Pentagon Memorial

Design Criteria
Design Program

Prepared for:

Department of Defense
Washington Headquarters Services
The Pentagon

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PENTAGON
RENOVATION
PROGRAM

SEA appendix H

1.0 INTRODUCTION

1.1 Background

On September 11, 2001, American Airlines Flight 77 took off from Washington Dulles International Airport with 64 people aboard, bound for Los Angeles. In flight, five terrorists hijacked the plane and crashed it into the west face of the Pentagon. The crash resulted in the death of the 59 passengers and crewmembers aboard the aircraft, as well as 125 military service members and civilians within the Pentagon. Many others suffered injuries.

The FY 2002 Defense Authorization Act, Section 2864 provides authorization for the Memorial. ***"The Secretary of Defense may establish a memorial at the Pentagon Reservation dedicated to the victims of the terrorist attack on the Pentagon that occurred on September 11, 2001."***

1.1.1 Design Competition

On December 27, 2001, the Director of WHS signed a Support Agreement (SA) which engaged the United States Army Corps of Engineers (USACE) to provide for planning, site selection, design and related technical services leading to the completion of the design competition for the Pentagon Memorial (Memorial).

A two-stage competition for a memorial Concept Design was planned and executed by USACE. Over 1,100 designs from around the world were submitted in Stage One. The Pentagon Memorial Competition jury met in Washington, DC from September 30 to October 2, 2002 to select six finalists to advance to Stage Two. The Pentagon Memorial Competition jury met again on February 21, 2003 to choose the final Concept Design from among the six finalists. The winning Concept Design by Keith Kaseman and Julie Beckman (KBAS) was announced at the Pentagon on March 3, 2003.

1.1.2 Design Lock

To preserve the integrity of the design composition and formally validate the Competition process and Jury decision, the Pentagon Memorial Family Steering Committee (FSC) has placed a "lock" on the Concept Design. Changes involving the aesthetic characteristics, layout / orientation, and/or form of the design elements will not be accepted nor considered.

The Design Lock will still allow for modifications that may be required for constructability or code compliance.

1.2 Project Overview

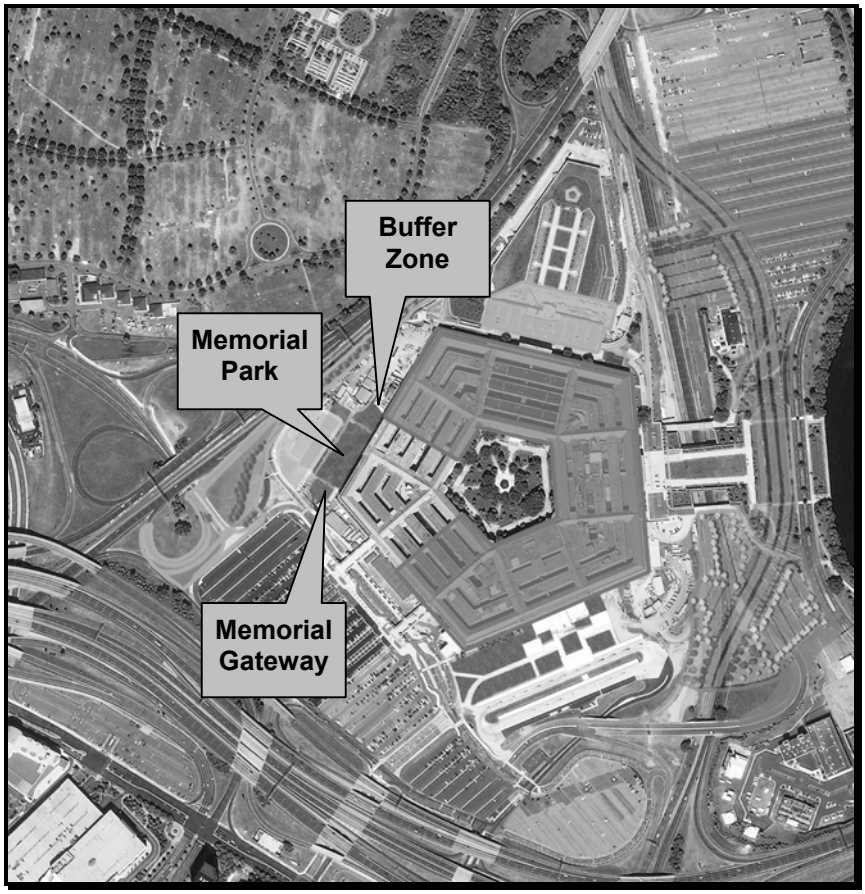
This acquisition is for the design-build of the Pentagon Memorial to develop the winning Concept Design in partnership with KBAS and construct a Memorial to the victims of the September 11, 2001 attack on the Pentagon. Attention to detail, durability and maintainability are of paramount importance.

1.3 Project Site

The location of the Project Site is within the Pentagon Reservation. Activities associated with the Project will take place on two (2) distinct, but adjacent areas- the Memorial Park and the Memorial Gateway. A Buffer Zone comprised of a thirty foot-wide strip of land at the northern boundary of the Memorial Park has been established to keep an area free of any obstruction or construction-related activity associated with the ongoing renovation of the Pentagon.

1.3.1 Memorial Park

- Established the site parameters for the USACE competition for a concept design;
- Is located 165 feet west of the Pentagon Building in an area bounded by the RDF Secure Access Lane (under construction), the South Parking Lot, and an open area (formerly a heliport, currently utilized as construction staging for the renovation of Wedges 2-5);
- Is within clear view of the point at which flight 77 struck the building (the flight path crosses directly over the site along an easterly vector);
- Is currently being utilized for construction staging and contractor support for the Wedge 1 reconstruction / Phoenix Project; and
- Consists of approximately 1.93 acres. (Site is indicated in photograph)



The Pentagon Reservation

1.3.2 Memorial Gateway

- Is located directly adjacent to the Memorial Park's southwest boundary;

- Will require coordination with other PENREN construction projects;
- May be the location for Project staging and contractor support activities;
- May be the location for an underground vault serving as an Equipment Control Center (ECC) for the Memorial Unit pool water circulation system; and
- May include an interpretive board, donor plaque, entry sign, benches, and drinking fountains as visitor amenities.

1.4 Project Objectives

The Key Objectives for a successful Project are:

- Ability to execute a Project to the satisfaction of all family members represented by this Memorial and the DoD community as a whole.
- Ability to execute a product utilizing construction and design detailing of the highest quality without compromising the winning Concept Design.
- Ability to perform within the scheduled timeframe while meeting all interim milestones.
- Ability to accommodate safety and security requirements while integrating the interests, programmatic and functional requirements of other project teams and government contractors.

