

Provide storage and mixing area as prescribed by authorities having jurisdiction (EPA, state, and other code officials). At a minimum, storage areas have chemical-resistant coated surfaces and secondary containment areas. Also, provide dust and explosion-proof lighting, positive ventilation, appropriate signage, and an eye wash/emergency shower. Coordinate with cemetery Operations on required type and quantity for storage.

Planning Factors:

Pesticide Storage

- **1-6 burials/day** Combined in Hazardous Material Storage
- **Over 6 burials/day** 9.3 NSM (100 NSF)

Special Requirements – Designed to meet current EPA regulations for chemical storage and containment; Designed to meet local building codes and pesticide storage regulations; Fire-proof construction; Positive ventilation, with explosion-proof motor(s); Impermeable floor surface; Chemical resistant coated surfaces; sealed concrete floors; Explosion and dust proof lighting; Key locking doors; Metal storage shelving; Secondary containment area to prevent spill leakage; Mix and load area adjacent to storage, under roof with containment area; Eyewash/emergency shower; SS sink with foot controls and SS drainboard; Dry stack sprinkler head.

(12.) Vehicle, Equipment, and Materials Storage

Provide uncovered and covered storage per specific cemetery and operations guidance. NCA typically designs enclosed storage buildings, open front-pole barn-type structures, or roof cover carports to keep those items from direct sun and weather elements. In cold weather climates, an enclosed building is typically used. In milder climates, an open front pole barn structure or carport-type roof is used. Enclosed equipment storage areas are not generally heated. However, convenient electrical outlets should be provided for engine block heaters to protect the equipment in extreme cold weather areas. Facility heating may be utilized as long as it is



controlled adequately through schedules and occupancy sensors to avoid wasting energy during evenings weekends. The area must be shielded from view or located away from gravesites.

Planning Factors:

Vehicle and Equipment Storage – Enclosed (Unheated), Sheltered, Paved

Vehicles and Grounds Maintenance Equipment -

The total storage space (NSM/NSF) required is determined from the following equipment index. The total space to be enclosed, sheltered, or paved is determined on an individual project basis.

1. Back Hoes	26.8 NSM (288 NSF)
2. Utility Truck (one only)	22.3 NSM (240 NSF)
3. Dump Trucks	22.3 NSM (240 NSF)
4. Pickup Trucks	22.3 NSM (240 NSF)
5. Truck Trailers	22.3 NSM (240 NSF)
6. Automobiles	22.3 NSM (240 NSF)
7. Plow Blades	11.2 NSM (120 NSF)
8. Street Sweeper (one only)	11.2 NSM (120 NSF)
9. Industrial Tractors	8.9 NSM (96 NSF)
10. Agricultural/Garden and Lawn Tractors	3.0 NSM (32 NSF)
11. Trailers (Tractor)	3.0 NSM (32 NSF)
12. Fork Lift	8.9 NSM (96 NSF)
13. Tractor-Mounted Gang Mower	37.2 NSM (400 NSF)
14. Hand Mowers and Trimmers (per 2)	1.1 NSM (12 NSF)
15. Toro Mower (Grounds Master)	4.5 NSM (48 NSF)
16. Tank Sprayer (Tractor)	6.5 NSM (70 NSF)
17. Air Compressor	6.5 NSM (70 NSF)
18. Wood Chipper	9.3 NSM (100 NSF)
19. Seeder	7.4 NSM (80 NSF)
20. Spreader	7.4 NSM (80 NSF)
21. Equipment Attachments (auger, power rake, core aerator, etc.)	1.1 NSM (12 NSF) each

Grounds Maintenance Storage - Enclosed (Unheated)

• 1-3 burials/day	None
• 4-6 burials/day	9.3 NSM (100 NSF)
• 7-15 burials/day	26.8 NSM (288 NSF)



- **Over 15 burials/day** 37.2 NSM (400 NSF)

Vehicle and Equipment Storage - Definitions.

1. Enclosed (E)- the structure has a roof and is enclosed on all four sides.
2. Sheltered (S) - the structure has a roof and is enclosed on three sides.
 - (a) Exception - the structure has a roof and be open on all sides in a geographical location where climate permits.
3. Paved (P) – The area does not have a structure.

Vehicle and Grounds Maintenance Equipment Storage - Guidelines for determining the proportion of the total storage space to be Enclosed (E), Sheltered (S), and Paved (P). These general guidelines should be used in conjunction with specific climatic data for the cemetery.

Vehicle/ Equipment	Storage by Weather Conditions/Location	
	Warmer	Colder
(1) Back Hoes	S	E
(2) Utility Trucks	S (or exception)	S
(3) Dump Trucks	One S All others P	One E All others S
(4) Pickup Trucks	P	S
(5) Truck Trailers	S (or exception)	S
(6) Automobiles	P	S
(7) Plow Blades	P	P
(8) Street Sweeper	S	E
(9) Industrial Tractors	S (or exception)	E
(10) Agricultural and Garden and Lawn Tractors	S (or exception)	S
(11) Trailers (Tractor)	P	P
(12) Forklift	S (or exception)	E
(13) Tractor-mounted Gang Mower	S	S
(14) Hand Mowers and Trimmers	E	E
(15) Toro Mower (Grounds Master)	S	S
(16) Tank Sprayer (tractor)	S (or exception)	E



Vehicle/ Equipment	Storage by Weather Conditions/Location	
	Warmer	Colder
(17) Air Compressor	E	E
(18) Wood Chipper	S	S
(19) Seeder	E	E
(20) Spreader	E	E

Special Requirements – Material storage 6' double doors may be used instead of garage door; 10' - 12' garage door width, 10' - 12' height; coil type roll-up door preferred with electric opener; vision lights desirable; Pedestrian access to Maintenance Yard; Compressed air outlets @ 862 kPa (125 psi).

(13.) Headstone Storage

Provide an area for headstone storage. The area must be shielded from view or located away from gravesites.

Planning Factors:

Headstones (Paved)

- **1-6 burials/day** 11.2 NSM (120 NSF)
- **7-15 burials/day** 22.3 NSM (240 NSF)
- **Over 15 burials/day** 33.5 NSM (360 NSF)

(14.) Sand & Gravel Storage Bins

Provide sand, topsoil, gravel, compost, decomposed granite, and salt storage areas separated to prevent mixing. NCA typically includes a 3-bin roof/wall-covered materials storage structure with each new national cemetery design. Each of those three bins is typically 12'-14' in width and 24'-30' in depth. The bins include structural concrete walls to 6' height so that materials can be pushed up against the walls without fear of damage. Concrete masonry units (CMU) are prohibited due to cracking or crushing with the prolonged operation. The slabs of the bins are concrete (not asphalt). An 8-ft. apron on the front side of the bins allows the materials to be scraped and pushed onto the slab. The roof cover is typically designed to have about 18' vertical clearance in front of bins for dump trucks to dump materials into the bins with their beds raised or for backhoes to maneuver without hitting the roof. That roofline is typically pitched on a single slope to a 12' height at the backside of the bins. Roofs and sidewalls are typically metal panels. Coordinate with cemetery Operations on required type and quantity for storage.



2.7.7. FA7, HONOR GUARD AREA

Provide a space dedicated to Honor Guard support of burial services. Space includes locker rooms, firearms storage, and lounge area. See [Section 19.0 X - Other](#) and [VA's Physical Security and Resiliency Design Manual](#) for additional considerations pertaining to storage and security of ceremonial firearms.

Users – Volunteer Honor Guard.

Interior Design / Furniture – Locker 450 mm wide x 525 mm deep x 1800 mm high (18" x 21" x 72" or 36"); Lockable cabinet; Firearms cabinet.

Special Requirements – Firearms storage space must meet Federal Storage Regulations.



3.0 GENERAL REQUIREMENTS

3.1. INTEGRATED DESIGN PROCESS (IDP)

VA is a proponent of the Integrated Design Process. IDP is a project delivery method, following closely upon the heels of CM-at-large, Design/Build, and LEAN construction. But IDP goes beyond these other delivery methods in that it binds the parties into a contractual arrangement where risk and reward are genuinely shared. IDP also goes well beyond typical collaboration and team-building efforts.

The VA's preparation for a project identifies the need for a building based on quantifiable requirements for space and budgetary capacity to undertake the activity. A needs assessment accompanies this planning activity—it describes space use; develops estimates of requirements both spatial and technical; initiates evaluation of possible environmental impacts,

The A/E's team, planners, architects, landscape architects, engineers, and consultants must work together from the project's inception. They must make sure that all engineering disciplines coordinate with the architectural programming requirements of the project. Exercise care to provide design solutions that meet the construction standards, space requirements, equipment layouts, and vertical and horizontal clearances shall resolve by the final design development submission. Where possible, incorporate the mechanical equipment space into the building envelope to avoid the need for a screen.

3.2. SUSTAINABLE DESIGN

The Federal Government has issued three Federal Mandates (one law and two Executive Branch policies) for Executive Branch agencies that outline sustainable and energy goals. In addition, on March 30, 2007, the VA signed a Green Buildings Action Plan that guides compliance.

The *VA Sustainable Design Manual* (<https://www.cfm.va.gov/til/sustain.asp>) is the agency's guidance to define a methodology to achieve these Federal Mandates. The Manual guides in incorporating sustainable design on every phase of a project, from proposals, goal setting, and preliminary planning through design and construction for projects of all sizes. Recognizing that each space acquisition project is unique and requires different strategies, all projects must meet the Federal Mandates appropriately given the project scope and budget.

3.2.1. OPTIMIZE ENERGY PERFORMANCE

- **Energy Efficiency:** Establish a whole building performance target that considers the intended use, occupancy, operations, plug loads, other energy demands, and design to earn the Energy Star® targets for new construction



and significant renovation where applicable. For new construction, reduce the energy cost budget by 30 percent compared to the baseline building performance rating per the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., (ASHRAE) and the Illuminating Engineering Society of North America (IESNA) Standard 90.1-2004, Energy Standard for Buildings except Low-Rise Residential. For major renovations, reduce the energy cost budget by 20 percent below pre-renovations 2003 building performance baseline.

- **Measurement and Verification:** Following DOE guidelines issued under [*Section 103 of the Energy Policy Act of 2005*](#) (EP Act), install building-level utility meters in new major construction and renovation projects to track and continuously optimize performance. Compare actual performance data from the first year of operation with the energy design target. After one year of occupancy, measure all-new major installations using the Energy Star® Benchmarking Tool for building and space types covered by Energy Star®. Enter data and lessons learned from sustainable buildings into the High-Performance Buildings Database.

3.2.2. PROTECT AND CONSERVE WATER

- **Indoor Water:** Employ strategies that aggregate use a minimum of 20 percent less potable water than the indoor water use baseline calculated for the building after meeting the Energy Policy Act of 1992 fixture performance requirements.
- **Outdoor Water:** Use water-efficient landscape and irrigation strategies, including water reuse and recycling, to reduce outdoor potable water consumption by a minimum of 50 percent over that consumed by conventional means (plant species and plant densities). Employ design and construction strategies that reduce stormwater runoff and polluted site water runoff.
- Consider areas of irrigation and options of areas not irrigated during design and planning.

3.2.3. EXECUTIVE ORDER 13514, REDUCTION OF GREENHOUSE GASES

This Executive Order requires agencies to measure, manage, and reduce greenhouse gas emissions toward agency-defined targets. It describes a process by which agency goals are set and reported. Additionally, the Executive Order requires all Federal agencies to meet energy, water, and waste reduction targets, including:

- 30% reduction in vehicle fleet petroleum use by 2020;
- 26% improvement in water efficiency by 2020;



- 50% recycling and waste diversion by 2015;
- 95% of all applicable contracts must meet sustainability requirements;
- Implementation of the 2030 net-zero-energy building requirement;
- Implementation of the stormwater provisions of the *Energy Independence and Security Act of 2007, section 438*.
- Development of guidance for sustainable Federal building locations must align with the Livability Principles put forward by the Department of Housing and Urban Development, the Department of Transportation, and the Environmental Protection Agency.

It is the intent and responsibility that all A/E's designing projects for the VA, whether minor or major projects in scope, meet this Executive Order's goals to reduce costs, reduce air and water pollution, and utilize clean energy. Implementation of the Executive Order shall focus on integrating sustainability goals with agency mission and strategic planning to optimize performance and minimize implementation costs.

Implementation is managed through the previously established Office of the Federal Environmental Executive, working in close partnership with the Office of Management and Budget (OMB) and Council on Environmental Quality (CEQ).

U.S. Department of Energy has developed a series of initiatives to implement "cool" roof technologies more broadly on U.S. Government Facilities and Buildings. Cool roofs use lighter-colored roofing surfaces or special coatings to reflect more of the sun's heat, helping improve building efficiency by reducing cooling costs and offsetting carbon emissions.

Cool roofs are one of the quickest and lowest-cost ways to reduce global carbon emissions. Demonstrating the benefits of cool roofs on our VA facilities can lead the nation toward more sustainable building practices while reducing taxpayers' federal carbon footprint and saving money.

Roofs and road pavement cover 50 to 65 percent of urban areas. Because they absorb so much heat, dark-colored roofs and roadways create the "urban heat island effect," where a city is significantly warmer than its surrounding rural areas. Cool roofs considerably reduce the heat island effect and improve air quality by reducing emissions. A recent DOE initiative indicates that using cool roofs and cool pavements in cities can help reduce the demand for air conditioning, entire cool cities and potentially cancel the heating effect of up to two years of worldwide carbon dioxide emissions.

3.2.4. ENHANCE INDOOR ENVIRONMENTAL QUALITY

The A/E shall implement and comply with the VA Green Buildings Action Plan: Implementing the Memorandum of Understanding on Federal Leadership in High Performance and Sustainable Buildings, dated February 28, 2006.



- **Ventilation and Thermal Comfort:** Meet the current ASHRAE Standards, Thermal Environmental Conditions for Human Occupancy, including continuous humidity control within established ranges per climate zone, and ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality.
- **Moisture Control:** Establish and implement a moisture control strategy according to ASHRAE Standards 55-2004 and 62-2004 for controlling moisture flows and condensation to prevent building damage and mold contamination.
- **Daylighting:** Achieve a minimum daylight factor of 2 percent (excluding all direct sunlight penetration) in 75 percent of all space occupied for critical visual tasks. Provide automatic dimming controls or accessible manual lighting controls and appropriate glare control.
- **Low-Emitting Materials:** Specify materials and products with low pollutant emissions, including adhesives, sealants, paints, carpet systems, and furnishings.
- **Protect Indoor Air Quality during Construction:** Follow the recommended approach of the Sheet Metal and Air Conditioning Contractor's National Association Indoor Air Quality Guidelines for Occupied Buildings under Construction, 1995. After construction and before occupancy, conduct a minimum 72-hour flush-out with maximum outdoor air consistent with achieving relative humidity no greater than 60 percent. After occupancy, continue flush-out as necessary to minimize exposure to contaminants from new building materials.

3.2.5. REDUCE ENVIRONMENTAL IMPACT OF MATERIALS

- **Recycled Content:** For EPA-designated products, use products meeting or exceeding EPA's recycled content recommendations. For other products, use materials with recycled content. The sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.
- **Bio-based Content:** For USDA-designated products, use materials meeting or exceeding USDA's biobased content recommendations. For other products, use biobased products made from rapidly renewable resources and certified sustainable wood products.
- **Construction Waste:** During a project's planning stage, identify local recycling and salvage operations to process site-related waste. Program the design to recycle or salvage at least 50 percent construction, demolition, and land clearing waste, excluding soil, where markets or onsite recycling opportunities exist.
- **Ozone Depleting Compounds:** Eliminate the use of ozone-depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with Title VI



of the Clean Air Act Amendments of 1990 or equivalent. Overall, air quality benefits take into account life cycle impacts.

3.2.6. PRIORITY TO RENOVATION OF EXISTING FACILITIES.

- If not inconsistent with mission needs, priority should be given to renovating existing buildings and other facilities over new construction. Renovation saves energy and physical resources and is often more cost-effective than new construction.
- Where historic buildings or building complexes are present, special efforts should be made to rehabilitate and reuse them under the National Historic Preservation Act of 1966, as amended, provided doing so achieves VA's mission requirements.

3.3. ACCESSIBILITY

All features constructed, except turf-covered gravesites, shall be fully accessible to physically disabled persons, in compliance with the Americans With Disabilities Act-1990 (ADA), Architectural Barriers Act of 1968 (ABA), as amended other applicable policies governing barrier-free access. To achieve compliance, the National Cemetery Administration uses the Architectural Barriers Act Accessibility Standard (ABAAS) as its standard for building and facility design. The standards are found at the following URLs: <http://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/aba-standards> and <https://www.cfm.va.gov/til/accessibility.asp>. The criteria of these standards should be considered a minimum in providing access for the physically disabled. Dimensions that are not stated as “maximum” or “minimum” are absolute. All dimensions are subject to conventional industry construction tolerances except the requirement as a range with specific minimum and maximum endpoints. All aspects of compliance are to be discussed, and exceptions may apply based on on-site specific conditions.

Refer to the TIL – *VA’s Barrier-Free Design Standard, PG-18-13*
(<https://www.cfm.va.gov/til/accessibility.asp>)

3.4. HISTORIC PRESERVATION, ARCHAEOLOGY, CULTURAL RESOURCE MANAGEMENT

NCA locations may be listed in the National Register of Historic Places and subject to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended). Sites may contain historic features such as Lodges or walls in which character and appearance should be maintained.

Refer to: *Directive 7545* and *Section 5.12 of this Manual*



3.5. ENVIRONMENTAL COMPLIANCE

Environmental compliance is based upon the Department of Veterans Affairs “Environmental Effects of VA Actions,” 38 CFR Part 26.

See also Section 5.11. of this manual for more information

3.6. PHYSICAL SECURITY

VA facilities owned, leased, managed, constructed, modernized, or purchased shall have countermeasures designed into the facility’s infrastructure to abate potential threats.

Refer to the TIL – *VA’s Physical Security Design Manual*
(<https://www.cfm.va.gov/til/dManual.asp#PSR>)

CONSIDERATIONS

- Providing a secure design that meets all facility requirements is often a challenge. Providing the most secure facility, architecturally expressive design, or energy-efficient building envelope with limited resources is not always feasible. All project or design stakeholders must work cooperatively to ensure a balanced design from the planning and concept stages through construction documents. Successful designs must consider all competing design objectives and make the best selections.
- Care should be taken to implement physical security measures that allow Fire Protection forces access to sites, buildings, and building occupants with adequate means of emergency egress.
- Consideration should be given to integrating various stand-alone security systems, integrating systems across remote locations, and integrating security systems with other communications and fire and emergency management systems.

3.6.1. PHYSICAL SECURITY MASTER PLANNING REQUIREMENTS

As part of the master plan development, conduct appropriate risk and vulnerability assessments for the facility or campus being planned. The findings of these assessments shall be incorporated into the master plan. For facilities with master plans, these plans shall include physical security design guidelines and parameters consistent with those included in, or referenced by, this document. At a minimum, master plans shall include standoff distances, provisions for perimeter security, site access control, applicable Crime Prevention Through Environmental Design (CPTED) principles, site utility entrances and distribution, a mass evacuation plan, and a schedule for implementation of design guidelines and parameters or approved risk mitigation alternatives.



3.7. SEISMIC AND OTHER NATURAL HAZARDS

Consideration should be given to seismic and blast-resistant design as they share some standard analytical methodologies and a performance-based design philosophy that accepts varying levels of damage in response to varying levels of dynamic excitation. Both design approaches recognize that it is cost-prohibitive to provide comprehensive protection against all conceivable events. An appropriate level of protection that lessens the risk of mass casualties can be provided at a reasonable cost. Both seismic and blast-resistant design approaches benefit from a risk assessment that evaluates the functionality, criticality, occupancy, site conditions, and design features. Weather-related (hurricane and tornado) protection requires blast-resistant design. Blast-resistant facade systems require the glass to satisfy the debris hazard conditions in response to the specified blast loading.

In contrast, the mullions and anchors must resist the collected forces within the specified deflection and flexibility limits. In addition to resisting the specified blast loads, the criteria often require the designer to consider the more extreme blast loading damages. The criterion requires a balanced design. The mullions must develop the capacity of the selected glass within allowable deformation limits, and the anchors must develop the capacity of the selected mullions.

- **Window Fenestration:** The total fenestration openings are not limited; however, a maximum of 40 percent per structural bay is a preferred design goal. In the renovation of older buildings and new construction in older buildings' ensembles, the impacts of fenestration design on historic buildings and views must be considered and addressed in planning.
- **Window Frames:** The frame system should develop the maximum capacity of the chosen glazing up to 750 breaks per 1000 and provide the required level of protection without failure; this can be shown through design calculations or approved testing methods.
- **Anchorage:** The anchorage should remain attached to the facility's walls during an explosive event without failure. The capacity of the anchorage system can be shown through design calculations or approved tests that demonstrate that failure of the proposed anchorage does not occur and that the required performance level specified is provided.

Refer to the TIL – *VA's Seismic Design Handbook, H-18-8*
(<https://www.cfm.va.gov/til/seismic.asp>)

3.8. COMMISSIONING

In 2006, the VA co-signed the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (MOU) and many other federal agencies, which was subsequently included in Executive Order 13423 – Strengthening Federal Environmental Energy,



and Transportation Management. One of the requirements of this MOU is for total building commissioning (Cx) practices for federal buildings.

Total building commissioning practices shall be employed in a project's design, construction, and guarantee phases; the VA identifies a Commissioning Agent (CxA) who works directly for VA at the pre-design phase. The A/E shall work collaboratively with the CxA in all aspects of commissioning work from the pre-design, Schematic, Design Development, and Construction Document phases of the design work. Moreover, the A/E shall work collaboratively with the CxA during the construction phase of the project.

The VA utilizes the services of an independent third-party commissioning authority to oversee the project from design to construction documents and Post Occupancy commissioning plan to verify the design and engineering performance, including the installation and performance of systems to be commissioned, providing the VA with a commissioning report.

The A/E shall use and follow the *NCA's Commissioning Process Manual* (<https://www.cfm.va.gov/til/NCA.asp>) TIL as a guide for the commissioning work.

The A/E shall use and modify, as needed, the VA General Commissioning Specifications, located in TIL – *Master Construction Specifications edited for NCA construction projects, Div 01, General Requirements, Section 01 91 00* (<https://www.cfm.va.gov/til/ncaSpec.asp>), to suit the design criteria, size, and complexity of a project.



4.0 DESIGNER REQUIREMENTS

4.1. RESPONSIBILITY

The A/E shall provide all necessary professional services to perform the planning and design of the systems for the project. The A/E is responsible and liable for the professional design per Scope of Work (SOW), the contract, sound engineering practices, VA standards, VA project-specific requirements, if any, and all applicable codes.

4.2. AUTHORITY HAVING JURISDICTION

Unless otherwise directed by VA, the Authority Having Jurisdiction is the NCA Operations Director.

4.3. COORDINATION

4.3.1. DESIGN QUALITY CONTROL:

The Architect-Engineer shall coordinate planning and design work with the architectural, landscape, structural, civil, plumbing, mechanical, fire protection, and LEED/Sustainable designs.

The A/E shall implement and maintain a quality-control program assuring that all services, designs, drawings, and specifications required by the contract are performed and provided in a manner that meets professional architectural and engineering quality standards adopted and utilized by the Department of Veterans Affairs.

The design documents shall be systematically and thoroughly reviewed for compliance with VA's project requirements and applicable codes, commitments made in EIA documents, and agreements entered into under environmental and historic preservation regulations. VA-approved deviations in the design documents shall be documented. T. The A/E shall be held responsible for ensuring that all sub-consultants comply with the design requirements. Likewise, all Sub-consultants shall be held responsible for ensuring that their portion of the project complies with the design requirements.

4.4. DOCUMENT CHECKING, AGENCY CONSULTING/ REVIEW/ APPROVAL SERVICES

Provide environmental coordination between the A/E, NCA, and the VA Contracting Officer. – See VA Environmental Compliance Manual.



Provide historical and cultural resource coordination between the A/E, NCA, and the VA Contracting Officer.

Research Federal, State, and municipal laws, regulations, and permits concerning design and construction controls for environmental protection of aesthetics, air, water, and land. See *NCA Master Construction Specifications, Environmental Protection* (<https://www.cfm.va.gov/til/ncaSpec.asp>). VA, as owner, signs permits and pays necessary fees appropriate to the owner. Investigate the following regulatory categories:

- A. Stormwater permits, e.g., National Pollutant Discharge Elimination System (NPDES).
- B. Pollution control and solid waste disposal.
- C. Erosion control and protection of land resources.
- D. Protection of the landscape.
- E. Protection of water resources, wetlands, and areas preserved for wildlife.

4.5. EXISTING CONDITIONS

The A/E shall investigate the building to determine if sufficient structural, mechanical, plumbing, site utilities, and electrical capacity can accommodate the renovations or additions to existing buildings. Particular attention should be directed towards structural loads and HVAC and electrical systems. If applicable, the A/E shall inform the VA Project Manager if additional structural, mechanical, plumbing and electrical capacity is required.



5.0 VA DESIGN REQUIREMENTS AND STANDARDS

The following are requirements and standards of VA's Office of Construction and Facilities Management's Technical Information Library (TIL):

5.1. NCA MASTER CONSTRUCTION SPECIFICATIONS (PG-18-1)

Located in TIL <https://www.cfm.va.gov/til/ncaSpec.asp#01>

Purpose: Defines a standardized method for the A/E to assure that the contractor provides equipment and systems that meet the design intent in terms of performance, quality, and cost

The Specifications accomplish this by:

- Providing specific narrative descriptions of required equipment, salient elements, and system construction
- Listing applicable standards and codes and references
- Requiring individual submittal of equipment and systems for review and approval before contractor's purchase
- Defining specific installation methods to be used

5.2. DESIGN AND CONSTRUCTION PROCEDURES (PG-18-3)

Located in TIL <https://www.cfm.va.gov/til/cPro.asp>

Purpose: Establishes minimum consistent design/construction practices of all VA units. Planners and Designers should be aware of what topics of (PG-18-3) apply to NCA construction or are scaled down to meet the needs of NCA.

The Procedures section accomplishes this by:

- Referencing applicable codes and policies
- Describing standard drawing formats
- Listing security strategies
- Including miscellaneous design details

5.3. NATIONAL CAD STANDARD, VHA/NCA APPLICATION GUIDE & STANDARD DETAILS (PG-18-4)

Located in TIL <https://www.cfm.va.gov/til/projReq.asp>

<https://www.cfm.va.gov/til/sDetail.asp>



Purpose: The VHA Application Guide adopts the NIBS National CAD Standard, establishes VA-specific drafting standards for preparing design and construction documents, and provides utility and sheet template files and standard construction details organized by discipline for use in design and construction documents of VA projects.

5.4. EQUIPMENT GUIDE LIST (PG-18-5)

Located in TIL, <https://www.cfm.va.gov/TIL/equip.asp>

See Excel spreadsheets equip701 & equip703 for administrative and maintenance areas, respectively.

Purpose: Provides information for planning and developing all equipment and furnishings requirements in all VA rooms/spaces.

5.5. SEISMIC DESIGN HANDBOOK (H-18-8)

Located in TIL <https://www.cfm.va.gov/TIL/seismic.asp>

Purpose: Provides the A/E with specific requirements and design parameters for seismic design and addresses the following topics of concern:

- New Critical and Essential Facilities
- New Ancillary Facilities
- Existing Facilities for evaluation or rehabilitation include alternative seismic approaches.
- Spectral Response Acceleration
- Special Provisions for Structures in Seismic Categories C, D, E, and F
- Limitations on Steel Structures and Reinforced Concrete Structures
- Drift Limitations, including Modifications of IBC requirements for new Critical and Essential facilities in high seismic design categories.

5.6. DESIGN MANUALS (PG-18-10)

Located in TIL <https://www.cfm.va.gov/til/dManual.asp>

Purpose: To convey the general and specific VA design philosophy for the HVAC, Electrical, Plumbing, Fire Protection, and other systems for VA medical and support facilities, the Manuals accomplish this purpose by:

- Explaining specific design methodologies
- Listing acceptable system types
- Setting the overall energy consumption target



- Codifying certain code interpretations
- Listing values for design parameters
- Referencing certain sections of the Master Specification and Standard Details
- Containing examples of specific design elements

Note: The A/E shall submit to VA a list of Design Manuals and the TIL posted dates in effect on the contract award date.

5.7. DESIGN GUIDES (PG-18-12)

Located in TIL <https://www.cfm.va.gov/til/dGuide.asp>

Applicability: Although centered around VA medical facilities, design disciplines shall follow guidance for similar administrative and facility support/maintenance functions. Information Technology, Electrical, Plumbing, Mechanical, and other systems have applicability.

Purpose: Provides the A/E with specific layout templates for all spaces/uses and specific design parameters for structural, electrical, and mechanical service. The Design Guides accomplish this by:

- Design Guides contain descriptive and graphical concepts of specialized services provided by the VA. They are instrumental in describing and graphically annotating components and relationships to one another specific to the area of specialization. Additionally, they contain:
 - Design narratives
 - Functional diagrams and room guide plates
 - Identifies baseline room finishes and engineering design requirements
 - Updated on a three to five-year cycle.
- The User of the Design Guides should be aware that significant updates and revisions to the VA Design Guides are a work in progress that is continually changing based on advances in changing cemetery practices. Updates and revisions are incremental, and where significant updates occur, design alerts are issued and remain effective until the Guide is updated. Completed Guides are posted on the Technical Information Library (TIL) and noted as current. Information in the Design Guides may be dated, and it is recommended to use it with moderate caution to assure that current standards of the health care industry are addressed in meeting VA's needs.
- Design Guides are intended to help speed the design process, control cost, avoid errors and omissions, and get value for dollars spent. Design guides are developed in partnership with the using service and are benchmarked with similar private-sector guides. They are to be applied flexibly, not as rigid standards.



5.8. BARRIER-FREE DESIGN STANDARD (PG-18-13)

Located in TIL <https://www.cfm.va.gov/TIL/accessibility.asp>

Purpose: Provides the A/E with VA standards that exceed the minimums of the Architectural Barriers Act (ABA) and the Americans with Disabilities Act (ADA) for all VA/NCA facilities users. These standards relate to specific Veteran population needs.

