Stormwater Report

Village of South Blooming Grove, NY

Prepared for:

OCCR Enterprises, LLC
c/o The Cordish Company
601 East Pratt Street, 6th floor
Baltimore, MD 21202

McLaren Project No. 140346
June 2014

Prepared by:
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1.0 INTRODUCTION

McLaren Engineering Group (MEG), has been retained by the OCCR Enterprises, LLC to conduct an independent analysis regarding a proposed stormwater detention system for the proposed casino/hotel development in the Village of South Blooming Grove, Orange County, New York. The proposed project will be a joint venture between two established gaming operators, the Cordish Companies and Penn National Gaming, Inc.

2.0 MCLAREN ENGINEERING GROUP QUALIFICATIONS

Founded in 1977, McLaren Engineering Group has a 37-year history of providing multidiscipline consulting engineering services to clients worldwide. Headquartered in West Nyack, NY and with offices in New York, NY; Orlando, FL; Baltimore, MD; Middletown, CT; and San Francisco, CA.

We have an excellent history of inspection, engineering and design experience working for both public and private entities. McLaren is currently providing or has recently provided structural engineering services for clients such as the Port Authority of New York and New Jersey, New York City Department of Transportation, New York City Economic Development Corporation, New York City Department of Corrections, New York State Department of Transportation, the Baltimore Center for the Performing Arts, Olympia & York, Carnival Cruise Corporation, U.S. Gypsum, Roseland Contractors, LLC., R&D Development, Turner Construction, Consolidated Edison Company, PSE&G, and the U.S. Navy.

The Site/Civil Division provides complete design and construction management services for all types public and private of civil and site development projects. Including drainage, grading, infrastructure, geotechnical services, utilities design, erosion control, stormwater management and zoning and entitlement permitting and assistance for large-scale public and private infrastructure, mixed-use developments, parks, and waterfront facilities. We have specific in-depth expertise in large site development projects and public transportation and infrastructure facilities.

Our recent experience with similar large-scale entertainment and gaming facilities include: Philly Live! which contains which approximately 57,000 s.f. of entertainment/ retail space where McLaren provided site/civil engineering and geotechnical engineering services including the subsurface investigation and report and development of ground modification specification; and Maryland Live! gaming facility that includes the 2 million square foot structure and parking for 4,300 cars on the six-level structure.

Other large-scale site development and infrastructure experience includes: the Club at Briarcliff Manor Senior Housing will be a 385 unit continuing care retirement community with on a 59 acre campus; the General Electric Training Center in Ossining, NY, which includes a new residential building, maintenance building, classroom addition, and renovations on the 52 acre campus; the Port Imperial development which consists of 6,500

residential units and approximately 2 million square feet of commercial space, including office, retail and a full service hotel: the Central Nyack Drainage Improvement Project for the Town of Clarkstown which is a $11 million dollar infrastructure project including street and streetscape improvements, drainage improvements and a 30-acre regional dam and detention basin; and the Village of Briarcliff Water Infrastructure projects which includes a water pump station to replace an existing elevated tank, water and sewer infrastructure and a comfort station at a Village Park

3.0 SCOPE OF REPORT

This Report has been prepared to provide the Preliminary Stormwater Report for the Live! New York Hotel & Casino (the Project) that is located in the Village of South blooming Grove, Orange County, New York. This Report addresses the requirements set forth in the New York State Department of Environmental Protection's (NYSDEC) Pollution Discharge Elimination System (SPDES) for Discharges for Construction Activities, General Permit GP0-10-0001 (General Permit), and the Village of South Blooming Grove Code, Chapter 158, Stormwater Management.

4.0 RESPONSIBILITIES OF THE CONFOMNACE WITH THE GENERAL PERMIT

It is the responsibility of the Owner/operator, General Contractor, and Subcontractors to comply with the General Permit and the measures set forth in the Storm Water Pollution Prevention Plan (SWPPP) prepared for the project and approved by the local municipality and to implement pollutant control measures, which retain surface water quality and prevent sediment-laden runoff from entering rivers, streams, estuaries, wetlands and other sensitive environments. The responsibilities of the owner's engineer, owner/operator, and the contractors and subcontractors are outlined, but are not exclusively detailed within this section.