1.5 Government Entities

1.5.1 Washington Headquarters Services (WHS)

Washington Headquarters Services (WHS) was established under Title 10, United States Code, on October 1, 1977 as a Department of Defense (DoD) Field Activity to provide operational support to specified DoD activities in the National Capital Region (NCR). In this role, WHS assumes the responsibility for planning and management of DoD-occupied space in the NCR, including the Pentagon. The Secretary of Defense has delegated authority for exercising jurisdiction, custody, operation and control of the Pentagon Reservation to the Director of WHS.

1.5.2 The Pentagon Renovation Program (PENREN)

The Pentagon Renovation Program (PENREN) of WHS, hereinafter referred to as "the Government," is the Owner's representative and contracting agency for this project.

1.5.3 Real Estate and Facilities Directorate (RE&F)

The Real Estate and Facilities Directorate (RE&F) of WHS through its Federal Facilities Division (FFD) operates and maintains the facilities on Pentagon Reservation grounds. RE&F has overall responsibility for this Project.

1.5.4 Pentagon Force Protection Agency (PFPA)

The Pentagon Force Protection Agency (PFPA) is the force protection arm of the Pentagon and is responsible for all security aspects related to the design, construction, and operation of the Pentagon. PFPA personnel screen and control all pedestrian and vehicular access into the Pentagon and within the Pentagon Reservation.

1.6 Acronyms and Abbreviations

Following is a partial list of acronyms and abbreviations used throughout this document. Note that drawings have their own legends.

ADA	Americans with Disabilities Act
AIA	American Institute of Architects
CAD	Computer Aided Drawing
CD	Construction Document
CFA	Commission of Fine Arts
CL+	Concept Level Plus
CNC	Computer Numerically Controlled
CO	Contracting Officer
Contractor	Design Build Contractor
COR	Contracting Officers Representative
CPM	Critical Path Method
CQC	Contractor quality control
CS	Commissioning Specialist
CSI	Construction Specifications Institute
Cx	Commissioning
DB	Design-Build
DCx	Decommissioning
DGN	File format for Bentley Microstation drawing
DID	Design intent document
DoD	Department of Defense
DPS	Defense Protective Service
DWG	File format for Autodesk AutoCad drawing
ECC	Equipment Control Center
EO	Executive Order
EPP	Environmentally Preferred Products
EV	Earned value
FAA	Federal Aviation Administration
FFD	Federal Facilities Division
FIM	Facility Information Management
FSC	Family Steering Committee (of the Pentagon Memorial)
GUI	Graphical User Interface
HVAC	Heating, Ventilation and Air Conditioning
IEQ	Indoor Environmental Quality
KBAS	Kaseman Beckman Amsterdam Studio
NCPC	National Capital Planning Commission
NCR	National Capital Region
NEPA	National Environmental Protection Act
NHPA	National Historic Preservation Act
NTP	Notice to Proceed
O&M	Operations and maintenance
OGC	Other Government Contractor
P3	Primavera Project Planner
PA	Public Affairs (of PENREN)
PBMO	Pentagon Building Management Office
PDE	Primary Design Element
PDF	File format for Adobe Portable Document Format
PDI	Project Design Intent
PDM	Precedence Diagram Method
PDP	Project Design Program
PENREN	Pentagon Renovation Program
PFPA	Pentagon Force Protection Agency
PRPEDS	Pentagon Renovation Program Electronic Data Standards

PVC	Polyvinyl Chloride
QA	Quality assurance
QC	Quality control
RDF	Remote Delivery Facility
R&D	Research and Development
RE&F	Real Estate and Facilities Directorate
RFI	Request for Information
RFP	Request for Proposal
RFQ	Request for Qualifications
SAL	Secure Access Lane (of the Remote Delivery Facility)
SHPO	State Historic Preservation Officer
UFAS	Uniform Federal Accessibility Standards
USACE	United States Army Corps of Engineers
VA	Virginia (Commonwealth of)
VOC	Volatile Organic Compounds
WHS	Washington Headquarters Services

2.0 PROJECT REQUIREMENTS

2.1 Professional Design-Build Services

The Contractor shall provide all services for the design and construction of the Project, including, but not limited to; management, design development of the Project Design Intent (PDI), administration, and construction necessary for completion of the project. The Contractor is responsible for the professional quality, code compliance, technical accuracy, and coordination of all designs, drawings, specifications and other documents or publications upon which the design and construction are based. The Contractor is responsible for the coordination of all design disciplines, trades, manufacturers, suppliers, consultants, etc., for all elements and systems. Additionally, coordination with Other Government Contractors (OGC) may also be required where their work could directly or indirectly impact this Project (e.g. installation of security devices, controls, and telecommunications infrastructure). The Project must be designed and constructed with the understanding and respect that the Memorial will be a permanent, dignified and moving testament to the sacrifice of both those killed in the Pentagon, and those who died aboard American Airlines Flight 77 as it was crashed into the building.

2.1.1 Concept Designers

An international design competition has established a pre-selected concept design for the Project. In order to successfully meet the Project Objectives established for the Pentagon Memorial, the Concept Designers (KBAS) shall be an integral part of the Contractor's team with full involvement throughout all phases of the Project providing insight, research and problem-solving skills critical in developing strategies for fabrication, documentation, coordination and implementation of all facets of the design. PENREN seeks an environment of teamwork and collaboration where the Architect of Record, the Contractor construction manager, and KBAS work together, to lead the team and establish the high standards expected by all. Working within, and coordinated with the overall Project team, KBAS shall provide services in support of the design and construction of the Project.

2.1.2 Architect of Record

The Contractor shall designate a registered Architect as the Architect of Record who will be responsible for the integration and approval of the complete design and construction documents package. The Architect of Record must sign and seal all construction documents for each phase of work. The Architect of Record shall designate representatives with sign-off authority for individual disciplines required for the completion of the design. Those individuals must be registered architects and engineers and have significant influence over the development of the design. Sign-off from the Architect of Record and designated representatives shall be on all applicable construction documents, specifications, material and mock-up submittals, and shop drawings before construction can begin.