5.9. ROOM FINISHES, DOOR, AND HARDWARE SCHEDULES (PG-18-14)

Located in TIL <https://www.cfm.va.gov/til/spclRqmts.asp#room>

Applicability: Although centered around VA medical facilities, this guide shall aid the designer in choosing appropriate finishes, doors, and hardware for similar administrative functions. NCA is working on adding criteria to this manual in the future.

Purpose: This document provides guidelines for VA Facility Interior finishes, doors, and hardware for new or renovated facilities constructed within the Department of Veterans Affairs. The essential criteria for selecting products/materials are their appropriateness for function and space, sustainability, life cycle costs, durability, and ease of maintenance.

5.10. MINIMUM REQUIREMENTS FOR A/E SUBMISSIONS (PG-18-15)

Located in TIL <https://www.cfm.va.gov/til/aeDesSubReq.asp>

Purpose: To provide a staged listing of tasks in various design categories as a way to define the A/E scope to assure thorough and timely completion of the final design package and bid documents

The Instructions accomplishes this purpose by:

- Progressively listing tasks as Schematic, Design Development, and Construction Documents stages
- Requiring task completion and submission for each stage according to a Critical Path Method (CPM) calendar
- Implementation of a QA/QC process to assure a quality design product
- Requiring life cycle analysis of alternatives to optimize the design/cost tradeoff
- Listing and detailing all the drawings, calculations, and specifications required for a complete design package indicating the final distribution of bid documents



5.11. ENVIRONMENTAL COMPLIANCE MANUAL (PG-18-17)

Located in CFM Website <https://www.cfm.va.gov/environmental/index.asp>

Purpose: This manual provides guidance to VA project proponents for ensuring the required evaluation of potential impacts under the National Environmental Policy Act (NEPA) is technically adequate and legally sufficient. This evaluation may be concluded at one of three levels of evaluation as appropriate: a Categorical Exclusion (CATEX) for projects meeting one of the definitions in VA's Implementing Regulations (Title 38 CFR Part 26) with no extraordinary circumstances; an Environmental Assessment (EA) resulting in a Finding of No Significant Impact (FONSI) for projects which do not meet a CATEX definition; or an Environmental Impact Statement (EIS) for those projects which have an impact(s), but still make sense to proceed with legally binding Mitigation Measures to be implemented. This document also guides concerning the interaction of the NEPA evaluation and other environmental/historical regulatory requirements.

See also Section 3.5. of this manual for additional information.

5.12. THE NCA CULTURAL RESOURCE MANAGEMENT (NCA DIRECTIVE 7545)

Directive 7545 and Section 3.4 of this Manual

Purpose:

This directive describes the NCA's procedures to meet Federal preservation requirements for all program and construction activities affecting cultural resources. Cultural resources include historic buildings, landscapes and districts, archaeological sites, Indian tribal spiritual sites and burial places, historical documents and artifacts, and neighborhoods and communities' cultural and historical values, all of which may be affected by NCA construction projects.

5.13. DESIGN REVIEW CHECKLISTS

Located in TIL <https://www.cfm.va.gov/til/aeDesSubReq.asp>

Purpose: Provides the VA Peer Reviewer with a minimum list of critical items, which must be included in each A/E submission

The Checklist accomplishes this by referring to all applicable VA design tools, included but are not necessarily limited to the listed checklists, which apply to the specific project

- Site and Landscape
- Architecture
- Detailing Life Safety and coordination requirements
- Structural



- Heating, Ventilating, and Air Conditioning
- Plumbing / Fire Protection / Sanitary
- Steam Distribution
- Steam Generation
- Boiler Safety Devices - Operation Checklist
- Electrical
- Incineration

5.14. DESIGN ALERTS

Located in TIL <https://www.cfm.va.gov/til/alert.asp>

Purpose: Communicates current design issues and solutions by:

- Publishing periodic alert memos
- Summarizing design solutions

5.15. STANDARDS ALERTS

Located in TIL <https://www.cfm.va.gov/til/alert.asp>

Purpose: Identify innovative and broad ranging Standards and Design processes and procedures that have a major impact on the VA's goal of delivering world-class facilities by:

- Publishing periodic alert memos
- Summarizing design solutions

5.16. COST ESTIMATING MANUAL

Located in TIL <https://www.cfm.va.gov/cost/>

Purpose: To convey the general and specific VA cost estimating philosophy for VA facilities

The Manual accomplishes this by:

- Explaining specific estimating methodologies
- Containing examples of certain design elements
- Provides proper format
- Integrates the General Accountability Office (GAO) Estimating Process [GAO-09-3SP GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs](#) and GAO audit recommendations. and GAO Cost Estimating and Assessment Guide [Cost](#)



Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs (gao.gov)

5.17. SUSTAINABLE DESIGN

Located in TIL <https://www.cfm.va.gov/til/sustain.asp>

Purpose: This manual identifies the seven sustainability goals outlined in the Federal Mandates and maps each goal to the appropriate LEED strategy for implementation. Methods for consideration to achieve the goals, budget considerations, case studies, and checklists are also included.

The Manual accomplishes this by:

- Prescribing the use of integrated design practices
- Providing strategies for optimization of energy performance
- Providing strategies for the protection and conservation of water resources
- Providing strategies for enhancement of indoor environmental quality
- Providing strategies for reduction of the environmental impact of materials

5.18. PHYSICAL SECURITY AND RESILIENCY DESIGN MANUAL (PG-18-10)

Located in TIL <https://www.cfm.va.gov/til/dManual.asp#PSR>

Purpose: Design Manual for VA Facilities sets physical security standards for facilities required to continue operation during a natural or human-made extreme event and for facilities required to protect staff life safety in an emergency.

The Manuals accomplish this by:

- Setting objectives for physical security
- Providing strategies for use in design and construction to protect VA facilities
- Providing cost-effective design criteria

Please contact your project manager for any interim physical security guidance, such as applicable cemetery-related updates to the manual.

5.19. FIRE PROTECTION DESIGN MANUAL (PG-18-10)

Located in TIL <https://www.cfm.va.gov/til/spclRqmts.asp#FS>

Purpose: This document provides fire protection design criteria for all VA facilities, including fire alarm requirements.



5.20. SIGNAGE DESIGN MANUAL (PG-18-10)

Located in TIL <https://www.cfm.va.gov/til/dManual.asp#SIGN>

Purpose: This document provides signage design criteria for all VA facilities.

5.21. FACILITIES DEDICATION PLAQUES & SEALS (PG-18-13)

Located in TIL <https://www.cfm.va.gov/til/topicSpecific.asp#PS>

Purpose: This document provides design and procurement criteria for all specific VA plaques and seals.

5.22. THERMAL DESIGN CRITERIA

5.22.1. ENERGY CONSERVATION

The Federal Government mandates the need to conserve energy by Executive Order and by Law enacted by Congress. In addition, 19 Federal Agencies have signed a Memorandum of Understanding (MOU) outlining specific goals and targets for energy conservation and sustainable design. VA is one of the signatory agencies. The following paragraphs list references and details of various requirements, and compliance with VA energy conservation and water management is defined. Facilities designed shall comply with:

- VA Directive 0055, VA Energy and Water Management Program
- Energy Policy Act of 1992
- Energy Policy Act of 2005
- Executive Order 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability
- Executive Order 13514, Federal Leadership in Environmental, Energy and Economic Performance
- National Energy Conservation Policy Act (NECPA)
- 41 CFR 102-74, Energy Conservation
- 10 CFR 433, Energy Efficiency Standards for New Federal Commercial and Multi-Family High-Rise Residential Buildings
- 10 CFR 435, Energy Conservation Voluntary Performance Standards for New Buildings: Mandatory for Federal Buildings, Subpart C, Mandatory Performance for New Federal Low-rise Residential Buildings
- 10 CFR 436, Federal Energy Management and Planning Programs, Life Cycle Cost Analysis, Subpart A – Methodology and Procedures
- VA Energy Management Action Plan and Secretary's Decision Statement
- EPA's Energy Star Program



5.22.2. DOE INTERIM FINAL RULE

In the Federal Register (Volume 71, No. 232) dated December 4, 2006, the Department of Energy (DOE) issued mandatory energy conservation guidelines as the interim final rule for implementing provisions in the Energy Policy Act (EPACT 2005). Provisions of the interim final rule are as follows:

5.22.3. ASHRAE STANDARDS

A. ASHRAE STANDARD 90.1

- **ANSI/ASHRAE/IESNA Standard 90.1 – 2019:** ASHRAE Standard 90.1 –is a component of the DOE final rule. Provisions of this standard shall be used as a baseline for computing energy savings. By reference, DOE has incorporated Standard 90.1 – 2004 into 10 CFR Part 433. Also, the U.S. Congress has prescribed this standard in section 109 of the Energy Policy Act of 2005 (EPACT).
- **ANSI/ASHRAE/IESNA Standard 90.1 – 2019:** ASHRAE has published the revised Standard 90.1. HVAC systems shall be designed to comply with the ANSI/ASHRAE/IESNA Standard 90.1 for Buildings except for Low-Rise Residential Buildings. The A/E is expected to comprehend and implement the practices dictated in ASHRAE 90.1 entirely.
- **ASHRAE/IESNA/USGBC Standard 189.1 – 2017:** Standard for High-Performance Green Buildings Design except for Low-Rise Residential Buildings.
- **ANSI/ASHRAE Standard 62.1 – 2019:** Ventilation for Acceptable Indoor Air Quality
- **ASHRAE Guideline 1.1 – 2007:** HVAC & R Technical requirements for the Commissioning Process
- **ASHRAE Guideline 0 – 2019:** The Commissioning Process
- **ANSI/ASHRAE Standard 55 – 2017:** Thermal Environmental Conditions for Human occupancy
- **ASHRAE:** An Introduction to Building Information Modeling (BIM)

5.22.4. ADDITIONAL MANDATED ENERGY CONSERVATION MEASURES

In addition to complying with the ASHRAE Standard, DOE has mandated that a new Federal building must be designed to achieve an energy consumption level at least 30 percent below the level achieved under Standard 90.1-2004 *if life-cycle is cost-effective*. Use the Performance Rating Method – Appendix G of ASHRAE Standard 90.1 -2004 to document the energy savings.



- **Life-Cycle Cost (LCC) Analysis (Requirements):** If an additional 30 percent reduction in energy consumption is not lifecycle cost-effective, the A/E must evaluate alternate designs; at successive decrements (e.g., 25 %, 20 %, or lower) to identify the most energy-efficient design that is lifecycle cost-effective. To do so, the A/E shall consider and evaluate readily available energy conservation measures which the industry is generally familiar with and should be considered and evaluated. DOE further stipulates that the “agencies must estimate the life-cycle costs and energy consumption of the planned building as designed and an otherwise building just meeting the minimum criteria outlined in the baseline, ASHRAE Standard.” This measure is meant to demonstrate and record the mandated compliance and the extent of it.
- **Life-Cycle Cost Analysis (Methodology):** An engineering economic analysis, to comply with the Public Law 95-619, shall be performed following the procedure outlined by the Department of Energy (DOE) in the National Institute of Standards and Technology (NIST) Handbook 135 dated February 1996 (or the latest version) - Life Cycle Costing Manual for the Federal Energy Management Program.

Use the following parameters when performing the analysis:

- 20-year life cycle period for system comparison
- Other features are:
- 7 percent discount factor
- No taxes or insurance, while computing cost

5.22.5. EXECUTIVE ORDER 14057 - CATALYZING CLEAN ENERGY INDUSTRIES AND JOBS THROUGH FEDERAL SUSTAINABILITY, DATED DECEMBER 8, 2021

Outlines Government-wide goals to net-zero emissions by 2050. Mandatory energy and water efficiency, pollution and waste reduction requirements are also published in the above Executive Order. Federal agency goals are:

- Achieving net-zero emission buildings
- Increase facility energy efficiency and water efficiency; establish agency-wide targets
- Minimize waste, including the generation of wastes requiring disposal; provide advanced pollution prevention; diverting at least 50% non-hazardous solid waste from landfills including construction and demolition waste by fiscal year 2025 and 75% by fiscal year 2030.



- Utilize sustainable acquisition and procurement to reduce emissions by prioritizing use of recycled or energy efficient products as identified by the Environmental Protection Agency (EPA)
- Buy clean; expand consideration of embodied emissions and pollutants of construction materials in Federal procurement and federally funded projects
- Achieve and maintain annual reductions in building energy use and implement energy efficiency measures that reduce costs;
- Meet statutory requirements relating to the consumption of renewable energy and electricity;
- Reduce potable and non-potable water consumption, and comply with stormwater management requirements;
- Ensure that new construction and major renovations conform to applicable building energy efficiency requirements and sustainable design principles; implement space utilization and optimization practices

5.22.6. VA POLICY: ENERGY AND WATER MANAGEMENT PROGRAM

VA Directive 0055, dated December 10, 2014: The directive updates VA's Green Management Program energy policy to include new and updated executive orders and legislation requirements. This document also expands the scope and applicability of this policy to water management.

5.22.7. VA POLICY: ENVIRONMENTAL MANAGEMENT PROGRAM

VA Directive 0057, dated October 25, 2021: The directive updates VA's Environmental Management Program to include new and updated executive orders and legislation requirements. The document includes Green Purchasing, Chemical Management and Pollution Prevention, Electronics Stewardship, Environmental Compliance, and Waste Prevention and Recycling.

5.22.8. ADDITIONAL MEASURES (MOU)

MOU also addresses related issues, such as commissioning and measurement, and verification. These issues are described below.

5.22.9. MEASUREMENTS AND VERIFICATION

Per DOE Guidelines issued under Section 103 of EPACT, install building-level utility meters in new major construction and renovation projects to track and continuously optimize performance. MOU mandates that the actual performance data from the first year of operation be compared with the energy design target. After one year of occupancy, measure all-new



major installations using the Energy Star® Benchmarking Tool for building and space types covered by ENERGY STAR® or FEMP designated equipment.

Install building-level utility meters in new major construction and renovation projects to track and continuously optimize performance to measure the consumption of potable water, gas, steam, electricity, and thermal energy in federal buildings and other facilities and grounds. Metering systems should be coordinated with the VA facility and the VA national metering reporting system. Meters shall be installed per the VA Sustainable Design Manual.

5.23. BUY AMERICA ACT

Many products have both American-made and foreign-made products in the same series or book or collection. Many American companies have items that are not American-made. Ensure that all selections, unless adequately justified, follow the requirements as found in Federal Acquisition Regulation (FAR) 25.201.

5.24. APPLICABLE CODES AND STANDARDS

5.24.1. GENERAL

Use the latest edition of Codes, Regulations, and Standards as a basis of design. Refer to *Design and Construction Procedures, PG-18-3, Topic 1, Codes, Standards, and Executive Orders* (<https://www.cfm.va.gov/til/cPro.asp>). Unless otherwise indicated by VA criteria, use the Codes and Standards of the following organizations:

- American National Standards Institute (ANSI)
- American Society for Testing Materials (ASTM)
- Building Industry Consulting Service International (BICSI)
- Federal Communications Commission (FCC), all Regulations, Procedures, and Standards for Two-Way Radio Equipment, Systems, and Operation
- Illuminating Engineering Society of North America (IESNA)
- Institute of Electrical and Electronics Engineers (IEEE)
- International Organization for Standardization (ISO), Standards for Protocols and Interfaces that include Open System Interconnections (OSI)
- Facilities Guidelines Institute (FGI): 2010, *or most current issue*, Guidelines for the Design and Construction of Health Care Facilities
- U.S. Green Building Council (USGBC) LEED Program & Sustainable Building Design Council
- The Green Building Initiative (GBI), Green Globes Environmental Assessment and Rating System
- The American Institute of Architects (AIA) and National Society of Professional Engineers (NSPE) recent additions to their professional codes of ethics encouraging ***“environmentally responsible design.”***



- National Fire Protection Association (NFPA): A/E shall pay particular attention to the following publications:
- NFPA 20 – Standard for the Installation of Stationary Pumps for Fire Protection
- NFPA 70 – National Electrical Code
- NFPA 70 E – Standard for Electrical Safety Requirements for Employee Workplaces
- NFPA 72 – National Fire Alarm Code
- NFPA 75 – Standard for the Protection of Electronic Computer/Data Processing Equipment
- NFPA 77 – Recommended Practice on Static Electricity
- NFPA 80 – Standard for Fire Doors and Fire Windows
- NFPA92A– Recommended Practice for Smoke-Control Systems
- NFPA 101 – Life Safety Code
- NFPA 110 – Standard for Emergency and Standby Power Systems
- NFPA 780 – Standard for the Installation of Lightning Protection Systems
- National Electrical Manufacturers Association (NEMA)
- Underwriters' Laboratories, Inc. (UL)
- Telecommunications Industry Association and Electronic Alliance Standards Association (EIA/TIA) 568 and 569A, Communications Cabling Circuits and Equipment
- Building Industry Consulting Service International, Inc. (BICSI): A/E shall pay particular attention to the following publications:
- Outside Plant Design Reference Manual
- Telecommunications Distribution Methods Manual
- Network Design Reference Manual
- ANSI/TIA/EIA-942 – Telecommunications Infrastructure Design for Data Centers.
- United States Department of Commerce, National Telecommunications and Information Administration (NTIA), Manual of Regulations and Procedures for Federal Radio Frequency Management for all Two-Way Radio and Radio Paging Systems, all Narrow-Band and Frequency Use Standards
- International Plumbing Code (IPC)
- ASHRAE, see Thermal Design Criteria Section, above
- ASHRAE: Handbook HVAC Applications
- American Society of Plumbing Engineers (ASPE) – Data Books

5.24.2. LOCAL CODES AND CONDITIONS

The A/E shall bring local and regional climatic and geographic conditions and provisions of local building codes that are significantly different from the codes and standards listed above to the attention of VA and shall provide specific information on how the proposed design reflects



these conditions and codes. Of particular focus shall be local codes, code amendments, and conditions related to coastal, hurricane-prone, arctic, or seismically active regions or other climatic or regional conditions that warrant additional measures to protect the integrity of systems.



6.0 TECHNICAL REQUIREMENTS

6.1. PURPOSE

This manual serves as the master reference document for architecture, planning, and design at the Veterans Affairs (VA) National Cemetery Administration (NCA) facilities. Architectural requirements and criteria in this manual are expected to be followed in the planning of VA facilities.

A. RESPONSIBILITY

VA's Office of Construction and Facilities Management (CFM) is responsible for all built environment components (buildings, open spaces, and infrastructure, including VBA and NCA) for Major Construction projects over \$20 million. NCA's Design and Construction Service (DCS) is responsible for Minor Construction, Sustainment, Renovation, and Modernization projects under \$20 million.

B. BUILDING GOALS

CFM and DCS are entrusted with providing VA with facilities that incorporate the highest degree of cemetery planning, design, and construction which reflect:

- Functional Efficiency
- Innovative but appropriate design
- Contextual harmony with the site
- Appropriately selected materials and systems
- Health and safety characteristics
- Accessibility for the Disabled
- Life Cycle Value

C. APPLICABILITY

These Architectural and Engineering Design Standards have been compiled to establish general and, in some cases, specific design policies to guide consultant architects and engineers (A/E) to design new facilities and alter or renovate existing structures.



6.1.1. DESIGN PRINCIPLES:

A. GENERAL

New and renovated facilities must provide the VA's functional, aesthetic, environmental, and safety needs with a reasonable balance between initial cost and life-cycle value. The VA is dedicated to improving the quality of its facilities through architectural, planning and engineering services, which must:

- Ensure the highest degree of professionalism from the A/E Team to develop and implement innovative and functional design concepts in harmony with the site environment and appropriate to the project needs.
- Implement reliable procedures for controlling project estimates, construction costs, life-cycle factors, and time schedules.
- Establish thorough quality-control coordination during all phases of the A/E Scope of Services
- Respond to governing codes and standards ensuring environmental health and safety.
- Ensure that design concepts for repair, alterations, and renovations are executed with professional consideration as new facilities.

The NCA's expectations are that landscape and architectural components, elements, and facilities designed using this manual meet their primary objective of providing an everlasting shrine to our nation's veterans and a welcoming place for their families, staff, and visitors. The cemetery design shall meet all NCA design criteria, NCA/VA design requirements, applicable codes, technical requirements and coordinate well with other trades and disciplines.

Deviations can be made from the requirements of this manual to accommodate new concepts, methods of construction, and design enhancements. NCA shall approve such deviations. Deviations are not permitted from those requirements, including federal regulations, public laws, executive orders, and other applicable codes and standards.

Throughout this manual, the statement is made: to obtain approval from NCA Authorities.

Authority is defined as the CFM/NCA Project Manager with consultation with NCA Operations and District Staff.

6.1.2. CHANGES DURING DESIGN

Do not withhold proposals for changes in plan arrangement, materials of construction, or architectural design for the periodic scheduled reviews. Changes shall be discussed with the Project Manager by telephone and correspondence and forward drawings for review as soon as they are sufficiently developed for consideration.



6.1.3. COORDINATION OF DOCUMENTS

The drawings and specifications shall be complete, precise, and coordinated. The Construction Contractor only agrees to produce what is depicted on the drawings and described in the specifications and performs within the precise scope of the contract documents. The A/E is responsible for coordinating the various documents to eliminate ambiguous requirements.

6.1.4. CONSTRUCTION TERMINOLOGY

To avoid conflicts over ambiguous terms and statements, use identical terms on drawings and specifications. For example, the "roofing system" in the specifications should not be called a "built-up roof" on the drawings.

6.1.5. NAMES OF SPACES

Names of rooms and departments also play an essential role in coordination. The names on the drawings must be the same as in the Program for Design, as they impact finishes and equipment and construction details and mechanical & electrical systems. All room names should be placed on the drawings within the specific rooms named as far as possible.

A. EXISTING FACILITIES

- The design shall coordinate interior design solutions, wayfinding and signage, and fixtures and equipment at existing facilities.
- Provide existing finishes on demolition plans.

6.2. SCHEDULED PROGRESS REVIEWS

The A/E contract includes designated specific intervals for the review of the development of the work. These reviews are joint consultations between the CFM/VA Project Manager, NCA Operations, NCA District Staff, CFM Consulting Support Service, and other NCA/VA Services. Concurring reviews help exchange information, reconcile differing views on objectives, judge the quality and completeness at each stage, assure that previously noted changes have been incorporated, and warn of unacceptable departures from criteria or standards during the design development. The design review encompasses all disciplines. They are not to discover errors or omissions in detail. The contract documents' quality, accuracy, coordination, and completeness remain the A/E's responsibility; Refer to TIL - [*VA Program Guide, A/E Submission Instructions \(PG-18-15\), Volume D – Cemetery Projects*](#).



6.3. DESIGN DOCUMENTATION

6.3.1. DRAWINGS

A. GENERAL

All drawings sheets shall use the standard VA/NCA title block containing the following information: Project Title, Location / Address, and Project Number. The sheet size is 30" x 42".

Each drawing sheet is arranged and labeled per the *VA Drawings Deliverable Requirement (DDR), Appendix A - Sheet Identification* (<https://www.cfm.va.gov/til/projReq.asp>) which follows the National CAD Standards (NCS) Format with VA specific modifications.

Each drawing sheet (as well as all other materials submitted) is clearly and consistently labeled above the title block, what submission it is, corresponding to the required submissions in this statement of work, i.e., "Design Development 1 Submission [DD1]," "Construction Document Submission[CD]," and other labels as need it. The label is changed after each review. Drawings shall be labeled "NOT FOR CONSTRUCTION." The labels are removed before printing and signing/stamping/sealing the bid sets.

Drawing Cover Sheet: Each set of drawings have a cover sheet that indicates: current VA signature, project title, VA project number, index of drawings in the set with sheet numbers and sequence, names, addresses, and phone numbers of all associated A/E firms, vicinity map, site location map, cemetery map showing project location and other pertinent project information to include a table of the gravesite inventory developed in this project. The table identifies the burial section/columbarium wall, the net acreage of each burial section, the sizes and quantities of the gravesites (i.e., casket and cremated remains), and the number of niches in the court and each wall. A second table provides Site Summary Information showing the phase's overall site development area and the breakdown of each major element within the project (i.e., irrigated turf, landscape beds, walkways, roads, building footprint, and other elements.). A comprehensive legend of drawing abbreviations and drafting symbols for the drawings (all disciplines) are included either on the cover sheet or a second sheet immediately following the cover.

Graphic Standards: Drawings shall have graphic scales, a north arrow (either true north or plan north; orientation shall be consistent throughout drawings unless approved by the VA Project Manager, title block, and key plan identifying the drawing component within the overall plan. Each drawing, booklet, and other supporting submittals, including cover sheets, shall be clearly and consistently identified with the project title, location, building, phase, section, and segment throughout the design process. Submission labels are removed before printing bid documents. Each sheet has a keymap for locating and orienting individual drawing sheets to the whole site. The current sheet shall be shaded on each keymap. Each drawing title is unique. If multiple sheets should have the same drawing title, add a unique number or letter to the title to make it unique (example, Survey Area A, Survey Area B, Site Details 1, Site Details 2)



Plans must demonstrate what is new work and what is existing and what is to be demolished. New work must be graphically bolder than existing work. For example, existing items to remain may be screened, with new work shown solid. Dashed lines shall show demolition work.

When more than one continuous plan is required, match lines shall identify adjoining plans. When match lines are required, an overall plan sheet shall be provided as the first sheet in the sequence, showing the sheet's breakdown to follow and the location of corresponding match lines identifying adjoining plans. Each match line shall be referenced to the adjacent corresponding plan by sheet name and number. Drawings using match lines must not overlap information. All information must stop at the match line and resume at the corresponding match line. Match lines must not obscure information on the plans.

Detail sheets should be organized logically and present the material intended in an orderly way; for example, the head, jamb, and sill should be arranged from top to bottom, not randomly placed on the sheet. Items with the plan, front and side views should be arranged in that context to one another. Each detail must be clearly labeled and the scale indicated. There should be one door schedule and one window schedule for all buildings in the project. Each building should have a color and finish schedule on the same sheet with the individual floor plan.

A legend that applies to multiple drawings in the set should appear on each drawing in that series. For example, the Plant Legend must appear on every Planting Plan sheet, not only on the first sheet in that series. If the standard legend contains a significant amount of information that does not fit on each sheet, a reference legend sheet can be provided as the first sheet in the series; however, a legend with specifically referenced items should appear on every sheet.

Material notes and labels on the drawings must correspond to the terminology in the specifications. The item's name in the specifications is used as the label on the drawings, and the labels and notes are consistent from sheet to sheet.

B. COMPUTER-AIDED DESIGN AND DRAFTING (CADD)

For general drawing requirements, including organization, size, scales, and Computer-Aided Design and Drafting (CADD) format, refer to *TIL - Standard Details, VA CAD Standards PG-18-4. Presentation of Design* (<https://www.cfm.va.gov/til/sDetail.asp>)

When reviewing the design, suitable exterior illustrations should be presented, which address the relationship to adjacent buildings and surroundings. Elevations may suffice, but any drawings, sketches, or models that clearly show the design intentions of massing, fenestration, and materials are encouraged. If future vertical expansion is planned, the building must be illustrated with and without the future floors. A written description of the design concept and intent may be helpful, especially for unusual or complex solutions.

If the Architect/Engineer office performs their project design work in two different CADD formats, the electronic file compact disk submission to the National Cemetery Administration



shall be in only one unified CADD format. The conversion and the integrity of the drawings are solely the responsibility of the Architect/Engineer. All CADD files created for this project shall be the property of the Department of Veterans Affairs and the National Cemetery Administration.

The external label for the electronic submittal shall contain at a minimum:

- VA Project Number
- Format and version of the operating system software used
- Name and version of utility software used for preparation (e.g., compression/decompression, if applicable) and copying files to media
- The sequence number of the digital media
- The index of the filenames on the digital media, as space on the label permits.

6.3.2. REPORTS/ CALCULATIONS / STUDIES / ANALYSES / ESTIMATES & SPECIFICATIONS

Submit 8 ½" x 11" copies of all required calculations, cost estimates, and specifications. All letter reports must be labeled with the project name, project number, name(s) of A/E firm(s), date, and title of the report or estimate. The final submittal of specifications shall be in Microsoft Word and Portable Document (PDF) format on the compact disc. For graphics that may be incorporated in the reports, foldout sheets up to 11" x 17" are acceptable.

Specifications shall be prepared using National Cemetery Administration (NCA) Master Construction Specifications. Subsequent submissions shall show changes to master specifications by using the "Track Changes" function. Each submission shall indicate changes from the previous submission, not all changes to the master.

6.3.3. COLOR RENDERINGS

If required by the contract, Renderings shall show the true colors of the materials to be used to construct the project and the surroundings, including road systems and planting groups, in sufficient detail to predict the project's final appearance. Show all penthouses, architectural screens, roof enclosures, skylights, stacks, and breechings visible from the station point by accurate perspective projection. Show roof-mounted equipment unless hidden by architectural screens. From aerial perspectives, show major masses of mechanical equipment located behind architectural screens in block form. If the exact size, color, and appearance of exposed roof-mounted equipment are unknown, show as accurately as possible or provide a drawing of similar equipment on the rendering(s). Rendering(s) should be mounted on 750 mm high by 1000 mm wide (30 in. by 40 in.) "Bristol" board. Provide borders of 125 mm (5 in.) at the top and sides and 150 mm (6 in.) at the bottom. The Project Manager advises the A/E on the appropriate labeling for renderings. Renderings are lettered on the mat rather than on the rendering itself.



6.3.4. SPECIFICATIONS

The VA's Master Construction Specifications, broken down by division, has been edited for use on VA National Cemetery construction projects, refer to TIL – [NCA Master Construction Specifications \(https://www.cfm.va.gov/til/ncaSpec.asp\)](https://www.cfm.va.gov/til/ncaSpec.asp)

6.3.5. PROPRIETARY ITEMS

The use of trade names or other indications that identify a product of an individual manufacturer on any project shall not be used under any circumstance unless specifically approved by VA. Where VA authorizes specific products, the following shall be identified:

- Where necessary to identify existing equipment,
- Where an existing system is to be extended and competitive manufacturers cannot meet performance or dimensional requirements,
- Where required by a public utility or municipal system as a condition of service shall be stated explicitly in the specifications.

6.3.6. DISTRIBUTION / RETENTION

This section applies to major construction and minor construction projects regardless of execution agent within the VA or an external party like the US Army Corps of Engineers.