5.0 METHODOLOGY

5.1 Stormwater Management

The Stormwater Management (SWM) Plan has been designed in accordance with Appendix D of the General Permit and the following publications:

- "Urban Hydrology for Small Watershed" (Technical Release No. 55), published by the United States Department of Agriculture, Soil Conservation Service, dated June 1986.
- New York State Stormwater Management Design Manual, June 2010.

5.2 Rainfall Data

Rainfall data utilized in the analysis was obtained in Exhibit 10.1 in the New York State Department of Environmental Conservation publication entitled, "New York State Stormwater Management Design Manual", October 2001. The data used specific to the Project site and various 24-hour storm events are presented in Table 1 below.

Table 1
Rainfall Data

24-Hour Storm Event	Type III, 24-Hour Rainfall (inches)
Water Quality, Rainfall	1.3
2-Year	3.5
10-Year	5.0
25-Year	6.0
100-Year	7.5

5.3 Water Quality

The Water Quality (WQ) management measures and designs are in accordance with Part III.D.1 of the General Permit. The objective of a WQ management system is to meet the pollutant removal goals by capturing and treating 90% of the average annual stormwater runoff volume (WQ_v). Providing the WQ_v requirements with installation of acceptable Stormwater Management Practices (SMP) listed in the NYSDEC Design Manual, the project will, by default, meet water quality objectives. The SMP for water quality treatment are designed to capture and teat the full water quality volume (WQ_v), provide 80% TSS removal and 40% TP removal, have longevity in operation and must incorporate a pretreatment mechanism.

5.4 Channel Protection Volume

Stream Channel Protection Volume Requirements (Cpv) are in accordance with Section 4.3 of the NYSDEC Design Manual and are designed to protect stream channels from erosion through the extended detention of the one (1)-year, 24-hour storm event.

5.5 Overbank Protection

The primary purpose of the overbank flood control is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development. In accordance with Section 4.3 of the NYSDEC Design Manual, overbank control requires storage to attenuate the post development 10-year, 24-hour peak discharge rate (Qp) to predevelopment rates.

5.6 Extreme Storm

The Extreme Flood Control criteria is to prevent the increased risk of flood damage from large storm events, maintain boundaries of the pre-development 100-year floodplain and protect the integrity of stormwater management practices, Section 4.5 of the NYSDEC Design Manual requires storage to attenuate the post development 100-year, 24-hour peak discharge rate (Qr) to predevelopment rates.

6.0 Green Infrastructure Practices

6.1 Planning Practices for Preservation of Natural Features and Conservation Design

The following practices have been implemented to avoid or minimize land disturbance by preserving natural areas. The conservation design includes laying out the elements of the project in such a way that the site design takes advantage of a site's natural features, preserves the more sensitive areas and identifies any site and opportunities to prevent or reduce negative effects of development. The techniques covered include in the project include the following:

6.1.1 Conservation of Natural Areas

1. Preservation of Undisturbed Areas – Minimize impact to undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain. The project will maintain the nature wooded area in the western portions of the site and minimize impact to the floodplain and wetland areas.
2. Reduction of Clearing and Grading - Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.
3. Locating Development in Less Sensitive Areas - Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, mature forests and critical habitats by locating development to fit the terrain in areas that will create the least impact.
4. Soil Restoration - Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of post construction practices

6.1.2 Reduction of Impervious Cover

1. Roadway Reduction - Minimize roadway widths to reduce site impervious area.
2. Building Footprint Reduction - Reduce the impervious footprint of buildings by using taller buildings. The hotel is provided on multiple floors to reduce the building footprint.
3. Parking Reduction - Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, and using multi-storied parking decks.