2.1.3 Design Review

The Design Review process is the critical step to ensuring compliance with the Project Design Intent (PDI), compliance with contract requirements, proper system interface, constructability, and operability of the Project. The Contractor must provide a Project Submittal Schedule to include all required design submissions. The Project Submittal Schedule shall also include reasonable durations for full reviews. The reviews will include members of PENREN, FFD, the Family Steering Committee, and various regulatory agencies. The schedule shall be organized by the project phasing as determined by the Project Design Manager.

2.2 General Requirements

2.2.1 Existing Conditions

The existing conditions for the Project Site are provided for in drawings from two other PENREN construction projects -the Phoenix Project and the RDF –SAL. The Project Site spans the Phoenix and RDF-SAL sites; therefore drawings from both projects should be utilized. The existing conditions drawings are not record drawings, but should be used as a reference for initial planning and for purposes of preparing the proposal. The drawings notionally depict utility routings and are provided to the Contractor to understand the origin and terminus of the required utility services. They are not meant to signify the exact location of items as noted, nor signify the only acceptable design solution for the utility routings. Immediately upon Notice to Proceed, the Contractor shall focus upon certification and documentation of existing site conditions to include utility locations, geotechnical conditions and topographical data. The Contractor shall conduct all geotechnical and utility investigations and evaluations necessary to ensure the performance of the design. Revised, expanded, and/or new documents shall be produced as required to sufficiently describe the actual site conditions. Survey documentation shall consist of plans and diagrams with identification of items or areas requiring special protection during construction.

2.2.2 Demolition and Abatement

Prior to any construction-work taking place, it will be necessary to provide for the protection and safety of the traffic, both vehicular and pedestrian, and the work area. The Contractor shall provide this protection in accordance with the Commonwealth of Virginia's Work Area Protection Manual, OSHA, and any other applicable codes.

Demolition will include the removal of all existing features that are not part of the final product. All demolition debris will become property of the Contractor and shall be promptly removed from the Pentagon Reservation. Demolished non-hazardous materials shall be recycled during the demolition process to the maximum extent practical.

The Contractor shall abate hazardous materials such as asbestos, lead, and other contaminants if encountered. Removed hazardous materials shall not be mixed with non-hazardous materials, recyclable and generic debris. Hazardous materials removed from the Reservation shall be disposed of in accordance with applicable federal, state, and local regulations governing the handling of these materials. Originals and one copy of all manifests shall be supplied to the Contracting Officer or their designated representative.

Fuel oil was used as a dust control for excavation during the original construction of the Pentagon, and there is a high probability that some level of contamination will be encountered during any soils work. Previous experience with the Commonwealth of Virginia, Department of Environmental Quality suggests the Contractor will be able to redeposit within the Pentagon Reservation soils below 500ppm Total Petroleum Hydrocarbons (TPH) so long as the material is stockpiled if reused as part of the Project in a manner that will prevent further migration. Soil used for re-grading or backfill of excavated areas must contain less than 50ppm TPH and less than 5ppm benzene based on VA Department of Environmental Quality (VDEQ) "Guidelines for the Disposal of Soil Contaminated With Petroleum Hydrocarbons."

2.2.3 Governing Codes, Regulations, Permits, Approvals & Measurements

The Contractor shall comply with the current requirements of all applicable Federal, State, and local codes and regulations to include the Virginia Uniform Statewide Building Code (VUSBC), Virginia Statewide Fire Prevention Code, and Virginia State Health Code in the design and construction of this project. Current is defined as the code version in effect at the time of the initial award.

The Director, Real Estate and Facilities, is the authority having jurisdiction for building, fire, and life safety codes. Interpretation of Fire and Life Safety issues shall be coordinated through the FFD / Tech Staff / Safety and Occupational Health Group supporting the Director, RE&F.

The Contractor shall follow the Accessibility Guidelines of the Americans with Disability Act (ADA) and the Uniform Federal Accessibility Standards (UFAS). The most stringent code of these two shall govern in the event of a discrepancy.

2.2.3.1 Regulatory Agencies

The Pentagon is perhaps the most recognizable United States Government building in the world. It has been inseparably linked with the United States Military since its construction during World War II.

The Pentagon is a listed structure on the National Register of Historic Places and has been designated a National Historical landmark by the Secretary of the Interior. Five (5) distinguishing elements of the Pentagon were cited for special attention in the National Register nomination. The five elements are:

- The distinctive, equal length, five-sided design
- The five exterior facades
- The center courtyard and interior facades
- The terrace at the Mall Entrance (Mall Terrace)
- The terrace at the River Entrance (River Terrace)

Although the Memorial will have no direct impacts to any of the five distinguishing elements, its significance and proximity to the site of a recent national tragedy requires coordination, as directed by Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA). Therefore, all alterations, repairs or additions to the building must be respectful of the historic elements and the Secretary of Interior's Standards for Rehabilitation apply.

PENREN has received Master plan approval from all regulatory agencies for the activities associated with the renovation of the Pentagon. A supplement to the Final Environmental Assessment of May 28, 1991 (EA) and the Pentagon Reservation Master Plan has been prepared for this Project. Site approval for the Memorial Park, in accordance with NHPA, has already been secured by the United States Army Corps of Engineers.

Prior to Notice to Proceed (NTP), the portion of the Project Site known as the Memorial Gateway and drawings of the winning Concept Design will have been submitted to the regulatory agencies for approval at the concept level. Deviations or additions to the approved Master plan and/or Supplement to the Final EA will require review and/or approval by the relevant regulatory agencies. The Contractor will be responsible for a design that must receive approval for all of its elements/features affecting historic considerations of the building from the National Capital Planning Commission (NCPC), the Commission of Fine Arts (CFA) and the Commonwealth of Virginia Department of Historic Resources (SHPO). The Contractor shall work in conjunction with the Historic Preservation Specialist at PENREN to provide the required drawings and supporting material necessary to obtain all required approvals.

2.2.3.2 Units of Measurement

All submittals to the Government shall be in English (Imperial) measurements.

2.2.4 Safety

Worker safety is of paramount importance to the Pentagon Renovation Program. The Contractor is required to develop a Safety Plan and program that assures focused attention to this critical effort during the entire duration of the project. The Safety Plan, which shall be submitted and approved prior to construction start, should comply with requirements of US Army Corps of Engineers Manual, EM 385-1-1 (http://www.usace.army.mil/inet/usace-docs/eng-manuals/ceso.htm), OSHA regulations, and PENREN requirements for PPE. All Contractor supervisory personnel are considered safety officers, in addition to a

designated, full-time Safety Manager who shall be present whenever construction is underway. The Contractor's Safety Manager shall enforce the approved safety plan and ensure that all construction workers have received adequate, relevant safety training. For non-English speaking employees, there must be a bilingual foreman on-site who can effectively communicate with the employee. All Contractor personnel should also be aware that the Pentagon Defense Protective Service (DPS) serves as the first-response coordinator for all Emergency services including response from the Pentagon Medical Clinic, Police, Fire and Ambulance. In Case of Emergency, call (703) 697-5555 first. Calling 911 will result in slowed response, as Arlington County Virginia Police/Fire will have to coordinate with DPS for access.