As each project design reaches 100% and Bid Set documents are produced, NCA Design and Construction and the appropriate NCA District office shall receive an electronic, hard copy of the final design documentation. Including native drawings in AutoCAD, .dwg, and Portable Document Format, .pdf, formats, and all other final products produced under contract with the VA. AutoCAD drawing transmittal shall be “relative pathed,” contain all references, line weight (ctb/stb) data, and maintain original cross-reference (xref) drawing structure.

As each project construction is complete and final inspection has occurred, NCA Design and Construction and appropriate NCA District office shall receive an electronic, hard copy of the final As-Built documentation, Operation and Maintenance Manuals, and construction inspection documentation (to include specific material selection information) for permanent retention. Including As-Built drawing files in AutoCAD, .dwg, and Portable Document Format, .pdf, formats.



6.4. PROJECT-SPECIFIC REQUIREMENTS AND INFORMATION

6.4.1. VA PROVIDED MATERIALS

The VA/NCA Project Manager provides the following data to the A/E on a project-by-project basis:

- Master Plan, if available
- Building number / Street Name assignments
- All existing drawings of the site, especially any utility plans, if available
- Design objectives
- Limitations
- Design criteria specific to the project
- Site requirements



NOTE: The following sections of this guide are arranged per the *VA Drawings Deliverable Requirement (DDR), Appendix A - Sheet Identification* (<https://www.cfm.va.gov/til/projReq.asp>) which follows the National CAD Standards (NCS) Format with VA specific modifications.

7.0 G – GENERAL

7.1. SIGNS, PLAQUES, AND EMBLEMS

Refer to TIL – *Signage and Wayfinding: Signage Design Manual* (<https://www.cfm.va.gov/til/dManual.asp#SIGN>)

A. SAFETY SIGN

Provide a safety sign for each NCA construction project over \$2 million in cost.

Refer to TIL – *NCA Master Construction Specifications* (<https://www.cfm.va.gov/til/ncaSpec.asp>)

Refer to TIL – *Standard Details (PG-18-4) Division-1, General Requirements* (<https://www.cfm.va.gov/til/sDetail.asp>)

B. CONSTRUCTION SIGN

Provide a construction sign at the site of VA construction projects over \$2 million in cost.

Refer to TIL – *NCA Master Construction Specifications* (<https://www.cfm.va.gov/til/ncaSpec.asp>)

Refer to TIL – *Standard Details (PG-18-4) Division-1, General Requirements* (<https://www.cfm.va.gov/til/sDetail.asp>)

C. DEDICATION PLAQUE

For new cemeteries, NCA furnishes a dedication plaque, and the contractor installs it. The plaque is located in the Public Information Center or Gravesite Locator and is shown on contract drawings.

Refer to TIL – *Topic Specific Standards and Criteria (PG-18-13), Facilities Dedication Plaques & Seals, VA Facilities Dedication Plaques and Seals Procurement* (<https://www.cfm.va.gov/til/topicSpecific.asp#PS>) and *NCA Master Construction Specifications Division-10, Specialties* (<https://www.cfm.va.gov/til/ncaSpec.asp>)



D. VA SEAL

The VA seal is prominently displayed on all Public Information Center and Main Administrative/Maintenance buildings. Replicas are available in bronze in three sizes. Incorporate the seal in the design near the main entrance—persons approaching either vehicles or foot see the emblem.

Refer to TIL – *VA Signage Design Manual* (<https://www.cfm.va.gov/til/dManual.asp#SIGN>) *NCA Master Construction Specifications and Standard Details (PG-18-4)* Division 10 – Specialties (<https://www.cfm.va.gov/til/ncaSpec.asp>) (<https://www.cfm.va.gov/til/sDetail.asp>)

E. SERVICE SEALS

Service Seals may be provided at either Flag /Assembly Area; service shelters; or PIC Building. The seals should not be placed at all locations. Seals should be 18-inch Diameter Bronze representing each of the six services. The seals should mount 5'-5" to center above the finished floor, left to right - ARMY, MARINES, NAVY, AIR FORCE, SPACE FORCE, COAST GUARD.

Refer to TIL – *NCA Master Construction Specifications Division-10, Specialties* (<https://www.cfm.va.gov/til/ncaSpec.asp>)

F. OTHER PLAQUES

Refer to TIL – *NCA Master Construction Specifications Division-10, Specialties* (<https://www.cfm.va.gov/til/ncaSpec.asp>)

Each VA-managed national cemetery shall contain a historic (1909) or a replica (2009) Gettysburg Address (GA) tablet produced at the Army's Rock Island Arsenal (RIA). Refer to https://www.cem.va.gov/cem/pdf/Exhibit-Gettysburg_Address.pdf and <https://www.cem.va.gov/cem/history/LincBic.asp>. The tablet shall be incorporated near the Public Information Center or Gravesite Locator.

Each VA-managed national cemetery shall contain a Bivouac of the Dead plaque near the Public Information Center or Gravesite Locator.

G. SITE / BUILDING SIGNAGE

Refer to Civil and Architectural / Interior sections for other applicable signage/wayfinding requirements.

7.2. PHASING

Ensure that construction causes minimal interference with the normal functioning of the VA cemetery and surrounding community



Refer to TIL – *Minimum Requirements for A/E Submissions (PG-18-15), Vol. D, Critical Path Method (CPM) Phasing* (<https://www.cfm.va.gov/til/aeDesSubReq.asp>)



8.0 V – SURVEY / MAPPING

8.1. SITE, TOPOGRAPHIC, UTILITY, LANDSCAPE SURVEY

Contours Crossing Roadways: When crossing roads, contour lines shall clearly illustrate the crown, grade, and height of curbs. Spot elevations shall be shown on approximate 50-foot centers along the centerline of roads, the edges of roads, and the bottom and top of curbs.

Trees & Shrubs: Locate and identify all freestanding trees of 3" caliper and larger by botanical and common names and by trunk caliper. Locate all trees of 15" caliper and larger within wooded areas.

Illustrate the perimeters of all shrubbed and wooded masses, ground cover, and plant beds. Describe the predominant vegetation located within these outlines, if known. Indicate the height and diameter of freestanding shrubs. Identify turf and lawn areas.

Locate major hedge lines and delineate tree trunk sizes, locations, and canopies.

Location of Borings and Grave Test Pits: The Surveyor shall locate and stake in the field and illustrate the location of all borings and test pits on the final survey drawings.

Reference *NCA Master Specifications, Division 2, Existing Conditions*
(<https://www.cfm.va.gov/til/ncaSpec.asp>)

8.2. GIS DATA / NATIONAL INVENTORY INTEGRATION

Interment shall be documented under procedures for the mandatory uniform electronic inventory control of gravesites. NCA requires that the A/E designer convert their electronic CAD design files into a usable GIS format to achieve this.

8.2.1. DELIVERABLES FOR ALL GRAVESITE EXPANSION PROJECTS

Interment sections shall be documented under procedures for the mandatory uniform electronic inventory control of gravesites. NCA requires that the A/E designer convert their electronic CAD design files into a usable GIS format. For Burial, Columbarium, and Memorial Sections, convert all AutoCAD as built files to closed polylines (i.e., GIS Polygons) in a NCA provided ESRI ArcGIS File Geodatabase format. The local SPCS should be used as the spatial reference in the GIS file. Section and gravesite numbers should be attributed for each polygon gravesite feature. All Columbaria and Memorial Walls should be drawn birds' eyes, with real-world corner locations representing the outermost edges of each wall. Each wall is divided into equal-sized polygons totaling the number of niches/plaques available for each wall. Columbaria niche and memorial wall plaques should be numbered from top left to bottom right as if



standing in front facing the wall, with the closest row in GIS being the bottom (as if laid down on its back). Submit the file geodatabase electronically or as an eHDD/thumb drive.

8.2.2. DELIVERABLES FOR MAJOR EXPANSION PROJECTS

Projects funded through the major program may also include new or replacement RTK reference stations, additional GNSS data collection equipment, training, etc. Requirements defined in specification sections from the NCA Technical Information Library (TIL) 11 83 00 and 11 83 02 should be considered and included with consultation from NCA's GIS Program Manager.



9.0 B – GEOTECHNICAL

9.1. GENERAL

9.2. SOIL SURVEY / SUB-SURFACE INVESTIGATION

A licensed geotechnical engineer makes a site survey to locate any surface conditions that indicate specific areas of concern for building the proposed structure(s). The geotechnical engineer shall be responsible for obtaining all necessary clearances from the Department of Veterans Affairs National Cemetery Administration and all agencies and utility surveyors having facilities in the vicinity of the work.

Subsurface test borings shall be done in a quantity and location to be determined by the A/E. These locations are staked in the field and elevations marked. A digital site plan is utilized for the report and other exhibits.

Borings shall be carried to a depth as determined by the A/E based upon site-specific conditions.

The A/E shall perform the Standard Penetration Test per ASTM-D1586.

Laboratory examination/verification and testing shall be made of the representative portions of the samples to establish moisture content, density, Atterberg limits, grain size and distribution, unconsolidated triaxial compression, and unconfined compressive strength as applicable to the soil type encountered.

Chemical analysis shall be performed to determine if site conditions exist which might be detrimental to buried concrete, steel, cast iron, or ductile iron, such as the presence of sulfates or carbon dioxide.

Perform tests required to comment on groundwater control during the construction phase and for the completed building. Provide specific methods and conceptual layout for any dewatering that may be required to facilitate construction, along with the order of magnitude estimates for dewatering.

Include within the report any other factors, i.e., underground utilities, which could influence the proposed construction design.

9.2.1. SOILS REPORT:

The subsurface investigation and related testing results, together with interpretations, discussions, and foundation recommendations, shall be presented in the form of a detailed soil



report. Foundation and soil investigation shall be conducted in conformance with Chapter 18 of the IBC. The report shall include items noted in IBC1802.6 and the following at a minimum:

- a) A boring location plan showing the exact location of each boring on the limits of the project.
- b) Boring profile showing:
 - i) Ground elevations.
 - ii) Classification of soils encountered with depth.
 - iii) A detailed description of any fill material encountered.
 - iv) Groundwater elevation at least 24 hours after boring is completed.
 - v) Rock classification and elevation of bedrock (if applicable).
 - vi) The number of blows required for every 6 inches.
- c) Comment on applicable foundations to support the proposed structures (to include preplaced crypts) and determine the allowable soil bearing value at the recommended depth. Discuss the influence of water tables on design values if deep foundations are recommended, including the allowable skin friction and bearing values for good deep foundations.
- d) If the use of deep foundations is warranted, recommendations shall include installation and testing requirements. Potential construction problems associated with deep foundations suggested installation methods and equipment shall also be discussed. Criteria for lateral load shall be discussed in the report.
- e) Recommend the value of active and passive soil pressures on structures retaining earth, including both segmental and cast-in-place retaining walls.
- f) Determine the depth required for protection from frost.
- g) Site excavation methods, equipment, and difficulties anticipated during excavation shall be discussed. Ensure that excavation/fill requirements for any pre-placed crypt fields are addressed. Include expansion and consolidation volume percentages. Report recommendations to address compaction, trench backfill, sub-surface drainage, unstable cut slopes, setbacks, construction during wet weather, and trenches.
- h) Recommendations for site improvements, pavement cross-sections, walkway cross-sections, groundwater control, and treatment of in-place soils to support slab on grade and pre-placed crypts.



10.0 C – CIVIL

10.1. SITE DESIGN GUIDELINES

The design for a VA National Cemetery shall conform to the following site planning criteria:

When locating the proposed interment areas, buildings, and roads consider topography, adjacent facilities, environmental impacts, and future development to produce a functional and aesthetically successful design.

Consider impacts on existing natural and artificial stormwater drainage patterns and systems.

Provide necessary data and coordinate VA compliance with FAA Regulations for obstructions to air navigation and other navigable air space regulations (see Advisory Circulars 70/7460-1H, Obstruction Marking and Lighting, Federal Aviation Administration (FAA) Advisory Circulars are available free of charge, in writing or by Internet, from:

- U.S. Department of Transportation Federal Aviation Administration 800 Independence Avenue, SW Washington, DC 20591

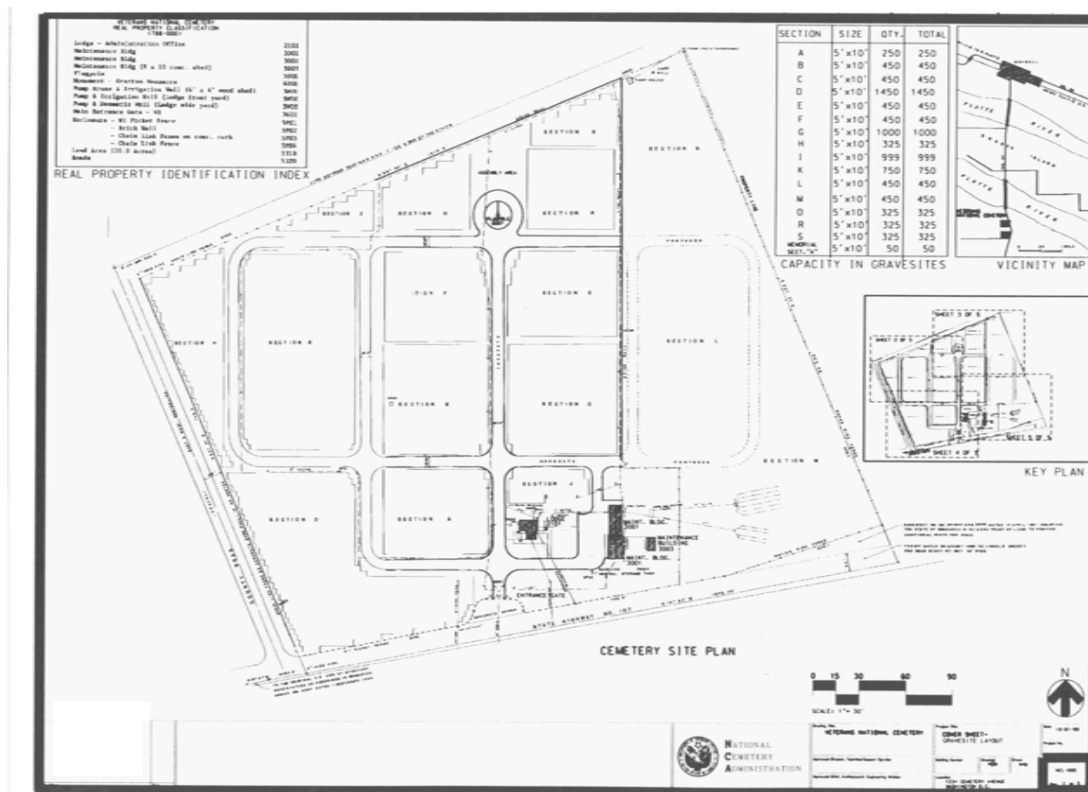


Exhibit 1: Example Cemetery Site Plan



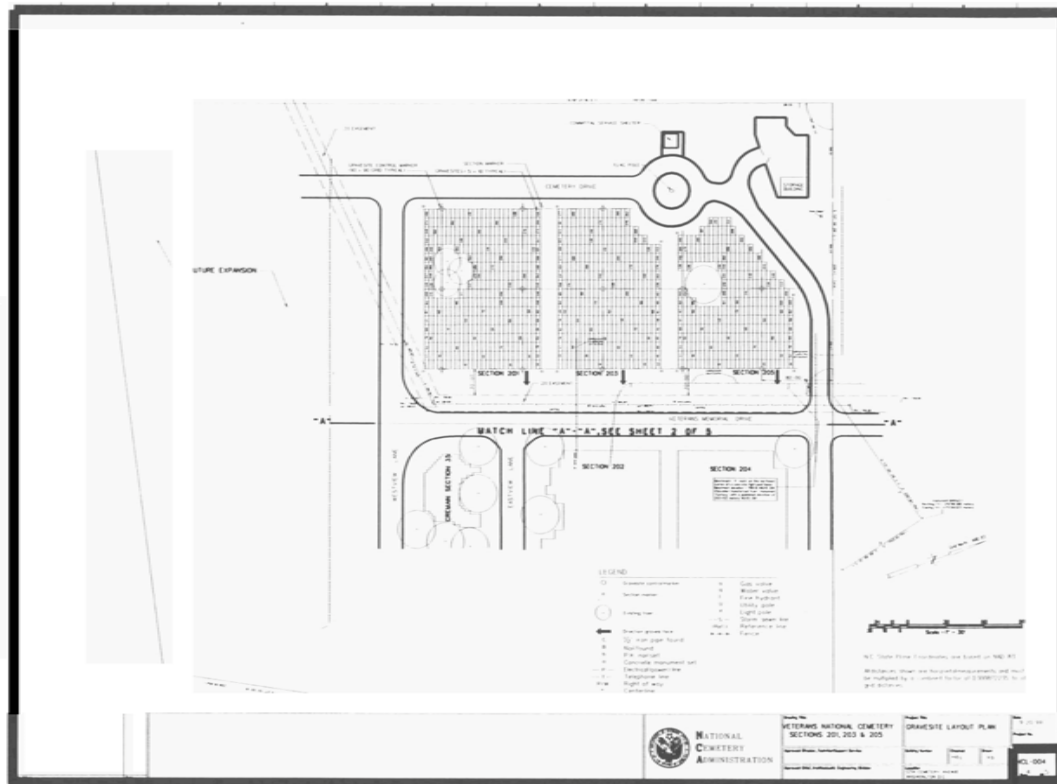


Exhibit 2: Example Gravesite Layout Plan containing gravesite numbering

10.2. CEMETERY SPECIFIC

Headstones and markers are placed per layout standards stated in the current [NCA Handbook 3120 - Interment Area Layout](#).

NCA's policy is that every interment shall be documented following procedures for the mandatory uniform electronic inventory control of gravesites.

10.2.1. IN-GROUND CASKET

A. GENERAL

Burial sections for full casket gravesites shall be no larger than 3 acres (1.2 hectares).

The size of full-casket gravesites adheres to the standards stated in the current [NCA Handbook 3120 - Interment Area Layout](#). See sizing below.

A minimum of 18 inches (46 cm) of earth covers each casket interred in a national cemetery.



A minimum of 12' feet shall separate adjacent burial sections to define the section boundaries and provide burial operations heavy equipment access. This separation shall not contain irrigation or function as irrigation aisles.

Burial sections shall be laid out to provide a minimum of 10' feet of turf between the headstones and the edge of the turf to provide access for mowers.

B. SIZE

The following standard gravesite sizes are used when conditions warrant:

- The 5 feet x 10 feet gravesite (1.5 m x 3 m) is used where double-depth interments in 7 feet (2.1 m) excavation are possible. These sites are inventoried in NCA Management and Decision Support System (MADSS) as "full casket sites."
- The 6 feet x 10 feet gravesite (1.8 m x 3 m) is used for single depth side-by-side interments where excavation below 5 feet (1.5 m) is impractical due to soil conditions. These sites are inventoried in MADSS as "full casket sites."
- The 4 feet x 8 feet gravesite (1.2 m x 2.4 m) may be used in those sections of national cemeteries that, by law, use flat markers. These sites are inventoried in MADSS as "full casket sites."
- The 3 feet x 8 feet gravesite (0.9 m x 2.4 m) or 3 feet x 10 feet gravesite (0.9 m x 3 m) may be used in those sections of national cemeteries that have been designated for the use of pre-placed crypts. These sites are inventoried in MADSS as "full casket sites."

10.2.2. IN-GROUND PRE-PLACED CRYPTS (PPC)

A. GENERAL

Pre-placed crypt fields are based upon typical burial plot sizes of 3' x 8', or when space is a premium, a reduced plot size of 3' x 7'-8" or 3' x 7'-7 1/2" are the alternative plot layout sizes. Confirm which size is to be used for a specific project with the Project Manager.

Unless directed otherwise, the design of the crypt fields shall contain irrigation isles that are the same width as the plot size. The locations and spacing of the irrigation isles shall be based upon the irrigation system design to achieve the most efficient irrigation water distribution. Refer to the Landscaping Design section, Irrigation Design sub-section of this guide.

Single plots shall not be placed at the end of an irrigation isle.

The minimum number of plots that are laid out side by side is two.



Crypt fields may be constructed with standard double depth crypts or quads (two double depth crypts manufactured in one casting). For those instances where there is a high probability that quads are provided, it is desirable to do the crypt field layout with plots being in even increments in each row, both in partial and complete rows between irrigation isles.

B. NUMBERING

PPC shall be numbered on the lid and interior headwall to match contract requirements. NCA requires photographic verification of all crypt lid numbering sequencing and orientation before backfilling. Provide photographic documentation of the entire crypt field using an aerial vehicle (drone). The entire PPC field(s) of all lid number photos shall be edited as necessary for inserting onto a single sheet of the Record Drawings with all lid number photos easily legible. Number “666” shall not be used and shall be replaced with “665A”.

C. GRADING AND DRAINAGE

Crypts shall be designed to be set on surface grade and subgrades that are flat up to a maximum slope of 3%. At a 3% maximum slope, it is still possible to lower a casket vertically and not hang up on the sides of the pre-placed concrete vaults.

Crypt fields shall be designed with finished grades that provide positive drainage. A minimum slope of 2% is required for the finished surface grade over crypt fields.

Crypt fields are generally constructed by excavation into the existing soil, thereby creating a bowl. Unless expressly excluded in a geotechnical report, indicating the existence of a very well-drained soil condition below the crypt field, an under-drainage system shall be designed and constructed below the crypts. One of the fundamental design principles for crypt fields is that water shall not enter into the crypts from the drain holes on the bottom of the crypts at any time following the completion of the field. CAUTION shall be taken when the crypt field underdrains are connected to site storm drainage systems. The designer shall ensure that backflow from the stormwater system, including ponds, cannot back up into the crypt fields to levels that introduce water into the lowest crypt in the field.

Crypts shall be set on a minimum of 6-inches of washed, well-drained stone, with aggregate being 1/8 inch or larger. Stone from 1/8” to 3/8” in size shall be limited to the top inch of the stone bed and shall be used for fine grading while setting the crypts. For the project location, the designer shall check with the local aggregate suppliers to determine what materials are available and check with the knowledgeable crypt installers to recommend the gradation that should be included for the specific project. The object of the stone base is to provide a free-draining base for supporting the crypts that is workable by the installers during installation and allows them to easily set the crypts to the allowed installation tolerances.

Crypt field design can be either sloped, 3% maximum, or stepped with the pre-placed crypts placed level, with the change in the grade being created by stepping the crypt field. Steps shall



be created, so the depth of cover material over the crypt at the headstone location is between 20 and 22 inches.

D. IRRIGATION

Irrigation lines through crypt fields should be installed with the top of the irrigation lateral a minimum of 4-inches below the top of the lid to ensure that the line is not damaged during excavation crypts.

10.2.3. IN-GROUND CREMAINS (IGC)

A. GENERAL

NCA's policy is that in-ground cremation sites adhere to [NCA Handbook 3120 - Interment Area Layout standards](#).

A minimum of 12' feet shall separate adjacent burial sections to define the section boundaries and provide burial operations heavy equipment access. This separation shall not contain irrigation or function as irrigation aisles.

B. SIZE

The standard cremains site sizes are used when conditions warrant:

- **Designated Cremains Section** [In-ground]. A burial site for the interment of cremated remains in a separate cremains section is 3 feet x 3 feet x 2 feet deep (91 cm x 91 cm x 61 cm) and is marked with a 12 inches x 18 inches flat granite marker. A minimum of 12 inches (30 cm) of earth covers cremated remains interred in a national cemetery designated cremains section. Burial sections for cremated remains shall have no more than 999 sites (approximately 0.2 acres) (28 square meters). These sites are inventoried in MADSS as "half-sites." Note that some cremains crypts exist at various sites; the size should match existing burial sites.
- **Garden Niche or Terrace** [In-ground]. A burial site for the interment of cremated remains in a distinct space using a system of paths, walls, and terraces that creates a tranquil garden setting, is 3 feet x 3 feet + 2 feet deep (91 cm x 91 cm x 61 cm) and is marked with a 12 inches x 18 inches VA standard flat granite marker or a wall-mounted bronze plaque. A minimum of 12 inches (30 cm) of earth covers cremated remains interred in a national cemetery garden niche or terrace. These sites are inventoried in MADSS as "half-sites."
- **Half-Site** [In-ground]. A gravesite is usually located on the perimeter of an existing full-casket burial section divided in half and designated "a" and "b,"



creating two cremains sites. Generally, this site is marked with a flat granite marker. These sites are inventoried in MADSS as “half-sites.”

- **Obstructed Gravesite** [In-ground]. A gravesite in a casket burial section that, due to some physical obstruction such as a tree, rock strata, or other obstructions., is usable only for cremated remains. This site is marked with the same headstone or marker as the adjacent gravesites. These sites are inventoried in MADSS as “obstructed sites.”

10.2.4. COLUMBARIUM [INTERMENT]

A. GENERAL

A columbarium is an above-ground structure with vaults or niches for the inurnment of cremated remains.

A niche in an above-ground structure designed for the inurnment of cremated remains is 10-1/2 inches x 15 inches x 20 inches deep (27 cm x 38 cm x 51 cm), measured at the face. Each niche is designed to accept an individual VA standard niche cover. Some columbaria developed earlier in national cemeteries utilized multiple niche covers and various sizes of niches. Columbarium sites are inventoried in MADSS as “niches.” A Columbarium Niche Standard Detail is shown below.

NCA’s policy is that columbarium niches adhere to [NCA Directive 3120 - Interment Area Layout standards](#).

Establish the elevations for each of the columbarium structures that are to be built. Key elevations are bottom of footings, top of foundation, shelf elevations, pier elevations, and top precast units.

If there are steps within a specific columbarium structure, ensure the elevations are checked, and drawings are appropriately annotated with elevations.

Coordinate the placement of reinforcing to be installed in the units with the Structural Engineer. Consider creating a plan drawing showing all of the reinforcing steel throughout the work, especially in the piers when they aren't all the same.

All installation materials should be specified as corrosion-resistant stainless steel to the maximum extent possible. The intent is to prevent deterioration which results in unsightly staining and long-term maintenance issues.

Coordinate with the Geotechnical Engineer to provide recommendations for the base material beneath the columbarium footings, especially if less than ideal soil conditions exist on the site. The Structural Designer for the columbarium footing/foundations shall work closely with the Geotechnical Engineer. The structural design shall consider any differential movement of the



columbarium walls and, if so, are control joints (for controlled cracking) required. Less than ideal soil conditions impact the rest of the design as to whether control joints continue through the upper portions of the structure or not.

The installation of decorative gravel strips (for flower vases) along the columbarium walls is a source for water entering the ground; this could provide a pathway for water to be conducted below the footing. Moisture in the footing zone could result in swelling of expansive soils and foundation instability. Coordinate the design of gravel strips and control the associated impacts of water entering into them. Ensure that if pipes are installed in the gravel strips that they are connected to a drainage system. To minimize the impact of water in the gravel strips, separate the soil below by installing an impermeable geotextile fabric below the stone, directing water to the footing drains.

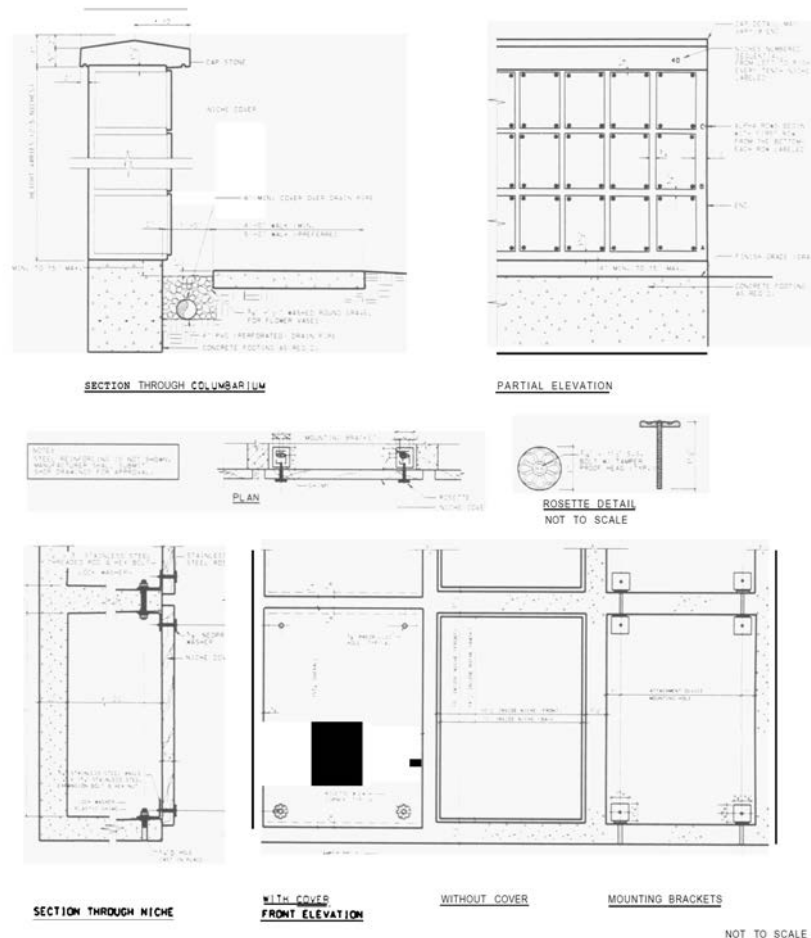
The designer shall detail the connection(s) of piers and wall units and consider the appearance of adjoining materials in close viewing distances rather than from far away. If unfinished concrete is used, the exposed concrete surfaces are cleaned of surface laitance with acid etching.

NOTE: The detailing is very important and can adversely affect the appearance of the final product. If the Contractors are left with too much latitude, the owner may get a final product that does not appear as initially designed/intended. The detailing is especially important when the design incorporates irregular stonework against straight precast concrete units. The designer shall detail the joints for stone to come against the concrete as a large mortared joint. A caulked joint is prohibited as it results in a poor appearance for the final product.

Consider creating three-dimensional views of the units, especially when the units are interconnected with numbering shown to ensure that the relationships visually make sense in Working Drawings and are constructible. Sometime during the design process, ensure that the construction tolerances of the columbarium assembly can be constructed as indicated.



COLUMBARIUM NICHE STANDARD DETAILS

*Exhibit 3: Example Columbarium Niche Details*

10.2.5. CREMAINS GARDEN [SCATTERING]

A. GENERAL

Cremated remains are scattered at a designated garden-type area in the landscape. A cremains garden should be designed to take advantage of the natural landscape features. It should be located in areas of a cemetery that are unsuitable for conventional interments because of terrain or landscape features. A site used for the scattering of cremated remains is not individually marked. Still, the deceased is acknowledged on a communal bronze plaque in the garden area or by an individual bronze plaque mounted on a wall designated for that purpose or by an appropriate marker on the memorial section of the cemetery.