6.1.3 Runoff Reduction Techniques

The following is a listing of the runoff reduction practices with an assessment of applicability to the proposed project:

1. Conservation of natural areas -Retain the pre-development hydrologic and water quality characteristics of undisturbed natural areas, stream and wetland buffers.
2. Tree planting / tree box - Plant or conserve trees to reduce stormwater runoff, increase nutrient uptake, and provide bank stabilization. Trees will be used for applications such as landscaping, stormwater management practice areas, conservation areas and erosion and sediment control.

7.0 IMPACT ANALYSIS

7.1 Existing Conditions

An investigation of the existing site and surrounding area was undertaken to allow an understanding of the surface runoff patterns on, and adjacent to the project site. Following a review of existing topography and site conditions.

The Design Point was identified for the project at the northern property line, where Slattery Creek exits the site. This point represents the location where the majority of runoff from the drainage area exits the site. The same design points are identified in post-development conditions so that a comparison can be made between the pre- and post-development conditions.

The existing peak discharge rate from the area to be developed, east of the Creek was determined and is shown in Table 2.

Table 2
Existing Peak Stormwater Discharge Rate

Location	Design Year Storm (CFS)			
	2-Year	10-Year	25-Year	100-Year
Flow from Project Development area	19.0	36.5	57.9	69.5

7.2 Proposed Conditions

7.2.1 Proposed Condition Stormwater Runoff

Based on the building program for the Project, an analysis of the proposed runoff conditions was performed to determine the impact of the stormwater runoff from the project site and to determine the measures required to meet the General Permit and Village of South Blooming Grove. The project will include the construction of approximately 40.2 acres of additional impervious area, including roads, parking and building structures

The proposed peak discharge rate from the area to be developed, east of the Creek was determined and is shown in Table 3.

Table 3
Existing Peak Stormwater Discharge Rate

Location	Design Year Storm (CFS)			
	2-Year	10-Year	25-Year	100-Year
Flow from Project Development area	81.8	155.6	261.3	288.4

7.2.2 Water Quality

To obtain General Permit coverage typically requires conformance with the technical standards for storm water quantity and quality controls presented in the NYSDEC Design Manual. The project will require approximately 4.7 acre-feet of water quality volume that will be incorporated in the following water quality measures.

Stormwater Ponds

Stormwater ponds are practices that have either a permanent pool of water, or a combination of a permanent pool and extended detentions, and some elements of a shallow marsh equivalent to the entire WQv.

Infiltration

Infiltration will be provided for underground detention facilities. The sand/gravel conditions of the property will provide a good means of infiltration and ground water recharge. All stormwater ponds are practices that have either a permanent pool of water, or a combination of a permanent pool and extended detentions, and some elements of a shallow marsh equivalent to the entire WQv.

Dry Swales

Dry swales will be incorporated into the storm water management system design along the perimeter of the project. The dry swales captures and treats the runoff directly from the building roof leaders and paved surface.

Hydrodynamic Systems

Hydrodynamic systems such as gravity and vortex separators are devices that move water in a circular, centrifugal manner to accelerate the separation and deposition of primary sediment from the water. These measures shall include, but not be limited to, "proprietary" oil/grit separators/hydrodynamic chambers such as devices manufactured by Stormceptor® or Vortechs® systems. These devices contain both the isolation/diversion

mechanism and a treatment chamber for capturing and treating the water quality flow. These devices can be installed in line with the storm drainage system and contain a bypass for flows in excess of the water quality flow. These devices meet the goal of the DEC criteria to provide at least 80% removal of total suspended sediment (TSS) from the first flush post-construction runoff**.**

Catch Basins
All catch basins and drain inlets will be provided with an 18-inch sump. The catch basins will act as pretreatment devices by removing coarse grit, sand and debris. The use of sumps will extend the life and performance of the selected water quality treatment system.

7.2.3 Channel Protection Volume
Stream Channel Protection Volume (Cpv) required for the project. The proposed ponds and underground detention facilities will be designed with a low flow orifice to provide storage for the one (1)-year, 24-hour storm event. The approximate water quality volume required is 6.6 acre feet and the Chanel Protection Volume will be provided within the detention facilities. The controlled outlet will provide an average discharge rate for the water quality volume of 3.3 cubic feet per second over a 24-hour period.