The Contractor shall investigate all accidents and immediately report an accident involving a fatality, major injury or property damage greater than $200,000. All accidents that involve lost workdays or property damage greater than $2,000 shall be reported within 24 hours. For all reportable accidents, submit a completed ENG Form 3394 within 72 hours of the occurrence. Submit monthly OSHA Log of injuries (29 CFR 1926) and the monthly man-hour exposure report (EM 385-1-1). If the accident has the potential to result in a fatality, permanent disability or property damage in excess of $200,000, the site shall be secured and remain undisturbed, except for rescue procedures, until released by the Contracting Officer.

Immediately notify the Contracting Officer when an OSHA Compliance official arrives at the work site to inspect. During construction, ensure there is no migration of contaminants, liquids, and/or odors into occupied spaces. In the event any contaminants, liquids, and/or odors are detected in occupied spaces, all activities that could generate the conditions(s) shall stop and not resume until the contaminants have dispersed and the cause remedied.

2.2.5 Noise Restrictions

The Contractor shall refrain from all construction operations producing noise levels greater than 80dba within the Project site and surrounding areas between the hours of 6:00am to 6:00pm, Monday through Friday. The Contractor shall not drive piles on weekdays during the hours of 8:00am and 8:00pm. Violations of the noise restrictions are taken very seriously by PENREN and can constitute cause for contract termination.

2.2.6 Stoppage for Official Ceremonies

The Contractor shall provide for work stoppages as directed by the Contracting Officer for official ceremonies at the Pentagon. This will be dealt with on a case-by-case basis. For proposal preparation purposes, the contract should assume 40 hours of delay as a result of official ceremonies each year.

2.3 Commissioning

To ensure a fully functioning Pentagon Memorial, with systems that meet building mission, design intent and quality requirements, the Contracting Officer (CO) will require the implementation of a commissioning process for this Project. Commissioning (Cx) is a proactive, systematic, and rigorous process of assuring by documentation, functional testing, and training, from the design to a minimum of one year after Substantial Completion, that all systems perform interactively in accordance with the Government's operational needs and the design documentation and intent. This process judges correct performance of both individual systems and systems operating interactively according to the project design intent.

The Contractor and OGCs as necessary shall supply the personnel and technical resources needed to execute project Commissioning activities with the advisory oversight of the Government's Commissioning Specialist (CS).

2.4 Turnover Process

2.4.1 General

A well-coordinated and executed process to prepare the Project for use is critical. The Contractor will be responsible for all milestone dates and activities needed to arrive at the required date of Construction Completion. A written Turnover Plan shall be submitted and approved by the Government prior to starting construction. The contractor will propose the dates and durations for the activities of this section.

Construction Completion is defined as the point at which all punch list items have been completed to the satisfaction of the Government and the project is ready for its intended use.

2.4.2 Training and Systems O&M Manuals

Before the final Cx inspections, the Contractor shall ensure that all systems training is complete and appropriate Systems Operations and Maintenance Manuals (SOMMs) are provided to the Commissioning (Cx) team for review and acceptance as required by the Cx Plan (Section C2.4). This will allow FFD staff to become knowledgeable of the equipment and systems they will be inspecting and for which they will be responsible following acceptance. The SOMMs shall include a list of responsible contractors and subcontractors with contact telephone numbers for warranty on each of the systems.

2.4.3 Functional Performance Testing

The Government requires full inspection and testing of systems (e.g. plumbing, power, energy management, and control) in preparation for turnover. The primary interest is in proving the systems are fully functional and meet all requirements of the design and O&M requirements. Functional performance tests of all systems will take place before the Pre-Final Inspection to ensure the systems will be fully operational. The Contractor is responsible for ensuring that all needed performance tests are conducted prior to the Pre-Final Inspection.

Systems will not be re-inspected during the Pre-Final Inspection. At the completion of all Cx inspections, FFD will be ready to accept the systems for operation and maintenance as part of the transition from PENREN to FFD.

2.4.4 Construction Completion and Inspections

No less than 15 calendar days prior to date of Construction Completion, the Contractor will conduct a Pre-Final Inspection. The inspection may produce a Punch List of all items requiring additional work or modification prior to acceptance by the Government. There will be only one Punch List maintained by the Project team and no additional items will be added to the Punch List between the Pre-Final Inspection and the Final Inspection. The Contractor shall update work on all Punch List items at a daily meeting held on-site until items are complete. The Contractor should expect the attendance of the PENREN Program Manager at the daily meeting. All Punch List items must be complete and accepted by the Government for a determination of Construction Completion.

2.4.5 Transition to FFD

After determination of Construction Completion and turnover to PENREN, the Contractor shall ensure all project documentation; manuals, reports, etc. are complete and accurate to allow for the transition of the Project from PENREN to FFD within 30 calendar days.

3.0 PROJECT DESIGN PROCESS REQUIREMENTS

The Contractor shall design and construct the Pentagon Memorial in accordance with the Performance Criteria, Design Process Requirements, Sustainability Goals, and Commissioning Requirements described below and the Project Design Program (PDP) described in Section 4.0.

3.1 Performance Criteria

The Contractor shall meet or exceed the Performance Criteria provided herein for the systems of the Project.

3.1.1 Pool System

Each individual Memorial Unit pool will contain about 17 cubic feet (approx. 130 gallons) of water. Clear, filtered and sanitized water will enter each pool through controlled inlet feeds on the wall, below the water's surface, under the cantilevered bench. This inflow of about 8 to 10 gallons per minute, without air bubbles or excess velocity to create unwanted turbulence at the water's surface, is to flow uni-directionally to the opposite short wall of the pool. The water shall be continuously recirculated (the surface shall move gently but noticeable) to unobtrusive skimmers and overflow slots (integrated into the final fabrication / assembly of the Memorial Unit) at a velocity of from 9" to 12" per second.

Supply and return lines feeding the pools shall be valved to assure the required flow. All lines (gravity drain and pressure supply) shall be sized to maintain a flow not to exceed 6 feet per second.