10.2.6. MEMORIAL SITE

A. GENERAL

Memorial gravesite sizes adhere to the standards stated in [NCA Directive 3120 - Interment Area Layout](#). A memorial site is 900 mm x 900 mm (3' x 3'), marked with a 300 mm x 450 mm (12" x 18") flat marker of granite or bronze, except that bronze memorial plaques may be mounted on walls designated for that purpose, instead of placement of a marker in a memorial section. These walls may be portions of other features such as retaining walls, terraces, or similar features.

A memorial site is 3 feet x 3 feet (91 cm x 91 cm), marked with a 12 inches x 18 inches (30 cm x 46 cm) flat granite marker, except that:

- A memorial site in a cemetery with an established memorial section using upright headstones on 5 feet x 5 feet (1.5 m x 1.5 m), 5 feet x 6 feet (1.5 m x 1.8 m), or similar size sites are the same particular size and use an upright headstone to maintain consistency in appearance.

Bronze memorial plaques may be mounted on walls designated for that purpose instead of placing a marker in a memorial section.

10.3. PAVING, GRADING, DRAINAGE

A. GRADING GUIDELINES

Retain the site in as natural a state as possible. Keep grading to a minimum while meeting the functional requirements of the cemetery. To the extent feasible, balance on-site cut and fill. Leave undisturbed such features as natural drainage ways, valuable trees or tree groups, shrubs, ground covers, rock out-cropping, and streams. Changes that may increase siltation or turbidity of natural wetland areas should be avoided to comply with applicable regulations. The design should use construction practices that minimize adverse effects on the natural habitat.

<u>Condition</u>	<u>Maximum Slope</u>	<u>Minimum Slope</u>	<u>Preferred</u>
Crypts	3% (33.3:1) (B)	2% (50:1)	2-3%
Lawns (Interment Areas)	10% (10:1) (B)	2% (50:1)	2- 6%
Xeriscape (Interment Areas)	2% (50:1) (B)	0.5% (200:1)	0.5-1%
Mowed slopes	25% (4:1) (A)	2% (50:1)	



<u>Condition</u>	<u>Maximum Slope</u>	<u>Minimum Slope</u>	<u>Preferred</u>
Road crown	3% (33.3:1)	2% (50:1)	2%
*Roads, longitudinal	10% (10:1)	1% (100:1)	1-10% (C)
Walks, longitudinal	5% (20:1)	1% (100:1)	1-5% (C)
Parking, longitudinal	5% (20:1)	1% (100:1)	1-3% (C)

- A. 25% is the maximum slope for mowing machinery.
- B. Slopes over 5% should have temporary and permanent erosion protection.
- C. Designated accessible routes used by people with disabilities shall conform to Architectural Barriers Act (ABA) Accessibility Standards.

* Payload is drastically reduced on heavy trucks sustaining grades over 3%. The ideal maximum sustained grade for the safe operation of trucks and automobiles is 6%. On roads subject to frequent icing and winter conditions, the maximum sustained grade is 5%.

10.4. ARCHEOLOGICAL / HISTORICAL FEATURES

Refer to TIL - *VA's Historic Preservation site for Archaeology Requirements, Cultural Resource Management* (<https://www.cfm.va.gov/historic/>)

10.5. TRANSPORTATION

10.5.1. ROADS

A. GENERAL

All the roads should accommodate anticipated traffic volume at a design speed of 24 km/h (15 mph).

Maximum Design Speed is 24 KPH (15 MPH)

Roads designed without curbing have edge reinforcement. Where curbing is used, it must be mountable (rolled, sloped, flush or battered face) for traffic control, equipment access, and drainage control: design storm drainage curb and gutter inlets to match the curb or curb and gutter profile. No part of the inlet shall be behind the curb. Select the grating for inlets based on drainage capacity, ability to screen out harmful debris, ability to pass unobjectionable debris, strength, and permanency. Use vertical curbing on roads within the cemetery only if necessary for traffic control. The maximum road grade is 10 percent. The entrance, primary,



and secondary roads are generally wide enough for two-way traffic to pass a parked vehicle. Preferred minimum road widths and radii are outlined in the table that follows in this section. Quality in initial construction and construction materials is critical to the cemetery roadway system. All roads should support heavy equipment and large trucks loaded with wet dirt, gravel, and headstones.

SUMMARY TABLE:

ROAD TYPE	MINIMUM WIDTH & MINIMUM RADIUS
Entrance Road:	5.4 m (18'), face to face of the curb;(per single lane divided by a median) 7.2 m (24'), edge to edge, with no curb 15 m (50') minimum radius
Primary Road:	7.2 m (24'), face to face of the curb; 7.2 m (24'), edge to edge, with no curb 9 m (30') minimum radius
Secondary Roads:	6 m (20'), face to face of the curb; 7.2 m (24'), edge to edge, with no curb 9 m (30') minimum radius
Service Roads:	
(1) Service Entrance:	7.2 m (24'), face to face of curb; 7.2 m (24'), edge to edge, with no curb 15 m (50') minimum radius
(2) Service to Buildings:	3 m (10'), edge to edge, no curbs 9 m (30') minimum radius
Committal Service Shelter Drives:	8.1 m (27'), face to face of the curb; 9 m (30'), edge to edge, with no curb; Narrow to 3.6 m (12') at the throat 9 m (30') minimum radius
Cortege Lanes:	3 m (10') per lane edge to edge no curbs

B. ENTRANCE ROAD

Entrance Road: (Divided Road, One Way In, One Way Out)

5.4 meters (18 feet) face to face of the curb;

7.2 meters (24 feet), edge to edge, with no curb 15 meters (50 feet) minimum radius

C. PRIMARY ROAD

The main loop is desirable for the primary cemetery road, allowing one to drive through the cemetery without turning around. Other configurations are possible depending on the specifics of the site. The primary road provides access to all other cemetery roads.



Primary Road: (Two-Way)

7.2 meters (24 feet) face to face of the curb;

7.2 meters (24 feet), edge to edge, with no curb 9 meters (30 feet) minimum radius

D. SECONDARY ROAD(S)

Secondary roads may be subordinate loops or connector roads. They provide access primarily to burial sections.

Secondary Roads: (Two-Way)

6 meters (20 feet) face to face of the curb;

7.2 meters (24 feet), edge to edge, with no curb 9 meters (30 feet) minimum radius

E. SERVICE ROADS

The following two types make up the network of service only roads within the cemetery roadway system:

- Service entrance – The road that provides access from the public road (approach road) directly to the cemetery administration/maintenance complex, if possible. Traffic consists of maintenance vehicles and delivery trucks.
- Service drives to buildings – The drives which provide access: (1) to the back of the committal service shelters, for removal of remains after the interment service, and (2) to wells, pump houses, and other appurtenances. These driveways have no curbs and may use alternative paved surfaces to minimize their visual impact on the site. Traffic consists of cemetery maintenance vehicles.

(1.) SERVICE ENTRANCE

7.2 meters (24 feet) face to face of the curb;

7.2 meters (24 feet), edge to edge, with no curb 15 meters (50 feet) minimum radius

Service Drives to Buildings -- The drives which provide access: (1) to the back of the committal service shelters, for removal of remains after the interment service, and (2) to wells, pump houses, and other appurtenant structures. These driveways have no curbs and may use alternative paved surfaces to minimize their visual impact on the site. Traffic consists of cemetery maintenance vehicles.



Service to Buildings - 3 meters (10 feet), edge to edge, no curbs 9 meters (30 feet) minimum radius

(2.) COMMITTAL SERVICE SHELTER DRIVES

Shelter drives shall be one-way in direction with a turn-around feature at the end of the road.

8.1 meters (27 feet), face to face of curb

9 meters (30 feet), edge to edge, with no curb; Narrow to 3.6 meters (12 feet) at the throat

9 meters (30 feet) minimum radius

10.5.2. PARKING

Parking in the cemetery is accommodated in several ways to meet the various needs of staff and visitors, as identified in the design criteria for the specific building/ complex. Typically, cemetery visitors parallel-park along cemetery roads or parallel pull-offs to visit interment areas or cemetery features such as the Flag/Assembly Area, Memorial Walkway, or Public Information Center.

Traditional parking lots are not provided for cemetery visitors.

NCA provides information on the number of required spaces.

Acceptable dimensions for parking areas follow for employee/visitor lots:

Minimum Bay Width 18 m (60'-0")

Minimum Stall Width 2700 mm (9'-0")

Public parking in national cemeteries is primarily on-street parallel parking. Visitor/staff parking lots may be provided with head-in stalls.

Design parking facilities to accommodate people with disabilities.

10.5.3. SIDEWALKS

Building Entrances: Analyze special requirements for entrances to buildings, especially accessibility compliance with ABAAG. Walks should be at least 1500 mm (60 inches), except 2400 mm (96 inches) minimum when abutting parallel parking pull-offs occur. Design walk slopes not to exceed 5%.

DOT details are NOT approved for use within the grounds of national cemeteries. However, DOT details are appropriate and approved for use in specific entry and exit locations where cemetery roadways directly intersect with public streets, roads, highways.



Truncated domes (detectable warnings, tactile paving, and other detectable warning means) shall not have bold coloring, such as bright yellow, typically found in DOT standards]. They do not represent NCA's goal to achieve national shrine cemeteries. The specified material color shall meet the contrasting criteria within ABAAG and balance the surrounding cemetery architectural finishes. Detectable warning concrete brick-colored paver material is preferred.

10.6. PAVING

Permeable pavement includes permeable or porous concrete, porous asphalt, single-sized aggregate, and other similar materials shall not be utilized in national cemeteries without a waiver from NCA Operations. Although the material selection lessens the environmental impact, these products have a short lifespan because the equipment used for burial operation tracks soil, requiring more maintenance to keep the required porosity of the pavement to maintain permeability.

The amount of earth cover required over a sewer, water, and gas lines follows:

Minimum cover under traffic areas shall be 900 mm (three feet).

The top of potable water and gas lines shall be at least 300 mm (one foot) below frost penetration.

Where practical, the top of sewers shall be at least 300 mm (one foot) below frost penetration. Where such depth below is not practical, provide supporting foundations to such depth and securely fasten sewer.

Do not install more than one utility in the same trench.

Maintain a horizontal distance of at least 3000 mm (ten feet) between parallel sewer and water lines, and parallel potable and non-potable (reclaimed) water lines.

Route the main distribution systems for utilities immediately adjacent to roadways within 3000 mm (10') of the curb or pavement edge. Route any utility lines through interment areas between sections to avoid obstruction of gravesites within burial sections. Install all utility lines, including electric power and communication lines, underground. Exceptions may be made depending upon the high cost or remoteness of the source from developed areas of the cemetery.

10.6.1. WATER

A. WATER SUPPLY:

A connection to a public water company is preferred for potable water. If a potable source is not available, provide on-site water treatment as necessary. Provide potable water to



administration and maintenance buildings, public restrooms, and yard hydrants. Untreated irrigation water (not sewage effluent) may be used at flower water spigots with proper signage. All signage follows the cemetery signage design.

Refer to *VA's Fire Protection Design Manual* (<https://www.cfm.va.gov/tl/spclRqmts.asp#FS>) for water supply pressure testing. Coordinate with the Fire Protection Section of this guide.

Investigate the use of non-potable water for irrigation. Effect on health, grass, and irrigation equipment shall be considered. Ensure that water is available either by two sources or on-site storage (lake, tank, or other means of storage.). Use potable water as a last resort. Coordinate with the Landscape Design section, Irrigation Design sub-section of this guide. Provide separate water meter (or deduct meter) for irrigation-only service connections to avoid sewer fees for irrigation water.

B. WATER DISTRIBUTION SYSTEM:

Design system to provide water service for maximum domestic and irrigation requirements. Fire hydrants are provided if an adequate water supply is available. Flow velocity shall not exceed three m/s (10 feet-per-second).

Place isolation valves to provide control over the reasonably sized area. In addition, designate valves in fire hydrant branches and building service lines near their connection to feeder mains.

At a minimum, provide one hydrant for first responders; if adequate supply is available, place a fire hydrant at occupied buildings or at an alternative location to serve the site. NFPA allows non-sprinkler administration buildings.

C. DOMESTIC WATER PUMPING SYSTEM:

Large Systems: Use a three-pump constant pressure system with a pneumatic tank and no-flow shut-down. Use variable speed pumps.

Small Systems: May be two pump systems with a pneumatic tank and operate with an on-off pressure switch. Provide controls that alternate the pumps and allow both pumps to operate at the same time. Use variable speed pumps.

10.6.2. SANITARY SEWER

A. GENERAL

Do not cross gravesites with utilities. Route the main distribution systems for utilities immediately under or adjacent to roadways. To avoid obstructing gravesites within burial sections, route utility lines in interment areas between sections to avoid obstructing gravesites within burial sections. Install all utility lines, including electric power and communication lines,



underground. Exceptions may be made depending upon the high cost or remoteness of the source from developed areas of the cemetery.

B. SANITARY AND STORM SEWERAGE SYSTEMS:

Design separate, underground sanitary and storm sewerage systems, including building connections, manholes, cleanouts, drainage inlets (yard and curb), cooling tower waste lines, open drainage channels, dry wells, and similar structures and fixtures, and all appurtenances. The storm drainage system shall serve all areas under construction or affected by construction.

Storm-water management shall be provided as necessary to comply with the Energy Independence and Security Act (EISA) Section 438 Storm Water Runoff Requirements for Federal Development Projects. Any development or redevelopment project with a facility footprint exceeding 5,000 square feet or expansion of existing facilities by more than 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property concerning the temperature, rate, volume and duration of flow. The footprint includes all horizontal hard surfaces and disturbed areas within the project site, including building and vehicular and pedestrian pavements. Additional information can be obtained from the EPA publication, Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act (EPA 841-B-09-001).

Comply with the NPDES mandated storm-water effluent limitations imposed on off-site municipal or regional receptors of stormwater runoff from the project site. Provide treatment and retention, if required by Agency and local jurisdictions.

Do not connect storm drainage systems to sanitary sewerage systems.

To the extent feasible, locate sewer pipes and manholes under the pavement at the centerline. Provide maintenance holes at junctions, changes in direction, slope, and changes in invert elevations of sewers 200 mm (8-inch) and above. [Cleanouts are required for 100 and 150 mm (4 and 6-inch) sewers]. Limit spacing between maintenance holes (manholes) to 90 m (300 feet), except 150 m (500 foot) spacing is permitted in straight runs of long outfall sewers.

Indicate on drawings where extra strength pipe is required to support anticipated trench and superimposed loads. Include adequate pipe bedding and, if necessary, provide structural supports for sewer pipes, maintenance holes, inlets, and other appurtenances.

Limit sanitary trunk sewers to not less than 200 mm (8-inch) diameter and sanitary sewer building connections to not less than 100 mm (4-inch) diameter. Establish sanitary sewer slopes to provide the minimum velocity of 0.6 m per second (two feet per second) when the pipe is flowing full; maximum slope shall be ten percent unless there are unusual circumstances; provide drop manholes when the difference between incoming and outgoing inverts is greater than 18 inches.



Limit storm sewers serving drainage inlets to not less than 300 mm (12") diameter and building connections to not less than 100 mm (4-inch) diameter. Establish storm sewer slopes to provide a minimum velocity of 0.6 m per second (two feet per second) when the pipe flows full. Maximum storm sewer design velocity shall be in the non-erosive range for specified pipe material.

Storm drainage curb and gutter inlets shall be designed to match the curb and curb and gutter profile. No part of the inlet shall be behind the curb. Grating for inlets shall be selected based on drainage capacity, ability to screen out harmful debris, ability to pass unobjectionable debris, strength, and permanency guidelines.

Use State or local standard details for maintenance holes, inlets, end walls, and pipe cradles. Adjust master specification as necessary. The curb and gutter inlets are designed with a grade to match the profile of the curb and gutter; no parts of the inlet are behind the curb.

Use septic tanks and leach fields to treat building waste if connecting to the public sewer is impossible and soil percolation is adequate. Septic tanks without leach fields shall be equipped with an audio/visual monitoring system. Provide details and installation instructions per the State or local Health Department and others having jurisdiction. If percolation is poor, provide an alternate solution of treatment.

Where required by high groundwater conditions, provide a subsurface drainage system in gravesite areas to ensure the water table is a minimum of 2400 mm (8 feet) below the estimated final grade or 12" below crypt fields.

C. SEWAGE PUMPING EQUIPMENT (EXTERNAL):

The design goal is to maximize the operating life of the pumping equipment by minimizing wear on critical pump components (seals, bearings, and other components), which worsens as pump operation moves farther from the pump's established Best Efficiency Point (BEP). The designer shall perform the hydraulic analysis. This analysis shall be the basis for establishing the number of pumps required and the design operating range (initial and buildout) for each pump to be provided. To the greatest extent possible, pumps shall be selected to maximize their operating efficiency during all hydraulic conditions that may exist, i.e., the curve of the selected pump shall wear back into the best efficiency range of the curve for buildout conditions. Pumps shall be designed for automatic pump alternation with operation at no more than ten times per hour under the worst-case condition (influent flow equals half of the pump capacity). The wet well shall be designed to provide a margin of safety over the net positive suction head required in feet. Include a high water level alarm system in the wet well, and place an alarm panel in the office of the Facility Maintenance Manager, chief, or other appropriate location. Coordinate with facility for proper placement of alarm system in Design Development. Provide emergency power.



10.6.3. GAS SERVICE

A. GAS DISTRIBUTION SYSTEM

Coordinate with Gas Company concerning housing and fencing for gas metering and regulating equipment. Comply with all gas company requirements.

10.6.4. ELECTRICAL SERVICE

Coordinate with Electrical Company concerning A/E estimated electrical service requirements.

All Electrical services should be routed underground via direct bury or conduit with duct banks.

Transformers shall be shielded from view by landscaping or architectural features.

10.6.5. FUEL FOR MAINTENANCE EQUIPMENT

Above ground type tanks are required to accommodate both gasoline and diesel fuels. Design per NFPA 30A, International Fire Code, or Uniform Fire Code, as applicable and match local jurisdictions' requirements. Tanks shall be listed by the manufacturer as protected above-ground type as defined as protection from physical damage and fire-resistive protection from high-intensity liquid pool fire exposure. Provide air, water, and electrical utilities as required to complete the installation. Provide emergency shut-off at a minimum of 20 feet but no more than 100 feet from the dispensing unit. Provide necessary warning signage. Provide tank protection from vehicles by 4" concrete-filled bollards 3' in height above grade, embedded 3' deep in concrete, and space no more than 4' apart. Pump hose(s) shall be able to reach all servicing equipment without excessive strain. Provide secondary containment. Provide emergency power.

10.7. SITE SIGNAGE / WAYFINDING

10.7.1. GENERAL

Signage should be consistent with *VA's Signage Design Manual, National Cemetery Administration Signs* (<https://www.cfm.va.gov/til/dManual.asp#SIGN>) unless there is a compelling reason for a unique design. Design all cemetery signs as a coordinated information system for cemetery visitors, using consistent locations, shapes, sizes, materials, colors, and graphics. The essential purpose of the signage is to communicate information in a legible, clear, and quickly comprehended manner. VA specifies the following sign types should make up the signage system:

- Cemetery Sign
- Orientation Map



- Visitor Information / Regulations
- Traffic Regulations
- Directional
- Street Identification
- Place Identification
- Floral Regulation/Visitor Information
- Burial Section Markers

Coordinate with VA Plaques and Seals Requirements.

DOT style signage and details are NOT approved for use within the grounds of national cemeteries. However, DOT signage is only appropriate and approved in specific entry and exit locations where cemetery roadways directly intersect with public streets, roads, highways.

10.7.2. OFF-SITE WAYFINDING / DIRECTIONAL SIGNAGE

Off-site wayfinding/directional signage shall be considered within all projects to guide visitors to the National Cemetery. Signage may be considered Tourist Oriented Directional (TOD) Signs, Official Signs, or Advanced Notice Signs in some jurisdictions. NCA intends to provide off-site wayfinding/directional signage for all rural areas as these signs provide directional information to the traveling public about places located on non-primary routes. Provision of more signage becomes more critical as more rural cemeteries are opened in remote areas of the country.

The designer is responsible for determining appropriate off-site locations and annotating them on the design plans. Since off-site signs are usually located on State, county, or local road rights-of-way, those agencies may define suitable sign substrates, colors, and letter styles based on their standards. The designer should coordinate with Local/ City, County, and State transportation departments for planning, permitting, and installation requirements.

The designer shall notify project leaders about legal requirements such as entering into Memorandums of Agreement with State or local highway agencies negotiating the terms of construction, installation, maintenance, and access for advance notice signs.

Signage shall conform to the Manual for Uniform Traffic Control Devices (MUTCD), the latest edition. Design standards shall conform to applicable Local/ City, County, and State requirements.

10.7.3. ENTRANCE AREA SIGNAGE

Cemetery identification is a significant component of the entrance area. The entrance area must incorporate the following elements in its design:

The Department of Veterans Affairs Seal, or insignia, at least two feet in diameter;



Using lettering sufficient to be seen from the public street (or approach road), the words, “(NAME of CEMETERY) National Cemetery.”

The design shall also include discreet lighting of the cemetery name.

10.7.4. ASSEMBLY AREA SIGNAGE

The Service Branch emblems are typically located in the assembly area. Note that Service Seals require written authority from each service to be posted; therefore, emblems are used.

10.7.5. SECTION MARKERS

Section markers are permanent section identification labels that are a part of the overall site signage system. Each burial section is marked by one or more section markers bearing either the number or letter assigned to that section. Section markers are positioned at the edge of the section, usually near a road, drive, or walk, readily visible to the public. They serve to identify the corner or boundary of the gravesite and memorial sections. Section markers consist of granite, marble, or concrete posts.

Each burial section in the cemetery shall be identified, with the limits of the burial section indicated by section markers. See paragraph (2) g., of this handbook for placement of section markers. Burial sections are designated by numerals or letters, or if necessary, both numerals and letters, for example, Section 14, Section G, Section AB, or Section 21A. New gravesites are designated by numbers only, and no alpha characters may be used.

When two burial sections are contiguous and are not otherwise separated by a road, drive, or walk, a section marker is placed at the dividing line between the two sections. This marker indicates the numbers or letters of both sections on one post and a directional arrow indicating which section is which.

Design details of the three standard section markers can be found in the [VA Signage Design Manual, National Cemetery Administration Signs](https://www.cfm.va.gov/til/dManual.asp#SIGN) (<https://www.cfm.va.gov/til/dManual.asp#SIGN>).

10.7.6. STREET NAMES AND BUILDING NUMBERS

The NCA assigns street names and building numbers during review meetings.

10.7.7. CONSTRUCTION AND SAFETY SIGNAGE

All projects shall have construction and safety signs outlined in NCA Specifications, General Requirements 01 00 01. The specified size and construction standard are mandatory for projects over \$2,000,000. Projects under \$2,000,000 size and construction standards are determined on a project-by-project basis.



10.8. SITE FURNISHINGS

The components of the site furnishings system should coordinate with and complement each other, the cemetery architectural design, and the site as a whole. Site furnishings, including signage, benches, trash receptacles, and flower container/ water receptacles, shall be simple, standardized, and adequately scaled with the function and character of the site. Design or select all components to be low maintenance and vandal resistant. The placement of site furnishings, i.e., benches, trash receptacles, flower vase receptacles, hydrants, and signage, is concentrated in high-use areas.

Locate and place trash receptacles, flower vase receptacles, and flower watering stations between the front side of adjacent burial sections, or if not possible, in front of irrigation aisles rather than directly in front of gravesites. Front and center location is not desired or preferred because it is somewhat unsightly for visitors and blocks the view of the gravesites behind it.

10.8.1. BENCHES

Design or select a commercially available bench, be placed at selected locations to take advantage of views or vistas, or establish spots for meditation. Donations by veterans service organizations are the primary means for acquiring the benches. Benches shall be mounted on concrete pads with space at the side for a companion wheelchair where accessible.

10.8.2. TRASH RECEPTACLES

The design or selection from commercially available products should coordinate with and complement the overall design scheme. The minimum quantity possible is desired, placed strategically to accommodate the public.

Exhibit 4 shows a typical Flower Watering Station with Flower Vase and Trash Receptacles.





These storage receptacles hold the conical metal/plastic flower containers available for public use in the cemetery. The receptacle is either placed adjacent to hydrants along the cemetery road or constructed to dispense water from a tank by cemetery visitors for flowers. The design of the receptacle is similar to a trash receptacle and should coordinate with all other site appurtenances. To provide accommodation for reaching into the receptacle, the height of the flower container receptacle shall be lower than the trash receptacles. Floral regulations sign panel should be attached to this container.

These are posts that enclose or adjoin the water standpipes provided along the roads throughout the cemetery. Water is intended to be used for flowers placed on graves by visitors. The post shall: identify the spigot locations, protect the standpipe from being hit by

maintenance equipment, and incorporate a splash block at its base. If non-potable water is used, the fixture shall be clearly labeled on at least three sides. The post design should coordinate with the cemetery signage and all other site appurtenances.

Operation of the flower water station spigot shall be by handle or lever that meets ABAAG requirements of 2.3 kg (5 lbs.) or less force to operate.

Flower water station spigot shall be of a type suitable for the climate and operation of the irrigation system. Recommend use of fixtures that are self-draining and have water feed installed below frost depth. Spigot shall have a laminar flow device to provide even flow.

Match existing when the existing fixtures are to remain permanently and currently meet standards.

Install a brass or bronze pressure regulator and an isolation valve on the water supply to the fixture in an accessible location below grade. The flowering station's concrete base does not need to be removed.

Connect the gravel in the splash box, and below the automatic drain to a storm drain, or to the gravel beneath a crypt field, or other suitable draining location, when the native soil is not a well-drained soil, to prevent saturation of the soil and operation of the automatic drain in water, especially when frost occurs.

Exhibit 4 above shows a typical Flower Watering Station with Flower Container and Trash Receptacles.

10.8.5. GRAVESITE CONTROL MARKERS

Gravesite layout control markers are permanent survey markers installed in a grid in each burial section and used to assist the accurate layout of gravesites. These are typically concrete posts with an embedded metal pin, installed flush with the ground to minimize interference with mowing operations.

Permanent gravesite control monuments, which meet the requirements detailed in [NCA Directive 3120 - Interment Area Layout](#), are installed before using any section (burial, cremains, or memorial) for interment.

The standard grid dimensions are 90 feet x 90 feet (27.4 m x 27.4 m). Other grid dimensions used are 80 feet x 80 feet (24.4 m x 24.4 m) and 100 feet x 100 feet (30.5 m x 30.5 m). For steeply sloping sites, the grid spacing must be close enough that the string level line used for laying out headstones can be held by hand.

Exhibits below show typical Placement of Gravesite Control Markers.



The standard gravesite control marker is a length of 3/4 inch diameter (1.9 cm) iron pipe driven flush with the grade, with an aluminum survey cap on top. Exhibits below show details of the standard Permanent Gravesite Control Marker. Crosshairs are inscribed within the center circle by the surveyor following marker installation. The standard gravesite control markers are installed in each section at all vertical and horizontal grid crossings. Markers shall be embedded in cast-in-place concrete or be precast and grouted in place. Formerly the embedment in concrete was used only in extreme soil conditions and was called the alternative marker. However, the marker cap embedded in concrete is the standard. Exhibit 4 shows the alternate Permanent Gravesite Control Marker.

At least three gravesite control markers are installed in each section (burial, cremains, or memorial). These are placed, one near each end of greater rectilinear dimension, and one at a right angle to this line and at all other intersections of the gravesite layout grid.

All gravesite control markers shall have an integrated magnet embedded in or glued to the marker for location by magnetic locator equipment.

All permanent gravesite control markers are maintained and protected by cemetery personnel.



