BASIS OF DESIGN

STRUCTURAL DESIGN

Foundation Construction:

The structure will be supported by a deep foundation system due to the poor soils at the building site. The deep foundation system will consist of driven Precast Concrete Piles or Steel H-piles. The piles will be driven in groupings and encased in a reinforced concrete pile cap to allow the piles to work together. Reinforced concrete grade beams will be utilized to support the exterior walls of the structure as well as provide lateral stability to the pile caps. The ground floor level of the building will also be supported by the deep foundation. To achieve this, additional pile caps and grade beams will be located between column locations to reduce the span of the first floor structural slab.

Concrete for the foundation work will have a 28-day minimum compressive strength (f’c) of 4000 psi unless the soils in the area require a higher strength due to their chemical composition. The foundation walls will be cast-in-place concrete and will also incorporate a masonry shelf to allow the exterior masonry to extend below grade.

Floor Construction:

The first floor will be a structural slab supported by the deep foundation system. The slab will be 8-10-inches thick and will have reinforcing steel in the top and bottom faces of the slab. The slab will be supported by a series of grade beams that are in turn supported by pile caps.

The slab will be elevated above the exterior grade by a minimum of four (4) feet and will create a ‘crawl space’ under the slab. This crawl space will be enclosed with openings for proper ventilation and access points. A 4” concrete slab will be placed over the grade within the crawl space. All piping, ductwork, conduit, etc within the crawl space will be supported by the structural slab to minimize differential movements between these elements and the building structure.

The elevated exterior slabs, stairs and ramps will also be supported on a deep foundation to minimize differential settlement between these slabs and the main building slab. The structural slabs, stairs and ramps in these areas may be placed on engineered fill to minimize formwork requirements.

Two elevated slabs within the building are incorporated into the design. The first is the “Roof” of the Armory (Room 105) and will be concrete for security purposes and should not be supporting any additional loading. The other elevated slab is for the Mechanical Equipment Mezzanine.

The concrete for the structural slab and the elevated slab will have a 28-day minimum compressive strength (f’c) of 4000 psi. The slab-on-grade within the crawl space will have a 28-day minimum compressive strength (f’c) of 3000 psi.

Roof Construction:
The superstructure will be a pre-engineered metal building that will be designed and detailed by the General Contractor’s manufacturer of choice. The roof construction will consist of main rigid frames spaced at approximately 20 feet on-center. Cold-formed purlins will span between the main frames and will have a maximum spacing of 5 feet on-center in the typical areas. In corner, edge and ridge locations, the spacing of the purlins may be reduced to 30 inches on-center to meet the high wind loading requirements.

**Wall Construction/ Lateral Resisting System:**

The wall construction will be reinforced Concrete Masonry Units (CMU) up to an elevation of 9’-4” above the finished first floor level. These walls will be reinforced as exterior walls designed to handle the Code prescribed wind load pressures. The exterior walls above the CMU will be furnished as part of the Pre-engineered Metal Building system.

The lateral resisting system will be part of the pre-engineered metal building system. The main frames of the building will be designed as pinned base rigid frames in the transverse direction of the building. In the longitudinal direction, braced frames utilizing steel rod braces or portal frames will be spaced as required to handle the lateral loading. The foundation system will be designed to adequately handle the loads from the pre-engineered metal building.
Load Criteria:

Live Loads
First Floor:
Typical Floor Areas 100 PSF
Mechanical Rooms 150 PSF
Access Ramps 100 PSF (Plus 500 pound point load)
Roof 20 PSF
Mechanical Mezzanine 150 PSF

Snow Loads
Ground Snow Load 0 PSF

Wind Loads
Basic Wind Speed (3-Second Gust) 140 MPH
Wind Exposure C
Wind Importance Factor 1.00
Building Category II
Internal Pressure Coefficient ±0.18

Seismic Design Data
Seismic Importance Factor 1.00
S\textsubscript{s} 0.088g
S\textsubscript{1} 0.04g
SITE CLASS D

Code Criteria:

All structures shall be designed in accordance with the International Building Code, 2006 edition. All design loads shall be in accordance with the ASCE-7 “Minimum Design Loads for Building and Other Structures”, 2005 edition.
Foundation Plan

GB-1, 20' W x 2'-5" T x 8" T B, #7 T&B, #4 Rein. B.

GB-2, 24' W x 3'-8" T x 8" T B, #4 at 10'-4" C.

10' Conc. wall to form 5' Conc. containment walls - Rein w/ 4' at 3'-11" C.E. W. each face.

24" sq. Conc. column Reinf w/ #10 vert. and 8' ties at 3'-11" C.E. (typ. 23)

Grout 8" Conc. wall and Reinf w/ #5 at 4' W. at launch ramp aw.

Pile Stays

Pile caps

P-1 = 42' W x 32" H. The W. 4 - #6 ir. bod.

P-2 = 42' W x 96" Long x 38" T.H. W. 6 - #6 Long Bars, 16 - #7 Short Bars.
FIRST FLOOR PLAN

B-1: 24" SLAB, 3-#8 T&B, #4 STIRRUPS
B-2: 24" SLAB, 3-#9 T&D, #4 STIRRUPS

8" CONC SLAB (CAST ON GRADE)
#6 AT 12" O.C. T&B
#5 AT 24" O.C. T&B

COLUMNS/PEDESTALS BELOW

8" CONC WALL TO 9-1/2" (MIN) - BEAM W/ #10 AT 12" O.C. TOP & 3/4" AT EACH WALL

8" CONC ARMORY ROOF SLAB BEAM W/ #10 AT 4" X 2" O.C.
1/2 CLEAR FROM THE BOTTOM OF THE SLAB

10" CONC ARMORY WALLS
BEAM W/ #4 AT 8" O.C.
EACH FACE = 10" STAIRCASE PEDESTAL IN EACH FACE TO EQUAL 4" WALL CLEAR
Typical Exterior Wall Section

8" Solid Precast Plank

#4 at 12" O.C.

7 - #8

24"

24"

Precast Option

Smart Vents - Space as Req'd

8" CMU Breakaway Wall

4" Conc Crawl Space Slab

Conc Col. Beyond See Plan

Grade Beam - See Plan

Pile Col. Beyond See Plan

PEMB Col. Beyond See Plan

REINF - See Plan

8" Conc Struct. Slab