The pool system shall be designed to:

- Allow for winter operation using most stringent weather data for Reagan National Airport, ASHRAE Handbook, 2001 Fundamentals;
- Remove all visible particles;
- Provide water to the pools that must preclude growths of algae, bacteria or mosquitoes without chemical odors;
- Provide for the complete volume of water within each pool to be recirculated a minimum of four (4) times within a 24-hour period;
- Operate on zones, which would allow for maintenance/shutdown/cleaning of pools in a manner that would not require the entire system of pools to be taken out of service at the same time.

3.1.2 Exterior Lighting and Control

3.1.2.1 Integrated Pool Lights

Lighting shall be low voltage and photometrically controlled. All electrical work must be fully grounded in accordance with applicable codes.

3.1.2.2 Memorial Park and Memorial Gateway

Contractor shall provide site lighting in accordance with standards from the Illuminating Engineering Society of North America (IESNA).

3.1.3 Electrical Distribution System

Provide a complete electrical distribution system. Include components such as grounding, enclosed switches and circuit breakers, and panel boards.

The contractor shall use electrical systems and equipment that are energy efficient, reliable, flexible, and easy to maintain. The equipment selected will be commercially available "off-the-shelf." Installation of equipment will be based on manufacturer's recommendations and industry standards. Equipment furnished will meet NEMA, UL, and ANSI standards.

3.1.3.1 Lightning Protection

Provide lightning protection systems per code where required.

3.2 Energy Efficiency and Environmental Design

3.2.1 General Requirements

The Government seeks a Project that promotes energy efficiency throughout all phases. The Contractor shall consider energy efficiency during the design of all Project systems and look for opportunities to conserve energy during construction as well.

It is the Government's objective to incorporate sustainable design principles in this project to the maximum extent possible within the project constraints and the PDI. These principles are described in Executive Order 13123, Greening the Government through Energy Efficient Management. This and other sustainable design references are available at http://www.epa.gov/oppt/epp/gentt/textver/resources.html.

As a minimum requirement for this project, the Contractor shall provide a complete erosion and sediment control plan, which complies with the Commonwealth of Virginia Erosion and Sediment Control Manual and all other applicable codes and regulations. The construction site must be maintained in a manner to ensure the proper function of the Erosion and Sediment Control Plan

The Contractor must meet or exceed the goals and objectives stated in Executive Order 13101 Greening the Government through Waste Prevention, Recycling, and Federal Acquisition.

3.2.2 Environmentally Preferred Products (EPP)

These are products that reduce effects on human health and the environment which consider raw material source, production, manufacturing, packaging, distribution, use of recovered materials, reuse of product, operation, maintenance, disposal and recyclability. These attributes must also be balanced with the overriding PDI and the Program goals of durability, cost effectiveness (based on life cycle cost analysis) and reliability. The Contractor shall also comply with requirements of the comprehensive procurement guidelines, which can be obtained at http://www.epa.gov/epaoswer/non-hw/procure/.

The following are specific EPP goals that are targeted for the Pentagon:

- No materials or building components that were manufactured with ozone-depleting compounds, including CFCs and HCFCs.
- No materials or building components that were manufactured with, or that contain Polyvinyl Chloride (PVC) or other chlorine –based compounds.
- No materials that contain Volatile Organic Compounds (VOC). In the cases such as roof assemblies and paints where zero VOC content is not available, low VOC materials will be acceptable; but VOC content must be documented and coordinated prior to purchase and installation.

Use building materials and products that reduce greenhouse gas emissions by specifying recycled-content, bio-based, and/or industrial by-products vs. virgin materials. A 35% reduction is the goal when comparing each specified product to a comparable product that is not an EPP but meets the performance requirements.

3.2.3 Waste Management

The Contractor shall be required to initiate and implement a Construction & Demolition Site Recycling program to divert a minimum of 50% of all recyclable waste materials from land filling or incineration, and should include mixed metals, clean wood, cardboard, asphalt, concrete, land clearing debris, beverage containers and other materials for which markets exist.

4.0 PROJECT DESIGN PROGRAM (PDP)

The Project Design Program (PDP) includes six (6) Primary Design Elements (PDE); the Memorial Unit, the Age Line, the Age Wall, the Perimeter Benches, Landscaping, and the Memorial Gateway. The Primary Design Elements are described separately but are not independent of each other. Site Work and the Pool System requirements make up the balance of the PDP. The materials of the Competition Stage Two submission for the winning Concept Design (APPENDIX C.6) and the following PDP narratives constitute the Project Design Intent (PDI).

4.1 Site Work

4.1.1 Grading

The site shall be graded to accommodate the PDI.

4.1.2 Drainage

Design low maintenance, durable drainage structures, which shall provide the maximum capacity and the least visual impact on the site. Site drains may include surface drains (hardscape and lawn areas) and sub-surface drains (planting areas) and be designed to take excess irrigation water as well as rain water into the existing storm drain system.

4.1.3 Lighting

Provide an energy-efficient site lighting system throughout Project Site (Memorial Park and Memorial Gateway) to ensure safe movement of pedestrians. Fixtures within the Memorial Park shall be proposed by Contractor and approved by the Government. Fixtures within the Memorial Gateway shall be "Washington" standards. All site lighting shall be photometrically controlled.

4.2 Pool System

Concept Design Intent: As depicted in the renderings and drawings, each personalized memorial unit will have its own reflecting pool. This water element has the dual purpose of contributing to a peaceful, contemplative environment at each individual Memorial Unit, as well as for the Memorial Park as a whole. The controlled surface movement of the water is to interact with natural sunlight during the day and with artificial light at night. This light will bounce off the clear-anodized underbelly of the cantilevered aluminum bench portion of the individual memorial unit, creating soft light shadows on the aluminum itself, as well as on the surrounding gravel surfaces.

The water within each individual memorial unit pool must be maintained at a level of approximately 1-1/2" inches below the surrounding ground surface. The continuous visible movement of the water within the pool must be soft and quiet. The water itself must be clear and free of debris.

Modifications to the materials, functionality and/or layout described herein shall be coordinated and approved by the Concept Designers.

Provide a fully functioning water circulation system to include the following.

4.2.1 Equipment Control Center (ECC)

Provide an Equipment Control Center (ECC) space to:

- House pumps, filters, sanitizers, sensors, controls, and all other equipment that is required to operate and maintain the pool system.
- House panels and equipment required for the electrical system.