7.2.4 Overbank Protection and Extreme Flood
The Overbank Protection and Extreme Flood Control requirements are provided will be provided in the proposed detention ponds and underground stormwater management structures. The total detention volume required will be approximately 11.5 acre feet. This includes the volume required for Channel Protection Volume.

7.3 Storm Drainage System
Storm water runoff from the site will be directed to the proposed pond within the onsite storm drainage systems. The storm drainage system were designed using the rational method and are sized for a 25-yr. design storm.

8.0 EROSION AND SEDIMENT CONTROL

8.1 Erosion and Sediment Control Measures
During construction of the Project, the potential for soil erosion and sedimentation will be controlled through the use of temporary soil erosion and sediment control measures. These measures will be designed and installed in accordance with *New York Guidelines for Urban Erosion and Sediment Control* dated October 2005, and [local code if applicable]. The soil erosion and sediment control plan will minimize the downstream erosion by controlling runoff at its source, minimizing runoff from disturbed areas and de-concentrating storm water runoff. Temporary and permanent stabilization methods will be implemented before construction begins and will be continuously modified throughout the project to provide the best methods for stormwater management and pollution prevention.

Phasing of activities shall be as follows:

Pre-Construction Activities

- Identify all natural resources and mark and protect them as necessary i.e. trees, vegetation.
- Identify on-site and downstream surface water bodies and install controls to protect them from sedimentation.
- Establish temporary stone construction entrance pads to capture mud and debris from the tires of construction vehicles.
- Install perimeter sediment controls such as silt fence as shown on the project plans.
- All earth disturbances during this phase should be limited to work necessary to install erosion and sedimentation controls.

During Construction Activities

- Install runoff and drainage controls as shown on the project plans and as necessary. These controls should reduce run-off flow rates and velocities as well as divert off site and clean run-off.
- Stabilize the conveyance system (i.e. ditches, swales, berms etc.) by seeding, mulching, installing rock check dams.
- Stabilize all stormwater runoff outlets as shown on the project plans and as necessary.
- Stabilization measures should be initiated as soon as practical in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days. Where activities will resume within 21 days in that portion of the site, measures need not be initiated.
- Limit soil disturbance and exposure of bare earth to a minimum.
- All topsoil stockpiles should be staged in an area away from surface waters and storm drains and should be protected and stabilized.
- Construction vehicles shall enter and exit the site at the stabilized construction entrance. The construction entrances will be maintained during the life of the construction and repaired and/or cleaned periodically to ensure proper function.
- Water trucks will be used as needed during construction to reduce dust generated on the site. The contractor will provide dust control in compliance with applicable local and state dust control regulations.
- At any location where surface run-off from disturbed or graded areas may flow off-site, sedimentation control measures must be installed to prevent sedimentation from being transported.
- Regular inspections and maintenance should be performed as described in the following section.

Post-Construction Activities

- Identify the permanent structural or non-structural practices that will remain on the site.

- Provide an Operation & Maintenance (O&M) manual to the Owner who is expected to conduct the necessary O&M over the life of the structures.

8.2 Implementing the SWPPP

The General Permit requires that site assessment and inspections for all construction activities in excess of one (1) acre. The site assessment and inspections insure the implementation of the SWPPP to retain surface water quality and prevent sediment laden runoff from entering rivers, streams, estuaries, wetlands and other sensitive environments.

The site assessment and inspections required for this project will include the following:

1. The operator shall have a "qualified inspector" conduct site inspections in conformance with the requirements of the General Permit "Qualified inspector" means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed Landscape Architect, or other Department endorsed individual(s).
2. Following the commencement of construction, site inspections shall be conducted by the qualified inspector as follows:
   a. Where soil disturbance activities are on going, conduct a site inspection at least once every seven (7) calendar days.
   b. Where the project has received authorization to disturb greater than five (5) acres of soil at any one time, conduct at least two (2) site inspections every seven (7) calendar days, separated by a minimum of two (2) full calendar days.
3. The qualified inspector shall prepare an inspection report subsequent to each and every inspection.

