MOHAWK VALLEY HEALTH SYSTEM

HOSPITAL PROJECT

Preliminary Structural Engineering Design Narrative

Version 1

KORDA

I. CODES, REGULATIONS AND DESIGN STANDARDS

A. All design will satisfy the applicable portions of the following codes, regulations and standards:

1. IBC, International Building Code
2. ACI 117, Specifications for Tolerances for Concrete Construction and Materials
3. ACI 302.1R, Guide for Concrete Floor and Slab Construction
4. ACI 318, Building Code Requirements for Structural Concrete
5. ACI 347R, Recommended Practice for Concrete Formwork
6. ACI Detailing Manual, SP66 (04)
7. ASCE 7-10, Minimum Design Loads for Buildings and Other Structures
8. CRSI "Placing Reinforcing Bars
9. Design Manual No. 31 for Composite Decks, Form Decks and Roof Decks, by the Steel Deck Institute
10. Diaphragm Design Manual, Third Edition (DDM03), by the Steel Deck Institute
11. Factory Mutual (FM)
12. Specification for the Design of Steel Buildings, by the American Institute of Steel Construction (AISC)
13. Specification for Structural Joints using ASTM A325 or A490 bolts
14. Specification for Structural Steel Buildings
15. Structural Welding Code – Steel AWS D1.1/D1.1M, Paragraph 6.6.5 specifically excluded.
16. Underwriters Laboratories, Inc. (UL)
17. WRI "Manual of Standard Practice" July 2001, 6th Edition
18. Steel Design Guide 11, Floor Vibrations due to Human Activity

II. STRUCTURAL SYSTEMS

A. Design Criteria

Floor Loading:

Stairs, First floor corridors	Live Load	100 psf
Corridors above first floor	Live Load	80 psf
Operating Rooms	Live Load	60 psf
Patient Rooms	Live Load	40 psf
Offices	Live Load	50 psf
Mechanical Rooms	Live Load	150 psf

Note: Live load reduction per IBC.

Superimposed dead load	15 psf

Risk Category	IV

Roof Loading:	Mechanical Units	Self Weight
	Snow	50 psf plus the effects of drifting snow
	Importance Factor	1.2
Wind Loading:	Basic Wind Speed	120 MPH
	Importance Factor	1
	Exposure Category	B
Seismic Loading:	0.2 Second Spectral Response Acceleration (S_S)	0.174g
	1 Second Spectral Response Acceleration (S_1)	0.069g
	0.2 Second Spectral Response Acceleration (S_{DS})	**T.B.D.**
	1 Second Spectral Response Acceleration (S_{D1})	**T.B.D.**
	Site Class	**T.B.D.**
	Seismic Design Category	**T.B.D.**
	Importance Factor	1.5

B. Foundations

1. **A subsurface investigation report is underway. Based on experience with the general area, deep foundations will be used. Most likely drilled shafts will support the columns and the concrete shear cores.**

2. Grade beams will span between the drilled shafts to support the perimeter walls and provide protection against frost.

C. Slab-on-Grade

1. All slab areas founded on grade will be of slab-on-grade construction. Its composition will be 5" of concrete on gravel sub-base over a polyethylene vapor barrier. The vapor barrier may be placed either below or on top of the gravel base. If there is heavy medical equipment in the basement, such as MRI's and CT's, then thicker and reinforced slab-on-grade will create a path for the transport of the equipment. The slab-on-grade within the rooms housing this equipment may need to be depressed.

2. The slab-on-grade will be reinforced with synthetic fibers for control of cracks due to shrinkage and flexural stresses. It will have control joints or construction joints, spaced at a maximum of 12' to 15' apart, for the control of shrinkage cracks. If some of the finish materials require control joints to control cracks due to shrinkage, the joints in the

flooring material must correspond to the joints in the concrete slab to minimize cracking through the finish material. This would include flooring materials like terrazzo or similar applied cementitious flooring. Slab areas with stained concrete, terrazzo, or similar finishes will be reinforced with re-bars.

3. The strength of concrete used in the floor slabs on grade will be specified as 3,500 psi at 28 days, and 2,100 psi at 3 days of age.

4. All interior slabs on grade will be finished to meet flatness and levelness requirements that are typical for hospitals.

E. Elevated Floor Structures

1. The floor framing system will consist of 16-18 inches deep composite steel beams spaced at about 10'-0" on center and supported by 24-inch deep composite steel girders. The slab construction will be 3,500 psi normal weight concrete fill on a 3-inch galvanized composite metal deck reinforced with 6x6-W2.9xW2.9 welded wire fabric. The overall slab thickness will be 7-1/2 inches and the overall structural depth 32".

2. The steel beams and girders will be cambered in order to reduce the weight of the members.

3. The floor will meet a 2-hour fire resistance rating but the steel beams and girders must be protected with fire resistive material such as spray-on fireproofing.

4. The steel framing will be designed to meet 0.5% of gravity acceleration due to walking excitation as recommended by Design Guide 11 endorsed by AISC.

F. Roof Structure

1. The roof framing will consist of steel beams and 3-inch deep galvanized metal deck with a total structural depth of 27 inches. The structural steel and metal deck must be protected with fire resistive material.

2. The roof framing will be designed to support a significant load of mechanical equipment. All mechanical equipment will be supported on a separate frame constructed above the roof level and supported directly from the building columns which will extend above the roof. There will be no concrete fill on the roof deck.

G. Lateral Force Resisting System

1. The building will be designed to withstand the wind pressure and seismic forces according to IBC.

2. Concrete shear walls will be used as lateral force resisting systems. They will be placed around stairwells and elevator shafts. The wall thickness will vary from 12 to 14 inches. The concrete strength will be in the 4-5 ksi range at 28 days.

3. The seismic design category for the building will be determined once the soils engineer determines the Site Class. If the resulting Seismic Design Category is C, then lateral restrains for life essential mechanical and electrical systems will be required.

H. Expansion Joints

1. The building is approximately 630'-0" long and 240'-0" wide. This length would normally require one expansion joint.

2. Given the locations of the concrete shear cores, we propose to use two temporary expansion joints, one at line 5 and the second at line 15. These two joints will separate the building into three sections and will allow the building to expand and contract towards the cores during construction.

3. Once the building is enclosed, the steel and slab along the temporary joints will be tied to form continuous framing and the temporary joints will be eliminated.