The ECC space shall be designed:

- To be a fully code-compliant, enclosed, and securable structure with applicable heating, ventilation and lighting.
- To allow for practical ingress and egress of O&M personnel and supplies.
- To be large enough to house all required equipment safely, logically, and in accordance with applicable codes.
- To permit ease in service, maintenance and repair/replacement of all components by O&M personnel.
- To include drainage to prevent flooding from rainfall or mechanical failure.

There shall be no visual or audible suggestion of the mechanical/electrical equipment or infrastructure anywhere within the Memorial Park. It is anticipated that the ECC space could be located within the Memorial Gateway or the Buffer Zone.

4.3 Memorial Unit (PDE #1)

Concept Design Intent: At the collective heart of the Pentagon Memorial is the individual **Memorial Unit**. 184 Memorial Units, each dedicated to an individual lost on September 11th, are to be strategically organized and placed across the approximately 2-acre site. Each Memorial Unit is a complex yet elegantly simple element that performs several tasks and is several things at the same time. It is an individual reflecting pool of water that glows with light at night, the place for the permanent inscription of each individual victim's name, a place to sit and place mementos. Its slender cantilevered form and the Memorial Unit's multidimensional integrity are rooted in the fabrication of its form. An extremely high level of coordination, research and development is required for the production of the Memorial Unit – its articulated fabrication; structural performance, systems integration and all resultant effects are unprecedented in a Memorial Park setting.

Modifications to the materials, functionality and/or layout described herein shall be coordinated and approved by the Concept Designers.

Provide and install one hundred eighty-four (184) Memorial Units.

4.3.1 Fabrication – Cast Aluminum Memorial Unit

No drawings are required for the production of the master pattern from which the Memorial Unit is cast in aluminum. The fabricator for the Memorial Units shall demonstrate an extremely high level of precision and quality.

Data from the three-dimensional computer model provided by the Government shall be read directly by a 5-axis Computer Numerically Controlled (CNC) milling machine. A "master" pattern, or positive master form, is created by milling / sculpting sections out of high-density foam. These sections will be assembled and sanded smooth to create one cohesive pattern from which the cast piece will be made.

Such a process allows not only for prototypes to be made rapidly for physical inspection and required adjustments prior to the casting production line, but also ensures a high level of quality control and efficiency in fabrication. Once the "master" pattern is developed, the casting process moves rather quickly.

Upon removing the cast aluminum from the mold, each unit will be sanded and buffed smooth. Lastly, the Memorial Unit will be clear anodized, protecting the aluminum from fingerprints, scratches and the elements.

It is the responsibility of the Contractor to assure that all 184 Memorial Units are equal in quality, precision, finish, and are free of any defects.

4.3.2 Prototyping, Load Testing, and Full Scale Mock-ups

An adequate number of CNC patterns and finished prototypes must be iteratively made, allowing for rigorous quality control / physical load tests and adjustments to be made in the computer model from one iteration to the next. An acceptable level of deflection is to be established, and a systematic regiment of physical load tests must be pre-established to examine the strength, durability and quality of the cast aluminum Memorial Unit against the acceptable deflection dimension. Load resistance, deflection and structural durability shall be verified with a test procedure that entails repetitive loading (of a conservatively substantial magnitude) over an extended period of time. Further, these early developmental prototypes must be clear anodized and incorporate the Polyester Composite Matrix mix (see 4.3.5), thus producing a full scale working mock-up to test the integration of the Memorial Unit's components. Once approved by the Concept Designers, the full-scale working mock-up shall be delivered to the Pentagon for Government approval.

Ultimately, tests shall be conducted on the full-scale mock-up to ensure that all materials and connections are integrally durable over extensive loads, periods of time and radical temperature differences.

4.3.3 Functional Specificity and Articulation

The Memorial Unit is a highly articulated and refined element – its programmatic and functional specificity is built into its form. Plumbing "nostrils" and other required elements, conduit channels and the light cove are all integrated into one solid cast of aluminum. The necessary structural cross section provides the pan within which the polyester composite matrix is poured. Any additional required surface treatments - bolt-holes, reinforcing dimples, ribs, shelves, reveals, notches, etc. – will be highly specific to the detail / issue at hand. All of these articulations are to be resolved and developed during the development phase, designed in the computer, and physically tested through rapid prototypes at full scale. In other words, any functional problem that is introduced or discovered during the development phase will be readily absorbed by the Memorial Unit's form through an iterative design, development and testing process.

4.3.4 Structural Rigidity

Though a sleek and slender cantilevered condition, the Memorial Unit is incredibly strong and rigid.

A precise and comprehensive engineering analysis must be performed prior to and during the rapid prototyping process. The current full-scale computer model is to undergo a finite element analysis, thus producing an annotated summary pinpointing critical stress-zones across the structural surfaces of the cast aluminum Memorial Unit. This analysis will not only help to optimize the amount and location of aluminum within the cast, but will also provide the performance parameters within which all integrated systems (plumbing "nostrils", pipe fixtures, light fixture, fasteners, etc.) must work within. As previously stated, full-scale prototypes of the Memorial Unit will undergo extensive and rigorous physical tests to verify load resistance and overall durability.

4.3.5 Polyester Composite Matrix

As shown in the cross sections, an adhesive mixture is poured into the Memorial Unit, allowing the gravel to be fixed in place as the Memorial Unit "grows" out of the surrounding stabilized gravel field.

The composite matrix is to be a precise ratio of a polyester-resin or epoxy material, glass fiber and gravel aggregate (to match the surrounding stabilized gravel). This matrix must be durable, waterproof, UV stable, non-toxic and possess the material and color qualities necessary to polish the surface smooth at the horizontal seating portion of the Memorial Unit, attaining a "terrazzo" finish that matches the surrounding field in color. All other aggregate in the Memorial Unit is to be adequately exposed and permanently affixed in place – its texture is to match that of the surrounding stabilized gravel field.

Research, development and physical testing will be performed to determine the recipe for the matrix in conjunction / coordination with the prototyping / testing regiment set up for the cast aluminum Memorial Unit (see above). The point of contact between the composite matrix and the aluminum is among the most critical of issues to ultimately resolve - the coefficient of expansion of the composite matrix shall match as closely as possible that of the cast aluminum Memorial Unit. This will ensure that the composite matrix moves in unison with the aluminum as temperatures change throughout the day, and throughout the seasons, thus ensuring a beautiful, watertight joint between the two different materials. Expansion joints and strips, if any, must be practically invisible.