CREMAIN
SECTION 24

SECTION 205

SECTION 201

PROPERTY LINE

DRIVE

LEGEND

○ PERMANENT TRAFFIC CONTROL

NOT TO SCALE

Exhibit 5: Typical Gravesite Control Marker locations



FIELD INSCRIBED IN CIRCLE

PERMANENT GRAVESITE CONTROL MARKER (STANDARD)

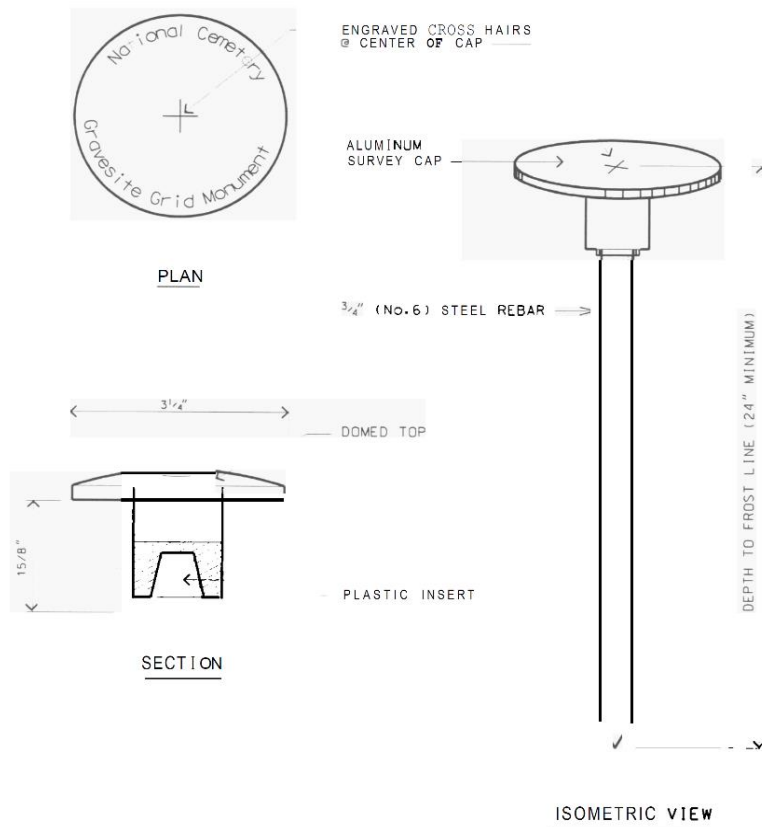


Exhibit 6: Gravesite Control Marker Cap Detail



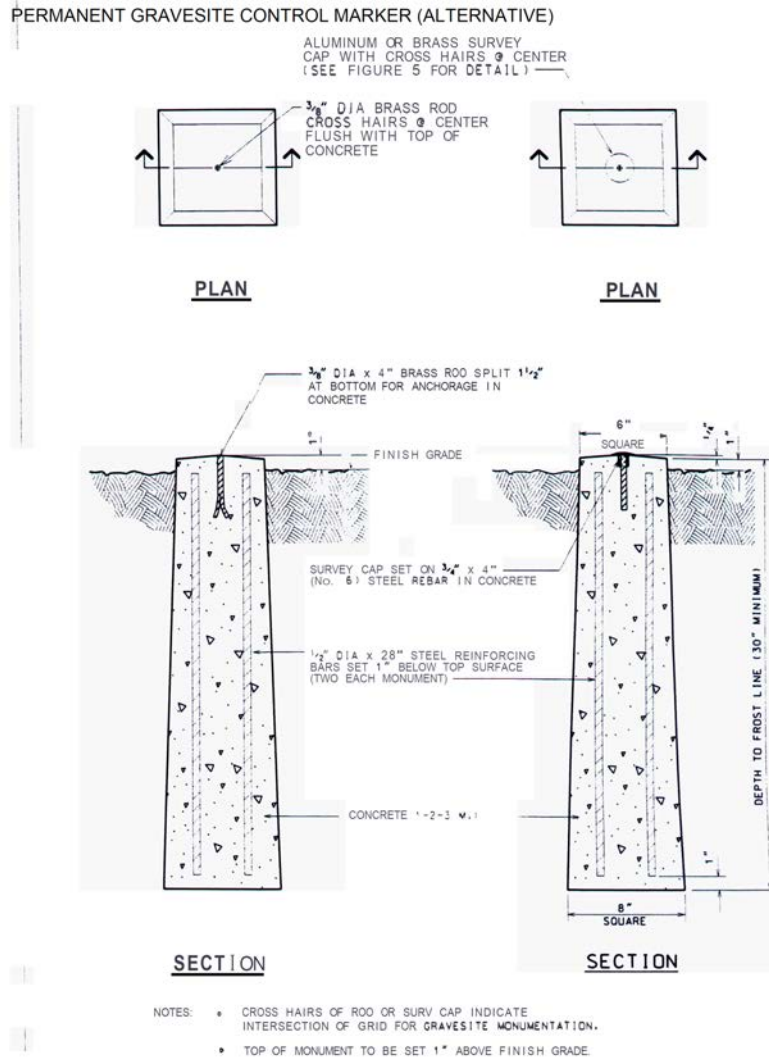


Exhibit 7: Example of one kind of Permanent Gravesite Control Marker

10.8.6. FLAGPOLES

Typically, two flag poles are used in National Cemeteries:

- United States Flag – height is project-specific, typically 60-80'.
- POW/MIA Flag – height is project-specific, 15-30'.

The structural engineer shall design the footings for the flagpole, considering the site's wind load zone, pole height, and flag size.

Flag size and purchase are the responsibility of cemetery operations.



10.8.7. FLAG SLEEVES

Flag sleeves are used in the Avenue of Flags for periodic placement and display of Donated Burial Flags (5'x 9' size) on poles 15'-30' high; these are placed along the entry route into a National Veterans Cemetery. Spacing shall be 15' to 30' apart, and the number of poles shall be based on available space.

Flag sleeves are typically for flags affixed to the flagpoles, are not raised and lowered, and are not removed or lit at night for the short-term they are displayed. Flag sleeves shall be designed and installed to handle the flag poles for the specific site. The flag sleeves shall match existing facilities unless the Cemetery operations staff receives a specific direction indicating desired modifications due to operational issues with the existing design.

10.8.8. FENCING

Where site conditions allow perimeter or boundary fencing beyond the entrance area is preferred but is a site-specific decision for NCA. An entire cemetery of hundreds of acres may be fenced as it is developed rather than first established.

Provide security fencing to maintenance yard adjacent to maintenance buildings.

Provide security fencing to control access to water supply, fuel supply, and other critical areas.

Per Physical Security Design Manual requirements: Security fencing shall be six feet high, black, vinyl-coated chain link; however, the materials and color shall integrate with the overall cemetery appearance. Refer to *VA's Physical Security and Resiliency Design Manual* (<https://www.cfm.va.gov/til/dManual.asp#PSR>) for required door type, hardware, and access control.



11.0 L – LANDSCAPE

11.1. GENERAL

Begin by referring to the cemetery master plan, if available. Integrate the landscape planting design with the overall design of the site. The landscape planting shall complement and enhance the architecture and site features, facilitate vehicular and pedestrian access, create open areas and vegetative screens, and ensure easy maintenance.

Enhance the established design and the historical character of existing buildings and landscapes. The design should be an outgrowth of site function and building massing. The site, the building, and the landscape should reflect an integrated concept.

Provide open lawn spaces (interment areas) framed by groups of upper and mid-story canopies trees. In drought-prone climates, limit irrigated turf to burial sections and frame the burial sections with planting beds containing naturalized/native landscape treatment. In desert / arid climates, select alternative groundcover whenever possible.

Concentrate the use of shrubs to buildings, screening, a separation between burial sections, and control of pedestrian traffic.

Where practical, select plants indigenous to the area require little maintenance and are disease and insect-resistant. If indigenous plant species are limited, then select plants that are native or well-adapted to the region.

Do not select plants that are poisonous, irritating, thorny, or that drop fruit or sap. Locate plants so they do not interfere with driver or pedestrian visibility, circulation, and safety.

Plant bed outline curvature shall have a minimum radius of 3m (10 feet) to accommodate riding mowers.,

Utilize an appropriate mixture of trees, shrubs, and ground cover plants of varying root depths to stabilize slopes steeper than 3:1, i.e., 3m horizontally to 1m vertically (3 feet to 1 foot). Slope planting shall provide 100 percent vegetative cover in 10 years.

Locate shrubs so that they can grow to their full natural spread without trimming, except for hedges. Locate individual ground cover plants 1-1/2 times their full spread away from curb lines, so they do not need edging. Do not locate shrubs over 2' height within the visibility triangle at road intersections.

The master plan should designate a location for the storage of soil spoils from interments. The area should not be visible to cemetery visitors. This same area may be used to process and store grave liners not too far away from active burial sections.



11.2. PLANTING

The planting design should articulate and strengthen the site layout. Develop interrelated patterns of open, closed, or semi-enclosed spaces to suit the planned function. Concentrate planting in non-burial areas, such as trees along streets, buffer planting to screen unsightly views, and plantings to separate burial sections. Each plant used should serve a purpose and contribute to the function and overall design intent of the cemetery master plan. The development should use regionally native plants and employ landscaping practices and technologies that conserve water and prevent pollution.

Prepare interment areas for seeding, sprigging, and sodding with topsoil and proper nutrients. In non-burial areas, consider alternatives to standard turf that are suitable to drought conditions. Plant cleared slopes steeper than three to one (3:1) with ground cover other than turf. The amount of annual rainfall and the type of irrigation system determine the plant material selected.

The following criteria are to be used as a guide for plant massing within pre-placed crypt fields. These are minimum standards for cemetery expansion projects at sites where the availability of land permits such practices. The designer shall confirm with the project manager the applicability of installing plants and trees within crypt fields before proceeding, as this determination is to be made on a project-by-project basis.

- Burial fields containing at least 1,600 crypts are allotted one (1) cluster of trees. Fields containing at least 2,000 crypts are allotted two (2) clusters of trees.
- Clusters of trees may be defined as a grouping of 3 or more trees. Clusters should be in the range of approximately 1,300sf and 1,800sf or approximately the equivalent of 60-80 gravesites, including irrigation aisles.
- Clusters shall be aligned with or next to irrigation aisles to allow for maximum grave counts.
- Alternatively, in cemeteries with a historical pattern of individual trees planted within burial sections, remove a block of 3 pre-placed crypts to provide a 9' x 8' planting pocket for one specimen tree while maintaining the overall crypt count. During design, locate the tree planting pockets in a natural pattern adjacent to the irrigation aisles to provide additional space for root growth. The number of individual tree plantings within each crypt field shall match the density of the historic tree plantings within burial sections.
- Tree selection shall match the existing plant palette within the site to look as natural as possible, ensuring minimal use of unique ornate trees.
- Avoid overuse of a single tree species to avoid mass loss of tree canopy in the event of a pathogen that attacks a specific species (e.g., Dutch Elm disease, Emerald Ash Borer, and other tree diseases)
- Plant selection shall avoid or carefully consider a selection of plants with excessive fruit clutter or other maintenance concerns.



- In sections with two or more groups, groups should be located no more than 61 linear meters (200 linear feet) apart.
- In sites where the availability of land is limited or where the visual aesthetic improves site, clusters may be aligned to the perimeter of the crypt fields near the roads allowing the maximum gravesite counts while still providing the visual aesthetic benefits of the trees.
- Locate linear root barrier against the crypt walls where trees are planted to reduce impacts on crypts.
- Locate trees a minimum of 5' from hardscape (e.g., curbs, walls, walks, other paving) to prevent root damage. All trees planted closer than 5' shall have a linear root barrier against the structure for ten lineal feet centered on the tree trunk. Locate trees no closer than 10' from utilities (storm-sewer, electrical, domestic water, or other utilities)

11.3. IRRIGATION

Irrigation is usually necessary to keep the landscape at an aesthetically pleasing level. Although sufficient rainfall may be received to sustain indigenous plants, situations involving introduced species or plants in stressful conditions may require irrigation. Evaluate the landscape environment, including turf grasses, and determine whether an irrigation system should be installed in the cemetery. The report should include a cost analysis of irrigation versus non-irrigation, on-site, and off-site water supply sources, including quality of available water, annual rainfall, and water quantity needed to sustain healthy plants. If an irrigation system is recommended, design and specify an efficient irrigation system that is automated, easily operated, and maintained. Irrigation lateral lines in burial sections should run parallel with the length of the gravesites. Water-efficient design methods shall be incorporated into the design.

11.3.1. GENERAL:

Design criteria for existing systems are unique to that system. The first design discussion should identify the existing system and determine what is or isn't working at the existing facility. Generally matching what is existing or modifying, expanding, or replacing what is existing are to be clarified during the design development for the project. As the designer becomes familiar with the operation of the existing system, the problems and objectives for the system improvements and appropriate design should be created, integrating the existing with the new. When the existing landscaping area changes, the existing sprinkler system must be modified to accommodate a practical and efficient irrigation design. These situations are unique and beyond the scope of the standard facilities design criteria, other than as a general guide.

Design criteria for irrigation systems shall, to the greatest extent possible incorporate water conservation and application efficiency. Irrigation system designs shall follow the current Federal and Local water conservation directives.



In the design of new irrigation systems, follow this facility design criterion and utilize the [NCA Master Construction Specifications \(https://www.cfm.va.gov/til/ncaSpec.asp\)](https://www.cfm.va.gov/til/ncaSpec.asp)

Unless otherwise noted on a project basis, design the system to require the amount of earth cover over mainline irrigation pipes, sub mainline pipes, and lateral pipes as follows:

- Minimum cover for main lines under traffic areas shall be 900 mm (36") from the bottom of the road subgrade.
- Top of irrigation lines, other than laterals, shall be at least 600 mm (24") below grade in turf areas.
- The top lateral lines shall be at least 450 mm (18") below grade to install swing joints or rotary sprinklers properly.
- The pipes entering the control valve boxes shall be site-specific based on local frost depths and winterizing requirements.

Maintain a minimum horizontal distance of at least 3000 mm (10 feet) between parallel potable water and irrigation lines, mainly when the irrigation water source is reclaimed water or water from non-potable sources.

Fire protection systems including, hydrants and building sprinklers, should not be connected to irrigation systems.

11.3.2. IRRIGATION UTILITY AISLES

Irrigation lateral pipes and sprinkler heads to be installed within burial areas require the design of irrigation utility aisles. The purpose of the aisle is to allow the internment activities to occur without disturbing the irrigation system components. Irrigation aisles should be designed to be the same width at the burial plots for the specific burial area; this is critical where upright headstones are to be used to keep the diagonals for the headstones aligned. The irrigation aisles are equidistant from the edge of the landscape area, including the 10' buffer between the street and burial section.

The lateral pipes and sprinklers should be located generally in the approximate center of the aisle, except where it is necessary to deviate to not interfere with layout monuments. Sprinkler heads should be located in the center of the irrigation aisles positioned perpendicular to the long axis of the burial plots at the mid-point between headstone rows for adjoining burial plots. Burial sections with upright headstones have a negative impact on efficiency since the headstones intermittently block the spray regardless of the location of the head. Therefore, sprinkler heads must be precisely located to minimize this interference.

For 3'x8' pre-placed crypts with upright headstones, the sprinkler head is positioned in the center of the irrigation aisle equidistant between four upright headstones (approximately 58" from the top of the 8' burial plot).



The irrigation heads should be spaced equidistant between the adjacent headstones for traditional burial sites with upright headstones and no irrigation aisles.

For 3'x4' or 4'x4' in-ground cremains sections with upright headstones, the irrigation head should be placed in the center of the irrigation aisle equidistant between four upright headstones. Use 12" high pop-up rotor heads.

The irrigation laterals should be run underneath the markers with heads spaced equidistant between the adjacent headstones for traditional burial sites with flat markers and no irrigation aisles.

Provide a sample burial section layout in Design Development before designing the entire irrigation system. Alternate methods of design are considered in this review.

Design layout distance between irrigation utility aisles is typically based upon application efficiency for the sprinklers. The size and shape of the landscape area drive the sprinkler selection and spacing, which determines the distance between irrigation aisles. Design the irrigation aisle spacing based upon multiple widths for the plots in the specific field. As an example, for pre-placed crypt fields, where plot width is 3', the design distance between irrigation aisles are a multiple of 3 feet, with the distance between aisles limited based upon the irrigation system characteristics, the type of sprinkler head, the available operating pressure, the available nozzles, and the efficiency metrics. Designed spacing between irrigation aisles greater than 63', resulting in higher pressure at the sprinkler heads and lower application efficiency metrics. These conditions have higher cost impacts on the pumping and distribution system. In addition, operating sprinkler heads with a pressure of 80-90 psi, compared to 50-60 psi, can adversely impact nearby trees and headstones. The most efficient head spacing for 3'x8' crypt fields with upright headstones is between 48 and 51 feet. For windy sites, this spacing should be further reduced.

11.3.3. IRRIGATION WATER SUPPLY:

The evaluation of irrigation water source(s) should be investigated during all the project development phases. Each site location has unique issues regarding the location and development of irrigation water supply sources. The methods for developing water at a specific site are not covered in the facilities' design guides. The source of irrigation water should follow the general design concepts in this design guide.

An irrigation water supply source for an NCA facility needs to be developed conceptually to provide the potential for a good water supply source for the entire build-out of the facility; this is not necessarily true at locations where a future phase is separated by a physical boundary such as a river or stream. It may be better to have a separate water supply for the future phase in the latter case; this is especially true if a pond is required as part of the irrigation water supply source. The specific requirements for water supply sources are site, project-specific, and



appropriate sources for a particular project based upon engineering evaluation, including life cycle costs. The alternatives are evaluated as early in the project process as possible.

The infrastructure designed for the current phase of the project should, wherever possible, be designed to be adequate for the future expansion of the facility as the project expands so that all of the facilities won't have to be entirely replaced during each expansion phase. There are many factors to be considered when designing the infrastructure for specific projects, and the above considerations should be addressed on a project-by-project basis.

Irrigation water sources being considered for development should be evaluated based upon the most cost-effective source based upon life cycle costing.

Generally, all water sources other than potable municipal water supply are preferable to municipal potable water sources. When there are no alternatives for municipal potable water sources, they should be considered the primary irrigation water supply source. Municipal potable water sources are considered viable on a case-by-case basis, during the development of alternative sources, and as a redundant source, on a project-by-project basis. The priority for sources should be those determined from an investigation of non-potable water sources for irrigation.

Public health concerns are of primary concern when designing an irrigation system using non-potable water sources.

Water quality that affects turf (nutrients and other constituents), headstone staining, and impacts on irrigation equipment must be considered, and adverse long-term impacts minimized as part of the design for these supply sources.

Where possible, ensure that the irrigation water source is uninterrupted. Where not possible, an alternative source to function as a backup supply source should also be provided. The backup source shall be adequate, should the primary source become unavailable to supply the irrigation water source of supply water in sufficient volume and duration to ensure that the landscaped areas within the cemetery do not become permanently stressed or die. The duration of the irrigation period shall be until either the other source is re-established or there is sufficient rain to maintain the landscaped areas of the cemetery.

Untreated irrigation water from surface water, or untreated well-water, may be used at flower water spigots, with proper signage and color-coding. All signage follows cemetery signage design.

Reclaimed tertiary treated effluent water may not be utilized at flower water spigots. In this case, a separate potable water source must be provided.



11.3.4. IRRIGATION WATER DISTRIBUTION SYSTEM

The water distribution system for cemetery irrigation systems generally consists of mains and sub-mains. Mains distribute water to a defined irrigation region [e.g., burial section(s)] to supply a sub-main to service remote control valves for that irrigation region. The connection of the sub-main to the main requires a service tee, an isolation valve, a normally-open master valve with pressure regulation, and a flow sensor. Each irrigation region often is under the control of a single satellite irrigation controller.

Mainlines and sub-mains shall be looped wherever feasible to provide the best system hydraulics and reduce pressure loss.

Do not cross gravesites with irrigation mainline or lateral pipes. Do not run irrigation mainlines behind columbaria walls when used as retaining walls. A mainline break could flood the remains within niches. Irrigation system mainline pipes for routing purposes are those that are larger than 6-inch diameter. There are two acceptable routes for the irrigation mains within new cemeteries or expansions in existing cemeteries, where new roads are constructed. The first route is in the new road network. For this construction, the installation of the irrigation main shall be designed to be constructed like public water mains in municipal streets. The water main shall be backfilled with flowable fill that can be excavated by hand or light equipment. Any other irrigation lines, power for the irrigation controllers, or control wiring for the irrigation system shall cross under the roads or any other hardscape inside appropriately buried pipe sleeves and electrical conduits for wires/cables; this allows for the repair or replacement of the facilities without disturbing the in-place hardscape. Where the decision for the project is to perform the general installation of the irrigation mains outside of the roads, any crossing of roads or hardscape with the irrigation mains shall be in sleeves with restrained casing spacers.

The second route for irrigation mains is to be immediately adjacent to roadways, whenever possible. For irrigation mains outside the roadways, they should be located between the roadway and interment sections or irrigation aisles to avoid obstruction of gravesites. Install electric power and control lines underground in the same trench as the irrigation pipes, with the wires below the top of the pipes, generally following the same path as the irrigation mains, at locations where the irrigation mains cross the roadways or other hardscape in sleeves, provide separate parallel conduits to run the power and control wiring for the irrigation system.

Mainline pipe sizes 3," and larger are PVC with ductile iron fittings and joint restraints; or HDPE pipe with HDPE fusion-weld fittings.

NOTE: The suggested location for the mainline pipe is 3' or 10' from the back of the curb or edge of the road. The goal is that the mainline does not pass under flower water stations and so that street trees are not planted on top of the mainline pipe. The designer shall provide a cross-section through this region to show all elements' locations (i.e., mainline, lateral line, valves, trees, burial sites, flower watering station, and other elements.).



NOTE: The decision as to whether the irrigation mains are to be designed to be inside or outside of the roadways has not been adopted as a standard for all locations in the NCA; therefore, this determination shall be on a project-by-project basis and should be determined during the Concept Design or Design Development Phase of the project development.

The distribution system for NCA irrigation systems shall be designed using computerized hydraulic network analysis to ensure that the pipe sizes meet the specified design parameters. The mainline pipe elements shall be checked for correct sizing based upon the anticipated build-out of the facility, from Master planning documents or more current sources as the project is built. The design objective shall be to have all mainline designed to be not replaced as the facility expands. Designs shall be per the following:

Design system to provide water service for maximum requirements. Flow velocity in the irrigation system pipes shall be designed not to exceed 1.52 m/s (5 feet-per-second).

Place isolation valves to provide control over all three branches of a mainline tee intersection. Provide isolation valves at all road crossings. Isolation valve locations shall be sufficient to allow adequate system isolation for flushing and blowing out the system. Provide flush valves/blow-off valves at ends and low points in the mainline.

Design system to minimize high points and provide combination valves (air release and air/vacuum valves) at high points for the system piping where the air is released through other nearby piping or facilities.

When possible, design the irrigation system to contain at least one redundant pressure release valve to prevent damage to the pipe system under any equipment failure scenarios.

11.3.5. IRRIGATION WATER PUMP SYSTEM:

Design for irrigation water pump systems shall be based upon the flow rate required to meet the peak season evapotranspiration rate applied during a programmed watering cycle for the irrigated area. The pipe network should then be sized to carry the pumping system's volume without exceeding the maximum flow velocity in the pipes. Whenever possible, the pipe network shall be looped and contain isolation valves to facilitate flushing the system at flow velocities of at least 0.6 m/s (2.5 feet-per-second). The specific requirements of an irrigation water pump system are site and project-specific, based upon the source(s) of irrigation water determined to be viable for the project. A viable water supply has an adequate volume of water available at the interval required for irrigation to maintain the landscape materials at the facility when water is not available from natural sources. Depending upon the source of irrigation supply, a storage system may be required; this is especially true when the water supply volume is not enough to meet the irrigation system's peak season water requirement.

The facilities design guide is not intended to provide specific design parameters for the site and project-specific irrigation pump system. The design criteria herein provide information on functional and performance criteria incorporated into the facility design. Regardless of the type



of source for irrigation water supply, irrigation water pump systems shall be designed to include the following:

The irrigation system should have an adequate pump capacity to meet the peak season's water requirement.

Multiple pumps are required to achieve the maximum design flow rate and act as a backup when pumps require repair or replacement. Use identical pumps. The control system for the pumps must include lead-lag operation with the pump with the least hours of operation being the next lead pump.

The normal operating point for the pumps shall be so that the pumps, when operating at the design flow rate, shall operate as close to the maximum pump efficiency as possible. The pump system shall be designed to deliver the required system pressure at all flow conditions.

Variable frequency drive control systems are required for all pumps as a means of energy conservation. Pumps shall operate on and off based upon the pressure in the system.

The pump system shall have built-in safeguards in its control system to minimize the potential for damage to the site if the pumps run due to a pressure drop caused by a mainline pipe break or leak in the system, not because of irrigation demands. Communication between the irrigation control system and the pump system should be provided, so the pump system operates only when irrigation is required.

The pump system shall have a long design life, except for the wearing equipment; this includes the mounting, housing, control system enclosures, and other parts.

11.3.6. IRRIGATION SYSTEM

A. SYSTEM CHARACTERISTICS:

Design of new irrigation system shall be performed to meet the most up-to-date industry standards and techniques incorporating maximization of operating efficiency and applicable water conservation directives. Expansion or modification projects are not required to completely retrofit existing facilities and bring them into compliance with up-to-date industry design standards. The amount of upgrading of the existing facilities shall be handled on a project-by-project basis. All components of the irrigation system shall be designed, as a minimum, to be installed and operated by guidelines, standards, and recommendations set forth by the product manufacturers and overall shall comply with the up-to-date industry standards.

Design irrigation system components for NCA expansion projects based upon the existing system and match the existing whenever possible, providing the existing system has been



functioning without any significant problems. Verify the operations of the existing system before proceeding with the design for and expansion of an existing NCA facility.

Spray or rotary type sprinkler systems shall be designed to provide efficient watering cycles applicable to the sprinkler types being utilized. Timing for application shall be based upon specific characteristics for the areas being watered and designed to minimize overspray and excess runoff during the irrigation cycle.

Systems shall be designed to provide either a minimum of 60% Distribution Uniformity-low quarter (DU_{LQ}) for spray type heads and 70% DU_{LQ} for rotor type heads or designed to have an application efficiency based upon the Scheduling Coefficient (SC). For example, if the system is designed with an SC of 1.2 or less, you can achieve a DU_{LQ} of 70% or greater. Since the SC can be directly used to calculate the run times on the controllers, it is recommended that this method be utilized. The designer needs to provide documentation that the DU and SC are part of the design submittal.

Pressure regulation devices shall be included in the system design to allow the entire system, including all remote-control valves and all sprinkler heads, to operate at design pressure. Operation of the remote-control valves, based upon regulated pressure, allows for efficient water application. It also allows the advanced irrigation control systems to provide flow control functions more accurately, allowing for more consistent, efficient, and predictable operation of the water supply source(s). Pressure regulation devices may include one or all the following:

- pressure regulation device on/at the remote-control valve
- pressure regulation device on individual sprinkler heads
- pressure regulation of low volume drip/microsystems

Systems shall be designed to complete the watering schedule for the entire facility by watering in daily increments of 12 hours maximum. Verify actual irrigation water window with individual cemeteries.

System design shall provide separate irrigation zones for areas of turf, shrubs, and drip-type application devices.

Turf rotor zones shall be designed with full circle heads on separate zones from part circle heads.

Design irrigation zones to provide separate zones for different exposures (i.e., north and east side of building vs. south and west side) and topographic slopes.

Design irrigation zones to be appropriate for plant material to be irrigated.

The design shall provide separate zones for the top and bottom of sloped areas. The design shall minimize runoff of the slopes, and accumulation of runoff at the bottom of slopes shall be considered part of the design. Design the laterals on slopes to run parallel to the slope.



System design shall include checking valves in the sprinklers, wherever necessary, to prevent low point drainage where applicable.

Design separate irrigation zones if identifiable differing soil types are irrigated (with different absorption and runoff characteristics); this would typically apply to crypt fields where the soil utilized for backfill over the crypts is significantly different from the characteristics of the surrounding soils outside of the crypt fields.

Design system layout with reduced head spacing or low angle nozzles where prevailing windy conditions prevent anticipated coverage with higher angle or wider spacing of heads. The exception to low-angle nozzles is for irrigation in burial sections with upright monuments, where low-angle trajectories cause too much interference/potential damage to the monuments.

Design each irrigation zone to have its station on the controller. When retrofitting and adding a zone becomes necessary, combining irrigation zones of the same soil and sprinkler types is acceptable, minimizing disruption of the existing cemetery to install additional control wiring, or if there is no additional station on the controller. Leave 2 to 3 open stations on each new controller to allow for unplanned expansion.

No single zone shall be designed or installed with sprinklers of differing pressure requirements or precipitation rates. (Rotors, spray heads, drip emitters may not be mixed within a zone.)

Computerized software that evaluates the SC and DU must design sprinkler head type and spacing based on the water application metrics. Sprinkler spacing should achieve an SC of less than 1.2 and a DU of 70% or greater rotary sprinklers. The design head spacing shall be at a maximum of 50% of the design performance diameter for spray sprinklers because there is not sufficient distribution rate curve data to evaluate SC/DU accurately in the design phase.

Design irrigation systems with 25 mm (1") point of connection (POC) or larger, or with a landscape area of 2500 square feet and more extensive, to include a master valve. A master valve/flow sensor system is beneficial on larger tap sizes because the larger POC are more likely to be used for burial sections, and there is a greater risk of damage if there is a mainline pipe break.

Use non-potable color indicators (equipment) for heads, valves, valve boxes, quick couplers, piping, and other equipment, when irrigation systems are designed to be supplied by secondary or other non-potable water sources.

B. POINT OF CONNECTION:

Design new systems with normally open master valves with flow sensors. Where necessary, the master valve shall be capable of manual operation to allow manual use of the irrigation system. A flow sensor connected to the controller is required and can shut the valve off in unscheduled flow (line break). If flower water stations are serviced off the irrigation system, use a normally



open master valve. A normally closed valve is acceptable only where flower watering stations are not serviced off the irrigation system.

Design new systems to use non-potable water, including filtration system equipment to clean the source water and protect irrigation system components. Design filtering equipment to be self-cleaning to minimize maintenance requirements. Provide accessible pressure gauges immediately upstream and downstream of the filtration device. The sizing for the filtration shall be determined by analyzing the water quality characteristics and identifying the products to be filtered out. The objective for the filtration system shall be to provide the irrigation water quality that does not adversely impact the operation of the irrigation system components and results in high maintenance costs. Secondary consideration during the design process is staining the headstones caused by particles (iron) in the irrigation water.

If reclaimed water sources contain highly corrosive compounds, such as chlorides, consider using non-corrosive, non-metallic components, such as stainless steel for pump stations/piping and HDPE mainline with HDPE fusion-welded joints.

C. CONTROLLER / WIRE:

For purposes of automatic watering based on ET, the control system shall be connected to an onsite weather station to adjust run times based upon real-time weather conditions automatically. This decision should be clarified in the design review process as part of the Design Development process. Minimally, the controller shall be capable of downloading real-time weather data utilizing a subscription service provided by the controller manufacturer. The project shall provide a minimum of 3 years/ maximum of 5 years subscription.

The design of the irrigation system controller shall match any existing components unless specifically indicated otherwise during the design development or initial project scope. The design for the controller and wire shall meet or exceed the following and follow ASIC Guideline 101-2003 For Communication Cable:

Provide broadband internet service to central controller/ irrigation computer for remote access and software updates. The project shall provide a minimum of 3 years/ maximum of 5 years of internet service.

The controller shall provide separate programs for turf zones, shrub zones, and drip zones.

Controllers shall be capable of temporarily shutting down the system by utilizing internal/external options (such as rain, wind, freeze devices, and flow sensors in conjunction with master valves).

The controller shall be programmable for multiple start times for “cycle and soak” and capable of water budget adjustment.



Power wire and control wire shall be designed to be installed in the same trench, on opposite sides of the mainline pipe, to minimize construction costs.

Controller wiring with outside exposure shall be contained in PVC conduit. EMT conduit shall be used for inside installations.

Use 2-wire decoder control systems when possible. Run the 2-wire cable in Sch. 80 PVC electrical conduit. Provide Decoder Cable Fuse Device (DCFD) at all 3-way splits in the 2-wire cable.

For communication cable between central irrigation computer and satellite controllers, run the cable in Sch. 80 PVC electrical conduit.

Remote-control valve wiring shall be a minimum of 14 gauge, UF UL, or PE UL rated.

All wire connections shall be made with watertight connectors and contained in the valve box.

Provide 450 mm (18") length of the loop of control wire at all changes in directions.