8.3 Best Management Practices

Throughout construction, care shall be taken to ensure sediment does not enter surface water bodies and chemicals do not enter stormwater, potentially contaminating surface and groundwater supplies. The following Best Management Practices (BMP) shall be observed to maintain responsible environmental practices on the construction site.

Good Housekeeping

Good housekeeping is essential to reducing the risk of contaminating runoff waters during every stage of construction. The General Contractor shall ensure supervisors train each employee in good housekeeping practices as they pertain to the implementation of this SWPPP.

Immediately following mobilization, the General Contractor shall take an inventory of all equipment and containers containing hazardous or toxic materials and submit this inventory to the Owner to keep on-site with this Stormwater Pollution Prevention Plan. This inventory shall be updated regularly to reflect changes in the quantity or type of

hazardous and toxic materials stored on site. In the event of a spill, the Spill Response Team can refer to the inventory if the contents of the spill are unknown.

All equipment shall be operational while it is stored on site. Inspections shall be conducted regularly to ensure all equipment is free of leaks and that oil and grease are not in contact with soils or stormwater. Portable equipment such as chain saws, drills as well as hand tools must be placed within a trailer or under cover at the end of each work day.

A storage area shall be designated on-site where all hazardous or toxic materials are stored. Each employee shall return the materials to the designated storage area following use. Chemicals, including oil, grease, solvents and detergents shall be stored on-site in approved containers only. Used chemicals shall be disposed of in refuse containers and removed periodically. Containers shall be regularly inspected to ensure the integrity of the container and seals to prevent leaks.

Paints and Solvents

During construction, temporary structures such as construction trailers may be moved on site to store items such as paints, solvents and gasoline pertinent to the continuation of construction activities. The intention of these structures is to shelter such items and reduce the potential of entering the stormwater runoff due to construction activities. After use, solvents shall be disposed of in approved containers and removed from site at scheduled intervals.

Fuels

Fuel for construction equipment shall either be obtained from a licensed distributor of petroleum products or from an approved above ground storage tank on site. Fuel from construction vehicles may come into contact with stormwater when vehicles are stored outside. Good housekeeping and preventative maintenance procedures shall be implemented to ensure fuel spills and leaks are minimized during refueling and storage.

Temporary Facilities

Temporary sanitary facilities may be located on site for construction workers. This facility shall be located in an accessible and visible location. A waste management company may be contracted to arrive on site and provide the routine pumping and sanitization of the facility.

Solid Waste

No solid materials are allowed to be discharged from the site with stormwater. All solid waste shall be collected and placed in containers. The containers will be emptied periodically by a contract trash disposal service and hauled away from the site.

9.0 LOCAL AND REGIONAL IMPACTS

The proposed project will provide stormwater management facilities to mitigate the increase stormwater runoff from the project site. With the construction of these facilities, no local or regional impacts are anticipated with respect to water facilities. Connection to the Village water system will provide back-up water for the existing water district and provide benefit to the Village Water district.

10.0 CONCLUSION

The proposed stormwater management system will reduce and/or eliminate the impacts of the proposed development by controlling and treating stormwater through the use of drainage ditches and channels, storm sewer piping, and a stormwater management and water quality facilities. The stormwater management system will function adequately and will not adversely effect adjacent or downstream properties.

Respectfully submitted by,

The Office of
McLaren Engineering Group
M.G. McLAREN, P.C.

