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MEMORANDUM

DATE: April 5, 2011

TO: Ms. Marilyn Timpone-Mohamed, ASLA, AICP, Frederick P. Clark Associates, Inc.

FROM: Mr. David P. Lombardi, PE, John Meyer Consulting, PC

RE: JMC Project 11020
Lawrence Hospital Expansion
55 Palmer Avenue
Village of Bronxville, NY

SUBJECT: ***Review of Surface Water Quality and Quantity Submission***

This memorandum provides a technical review of the "Drainage Report" prepared by The Chazen Companies, last revised February 4, 2011. In connection with this review, we also looked at the Site Plans by the Chazen Companies, dated 02/04/2011; the Landscape Plans by Mark K. Morrison, dated 02/04/2011; and the Architectural Drawings by Lillibridge, dated 02/04/2011, as they relate to stormwater. The report and supporting documents were reviewed for conformance with the New York State Stormwater Management Design Manual, dated August 2010. The following are our initial comments:

1. The report states that this project is not subject to the requirements of a regulated MS4, but does not state why.

2. The report states that the proposed project is considered a redevelopment project. However, the report should state whether it is a redevelopment with an increase or decrease in impervious area.

3. The report states that the green roof system will alleviate stormwater runoff peak flow rates. Green roofs provide storage for the water quality volume and can be used to store the channel protection volume. The applicant must demonstrate how the green roof systems will provide quantity control.

4. It is recommended that the applicant quantify the impervious area reductions and provide runoff reduction calculations. The green roof areas can be used as either an impervious area reduction or volume reduction, but not both.

5. The report states that the Green Roof(s) was/were designed according to the criteria set forth in Section 5.3.8 "Green Roofs" of the NYS Stormwater Design Manual, dated August 2010. However, the calculations for Green Roof Post Area 1 include area that does not drain to the practice. In addition, Green Roof Post Area 2 includes the chillers and mechanical penthouse, but it is not clear whether these areas drain to the green roof systems or not. It is recommended that the applicant create subdrainage areas for the green roof systems and the other areas that do not drain to the practices. The Tributary Drainage Areas in Table 3 should be revised accordingly. In addition, calculations for the provided WQv in Table 3 should be provided.

6. The report states that stormwater discharge from the project site is controlled by green roof practices and that it has been designed to provide quantity controls by attenuating stormwater runoff and releasing runoff at a rate equal to or less than that which existed prior to development of the site. It is unclear how the green roof practices will attenuate stormwater runoff. There are no ponds in the hydrologic model and zero depth of ponding in the Storage Volume (V_S) Calculation Worksheet in Appendix J. For example, the calculations indicate that Green Roof Post Area 2 provides 943 cubic feet of water quality volume. However, the runoff from a 100-year storm for the same area, using a runoff curve number of 98 for impervious surfaces, is 6,851 cubic feet. It is recommended that the green roof areas be modeled as impervious surfaces in the hydrologic analyses. The elevations of the roof drains should be added to the plans and report.

7. The following are comments on the Pre-Development Stormwater Map and Modeling:

   A. Short grass prairie, with a Manning's n value of 0.15, was utilized for the existing grass areas. Dense grasses, with a Manning's n value of 0.24 should be used for pre-development conditions.

   B. The entire concrete walk to the south, which is to be removed, should be included in Area 3S.

   C. A north arrow should be added to Fig. 4 "Pre Construction Conditions."

8. The following are comments on the Post-Development Stormwater Map and Modeling.

   A. Bermudagrass, with a Manning's n value of 0.41, was utilized for all proposed grass areas. Bermudagrass is appropriate for the proposed green roof areas. However, dense grasses with a Manning n value of 0.24, should be utilized for all grass areas on the ground.

   B. A runoff curve number of 39 was utilized for green roof areas and a runoff curve number of 69 was utilized for green roof walkway. The applicant should provide either the

source or calculations to substantiate these values. However, it is recommended that the applicant use a curve number of 98 in the hydrologic analyses.

C. There are existing impervious areas that are being disturbed and new impervious areas outside of the watershed boundary. These areas should be included in the water quality and hydrologic calculations, respectively.

D. There is no time of concentration flow path shown for Green Roof Post Area 1.

E. The hydrologic calculations indicate that the sheet flow component of the time of concentration for Post Area 2 is 100 feet. The distance from the hydraulically most distant point to the first roof drain is approximately 55 feet. The calculations should be revised accordingly.

F. The Water Quality Treatment System calculations should be revised to include only the areas draining to the green roofs. Additional water quality calculations should be provided for areas other than the green roofs.

G. A north arrow should be added to Fig. 5 "Post Construction Conditions."

9. It is recommended that details for the intensive and extensive green roofs be provided, as well as a detail of the green roof walkway.

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