Provide 600 mm (24") of slack wire at each remote-control valve in the valve box.

Remote-control valve wiring shall be installed with the mainline pipe where possible.

Remote-control valve wiring shall have colored jackets for common, control, spare, master valve, and flow sensor. Follow ASIC Guideline 102-2004 Wire & Cable Color Code for Irrigation System Equipment for color-coding.

Spare wire shall be available at all valve manifolds or clusters. All spare wires shall be "home run" to the respective controller. The distribution of spare wires shall be arranged to facilitate extension into future burial areas, especially when the future burial areas adjoin areas where irrigation systems are installed.

Provide spare control and single common wire to all mainline runs equal to the number of unused stations on the controller.

Run one dedicated spare control wire (yellow jacket) to each remote-control valve, terminate one end in the controller, and label "Spare/Sta-No."

Run dedicated common wire (white jacket) to each master valve on the project.

Outdoor controllers shall be lockable and weather resistant. Locate controllers in shrub beds near the edge of lawn areas.

All wiring under hardscaping shall be contained in conduits.

All wiring shall be identified at each end with labels to indicate which location the wire is connected to.



D. GROUNDING:

Ground irrigation equipment following procedures identified in ASIC Guideline 100-2002 for Earth Grounding Electronic Equipment in Irrigation Systems.

E. PIPING / FITTINGS:

Design of irrigation system pipes and fittings shall match any existing components unless it is specifically indicated to do otherwise during the design development or initial project scope. The design for the piping and fittings wire shall meet or exceed the following:

All PVC pipes shall be rated ASTM D 1784 or 1785.

Minimum recommended standards for PVC pipe: Schedule 40 for sizes 3/4" through 2-1/2", Class 200 for sizes 3" and up. 1/2" PVC pipe is not allowed.

Maximum flow velocity in any mainline pipe shall not exceed 1.52 m/s (5 ft/s). Pressure high-density polyethylene (HDPE) pipe shall be ASTM D2239 rated, lateral and drip tubing excluded.

All piping should be capable of winterization by compressed air blowout.

Manual drains may be used in mainline pipe applications.

All piping is backfilled with sand up to 2" above the top of the pipe, with the remaining backfill being clean material settled and compacted to proper finish grade.

All solvent-weld joints are to be installed according to manufacturer specifications.

Insert fittings shall not be installed on sprinkler laterals.

PVC Mainlines shall use a minimum of Schedule 40 fittings for 20 mm (3/4") through 40 mm (1 1/2") and Schedule 80 or better for pipes over 40 mm (1 1/2").

Push on ductile or Mechanical cast iron fittings shall be used on 75 mm (3") and larger PVC mainline fittings.

Proper thrust blocking shall be installed on all fittings 3" and larger.

Design the irrigation system where the pressure at the base of all sprinklers within a zone does not vary more than 10 percent of design operating pressure to ensure a uniform water application.

Indicate pipe sizes on the drawing at all tees and changes in size; charts are not acceptable as a replacement.



Size all laterals for overhead irrigation three-quarter inch in diameter or larger; one-half inch lateral pipe is not allowed.

F. REMOTE-CONTROL VALVES:

Design of irrigation system valves shall match any existing components unless specifically indicated otherwise during the design development or initial project scope. The design for the valves shall meet or exceed the following:

Remote-control valves shall be sized according to the zone demand requirement, lateral piping downstream, and manufacturer's recommendations.

Remote-control valves shall have flow control adjustment.

Remote-control valves shall have pressure-regulation.

Non-potable (secondary) systems shall use compatible (dirty water) remote-control valves.

Exposed pipe and fittings within valve boxes shall be Sch. 80 PVC.

Size valve box to allow a minimum distance of four inches between any control valve, manual valve, filter, or union and the valve box to maintain enclosed components without excavation.

Locate remote control valves in shrub beds wherever possible to avoid damage from mowers and excavation equipment. Locate irrigation sub-mains in turf areas adjacent to shrub beds.

Control valves are installed in a Jumbo size or larger, manufactured valve/meter box, capable of being locked closed after installation. Use polymer concrete or Fibrelite[®] valve boxes installed in turf areas. HDPE valve boxes are allowed when installed in planting beds.

G. SPRINKLER HEADS

Design of irrigation system sprinkler heads shall match any existing components unless it is specifically indicated to do otherwise during the design development or initial project scope. The design for the sprinkler heads shall meet or exceed the following:

All sprinkler heads shall be attached to lateral line pipe with a flexible joint swing assembly. Turf rotor heads shall be equipped with an Sch. 40 PVC triple swing joint.

Sprinkler heads adjacent to hardscape paving shall be spaced 25 mm to 75 mm (1" to 3") away from paving. An exception is for installation in concrete sprinkler collars. Sprinkler heads adjacent to rolled curbs shall be protected with a 14"x14" precast concrete collar. Turf rotor heads shall be protected with a 14"x14" precast concrete collar. Sprinklers adjacent to walls, buildings, fences, or other structures shall be spaced 150 mm (6" to 12") away from structures.



All sprinklers within a zone shall have matched precipitation rates. Matched precipitation rates for rotors may be achieved with nozzle selection or irrigation timing.

Shrub heads located adjacent to pedestrian areas shall be pop-up variety.

Sprinklers in turf areas shall be fully spring-retractable and pop up a minimum of 125 mm (5") to the centerline of the orifice; trajectory should be more than 21° to clear grave headstone.

Space sprinklers are equidistant from one another for the given lengths and widths of the area to achieve uniform coverage.

For spray heads, use fixed arc nozzles whenever possible; only use adjustable arc nozzles when odd arcs are required and use special pattern nozzles with considerable caution.

Select spray nozzles with the closest practical radius to the design spacing; do not allow for adjustment of more than 10 percent reduction in radius to prevent distortion of the spray.



12.0 S – STRUCTURAL

12.1. GENERAL

Refer to TIL - *VA's Structural Design Manual* (<https://www.cfm.va.gov/til/dManual.asp>)

12.2. SEISMIC / WIND HAZARD VULNERABILITY

Refer to TIL - *VA's Seismic Design Handbook, H-18-8* (<https://www.cfm.va.gov/til/seismic.asp>)

Coordinate required equipment/structure bracing and support with other design disciplines.



13.0 A – ARCHITECTURAL

13.1. GENERAL

Refer to TIL - *VA's Architectural Design Manual* (<https://www.cfm.va.gov/til/dManual.asp>)

The Architecture should coordinate with the existing architectural style, interior design solution, wayfinding and signage, and fixtures and equipment with existing.

Provide existing finishes on demolition plans.

The following sections supplement the referenced VA design manual with NCA Specific Criteria.

13.2. EXTERIOR

13.2.1. COMPARISON OF EXTERIOR MATERIALS

If a primary exterior material is proposed that differs from the primary material of existing buildings, submit studies and sketches of the exterior with both the existing and the proposed materials and analyze the costs of the different exteriors.

13.3. INTERIOR DESIGN SOLUTION

Interior Design is a multi-faceted profession in which creative and technical solutions are applied within a structure to achieve a built interior environment. These solutions are functional, enhance the occupants' quality of life and culture, and are aesthetically attractive. Designs are created in response to and coordinated with the building shell and acknowledge the project's physical location and social context. Designs must adhere to code and regulatory requirements and encourage the principles of environmental sustainability. The interior design process follows a systematic and coordinated methodology, including research, analysis, and integration of knowledge into the creative process, whereby the needs and resources of the client are satisfied to produce an interior space that fulfills the project goals. Interior design includes a scope of services performed by a professional design practitioner, qualified through education, experience, and examination, to protect and enhance the public's life, health, safety, and welfare.

A. VISION

To provide a supportive interior environment that is respectful of the public monies and expresses high-quality design.



B. CONCEPT AND INTENTION

The design is to reflect the National Cemetery mission, its staff, and the veteran clientele. The solution must provide an interior that responds to the regional elements and supports human performance, reflecting individual characters and their relationship to the group and the organization as a whole. The interior design should be user-friendly to those they serve, the veterans, and their families.

C. MATERIALS

The finish materials should be selected by using the following criteria:

- Meets project interior design concepts and intentions while supporting the exterior design
- Follows application/code requirements
- Provides durability and maintenance
- Supports sustainability and evidence-based design principles
- Minimizes initial costs/life cycle cost

D. DURABILITY / MAINTENANCE

Functional requirements dictate maintainable colors, textures, patterns, material selections, a combination of materials and installation techniques. Materials must be chosen for longevity and good appearance retention.

Working knowledge of the properties of all materials is a necessary tool; this includes the installation procedure, and the forgiveness of the materials as installed in a lower bidder situation, the replacement and patching qualities of the material. New materials that contain different maintenance procedures and training for required patching are typically not appropriate but may be considered on an individual project basis.

E. COST

As stewards of public monies, every design and selection are to employ the priorities of cost-savings. Information on the first term vs. life cycle cost, for applicable items, needs to be presented to make an informed judgment. Design or materials that impart dollars wisely spent are to be pursued while avoiding opulence or the illusion thereof.

Passive cost savings is also recognized as working smart, producing favorable contractual procurement, and leaving the client with a good value towards future replacement. Examples of this are a consolidation of selections with design planning that produces variety. Other design systems that follow the above practices and offer saving are encouraged.



All material choices should be decided with the overall project budget in mind. Break the budget down into floors, walls, and ceiling costs—factor in price escalation for future material purchases.

Create a cost analysis for each planned functional area.

Refer to the *VA Manual for Preparation of Cost Estimates for VA Facilities*.
(<https://www.cfm.va.gov/cost/index.asp>)

F. MATERIAL APPROPRIATENESS

- All projects should follow the schedule for finishes found in *NCA Master Specifications, Division 9, Finishes* (<https://www.cfm.va.gov/til/ncaSpec.asp>).
- Life-cycle maintenance costs and extended warranties strongly support the consideration of using this type of product.
- Colors, patterns, and designs that transcend time are endorsed. Trendy colors and patterns are to be avoided.
- Color and pattern considerations need to include:
 - Neutral background colors. Eliminate bright values for major surfaces such as walls or floors.
 - Pattern and textures are suitable for interest, maintenance, and sound.
- Occasional deviation for the *NCA Master Specifications* (<https://www.cfm.va.gov/til/ncaSpec.asp>) may be required. The design team and VA staff participating in interior design projects should justify the deviation and build the evidence to support the modification.
- Material deviations should also be coordinated with the local facility's environmental maintenance abilities, facility site and local repair abilities, local manufacturer relationships, and project budget.
- Material modifications would be expected if the deviation was to support Sustainable or Green Guidelines. Reference *NCA Master Specifications, Division 1, General Requirements* (<https://www.cfm.va.gov/til/ncaSpec.asp>) as well as the *VA Sustainable Design Manual* (<https://www.cfm.va.gov/til/sustain.asp>) for sustainability issues.
- Discuss the proposed deviation with the VA project manager and project team. Provide all backup material to support the rationale of the deviation.

G. VA GUIDE TO ROOM FINISHES

All interior finishes are indicated in the specifications. The project management team must review any deviation from the finishes described in VA Guidance documents before starting the construction document phase. The A/E shall combine the finish schedule and color design schedule and include them in the specifications. Do not indicate on the drawings. Use the finish schedule format included in Room Finishes, Door, and Hardware Schedule.



- Comply with TIL - *VA Standards for Construction, Room Finishes, Door and Hardware Schedule (PG-18-14)* (<https://www.cfm.va.gov/til/spclRqmts.asp#room>), for sizes, types, and symbols of doors. Provide solid core wood or hollow metal interior doors. Wood is preferred, except for locations where metal is required for functional reasons.
- Comply with TIL - *Physical Security and Resiliency Design Manual* (<https://www.cfm.va.gov/til/dManual.asp#PSR>) requirements for door hardware and access control.
- Comply with TIL - *Equipment Guide List (PG-18-5)* (<https://www.cfm.va.gov/til/equip.asp>)
- Refer to *NCA Master Specifications* (<https://www.cfm.va.gov/til/ncaSpec.asp>) for format and additional requirements.

13.4. SIGNAGE AND WAYFINDING

Refer to TIL - *VA Signage Design Manual* (<https://www.cfm.va.gov/til/dManual.asp#SIGN>) for general VA guidelines and National Cemetery Administration Signage Drawings for specific NCA requirements.

Verify that all directional and informational signage meets the minimum accessibility guidelines.

Coordinate Occupant Egress Plan signage with the *Fire Protection Design Manual* (<https://www.cfm.va.gov/til/spclRqmts.asp#FS>).

13.5. FIXTURES AND EQUIPMENT

After completion of the design development drawings, the A/E firm shall provide a listing that itemizes the government-furnished and installed (VV), government-furnished and contractor installed (VC), and the contractor furnished and installed (CC) personal property equipment. This listing applies to all fixed equipment installed as part of initial construction. One month after the construction contract award, the equipment list shall be updated by the A/E firm and submitted to the contracting officer.

We recommend that the architect organizes the equipment list chronologically on a room-by-room and drawing-by-drawing basis.

Refer to TIL – *Equipment Guide List (PG-18-5)* (<https://www.cfm.va.gov/til/equip.asp>) for required equipment.



14.0 F – FIRE PROTECTION

14.1. GENERAL

Refer to TIL - *VA's Fire Protection Design Manual* (<https://www.cfm.va.gov/til/dManual.asp>) and *Fire & Safety Guidance* (<https://www.cfm.va.gov/til/spclRqmts.asp#FS>)

The following sections supplement the referenced VA design manual with NCA Specific Criteria.

14.2. DETECTION AND ALARM

RESERVED

14.3. SUPPRESSION

RESERVED



15.0 P – PLUMBING

15.1. GENERAL

Refer to TIL - *VA's Plumbing Design Manual* (<https://www.cfm.va.gov/til/dManual.asp>)

Due to the space requirements of plumbing systems and ductwork, closely coordinate the layout of these systems. Where areas of interference are apparent, prepare a cross-section of the building showing a method of installation.

Investigate and, if feasible, connect new services to existing; otherwise, provide new services.

Piping may be exposed in the following buildings and spaces:

Mechanical equipment rooms

- Service rooms
- Shop Buildings
- Storage Buildings

In other spaces, conceal piping unless impracticable.

The following sections supplement the referenced VA design manual with NCA Specific Criteria.

15.2. FIXTURES AND EQUIPMENT

Comply with *NCA Master Construction Specifications Division 22, Plumbing* (<https://www.cfm.va.gov/til/ncaSpec.asp>)

Provide equipment schedules, including capacity, control settings, services, and sizes, for plumbing equipment and other requiring plumbing services.

Refer to TIL - *Equipment Guide List (PG-18-5)* (<https://www.cfm.va.gov/til/equip.asp>) for required fixtures and equipment.



16.0 M – MECHANICAL

16.1. GENERAL

Refer to TIL - *VA's HVAC Design Manual* (<https://www.cfm.va.gov/til/dManual.asp>)

The following sections supplement the referenced VA design manual with NCA Specific Criteria.

Due to the space requirements of plumbing systems and ductwork, closely coordinate the layout of these systems. Where areas of interference are apparent, prepare a cross-section of the building showing a method of installation.

Structural drawings and specifications provide all concrete and structural steelwork, including catwalks, concrete housekeeping pads, lintel supports around openings, and platforms for access to HVAC equipment and supports for mechanical equipment.

Electrical drawings and specifications provide motor starters and disconnects, not furnished as part of HVAC equipment, smoke detectors (duct or space mounted), all power wiring to HVAC smoke dampers, motors, heating cable, and controls for winterizing piping.

Plumbing drawings and specifications provide all floor drain outlets.



17.0 E – ELECTRICAL

17.1. GENERAL

Refer to TIL - *VA's Electrical Design Manual* (<https://www.cfm.va.gov/til/dManual.asp>)

Route the main distribution systems for utilities immediately adjacent to roadways within 3000 mm (10') of the curb or pavement edge. Route any utility lines through interment areas between sections to avoid obstruction of gravesites within burial sections. Install all utility lines, including electric power and communication lines, underground. Exceptions may be made depending upon the high cost or remoteness of the source from developed areas of the cemetery.

The following sections supplement the referenced VA design manual with NCA Specific Criteria.

17.2. LIGHTING

Refer to TIL – *VA's Lighting Design Manual* (<https://www.cfm.va.gov/til/dManual.asp>)

Lighting needs to be functional, and it should enhance the visual appeal of the built environment. The well-planned layering of the ambient, task, and accent lighting is critical in creating effective, efficient, and aesthetically pleasing lighting. Keeping current with the fast-changing lighting technology is most important for practicing interior designers.

- Public area lighting can be more decorative and can be image-building.
- Lighting in staff offices and areas needs to be functional and task-oriented.

17.2.1. EXTERIOR LIGHTING (CEMETERY SPECIFIC)

Exterior building lighting is only provided around buildings to support Physical Security, Electronic Security Systems.

Exterior site lighting is not required except at Cemetery Entrance Signage.

17.3. GENERATORS

NCA recommends emergency generators for all new cemeteries and existing cemeteries with over 1,500 burials per year. Existing cemeteries with less than 1,500 burials per year require a joint determination by DCS, District Engineer, and Cemetery Director. They will collectively determine whether sufficient risk exists for regional natural events (tornadoes, hurricanes, earthquakes, etc.) that may require the addition of emergency generators. As part of that



business decision, the Cemetery should provide historical information from the past 5 years detailing how many times the Cemetery has experienced power outages along with the duration and cause of those outages.

Emergency generators should support the Admin/PIC building and the Maintenance Staff building. Other cemetery outbuildings that don't provide critical mission support for interment operations (such as stand-alone PICs, storage buildings, and committal shelters) do not typically require generators. The Cemetery Director may request consideration for other buildings that are mission critical, provided adequate justification is provided to their District office.

Cemetery operations at high-volume cemeteries are critical to the community and the VA's mission. A final business decision will be based on business risk analysis for various regional natural events or other relevant events with the potential to cause extended power outages and should ensure cemeteries' ongoing functionality during any unexpected loss of primary power. For cemeteries not eligible for the Directive's threshold for requiring permanently installed emergency generators, the project should consider installing emergency power connection points that can connect portable emergency generator equipment as the need arises quickly. This substantially more cost-effective option provides an elevated level of system readiness, eliminating the maintenance and operational issues associated with a fixed emergency generator. It should ensure cemeteries' ongoing functionality during a severe weather event or other emergencies, which is critical to the community and VA's mission.

17.4. DECORATIVE WATER FEATURES

The use of decorative and ornamental water features does not align with VA's energy conservation requirements, which include reducing overall water use wherever possible.

Additionally, NCA considers the use of illumination systems for either type of water feature to be unnecessary since VA national cemeteries are closed from dusk to dawn.

Definitions:

Decorative or ornamental water feature. Any water feature intended solely for the purpose of enhancing the appearance or aesthetic of a cemetery, providing no functional support to the facility's engineered irrigation or storm water management infrastructure. Examples of decorative or ornamental water features include (but are not limited to): reflective water pools or ponds; decorative water fountains or water statues; waterfalls; and stream features.

Integral water feature. Any water feature that is a necessary part of a cemetery's engineered irrigation or storm water management infrastructure. Examples of integral water features include (but are not be limited to): storm water retention ponds; storm water outfalls; and pond aeration fountains specifically required for water quality improvement purposes.



18.0 T – TELECOMMUNICATIONS

18.1. GENERAL

Refer to TIL – *VA's Telecommunications and Special Telecommunications Systems Design Manual* (<https://www.cfm.va.gov/til/spclRqmts.asp#TelecomInfraStds>)

Refer to TIL – *NCA's Network Cabling Specifications NCACableSpec20100901.pdf* (<https://www.cfm.va.gov/til/nca/>)

Refer to TIL – *Office of Information Technology Design Guide* (<https://www.cfm.va.gov/til/spclRqmts.asp#TelecomInfraStds>)

In addition to the Electrical and Telecommunications Service required by the cemetery, requirements include one 56 k digital circuit. The need for conduit or direct burial is determined on a project-by-project basis. However, spare conduits are installed between buildings to accommodate future, unknown needs.

Route the main distribution systems for utilities immediately adjacent to roadways within 3000 mm (10') of the curb or pavement edge. Route any utility lines through interment areas between sections to avoid obstruction of gravesites within burial sections. Install all utility lines, including electric power and communication lines, underground. Exceptions may be made depending upon the high cost or remoteness of the source from developed areas of the cemetery.

The following sections supplement the referenced VA design manual with NCA Specific Criteria.

18.2. AUDIOVISUAL

Audiovisual equipment is to be provided within the Multipurpose Rooms at the Cemetery. NCA Cemetery Operations outline specific requirements.

18.3. DATA NETWORKS

RESERVED

18.4. TELEPHONE

RESERVED



18.5. SECURITY

Refer to *VA's Physical Security and Resiliency Design Manual*
(<https://www.cfm.va.gov/til/dManual.asp#PSR>)



19.0 X – OTHER

19.1. FIREARMS CONSIDERATIONS

Refer to *M1 Garand Operation, Safety, and Maintenance for Veteran and Civilian Service Organizations, Law Enforcement, and National Cemeteries prepared by Armament Research, Development and Engineering Center (ARDEC), Picatinny Arsenal NJ 07806-5000, latest edition* (<https://www.mortuary.af.mil/Portals/31/documents/AFD-130702-050.pdf?ver=2016-08-01-144721-273>)

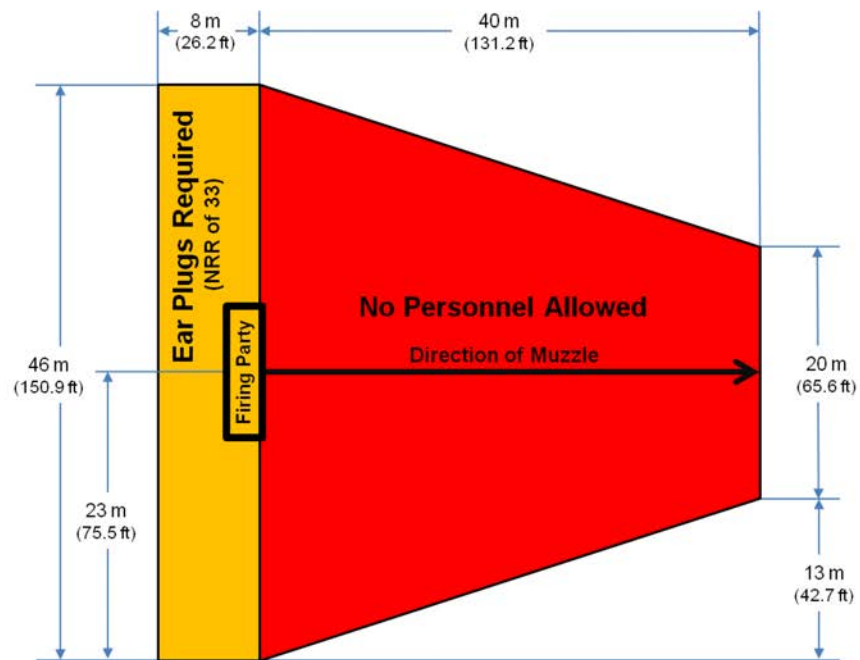
19.1.1. STORAGE

Provide space for storage cabinet/safe per project requirements. Refer to Physical Security requirements for required security system monitoring requirements.

19.1.2. STANDOFF DISTANCE

Provide adequate safety for spectators or Next of Kin (NOK) during firing salutes. It is strongly recommended that an appropriate standoff distance between the firing party and any spectators/Next of Kin is established while conducting these ceremonies.



Appendix A: SAFETY AREA TEMPLATE

Note: Personnel outside of the Safety Area do not need hearing protection

M1 Garand Operation and Maintenance Guide - 45



20.0 Z – CONTRACTOR / SHOP DRAWINGS

RESERVED



21.0 O – OPERATIONS

RESERVED



22.0 COST ESTIMATING

Refer to TIL – *VA's Manual for the Preparation of Cost Estimates*
(<https://www.cfm.va.gov/cost/index.asp>)

The A/E shall fully prepare a detailed estimate of construction consistent with the level of detail shown on the drawings (at every stage of the design and final submission) that fully incorporate the 12 steps identified in the GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs found at <https://www.gao.gov/new.items/d093sp.pdf>. All items must be accounted for, and Lump-sum items for things that are quantifiable are not acceptable.



23.0 FUNCTIONAL DIAGRAMS

23.1. GENERAL CONSIDERATIONS

Cemetery operations and equipment can be anticipated to change during the life of the building in response to new developments in technology or to change burial needs. Modular spaces and designs are encouraged to facilitate changes and minimize remodeling. The diagrams in this section illustrate typical concepts applicable to the design and development of space for NCA.

The diagrams illustrate the relationships between the functional areas defined in *VA's Space Planning Criteria (PG-18-9), Chapter 701 & 703 - National Cemetery Administration* <https://www.cfm.va.gov/til/space.asp>. The following diagrams are provided to illustrate the relationships for the spaces within each of the functional areas.

Functional diagrams represent key adjacencies and hierarchies between the functional areas and significant spaces defined by the Program for Design. They are not intended as suggested floor plans or layouts, or site plans. The blocks representing functional areas or spaces are generally proportional but are not drawn to scale. Space allocations for a particular project shall be per the project's approved Program for Design. The A/E is responsible for final space layouts.

Legend for Functional Diagrams



Functional area
(Used in Functional Diagram)



Adjacent functional area
(Used in Functional Area diagrams)