Steven L. Grogg, P.E.
Vice President– Site/Civil Division

SLG/rjk

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APPENDIX A
CALCULATIONS

WinTR-55 Current Data Description

--- Identification Data ---

User: BKelly
Project: 140346
SubTitle: Live! Hotel and Casino
State: New York
County: Orange
Filename: P:\Proj140\140346\8_Technical\Calculations\Current\Sormwater RFA\Existing Conditions.w55

Date: 6/18/2014
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Existing C		Outlet	72.8	50	.779

Total area: 72.80 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.5	4.5	5.0	6.0	7.0	7.5	2.9

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type III
Dimensionless Unit Hydrograph: <standard>

BKelly

140346
Live! Hotel and Casino
Orange County, New York

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 10-Yr (cfs)	25-Yr (cfs)	50-Yr (cfs)	100-Yr (cfs)	1-Yr (cfs)
SUBAREAS					
Existing C	18.96	36.53	57.85	69.49	0.72
REACHES					
OUTLET	18.96	36.53	57.85	69.49	0.72

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140346
Live! Hotel and Casino
Orange County, New York

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Existing C	72.80	0.779	50	Outlet	

Total Area: 72.80 (ac)

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140346
Live! Hotel and Casino
Orange County, New York

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Existing C							
SHEET	100	0.0300	0.400				0.291
SHALLOW	300	0.0133	0.050				0.045
CHANNEL	629	0.0031	0.030	2.00	4.00	1.747	0.100
CHANNEL	2803	0.0010	0.045	104.50	32.71	2.270	0.343
					Time of Concentration		.779

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Live! Hotel and Casino
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Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Existing C	Paved; curbs and storm sewers		A	.88	98
	Paved; curbs and storm sewers		C	.1	98
	Paved; curbs and storm sewers		D	.26	98
	Dirt (w/ right-of-way)		A	2.5	72
	Dirt (w/ right-of-way)		C	.12	87
	Pasture, grassland or range	(fair)	A	.69	49
	Pasture, grassland or range	(fair)	C	5.29	79
	Pasture, grassland or range	(fair)	D	.25	84
	Meadow -cont. grass (non grazed)		A	9.74	30
	Meadow -cont. grass (non grazed)		C	.32	71
	Woods	(fair)	A	35.29	36
	Woods	(fair)	C	11.8	73
	Woods	(fair)	D	5.56	79
	Total Area / Weighted Curve Number			72.8	50

WinTR-55 Current Data Description

--- Identification Data ---

User: SZaskey
Project: Live! Hotel & Casino
SubTitle: Proposed Conditions
State: New York
County: Orange
Filename: P:\Proj140\140346\8_Technical\Calculations\Current\Sormwater RFA\Proposed Conditions.w55

Date: 6/18/2014
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Proposed C		Outlet	72.8	76	.275

Total area: 72.80 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.5	4.5	5.0	6.0	7.0	7.5	2.9

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type III
Dimensionless Unit Hydrograph: <standard>

SZaskey

Live! Hotel & Casino
Proposed Conditions
Orange County, New York

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)	10-Yr (cfs)	25-Yr (cfs)	50-Yr (cfs)	100-Yr (cfs)	1-Yr (cfs)
SUBAREAS						
Proposed C	81.84	155.63	207.83	261.32	288.38	55.30
REACHES						
OUTLET	81.84	155.63	207.83	261.32	288.38	55.30

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Live! Hotel & Casino
Proposed Conditions
Orange County, New York

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Proposed C	72.80	0.275	76	Outlet	

Total Area: 72.80 (ac)

Live! Hotel & Casino
Proposed Conditions
Orange County, New York

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Proposed C							
SHEET	100	0.0200	0.011				0.019
SHALLOW	195	0.0200	0.025				0.019
CHANNEL	2803	0.0100	0.045	19.50	16.71	3.673	0.212
CHANNEL	1200	0.0300	0.012	3.14	6.28	13.333	0.025
					Time of Concentration		.275

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Live! Hotel & Casino
Proposed Conditions
Orange County, New York

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Proposed C	Open space; grass cover > 75%	(good)	A	4.83	39
	Open space; grass cover > 75%	(good)	C	2.41	74
	Open space; grass cover > 75%	(good)	D	.37	80
	Paved parking lots, roofs, driveways		A	40.22	98
	Meadow -cont. grass (non grazed)		D	.78	78
	Woods	(fair)	A	16.51	36
	Woods	(fair)	C	5.44	73
	Woods	(fair)	D	2.24	79
	Total Area / Weighted Curve Number			72.8	76