As the modulus of elasticity of the composite matrix will differ from that of the cast aluminum, there will be no composite structural action between the two materials. However, the material properties of the composite matrix, its reinforcement, flexibility, coefficient of expansion and its connection to the cast aluminum must be such that it does not crack, break or deteriorate under any circumstance.

4.3.6 Integrated Pool-Light

As the individual reflecting pools will glow with artificial light at night, a waterproof light fixture and enclosure will be integral with the Memorial Unit's form. The design development of the pool-light must be tied directly to the development and refinement of the memorial unit through the rapid prototyping process. Access to the light fixture and cove will be from within the volume of the reflecting pool – whether the pool's water has to be drained or not is provisional with the specific light fixture type and enclosure / cove detail.

4.3.7 Engraved Names

At the most slender face of the cantilever is an engraved name of the individual to whom the individual Memorial Unit is dedicated.

There are several cases in which the lives of more than one member of a family were lost at the Pentagon. In these cases the name(s) and birth-year(s) of the other family member(s) will be engraved onto the horizontal plaque portion of the memorial unit (directly above the light cove), referencing the location of their Memorial Unit by age-line within the Memorial Park. These engraved names will be just below the surface of the water in the reflecting / glowing pool. Otherwise, this plaque portion of the Memorial will remain blank.

4.3.8 Pre-installed Assembly / Site Installation

The Memorial Unit is sandwiched by two 1/4" thick aluminum plates that are as long in dimension as the Memorial Unit itself. By permanently affixing the aluminum plates to the sides, whether through mechanical fasteners, welded connections or welded conditions (or a combination thereof), the volume of the pool is defined. At this point, the Memorial Unit is ready to be bolted to its below-grade foundation

and spliced into the aluminum Age Line.

4.4 Age Lines (PDE #2)

Concept Design Intent: Oriented along the trajectory of American Airlines Flight 77 and spanning the site from perimeter to perimeter, the **Age Lines** are the organizational strategy of the Memorial Park as a whole. Each age line represents a birth year of each of the 184 victims; based on the birth year of the victim, their individual Memorial Unit is located along that age line. These lines ultimately serve as the "directory" or "map" with which the visitor will locate the individual Memorial Units, which are qualitatively organized along the Age Lines according to the victims' birth dates.

Modifications to the materials, functionality and/or layout described herein shall be coordinated and approved by the Concept Designers.

Provide and install Age Lines throughout the Memorial Park.

4.4.1 Assembly / Installation

Each "age line" consists of two parallel 1/2" thick aluminum prefabricated folded or welded plate assemblies separated by 14 inches. They are rigid service troughs, between which the Memorial Units are located and locked in place.

Despite pending grading and drainage implications, the age lines must remain straight across the entire site. At each Memorial Unit, a segment of aluminum 1/4" plate is fastened to the Unit to define the reflecting pool's volume – the assembled Memorial Unit is a segment of the age-line continuum.

The age lines are to be inlaid flush with the stabilized gravel field. As they reach each perimeter condition, the age lines continue up the vertical face and along the top of the perimeter benches – maintaining an inlaid flush condition.

At the concept level, the Age Lines were envisioned to act as service troughs with stiffener plates that accommodate for all electrical and plumbing lines. Actual routing of service lines shall be proposed by Contractor and approved by the Government. The Contractor shall propose the routing of service lines as part of the Engineering System Concept submission described in Section L.

4.5 Age Wall (PDE #3)

Concept Design Intent: The **Age Wall** runs along the western edge of the site and its purpose is dual-fold. The growing height of the wall corresponds to the growing birth years as one moves south to north within the Park - this serves as an indicator of the site's organization to those passing by along the adjacent highways. At the same time, the age wall reaches its tallest dimension as the RDF Secure Access Lane encroaches upon the Memorial Park, hence serving as a necessary buffer between the quiet contemplative environment of the Park and the movement and noise of the adjacent roadways.

Modifications to the materials, functionality and/or layout described herein shall be coordinated and approved by the Concept Designers.

Provide and install Age Wall.

4.5.1 Assembly / Installation

The Age Wall is made of exposed aggregate concrete wall sections. Pre-cast, tilt-up or poured-in-place options shall be explored, as the dimensions and configurations of every segment of the Age Wall vary across the site. The aggregate is exposed on both faces and the top of wall - the aggregate is to match that of the stabilized gravel ground cover.

Revealed expansion / control joints occur in alignment with the aluminum age lines that demarcate the entire site – to align and correspond to the aluminum Age Lines, the reveals are 1/2" wide and deep.

The Age Wall shall have integral planter and bench

4.6 Perimeter Bench (PDE #4)

Concept Design Intent: The **Perimeter Bench** provides a continuous and smooth seating surface for visitors to the memorial. The Perimeter Bench also serves as a planter for ornamental grasses, acting as a soft screen demarcating the boundary of the park. The 1/2" thick aluminum Age Lines that organize and demarcate the site continue up the vertical face and over the horizontal seating surface of the bench. – the aluminum is to be inlaid flush with the polished surface of the bench. A high degree of precision must be deployed in the construction and assembly of the perimeter benches as they invite constant interaction from visitors to the Memorial.

Modifications to the materials, functionality and/or layout described herein shall be coordinated and approved by the Concept Designers.

Provide and install Perimeter Benches.

4.6.1 Assembly / Installation

The bench shall be surfaced by synthetic terrazzo - a polyester composite matrix composed of resin / epoxy, gravel aggregate (to match the stabilized gravel field) and glass fiber. This composite mix / recipe must be taken into consideration, as the coefficient of expansion of the terrazzo mix must be as close as possible to that of the aluminum enabling all joints between the two materials to be as tight as possible in all configurations. Further, these joints must be water tight so as not to allow water penetration and the ice-freeze issues associated with it.

All aluminum is to be polished flush with all surfaces of the perimeter bench. All joints are to be as tight as possible – expansion strips, if introduced, must be practically invisible, as are all physical connections and fasteners required for this detail.

Perimeter Benches shall have integral planters.
Perimeter Benches shall have inlaid aluminum "birth years" at the end point of each Age Line.

4.6.2 Security Performance

The design and construction of the Perimeter Benches must satisfy the requirement of PFPA to provide for physical constraints that keep visitors from approaching any closer to the Pentagon building than the boundaries of the Memorial Park. Design shall require review and approval by PFPA prior to construction

4.6.3 Lighting

In conjunction with the overall lighting scheme, the inlaid aluminum birth years shall be illuminated at night.

4.7 Landscaping (PDE #5)

Provide hard and soft landscaping for the entire Project Site (Memorial Park and Memorial Gateway).