Room within a functional area

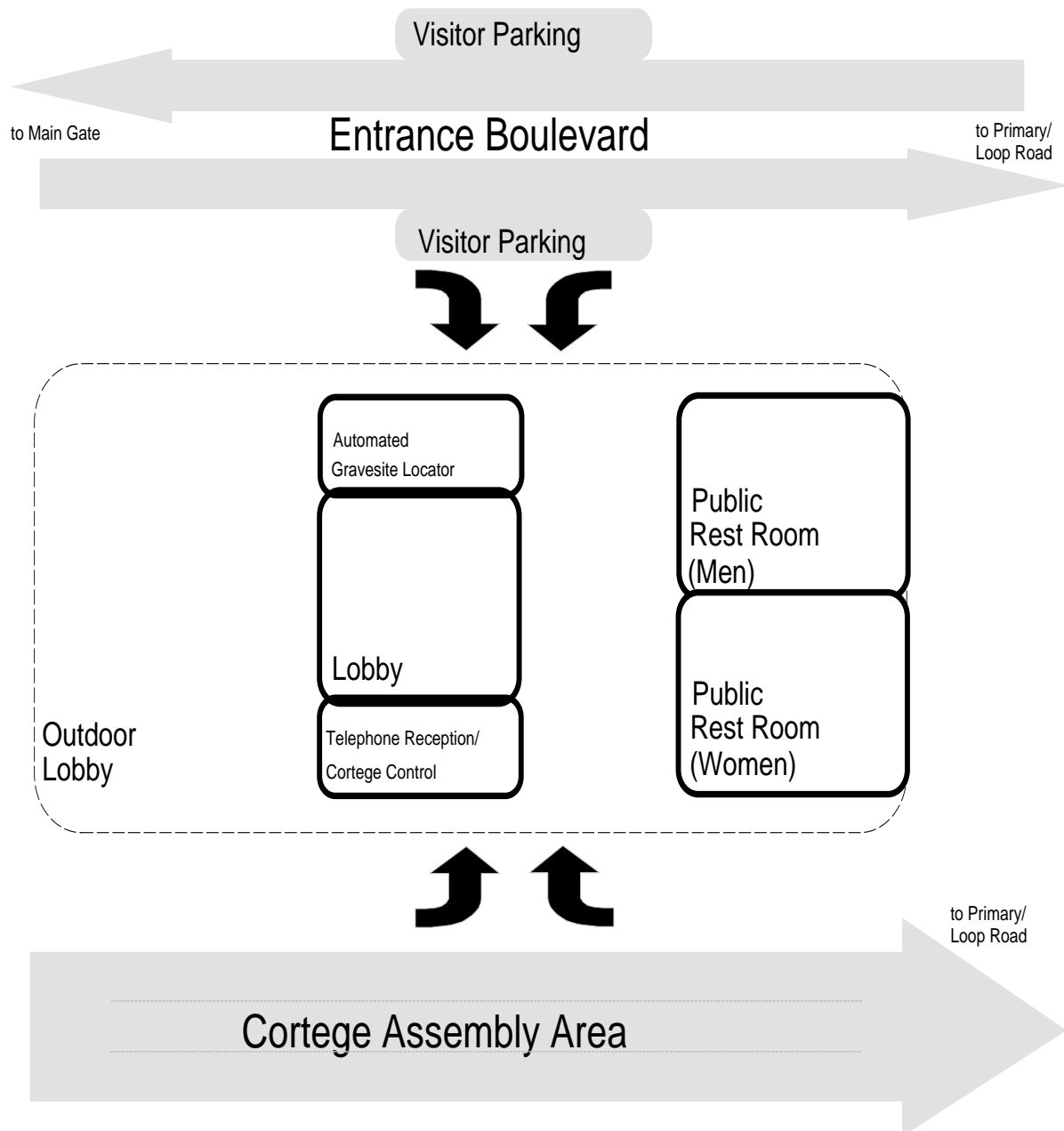


Designates subdivision within a room



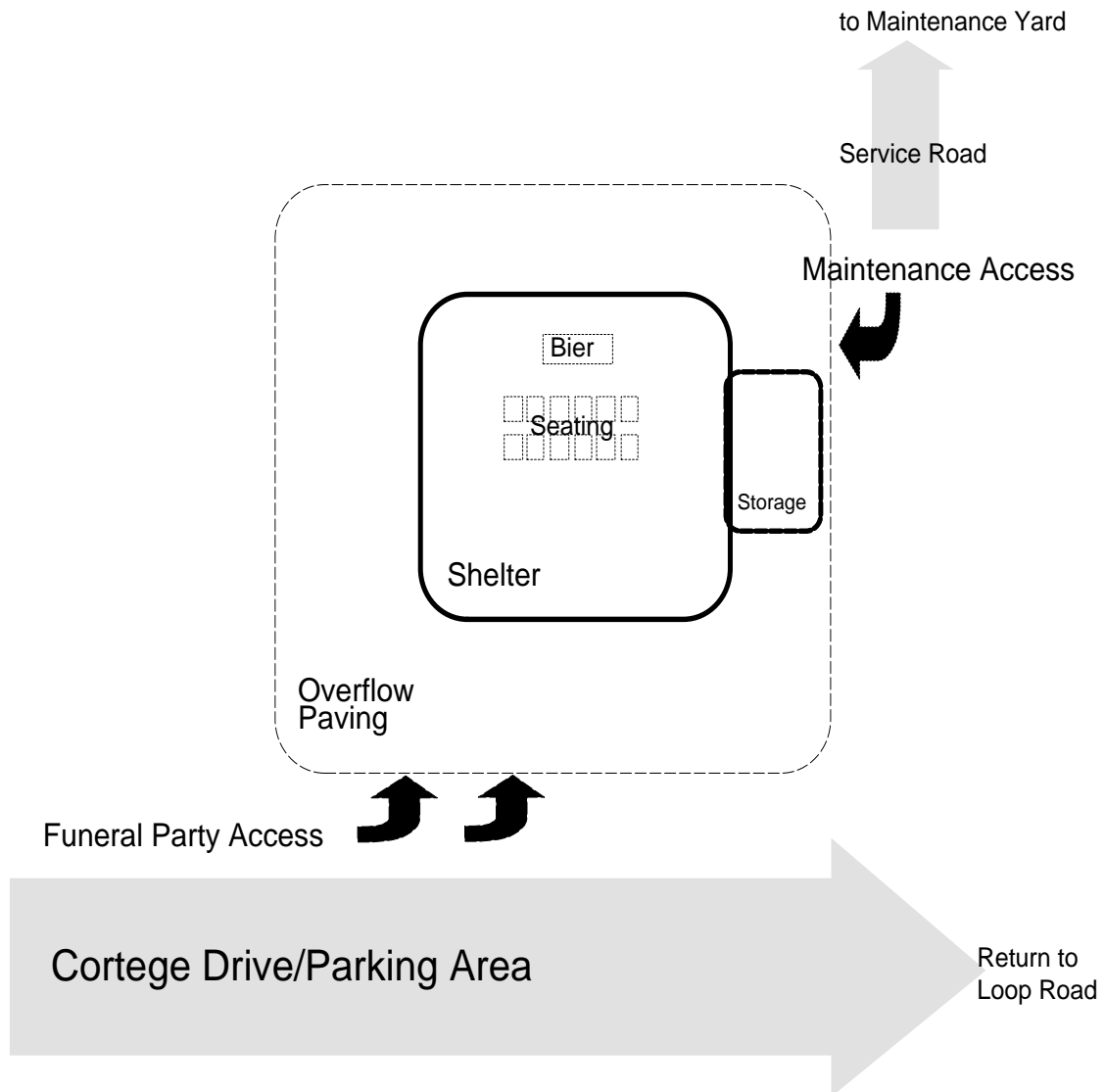
Functional Area Diagram

Public Information Center



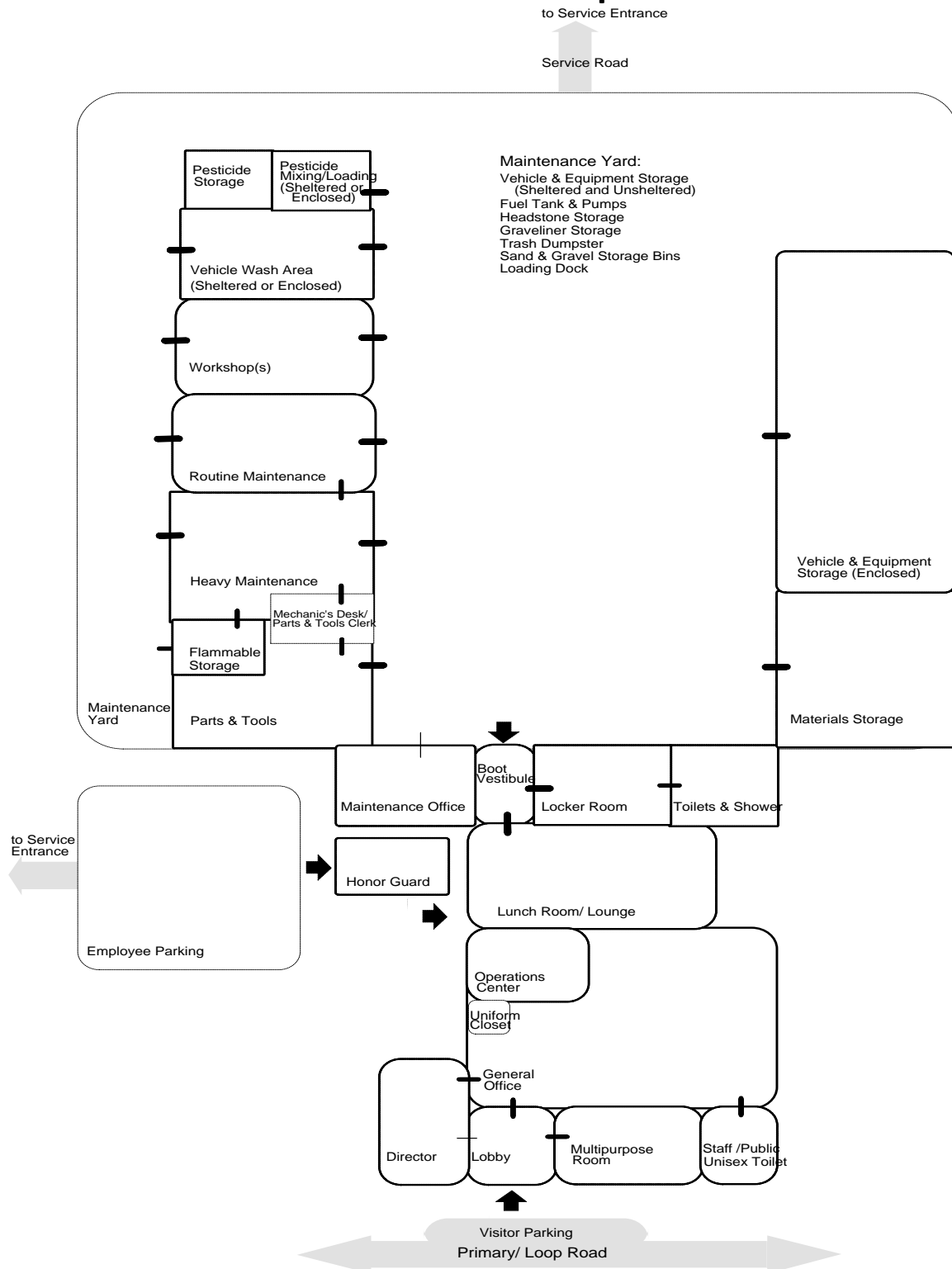
Functional Area Diagram

Committal Service Shelter



Functional Area Diagram

Administration and Maintenance Complex



24.0 FUNCTIONAL RELATIONSHIPS MATRIX

The following diagram presents the proximity relationships of various functional areas or spaces in a matrix format.

Proximity Codes for Matrix

The degree of optimal proximity to other areas that share a functional relationship is indicated by a scale of 1 to 4 (1 representing the greatest level of adjacency). An “X” entered in the diagram indicates that separation from the departments or areas in question is preferable.

Code Proximity Relationship

- 1 Very Strong: Adjacent
- 2 Strong: Close, Nearby
- 3 Moderate: Convenient
- 4 Weak: Maybe separated; limited traffic or communication necessary
- Neutral or no relationship
- X Separation required or preferable

Table 1.0 Functional Area Relationships

Functional Areas Relationship Values	Entrance Area	Public Information Center Area	Memorial / Dedications Area	Interment Areas	Administrative and Maintenance Area
Entrance Area	--	2	3	4	X
Public Information Center Area	2	--	2	3	X
Memorial / Dedications Area	3	3	--	3	3
Interment Areas	4	4	3	--	2
Administrative and Maintenance Area	X	X	3	2	--



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Exhibit # 10

**STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY**

Northwest Region Office
PO Box 330316, Shoreline, WA 98133-9716 • 206-594-0000

April 9, 2024

Alena Tuttle, Senior Planner
Department of Community and Economic Development
City of SeaTac
4800 South 188th Street
SeaTac, WA 98188

Re: Summit View Development
File# 2402-3004, Ecology SEPA# 202401282

Dear Alena Tuttle:

Thank you for the opportunity to provide comments on the State Environmental Policy Act (SEPA) Pre-Threshold Consultation (CONSULT) process for the Summit View Development Project. Based on review of the checklist associated with this project, the Department of Ecology (Ecology) has the following comments:

This proposed project is located in an area that may have been contaminated with heavy metals due to the air emissions originating from the old Asarco smelter in north Tacoma (visit Ecology's Tacoma Smelter Plume map search tool: <https://apps.wa.gov/ecy/dirtalert/>).

Soil contamination from the former Asarco smelter poses a risk to human health and the environment. Children are at especially high risk from direct exposure to contaminated soil. Construction workers, landscapers, gardeners, and others who work in the soils are also at risk.

Ecology recommends that the lead agency include the following as conditions of approval, prior to the issuance of any site development permits or the initiation of grading, filling, or clearing:

- Sample the soil and analyze for arsenic and lead following the [2019 Tacoma Smelter Plume Guidance](#). The soil sampling results shall be sent to Ecology for review.
- If lead or arsenic are found at concentrations above the Model Toxics Control Act (MTCA) cleanup levels (Chapter 173-340 WAC); the owners, potential buyers, construction workers, and others shall be notified of their occurrence. The MTCA cleanup level for arsenic is 20 parts per million (ppm) and lead is 250 ppm.

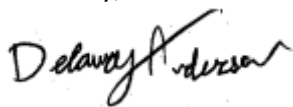
- If lead, arsenic and/or other contaminants are found at concentrations above MTCA cleanup levels, the applicant shall:
 - 1) Develop soil remediation plan and enter into the Voluntary Cleanup Program with Ecology. For more information on the Voluntary Cleanup Program, visit Ecology website at: <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Cleanup-process/Cleanup-options/Voluntary-cleanup-program>.
 - 2) Obtain an opinion letter from Ecology stating that the proposed soil remediation plan will likely result in no further action under MTCA. The applicant shall provide to the local permitting agency the opinion letter from Ecology.
 - 3) Prior to finalizing site development permits, provide to the local land use permitting agency "No Further Action" determination from Ecology indicating that the remediation plans were successfully implemented under MTCA.
- If soils are found to be contaminated with arsenic, lead, or other contaminants, extra precautions shall be taken to avoid escaping dust, soil erosion, and water pollution during grading and site construction. Contaminated soils generated during site construction shall be managed and disposed of in accordance with state and local regulations, including the Solid Waste Handling Standards regulation (Chapter 173-350 WAC). For information about soil disposal contact the local health department in the jurisdiction where soils will be placed.

The link below provides a fact sheet that explains more how the arsenic and lead clean-up levels were set and why Ecology sees that they are protective for human health:

<https://fortress.wa.gov/ecy/publications/SummaryPages/1109095.html>.

Thank you for considering these comments from Ecology. For assistance and information about Tacoma Smelter Plume and soils contamination, contact Diana Ison with the Toxics Cleanup Program at (360) 999-9593 or via email at diana.ison@ecy.wa.gov.

Sincerely,



Delaney Anderson
ERTS & SEPA Coordinator

Sent by email: Alena Tuttle, atuttle@seatacwa.gov

ecc: Diana Ison, Ecology
David Boe, Summit View Development (dboe@boearc.com)

Excerpt from
'A Celebration of Death'
by James Stevens Curl,
1980 by Constable
& Co. Ltd

John Claudius Loudon and the Garden Cemetery Movement.

The influence of the prolific and indefatigable Scot on the design of cemeteries.

'A garden cemetery, and monumental decoration afford the most convincing token of a nation's progress in civilization and the arts, which are its result.'

'A garden cemetery is the sworn foe to preternatural fear and superstition.'

'A garden cemetery and monumental decoration, are not only beneficial to public morals, to the improvement of manners, but are likewise calculated to extend virtuous and generous feelings.'

JOHN STRANG: *Necropolis Glasguensis: with Observations (sic) on Ancient and Modern Tombs and Sepulture Glasgow*, 1831

'Churchyards and cemeteries are scenes not only calculated to improve the morals and the taste, and by their botanical riches to cultivate the intellect, but they serve as *historical records*.'

JOHN CLAUDIUS LOUDON: 'Principles of Landscape-Gardening applied to Public Cemeteries'
The Gardener's Magazine 1843

John Claudius Loudon (1783–1843) was an industrious Caledonian who, in the words of John Gloag, 'lived a full, varied, and occasionally adventurous life, unencumbered by any misgivings about his personal abilities'. He was 'sustained through many misfortunes and disappointments by the blissful self-confidence and iron certitudes of the well-educated Scot'.¹ Indeed, there can be no Scot who has exercised a greater influence on landscape, popular architecture, and gardening than Loudon. His *Encyclopaedia of Cottage, Farm and Villa Architecture and Furniture*, published in 1833, had an enormous effect on taste, and helped to change the appearance of English houses and landscape from the first half of the nineteenth century.

Loudon embraced many innovations with enthusiasm, and the new cemeteries generally met with his approval. 'Cemeteries', he wrote, 'are increasing throughout the country; and, though many of these are not laid out in the manner which we think they ought to be, yet, as they multiply, they will excite the attention and criticism of thinking persons which will in the end lead to the adoption of a better taste.'²

From the beginnings of the cemetery movement, Loudon tried to influence developments, and his writings are full of references to cemeteries. In 1842 he wrote approvingly of the 'New Calton Burying-Ground' in Edinburgh. Here, 'scientific skill and good taste have contributed much to heighten the beauty of the place. The walks are neatly formed of gravel,

tastefully edged with grass, kept smooth and firm by rolling, and frequently mown to keep it short. A circular-built watch-house, commanding a full view of the whole cemetery, which at night is lighted with gas, and the many ornamental tombstones, with the nicely planted roots and flowers showing the affectionate regards of surviving friends, fill the visitor with a pleasing and tender melancholy.³ Yet what appealed to the practical Loudon most of all was 'Lamb's Receiving-Box', seven feet long, four feet broad, and thirty-two inches deep, in which earth from the grave was placed. The sides of the box were removable, so that when the coffin was placed in the grave, a side could be removed so that the earth ran freely into the grave. The tidiness of this invention ensured that there was no mess of soil around the new grave.

Loudon collated his notes, and in 1843 *The Gardener's Magazine* carried a series of articles on 'The Principles of Landscape-Gardening and of Landscape-Architecture applied to the Laying out of Public Cemeteries and the Improvement of Churchyards; including Observations on the Working and General Management of Cemeteries and Burial-Grounds'. This series was later published as a book.⁴

The stimulus for the work on cemeteries appears to have been a commission from the directors of a cemetery company at Cambridge to form a plan for the arrangement of the grounds. The main object of a burial-ground is, of course, 'the disposal of the remains of the dead in such a manner that their decomposition and return to the earth shall not prove injurious to the living, either by affecting health or by shocking feelings, opinions, or prejudices'. To Loudon a secondary object was 'the improvement of the moral sentiments and general taste of all classes and more especially of the great masses of society'.⁵

Decomposition was best achieved by interring a body in a wooden coffin in the free soil, in a grave five or six feet deep. This grave should be rendered secure from violation, and no body should have been placed in it previously. Loudon deplored the practice of burying several bodies in the same grave, and poured scorn on the modes of sepulture by which decomposition of a body or its union with the earth were prevented. He abhorred the use of leaden or iron coffins, and the practice of 'burying' in catacombs, vaults, and mausolea. 'We are of the opinion', he wrote, 'that the modes of burial which prevent the body mixing with the soil, which, for the sake of distinction, we shall call the sepulchral modes, cannot, on account of the danger to the living, be continued much longer in a highly civilized country, yet, in considering the conditions requisite for a complete cemetery suited to the present time, the various modes of sepulchral burial at present in use must be kept in view.'⁶

Loudon objected strongly to the re-use of graves after a limited time, which is surprising. He quoted Jewish, Quaker, and Moravian custom with approval, where single burial was usual, with no subsequent disturbance. He was more scathing about the practice of depositing bodies in leaden coffins in catacombs, owing to the dangers of putrefaction, and the tendency of gases to accumulate in lead coffins. 'Even in some of the public catacombs of the new London cemeteries explosions have been known to take place, and the undertaker obliged to be sent in order to resolder the

coffin; which shows the disgusting nature of this mode of interment, and its danger to the living.⁷

The security of graves was very important, until it became possible for surgeons to obtain cadavers legally. In some cases, security was effected by surrounding a graveyard with walls or railings; sometimes it was achieved by constructing watch-houses (Pl. 1); occasionally bodies were buried in walled graves covered with an iron grating or mort-safe over them (Pl. 2); sometimes great iron cases were erected over the grave; and occasionally iron boxes were dropped over the coffin until sufficient time had passed to render the body useless to the 'Resurrection Men'. In Scotland, where the medical schools had a voracious appetite for corpses, watchmen were employed to guard the burial-grounds. The entrance-gates to the churchyard of S. Michael, Dumfries, are flanked by gigantic gate-posts which are hollow to accommodate the watchmen (Pl. 3).

'The secondary object of cemeteries, that of *improving the moral feelings*,



Plate 1 Watch-house in the old graveyard of Cathcart, Glasgow (*The Author*)



Plate 2 Mort-safe in the old graveyard of Cathcart, Glasgow (*The Author*)

was of great concern to Loudon, 'for it must be obvious that the first step to rendering a churchyard a source of amelioration or instruction is to render it attractive'.⁸ In Loudon's day, churchyards were often covered with a 'black unearthly-looking surface, so frequently disturbed by interments', that no grass would grow on it.⁹ In the crowded cities, churchyards were often further disgraced by the emptying of chamber-pots out of adjoining houses. It was little wonder that Blair would state that his task was to 'paint the gloomy horrors of the tomb'.¹⁰ He described the grave as a 'dread thing'. Of it, he wrote:

Men shiver when thou'rt nam'd: Nature appall'd,
Shakes off her wonted firmness. Ah! how dark
Thy long-extended realms, and rueful wastes!
Where nought but silence reigns, and night, dark night,
Dark as was chaos, ere the infant sun
Was roll'd together, or had try'd his beams
Athwart the gloom profound! The sickly taper,
By glimm'ring through thy low-brow'd misty vaults,
(Furr'd round with mouldy damp, and ropy slime)
Lets fall a supernumerary horror,
And only serves to make thy night more irksome.



It was the revolting horrors of the unsavoury vault and parish graveyard that Loudon sought to dispel. Washington Irving could ask why death should be clothed with unnecessary terrors, and why horrors should be spread around the tombs of those we love. According to him, the 'grave should be surrounded by every thing that might inspire tenderness and veneration for the dead, or that might win the living to virtue. It is the place, not of disgust and dismay, but of sorrow and meditation'. Coleridge, too, compared the 'unsightly manner in which our monuments are crowded together in the busy, noisy, unclean, and almost grassless churchyard of a large town' with the 'still seclusion of a Turkish cemetery'. Picton warned against a tendency 'in our anxiety to escape from gloom and horror', to 'run into the opposite extreme of meretricious gaudiness', a warning that might be heeded by the perpetrators of tombstone design today. 'Death and the grave are solemn and awful realities; they speak with a powerful and intelligible voice to the heart of every spectator, as being the common lot of all. Our cemeteries, then, should bear a solemn and soothing character, equally remote from fanatical gloom and conceited affectation.'¹¹

It is clear that Loudon and most contemporary opinion approved of the cemetery of Père-Lachaise in Paris as a model, although Loudon noted that

Plate 3 Hollow gate-posts at the entrance to the churchyard of S. Michael, Dumfries, gave shelter to night-watchmen (*The Author*)

a report to the French Government of 1842 stated that much ground had been lost in consequence of the cemetery's not having been originally laid out on a rigid systematic plan, and the want of walks, of roads, and of drainage was noted, as was the dilapidated state of some of the monuments. These faults were shortly to be remedied.

Loudon quoted extensively from, indeed shamelessly plagiarized, *Necropolis Glasguensis*, a seminal work by his fellow-Scot, John Strang.¹² This book obviously provided Loudon with much of his material, even his inspiration, and Strang's insistence on the moral, improving, and educational aspects of cemeteries struck a chord in Loudon. Strang's prolix and lugubrious tome was really a tract to persuade public opinion of the wisdom of forming a large commercial cemetery on a hill adjacent to S. Mungo's Cathedral in Glasgow. Loudon acknowledged that churchyards had had little influence (up to that time) in 'improving the taste'. Yet a 'general cemetery in the neighbourhood of a town, properly designed, laid out, ornamented with tombs, planted with trees, shrubs, and herbaceous plants, all named, and the whole properly kept, might become a school of instruction in architecture, sculpture, landscape-gardening, arboriculture, botany, and in those important parts of general gardening, neatness, order, and high keeping'.¹³ Indeed, some of the new London cemeteries at that time might be referred to as answering 'in some degree these various purposes, and more particularly the Abney Park Cemetery'. The latter contained 'a grand entrance in Egyptian Architecture; a handsome Gothic chapel; a number, daily increasing, of sculptural monuments; and one of the most complete arboretums in the neighbourhood of London, all the trees and shrubs being named'.¹⁴ Thus instruction and education, so important in Strang's reasoning, became part of the general cemetery movement. Strang himself declared that the 'tomb has, in fact, been the great chronicler of taste throughout the world'.¹⁵

While Loudon's moral and educational arguments have a certain period charm, his practical views on the layout of cemeteries are of considerable interest, for he influenced the design of cemeteries and was responsible for laying out a few in his time. He also designed a curious monument to his father in the churchyard at Pinner that consists of an obelisk with a sarcophagus projecting from it.

Cemeteries, according to Loudon, should be at a distance from human dwellings, and should be situated 'in an elevated and airy' place, with a southern aspect, so that the surface should be dried by the sun. He considered subsoils to be of great importance, for cemeteries draining into public wells were a menace to health. He favoured a chalky or gravelly soil, where decomposition would be rapid. The London clays, with their moisture content, preserved bodies rather than allowed their rapid dissolution. All cemeteries should be secured by boundary walls or fences, ten or twelve feet high, 'to give the wall an architectural character'. Walls and piers would also carry the numbers and letters used as indexes to lines for the identification of plots. There ought to be one main entrance and one subsidiary gate.

In the laying out of the grounds the position of chapels, the road plan, and

the accessibility to the whole of the cemetery were important. No part of the cemetery should be remote, either from the point of view of upkeep or of the desirability of graves. Good drainage was essential, and Loudon deplored the sodden parts of Kensal Green in winter. All cemeteries should be divided into sectors that could be easily identified, and these should in turn be subdivided into plots. Loudon emphasized the necessity of a coherent system of marking plots (sector A, plot 3, etc.), not only for ease of management, but for the keeping of records. He advocated a layout of 'double beds with green paths between', to facilitate ease of access to each grave, and to help the problem of surface drainage.

Chapels should be in conspicuous positions, as focal points. He was highly critical of Norwood Cemetery because both chapels were 'placed equally near the eye'. Lodges were important, for here there could be the residence of the superintendent and the records office. One lodge should be enough, and Loudon was critical of the two lodges at Nunhead Cemetery. He seems to have approved of the lodges at Abney Park, at Tower Hamlets, at Kensal Green, and at Brompton.

Trees and shrubs were important, but they should not 'impede the free circulation of the air and the drying effect of the sun'. Loudon advocated the planting of trees with 'conical shapes, like the cypress . . . associated with places of burial from time immemorial'. He favoured evergreens because the 'variety produced by deciduous and flowering trees is not favourable to the expression either of solemnity or grandeur'.¹⁶ Deciduous trees also created problems in autumn, when the leaves had to be cleared. Loudon suggested that pines and firs, cypress, Irish yew, Swedish juniper, and other species would be most appropriate. Only evergreens with 'naturally dark foliage and narrow conical heads, or which admit of being pruned with little difficulty' should be planted.

Loudon disapproved of the planting in most cemeteries as being too much like 'pleasure-grounds'. He advocated the planting of 'no flowers at all' because he abhorred any ground that 'had the appearance of being dug or moved for the purpose of cultivation'. A state of quiet repose was essential.

He then turned his attention to the buildings of a cemetery. Chapels were important because the burial service was often read under cover, and thus bad weather could be avoided. It was necessary to have a bier in the chapel that could be fitted with rollers so that a coffin could be rotated after the ceremony. In Kensal Green Loudon described the catafalque there that could be turned round or lowered, depending on whether the coffin was to descend to the vaults or be carried outside. This machine was built by 'Mr Smith, Engineer, Princes Street, Leicester Square'.¹⁷ In Norwood Cemetery, the catafalque was controlled, not by a screw mechanism, but by 'Bramah's hydraulic press', manufactured by Bramah, Prestage, and Ball, of 124 Piccadilly.

On gate-lodges, Loudon was adamant. 'The *entrance lodge* to a cemetery ought to comprise a room to serve as an office to contain the cemetery books, or, at least, the order book and register, and the map book, where, from the system of squares being employed, such a book is rendered necessary.' He

was particularly impressed by the lodge at Tower Hamlets Cemetery, designed by Wyatt and Brandon, which he thought very convenient. The most appropriate cemetery lodge, according to Loudon, was that at Newcastle by 'Mr Dobson'. This lodge could 'never be mistaken either for an entrance to a public park or to a country residence'.¹⁸

Loudon then discussed other buildings. Vaults, he said, should be constructed in the face of a steep rock, where no drainage would be required, as at S. James's Cemetery in Liverpool. Catacombs above ground, as in Brompton or Kensal Green, were in 'bad taste'. When vaults were constructed with subdivisions into cells 'like bins in a wine-cellar', Loudon describes the cells as 'catacombs', though that term is also given to vaults or crypts not subdivided into cells. Each cell, once a coffin had been inserted, was sealed with brickwork or by a tablet on which there would be an inscription. Loudon noted with disapproval that in many new London cemeteries the cells or catacombs were often only closed with an open iron grating, the ends of the coffins being exposed to view. In the Brompton Cemetery, the whole of the side of the coffin was so exposed, as the cells were literally shelves. Loudon felt these modes of 'interment' were fraught with danger to the living.

He tells us much about the methods of construction of individual buildings within cemeteries. Private vaults, for example, could have steps leading down to the floor. The stair-well was covered with a flat stone, level, or slightly above the surface. In some cases, where the steps were under a path, the stone was concealed under this. Over the vault itself was a monument, most commonly a square tomb, or an altar-tomb. It is particularly interesting that Loudon should advocate such a big foundation for the headstone. He admired the regular verticality of headstones in Scotland and suggested good foundations for headstones in England.

A brick-lined grave is a substitute for a vault, but unlike the latter it differs from an ordinary grave in having the sides and ends constructed of brickwork or masonry, and in being covered by a large flat stone, technically called a ledger-stone. Brick-lined graves can be sufficiently wide for two coffins, but are generally only wide enough for one, and vary in depth from ten to twenty feet or more. The side walls have to be constructed as arches to take the strain of the soil outside, and engineering bricks are often used, as they are impervious to damp. When an interment takes place, the stone is loosened by levers, and removed on rollers. The coffin is then let down as in common graves. The sides of many brick graves have ledges that project from each side for retaining a flag-stone or slate between each coffin; in most cases there are no projections, but one coffin is prevented from resting on another by the insertion of two bars of iron in the side walls to support each coffin. Needless to say, time and rust have played havoc with most graves of this type. Loudon disapproved of this method, too, for hygienic reasons. He illustrated a typical brick grave, with openings in the side walls 'to permit the lateral diffusion of moisture and mephitic vapour'. Adjacent is a normal grave, so that the headstone would suffice for both graves, being inscribed on each side.

In respect of sepulchral monuments, Loudon was most particular. They

ought, he wrote, 'whether mausoleums (which is a term only applied to the most sumptuous description of tombs), square tombs, ledger-stones with inscriptions, sarcophagi, pedestals, vases, urns, columns, obelisks, pillars, crosses, &c., to have the appearance of security and permanence, to exhibit two features: they ought to be perfectly erect or perpendicular, and they ought to rise from an architectural base'.¹⁹ Such a foundation would have to be as deep as the adjoining grave or graves. In the case of vaults and brick graves, this foundation was supplied by the structure itself, but in most cemeteries, 'even in Père-Lachaise and Kensal Green', the greater part of the monuments had no other foundation than the moved soil. The consequence of this was, of course, that monuments started to lean, and gave any impression but that of permanence. Loudon recommended two brick or stone piers at the head of each grave, carried up from the bottom, and from twenty centimetres to over half a metre square, according to the depth. The lintel capping these piers would be the foundation of the headstone. Where a pedestal ornament of any kind was to be erected, one foundation-pier eighteen inches square should suffice, or, where there was no danger of the ground being moved, a nine-inch square pier would stop the memorial sinking. Loudon recommended a space half a metre wide between each double row of graves. When a suggestion was made to have a double line of brick graves, or to fill up a cemetery regularly, without allowing choice, then Loudon recommended a foundation-wall two feet in width, regularly carried up along the middle space, from one end of the line to the other, to support head-stones.

Loudon suggested that memorial-tablets, busts, reliefs, and other sculptures could serve to beautify chapels, boundary walls, and colonnades. All boundary walls should have letters and numbers set into them to identify the runs of graves and to facilitate plot identification. Drainage of cemeteries was most important to make grave-digging easier and to avoid the scandal of water-filled graves or vaults. Loudon advised cesspools under gratings for retaining sand and gravel, so that these could be cleaned each year. He discussed everything, from tools to grave-boards, and no aspect of cemetery design and management escaped his eagle eye. Grave-boards were necessary where a grave was to be dug more than five or six feet deep, to prevent the sides from caving in. The grave-boards, designed by 'Mr Northern, superintendent of the Tower Hamlets Cemetery', were illustrated by Loudon. The sides were hinged, so as to form a concave side to resist the lateral pressure of the earth in the manner of an arch. The boards and end-pieces were joined together, and let down from the top, one above the other, as in well-sinking. The shuttering was then removed as the grave was filled in. One side was hinged, and the other was retained in its angular position by strong iron plates. Both boards were fastened to the ends by iron pins which dropped into eyes at the angles.