4.7.1 Pedestrian Surfaces

4.7.1.1 Memorial Park

Concept Design Intent: A ground cover of stabilized gravel is intended to contribute to the sensuous, tactile environment of the Memorial Park. The gravel is hard enough for one to roll a wheelchair or stroller over, yet loose enough for the visitor to hear his/her own footsteps and the footsteps of others nearby. The porous quality of stabilized gravel system allows for two things; first, the trees can be planted and grow without a visible protective grating at the base of the tree trunk; and second, it is intended to assist in keeping the site as flat/planar as possible.

Modifications to the materials, functionality and/or layout described herein shall be coordinated and approved by the Concept Designers.

Provide and install pedestrian surfacing throughout the Memorial Park.

A system of stabilizing containment mats shall be used to hold the gravel aggregates in place. These mats shall remain invisible under a top layer of gravel. Aggregates are to be angular in cut and of maximum size allowed by system/manufacturer's specifications– color and type to be specified in conjunction with the development of the polyester composite matrix.

This stabilized gravel system shall be porous enough to provide for the sustained livability of the trees. It is anticipated that there will be no need for metal protective grating at the tree trunks.

All pedestrian surfaces shall be UFAS and ADA compliant.

4.7.1.2 Memorial Gateway

Concrete shall be used for all surfaces intended for pedestrian use within the Memorial Gateway. A sidewalk must be provided around the Memorial Park to connect the areas of the Reservation at both ends of the park without requiring entrance into the park.

Provide logical connections to the existing Reservation pedestrian walks as they cross into the Project Site.

4.7.2 Trees and Plant Material

4.7.2.1 General

Every effort shall be made to keep the area as secure as possible, and to prevent unwanted intrusion. Trees, shrubs, and other plants should be designed to keep views open and avoid hiding places. Provide soil mix (topsoil) to a two-foot depth at all areas to receive sod.

The landscape plan and proposed soil mix shall be submitted to the Government's Horticulturist for approval. The Contractor shall obtain Government approval prior to the installation of any tree or plant material.

4.7.2.2 Memorial Park Trees

Concept Design Intent: A grove of trees is intended to provide a vivid canopy of color and light and shade throughout the site. To create an intimate environment, the maximum appropriate number of trees will be clustered in accordance with the Memorial Units, providing a comfortable amount of shade to each Unit, while allowing enough sunlight to penetrate the canopy, creating dynamic lacey shadows on the ground.

Each tree type currently being considered (Paper Bark Maple, Trident Maple, and Field Maple) has a, brilliant, late falling canopy maintaining its foliage late into the fall and early winter months. The texture of the bark, the shape and color of the leaves, and the overall canopy spread, together will compose a most exquisite display of nature. The trees will seemingly grow straight out of the gravel surface, needing no visible protection or drainage grate.

Modifications to the materials, functionality and/or layout described herein shall be coordinated and approved by the Concept Designers.

Install Government-provided trees throughout the Memorial Park.
The appropriate drainage, soil and planting conditions shall be proposed by the Contractor and approved by the Government to insure sustainability of the trees.

4.7.2.3 Memorial Park Ornamental Grasses

Concept Design Intent: The perimeter conditions of the Memorial Park, as mentioned above, are to serve as a soft but impassable barrier that satisfies the security requirements deemed by the Project.

The natural quality of wild ornamental grasses will provide a soft edge to the site - type and color to be specified. During the off-season, the grasses must be cut back to allow for new growth.

Modifications to the materials, functionality and/or layout described herein shall be coordinated and approved by the Concept Designers.

Provide and install ornamental grasses for the Perimeter Benches and Age Wall.

4.7.2.4 Memorial Gateway Landscaping

The landscaping shall compliment the design of the Memorial Park. Native plantings shall be used, in particular those already present in adjacent areas.

Install Government-provided trees throughout the Memorial Park.
Provide and install sod in all areas within the Memorial Gateway intended for grass.

4.7.3 Irrigation

Provide irrigation for all trees and plant material (including sod and ornamental grasses).

A portion of the site is served by an existing irrigation system supplied by a potable water source. The work of this Project will require modifications to this system. Modifications must be compatible and consistent with the existing site irrigation system. Proposed modifications shall be submitted to the Government for approval no less than 30 days prior to the start of work.

Provide hose bibs throughout the Project Site for the washing of pavement, benches and other fixtures. Hose bibs should be placed for maximum efficiency assuming use of a 100-foot hose. Hose bibs and supply lines shall be protected from freezing. Locations of hose bibs must be coordinated and approved by the Concept Designers prior to submitting to the Government for approval.

4.8 Memorial Gateway (PDE #6) (OPTION)

Concept Design Intent: The Memorial Gateway is envisioned as a functional and interpretive landscaped buffer between the Pentagon's South Parking lot and the Memorial Park. The Memorial Gateway shall serve as the primary visitor entry point into the Memorial Park

The materials, functionality and/or layout of the elements that make up the Memorial Gateway shall be coordinated and approved by the Concept Designers.

Provide and install the following within the Memorial Gateway.

4.8.1 Interpretive Board

An Interpretive Board, protected from the elements, to provide the visitor with information to supplement their visit to the Memorial.

Size, design, and content will be provided to the Contractor once coordination by the Concept Designers, the Family Steering Committee, and PENREN has been completed.

4.8.2 Donor Plaque

A Donor Plaque to display the names of donors who make a significant contribution towards the construction of the Memorial.

Size, design, material and location will be provided to the Contractor once coordination by the Concept Designers, the Family Steering Committee, and PENREN has been completed.

4.8.3 Visitor comfort amenities

Drinking fountains (2) cooled.
Benches (4).
Bike Racks (for min. 10 bikes).
Trash Receptacles, bomb-proof (2).

4.8.4 Entry Sign

An Entry Sign to mark the formal entry point for visitors.

Location, size, design, and materials will be provided to the Contractor once coordination by the Concept Designers, the Family Steering Committee, and PENREN has been completed.

4.8.5 Reservation Way-Finding Signage

Way-finding signage to direct visitors to the Memorial Park from three primary directions.

Utilize the signage design and graphic standards from the recently completed Metro Entrance Facility project to:

- Provide at a minimum, two directional signs between the Metro Entrance Facility and the Memorial Park;
- Provide at a minimum, two directional signs along the Route 27 bike / walking path between the Route 110 overpass and the Memorial Park; and
- Provide at a minimum, two directional signs between the I-395 pedestrian tunnel and the Memorial Park.