Loudon's concern with detail is astonishing, and his practical mind approved of all sorts of gadgets invented to ease the running of cemeteries. He advocated no burials in land that had been used for interment before, unless two metres of soil lay between the first burial and the second. This obsession with hygiene led him to suggest filling brick graves with earth in

exactly the same manner, although he grudgingly admitted that if each coffin were hermetically sealed in compartments, separated from its neighbours by flagstones or slate panels set in cement, then a great many coffins might be got into one grave. However, with characteristic foresight, he said 'there is always the possibility of desecration at some future period', and advocated earth burial only. He was right, as any visitor to the London cemeteries in the 1960s and 1970s can testify. Loudon would 'allow of few or no catacombs or vaults in buildings, and certainly none in or under churches, or other places where assemblies of human beings were held'. Indeed, he felt that the boxing up of dead bodies 'as if in defiance to the law of nature' was 'disgusting and in bad taste'. He advocated a heavy tax on this mode of interment, and that all bodies then in vaults or catacombs should be taken out and buried in the free soil. Loudon felt he would 'encourage the erection of handsome monuments, and the inscription on them of moral sentiments, the former to improve the taste, and the latter to cultivate the heart and affections'. Cemeteries should at all times be kept in the best possible order. The grass should be kept short and smooth by regular mowing, and all paths, drains, buildings, and planting should be kept in thorough repair. In order to ensure the keeping of monuments in good condition, Loudon advocated the payment of a sum to the cemetery companies for upkeep in perpetuity. Currency in Victorian England was stable.

Loudon was confident that, if his ideas were implemented, all cemeteries would be as healthy as gardens or pleasure-grounds, and indeed would form the most interesting of all places for 'contemplative recreation'. Cemeteries could be 'rendered inviting' by being ornamental and 'highly kept', and it would be desirable to 'have a considerable display of monuments on the borders of roads and main walks, and along the boundary wall'. To Loudon, the finest of ancient monuments in the churchyards of Scotland were the sepulchral structures projecting from the walls of Greyfriars churchyard in Edinburgh, and in the cathedral graveyard in Glasgow. Yet these themselves celebrated interments in the free soil, and were 'superb architectural and sculptural compositions'. He contrasted these splendid Jacobean memorials with the monuments over brick vaults in the London cemeteries. Loudon felt it should be a general rule that handsome monuments should be placed at particular points of view, such as at angles formed by the junction of roads, as eye-catchers.

The need for the keeping of orderly records is stressed in Loudon's work. The 'curator' of a cemetery 'ought to be a man of intelligence, and of cultivated feelings, with a taste for and some knowledge of gardening'; for all which reasons Loudon thought 'the situation one well adapted for a middle-aged gardener'.²⁰ Loudon was practical about cemeteries, for he wrote that 'the greater the number of present cemeteries, the greater the number of future public gardens'. All cemeteries, once filled, should be closed as burial grounds, and in a few years opened as public walks or gardens, *but all gravestones and all architectural or sculptural monuments should be retained and kept in repair at public expense*. He was therefore mindful of the future need to conserve cemeteries.

No human dwellings should be built within cemeteries, except the entrance lodge. Once again, Loudon argued vehemently against the building of vaults and catacombs, not only for reasons of expense, where such burial modes were seen as being 'high-class', but from the point of view of hygiene. The inevitability of eventual desecration is stressed, and the examples of the crypts of London churches adds weight to Loudon's arguments.

Loudon was much concerned with the burial of the poor; on health grounds he was opposed to common graves being sunk in the London clay. He advocated the burial of London's poor outside London, as the price of land within ten miles of London was much too high to allow their burial in the London cemeteries. With remarkable foresight he suggested the purchase of eight hundred hectares of poor land at Woking, where the gravelly soil was ideal, and would enable yews, junipers, pines, and firs to grow. This idea was obviously the beginning of Brookwood Cemetery, near Woking. As an alternative, he suggested 'temporary cemeteries' for paupers that, once filled, could revert to agriculture, subject to safeguards concerning the future use of the land. Such cemeteries would preferably, or even essentially, be on a railway line, so that large numbers of bodies could be moved at any one time. Loudon could see no reason why this concept of funerals by train could not be an encouragement to companies to set up large monumental cemeteries, as well as temporary ones, on poor soils at great distances from London, along the railway lines. Union workhouses could have portions of their gardens used for burial, to be restored to cultivation eventually. Loudon also suggested that landowners should be encouraged to bury on their own grounds in the free soil, provided proper records were kept.

The cemeteries of Frankfurt-am-Main and Munich were observed to 'add greatly to the convenience, economy, and salubrity of persons having only small dwelling-houses, and moderate incomes'. In Frankfurt the cemetery was entered through an open propylaeum between two wings. In one wing was the residence of the overseer and his assistants, while in the other were ten cells in which confined bodies were deposited for some days before interment. As a precaution against premature inhumation, cords communicating with bells were fixed to fingers of the dead, so that the least movement would be detected. In Munich, the *Leichenhaus* held the dead in open coffins for forty-eight hours before interment.

After this examination of Loudon's opinions on cemeteries, it is all the more interesting to turn to his design for a cemetery at Cambridge, based on his report to the directors of the cemetery company. The ground, just over one hectare in extent, was inspected by Loudon in November 1842. The site was flat and well drained, the soil being a blue clay. The object of the cemetery company was to form a cemetery for the middle classes at a cost, including the purchase price, of £2,000. Loudon proposed a scheme, the most important part of which was that no part of a coffin or its contents should ever be exposed to view after burial. Since the cemetery was intended for all sects, Loudon opposed consecration by any one party. He proposed a lodge, a shed, a yard, and a chapel as essential. He further suggested that the frontage, and a portion of the land along the Histon Road, should not be

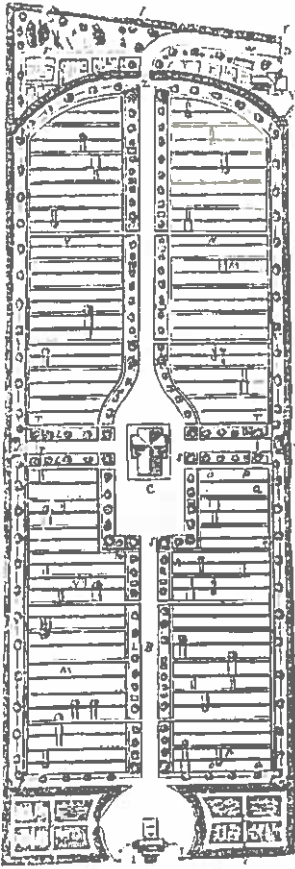


Plate 4 Plan of Loudon's design for the Cambridge Cemetery (Author's Collection)

included in the plan in the first instance, in case the cemetery should fail commercially, but that the frontage should be added later. Since the site was rectangular, he proposed an orderly rectilinear arrangement of paths and plots with trees planted around the perimeter and along the main walks. Trees with narrow conical shapes, such as cypress, were preferable, and indeed all varieties should be evergreen, to avoid maintenance problems and so that light and air could get to the surface of the ground. Loudon reluctantly allowed for ample space for vaults, but recommended against the construction of any catacombs above ground.

The designs, estimates, and plans of the lodges and chapel were by E. Buckton Lamb, architect, and Loudon's collaborator, who estimated the costs of buildings at £1,000. The 'proposed general arrangement of the grounds' (Pl. 4) shows the entire site surrounded by a holly hedge. The main entrance is at the west end, opening into the Histon Road, and a secondary entrance is shown on the New Huntingdon Road. On either side of the main entrance is a garden for the cultivation of flowers for sale. The chapel is in the centre, and turning space for hearses is provided. The ground at the top left-hand corner is reserved for superfluous earth, and for the storage of bricks and other materials. Borders were formed, six metres wide, planted with trees at regular distances. Spaces in the borders could be let as the most desirable plots for burial. Between every two trees there could be one burial-space, rendered ornamental by monuments. This space is divided into beds six metres wide, with paths between them just over a metre wide, and a space under a metre wide, raised about eight centimetres, is shown in the middle of each bed, on which space all headstones could be erected on a foundation of brickwork carried up from the bottom of each grave. Thus the verticality of monuments was assured, and each monument would stand independent of each grave. The paths between the beds are connected with a common path of under two metres' width which surrounds the beds and communicates with the main or central road. A funeral could thus be performed at any point without once deviating from the path or treading on the graves.

The planting consists of Taurian pines along the main avenue. This species was chosen because of its dark and solemn air, and the tree could easily be trimmed to form a conical shape. The trees at the corners of the space around the chapel are Cedars of Lebanon, the trees bordering the terrace walk being Irish yews. Around the ground at the top are Taurian or black Austrian pines. Should catacombs be demanded later, Loudon suggested that a range of these could be substituted for the curved walk, thus forming a 'handsome arcade with vaults behind and underneath'.

The designs for the entrance lodge and chapel were provided by Lamb 'both in the Gothic and Italian styles'. The directors chose Gothic, but Loudon preferred to illustrate the Italian design. The entrance gates and lodge contained a porch, an office, a living-room, kitchen, and an open court and shed. The first floor contained three bedrooms and closets (Pl. 5). The chapel itself was to be a pretty little building, to be constructed of stone, with dressed quoins, plinth, entablature, and aedicules, but with rubble walls (Pl. 6).

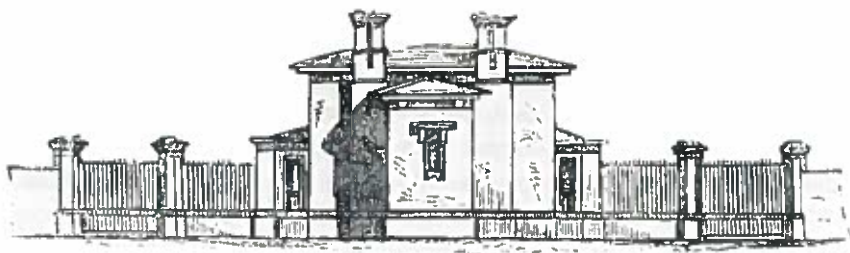


Plate 5 Entrance lodge in the Italian style, designed by E. B. Lamb for the Cambridge Cemetery (*Author's Collection*)

Loudon envisaged deep graves, some eight metres deep, to allow for two metres of earth over each coffin, and thus he calculated the cemetery would be full in sixty years. It is clear that his preoccupation with hygiene was not likely to provide a good economic basis, and the directors do not appear to have adhered to his recommendations in this respect.

After Cambridge, Loudon designed a cemetery on hilly ground, but with grave layouts based on the same principles as those he had adopted at Cambridge. The great extent of the borders in this cemetery rendered it 'particularly eligible for being planted as an arboretum' (Pl. 7).

From a consideration of his own designs, it was logical that he should turn his attention to a criticism of the eight cemeteries that had so far been laid out in London. He reiterated his objection to catacombs, and to all interments therein. In the cemeteries of London, he declared, 'so great an expense has been incurred in the catacomb department, that it must operate as a serious drawback to the profits of the shareholders'. This was wisdom indeed, as all catacombs are wasting assets that are expensive to maintain. Loudon also criticized the laying bare of coffins in new interments, and emphasized the offensiveness and dangers of disturbing the earth less than two metres above a recent burial. Loudon suggested that graves should be as deep as wells to ensure that layers of soil between coffins were adequate.

He objected to the system of laying out cemeteries in imaginary squares, for it did not allow of an obvious order and arrangement of graves, and made mapping and registration difficult. Frequently graves could only be found with the assistance of a member of the cemetery staff. All the London cemeteries appeared confused in their layout; most, being on clay, were inadequately drained, and Loudon advocated a clear, logical system of layout, where drains would be placed under paths.



Plate 6 Chapel in the Italian style, designed by E. B. Lamb for the Cambridge Cemetery (*Author's Collection*)

Plate 7 Design for Laying Out and Planting a Cemetery in Hilly Ground (*Author's Collection*)



The planting of all the cemeteries was 'highly objectionable' to Loudon, as being 'too much in the style of a common pleasure-ground, both in regard to the disposition of trees and shrubs, and the kinds planted'. Clumps of trees should be avoided, he declared, as it was impracticable to form graves in clumps and belts of trees. The South Metropolitan Cemetery at Norwood was advertised in an engraving, of which Loudon made a copy (Pl. 8),

Plate 8 South Metropolitan Cemetery, Norwood, planted in the Pleasure-Ground Style (*Author's Collection*)





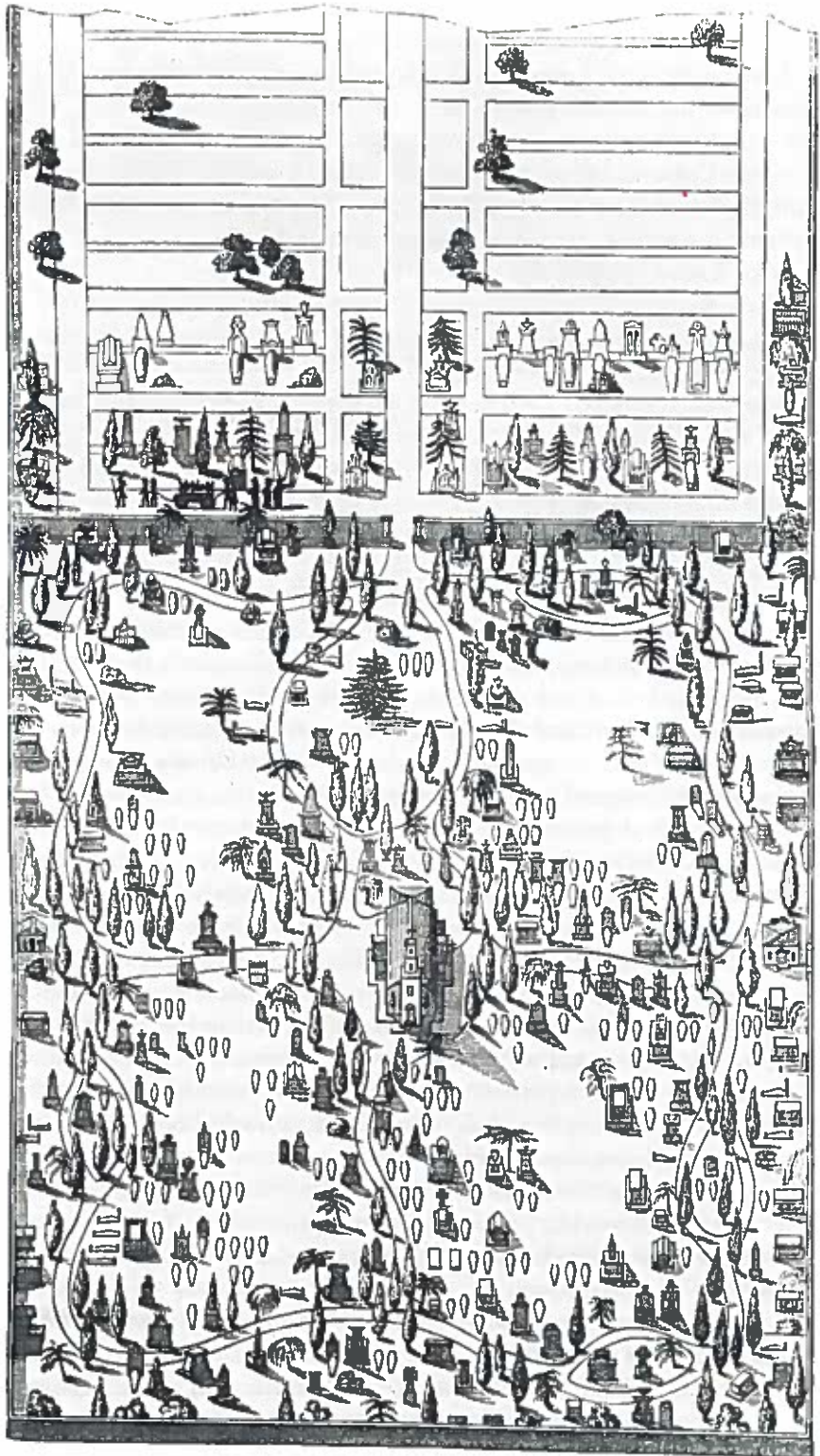
Plate 9 The South Metropolitan Cemetery, Norwood, planted in the Cemetery Style, as proposed by Loudon (*Author's Collection*)

showing the cemetery 'Planted in the Pleasure-Ground style'. Loudon published his own version of this view 'Planted in the Cemetery Style', showing his ideals of evergreen trees that were more like continental and eastern cemetery designs (Pl. 9). The cemetery at Eyub, near Constantinople, had planting of cypress-like trees. Turkish cemeteries were generally places of public resort, and the chief promenade in the evenings for the inhabitants of Pera was the cemetery, 'planted with noble cypresses', and 'thickly set in many places with Turkish monuments'. Opulent Turks had their graves railed in, and often a building over them, in some of which lights were kept constantly burning. Turkish cemeteries were generally out of cities, on rising ground, planted with cedars, cypresses, and odoriferous shrubs. Graves of males were usually adorned with turbans at the heads of the flat tombstones, and nearly all had plants growing from the centres of the stones.

Persia was celebrated for its mausolea, but Loudon found the cemetery of Hafiz particularly pleasing. This was square and spacious, shaded by poplars (a rare tree in Persia) and surrounded by a brick wall. Individual tombs covered the ground. In China, the high lands where rice could not be cultivated were set aside for burial, and Loudon illustrated two examples of Chinese cemeteries. From these examples he felt he could further justify his advocacy of evergreen trees in cemeteries on historical precedent.

From cemeteries he turned his attention to churchyards. 'The intellectual and moral influence which churchyards are calculated to have on the rural population', he felt, would not be disputed. Loudon deplored the unkempt condition of churchyards in his own day, and observed that the cause of their untidiness was that they had never been laid out to a systematic plan. He demonstrated how paths could be laid in a churchyard without removing any headstones or other monuments. Disused churchyards could be planted as a cemetery garden, and new grounds could be added for burial (Pl. 10).

Plate 10 Churchyard no longer used for burial, planted as a cemetery garden, with a new piece of ground added and laid out (*Author's Collection*)



Adequate drainage, records, foundations, and upkeep were advised, much on the lines of his cemetery recommendations.

Loudon designed a churchyard 'adapted for an agricultural Parish'. He illustrated the ground plan of this, which shows an 'isometrical' view (Pl. 11). A wall protects the enclosure, and there is only one entrance. The trees are Cedar of Lebanon, yews, thorns, and cypresses. Irish yew, Irish juniper, Swedish juniper, and other varieties were recommended. Burials without memorials were to be encouraged in the borders. In all this Loudon's sense of order and symmetry is displayed.

Throughout his writings, Loudon's sense of practicality is emphasized. Styles, and arguments about styles, were of little importance to him, except in that they could have an educational purpose. As education improved and became available to everyone, Loudon felt that styles as such would cease to be of any relevance. In any case, fitness for function was infinitely more important to Loudon than style, as the illustrations to his copious works should demonstrate. The great nineteenth-century cemeteries were laid out to satisfy a need, and though the first cemeteries were highly ornamental and picturesque, their style was soon superseded by the huge, almost rural, cemeteries of Brookwood and Little Ilford. Brookwood might be seen as the final realization of Loudon's philosophy, for this huge cemetery is on its own in country surroundings, and is planted in line with Loudon's theories. The fact that Brookwood was designed to be served by railway would have appealed to the practical Scot. Only twenty-five years lie between the founding of Kensal Green and the laying out of Brookwood, yet the differences in scale and in style are immense.

Loudon's ideas were strongly moral. He had faith in education and in liberal-humanitarian ideas of progress, social reform, education, and moral improvement. Like Archibald Alison, he had a firm belief in the value of common sense, and in the ability of the ordinary man to discern beauty. Education could give all men limitless associations: the function of the artist was to awaken responses to those associations. The cult of the associations of a place with a person, so much a concern of the Italian Renaissance, was important to Alison and to Loudon. The association of a house with the place of residence of a person 'whose memory we admire' would start a sequence of improving thoughts. 'The delight with which we recollect the traces of their lives, blends itself insensibly with the emotions which the scenery excites; and the admiration which these recollections afford, seems to give a *kind of sanctity* [my italics] to the place where they dwelt, and converts everything into beauty which appears to have been connected with them.'²¹

The idea of associations with the dead, and with worthy memories, was central to much of the thinking behind nineteenth-century cemetery design. Loudon believed that architecture, beauty, scale, and style were not concerned with aesthetics, but with fitness for function.

Some twenty pages of Loudon's tome on cemeteries were devoted to lists of plants that he felt were appropriate for use in burial-grounds. It is also interesting to note that he considered the lodge to the cemetery at Newcastle-upon-Tyne as 'peculiarly appropriate for a cemetery, on account

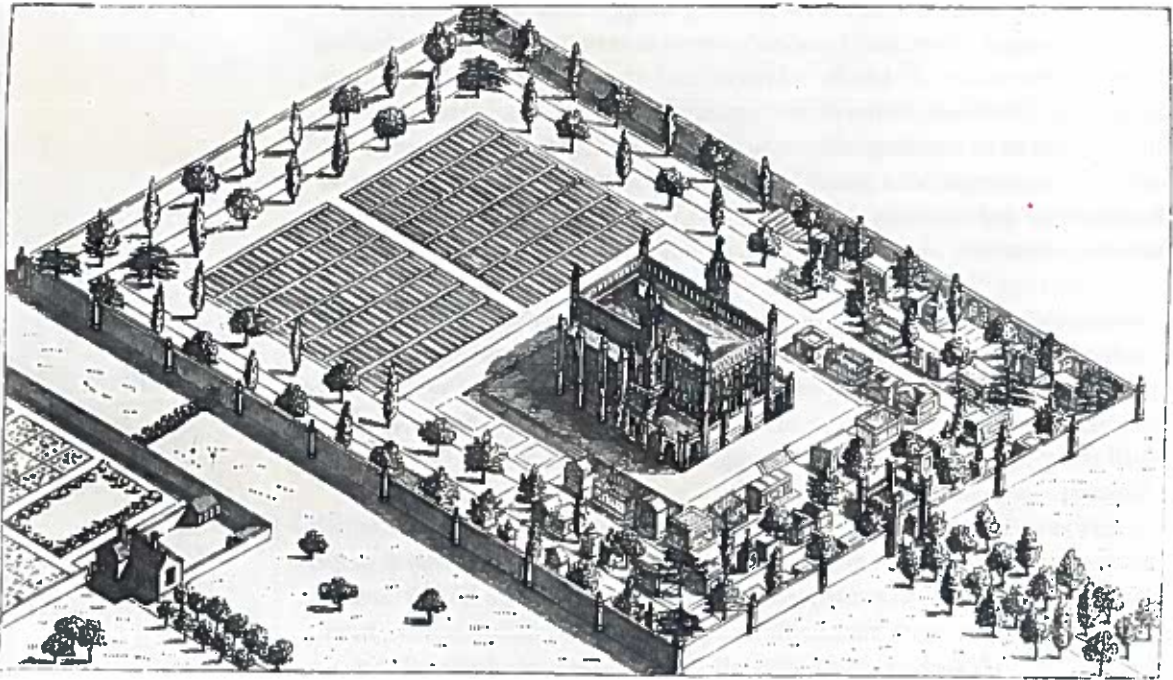


Plate 11 'Isometrical' view of a churchyard adapted for an agricultural parish (*Author's Collection*)

of its church-like towers'. The design was by John Dobson, who contributed to Loudon's *Encyclopaedia of Cottage Architecture*.

Loudon greatly admired the urban effect of the Glasgow Necropolis, and particularly the verticality of the monuments. He recognized that adequate foundations were necessary, and found Scotland greatly superior to England in this respect. He drew attention to Edinburgh, Glasgow, and Dumfries as examples where fine monuments had an added dignity by remaining sound and upright. The great Parisian cemetery of Père-Lachaise had been an influential example to the founders of the British cemeteries, and John Strang was a fervent admirer of this magnificent necropolis, but Loudon was critical of the haphazard way in which graves were laid out and sold, and felt the cemetery would be difficult to maintain.

In 1843 Loudon was employed by the Town Council of Southampton to make a plan for a general cemetery.²² For this he devised a plan to provide for the superfluous earth dug out of graves. The pile of superfluous earth at Kensal Green was 'enormous', and could not be sold, as it was consecrated ground. Loudon devised a system where alternate beds were to be used first, the soil being spread over the cemetery so that levels were everywhere adjusted and raised to the heights of the beds already used. Eventually the surfaces of the compartments would be raised above the natural surface, and ramps would be provided. Of course, individual headstones would have to be raised continually 'at a moderate expense' as the ground level was raised.

Loudon's commission to prepare plans for Southampton Cemetery was his only one for a public cemetery. It will be recalled that he had submitted plans and a report for the new Cambridge Cemetery, a private concern, and months before his death he was to design a cemetery for the Rector of Bath

Abbey. These three cemeteries, one public, one private and speculative, and one ecclesiastical, constitute Loudon's *oeuvre* in cemetery design, excluding those cemeteries on which he advised, and those where his ideas were influential. The Bath Abbey Cemetery is by far the most beautiful of the three, owing to its planting and to the idyllic views from it. The Cambridge Cemetery is recognizable from the original designs, with some changes to the planting and considerable demolition. The Southampton Cemetery, however, is scarcely identifiable from Loudon's Report to the Committee of 31 August 1843.²³ As Miss Melanie Simo has pointed out, the history of the planning and development of the cemetery stresses the wide gap between Loudon's ideas about cemeteries and those of contemporary received opinion. Loudon's arguments and designs were difficult to accept for two reasons: they were not conducive to the picturesque, and they were not based on 'Christian' premises. His approach was hygienic and essentially utilitarian.

The Corporation of Southampton submitted a petition for a municipal cemetery which received the Royal Assent on 6 July 1843.²⁴ Only a week later Mr Doswell, Surveyor, was instructed to identify some six hectares in the south-west corner of Southampton Common, and on 24 July Loudon explained his ideas before the Committee. He was then instructed to proceed with the plans. Drainage was Loudon's first concern, and he based his scheme on Captain James Vetch's reply to Edwin Chadwick.²⁵ The layout of the cemetery differed only slightly from his earlier design for the smaller Cambridge cemetery. However, the central avenue would be intersected by several cross-walks rather than two, as at Cambridge. The site for the chapels was about a third of the distance from the main entrance lodge on the south, as opposed to the centrally sited Cambridge chapel (now demolished). With economy in mind, Loudon had planned the Southampton chapels in one block, orientated east-west, with an arcaded gallery around the building to house the memorials. Areas for vaults were planned along the east and west boundaries of the cemetery, facing the respective Anglican and Nonconformist chapels, and Loudon suggested that if catacombs were to be provided under the chapels, they should only be used for the temporary storage of coffins.

The character of the cemetery was to be like that of a solemn garden. The ground was to be sown with rye-grass and with white clover. Trees, hollies, and thorns existing on the site were to be conserved. The borders of the main walks were to be planted with cypresses or with Irish yews.

Loudon was paid £34 3s 4d for his travel expenses, Report, and Plans. He did not live to see his designs realized, however. The committee members seem to have had a good opinion of Loudon, but they did not adopt his advice unreservedly. In February 1844 they considered alternative plans for the cemetery by W. Page and by W. H. Rogers. They accepted Rogers's plan on 27 February with some reservations. However, the original conception by Loudon, and Rogers's amendments, were arbitrarily altered by the committee. In addition, the Bishop of Winchester ordered the chapels to be built separately on sites completely surrounded by their respective consecrated and unconsecrated portions. Indeed, the cemetery

John Claudius Loudon and the Garden Cemetery Movement
today hardly fits the description given in a local paper two days after it had been consecrated:

No site ever selected for a Cemetery has been so favourably situated as this, being backed by a dense mass of wood, having in front some of the finest park scenery in England, and disclosing in all directions, save the Hill Lane side, a variety of views, yet in quietness of tone, which harmonises most agreeably with the associations belonging to the place . . .

Mr W. H. Rogers has contrived to unite all the requirements of a cemetery, as regards plotting out of the ground, giving easy access by paths to every part, and yet has deprived it of all formal character, and contrived to retain the fine trees which were already on the land.²⁶

Loudon's design was too rigidly planned, and perhaps too urban in character for contemporary taste. His cemetery was intended for use by the living as well as a depository for the dead. Fairly big, open areas, devoid of memorials and tall plants, would allow the ground to dry easily, and so aid decomposition of the interred corpses. The cypresses and yews, that were intended to flank the perimeter and the smaller walks, would not impede the free passage of air, while the borders that were to be laid out with varieties of plants would become a veritable arboretum. Here, the committee appears to have shared Loudon's enthusiasm for trees. In May 1846 *The Hampshire Advertiser* waxed almost lyrical on the planting of the cemetery:

Here are to be seen, for instance, the largest oak, thorn and holly on the Common. The shrubs are so disposed as to form vistas, and each plot or subdivision is an arboretum in itself, consisting of hundreds of varieties, among which are to be found some of the handsomest of the Coniferae tribe, as *Pinus Cambra*, *Excelsa Douglasii*, *Cephalonia*, *Norinda*, *Cedar of Lebanon*, and *Laricis*. Here are all the weeping trees of the lime, willow, birch, Chinese ash, elm, poplar, and oak, also the Irish junipers, *arbor vitae*, new hollies, the elegant *juniperus repandus*, ditto *chinense*, *cyprus*, *laburnums* (six varieties), flowering acacias, almonds, thorns, many sorts of *arbutus*, scarlet and yellow chestnuts, hemlock spruce, hybrid rhododendrons and magnolias and others. These are all planted twenty feet apart along the borders of the walks, and when they have grown to a proper size will have a most beautiful effect.

Loudon would no doubt have objected to the weeping willows. These lugubrious trees were associated with water, and so were inappropriate for a cemetery that was supposed to be properly drained. He would have approved of the arboretum, however, especially since it was to be maintained by the municipality 'at the expense of all, for the benefit of all'.

In his description of his works at Southampton we find a startling side to Loudon, for he refers to the suffering of 'bodies to be decomposed in the soil' giving way to the 'practice of burning'. Loudon was convinced that cremation would be adopted for the disposal of 'the great mass of the dead

... much sooner than even the most enlightened people' of his time could imagine. 'Every large town will have a funeral pile, constructed on scientific principles, instead of a cemetery; and the ashes may be preserved in urns, or applied to the roots of a favourite plant.'²⁷

Loudon was not to see his prophecy fulfilled, for he died on 14 December 1843, shortly after completing his book on cemeteries, and was buried in the General Cemetery of All Souls, Kensal Green. His work on cemeteries had enormous and lasting influence, however, not only in respect of the mode of layout of grave-plots, but especially in relation to the planting of evergreens. His advocacy of cemeteries outside London to be reached by train eventually gave rise to Brookwood Cemetery and to the Great Northern Cemetery. His amazing far-sightedness has been proved right in regard to cremation too, although what he would have said about the design of contemporary crematoria remains a matter for agreeable speculation.