McLaren ENGINEERING GROUP

JOB:	Live! Hotel & Casino		
JOB #:	140436		
CLIENT:	Cordish		
CALC BY:	SAZ	DATE:	6/16/2014
CHK BY:	SLG	DATE:	6/16/2014

WATER QUALITY VOLUME CALCULATIONS

WATER QUALITY FOR REDEVELOPMENT AREAS
NYSDEC DESIGN MANUAL CHAPTER 9
TREATMENT: NYDEC DESIGN MANUAL STANDARD PRACTICES
AREA: P 4

EXISTING IMPERVIOUS COVERAGE

C_{EX} = 1.25 ac

PROPOSED IMPERVIOUS COVERAGE

C_P = 40.22 ac

ADDITIONAL IMPERVIOUS COVERAGE

$C_P - C_{EX}$ = $I_{P\text{-}EX}$

$C_{P\text{-}EX}$ = 38.97 ac

DRAINAGE AREA

A = 72.80 ac

EXISTING IMPERVIOUS COVERAGE

$$I_{EX} = \text{Impervious Cover} = \frac{C_{EX}}{A} * 100$$

$$I_{EX} = \text{Impervious Cover} = \frac{1.25}{72.80} * 100 = 1.72\ \%$$

ADDITIONAL IMPERVIOUS COVERAGE

$$I_{P\text{-}EX} = \text{Impervious Cover} = \frac{C_{P\text{-}EX}}{A} * 100$$

$$I_{P\text{-}EX} = \text{Impervious Cover} = \frac{38.97}{72.80} * 100 = 53.53\ \%$$

$R_{V\text{-}EX}$ = 0.05 + (0.009 * I_{EX})

$R_{V\text{-}EX}$ = 0.05 + (0.009 * 1.72)

$R_{V\text{-}EX}$ = 0.07

$R_{V\ P\text{-}EX}$ = 0.05 + (0.009 * $I_{P\text{-}EX}$)

$R_{V\ P\text{-}EX}$ = 0.05 + (0.009 * 53.53)

$R_{V\ P\text{-}EX}$ = 0.53

P = 1.3 in. (1-yr storm)

WQ_V CALCULATIONS BASED ON ASSUMPTION THAT SITE IMPLEMENTATION OF NYSDEC DESIGN MANUAL STANDARD TREATMENT PRACTICES

$$WQ_V = 1.00 * \frac{1.3 * R_{V\text{-}EX} * 72.80}{12} +$$

$$1.00 * \frac{1.3 * R_{V\ P\text{-}EX} * 72.80}{12}$$

$$WQ_V = 1.00 * \frac{1.3 * 0.07 * 72.80}{12} +$$

$$1.00 * \frac{1.3 * 0.53 * 72.80}{12}$$

WQ_V = 4.7 ac-ft

WQ_V = 205,173 ft³

JOB:	Live! New York		
JOB #:	140346		
CLIENT:	Cordish		
CALC BY:	bmk	**DATE:**	18-Jun
CHK BY:	slg	**DATE:**	19-Jun

Channel Protection Volume (Cpv)
Overall Development Area

q_u

P =	2.9 in.	(1-yr storm)
Area =	72.80 acres	(P-F2)
CN =	76	
Ia =	0.632	
Ia/P =	0.22	
T_C =	0.275 hrs	

Using Figure 4-III, TR-55 and T_C, determine q_u (csm/in)

q_u = 460 csm/in

Qo/Qi

Using Figure B-1, DEC Manual Appendix B for T = 24 hrs and q_u, determine q_o/q_i

q_o/q_i = 0.04

Vs/Vr

$Vs/Vr = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3$

Vs/Vr = 0.628

Qd

Using TR-55-Figure 2.1,or SCS TR - 16 and P, determine Qd (in of runoff)

Qd = 1.72 in

Cpv

Cpv = Vs = (Vs/Vr) * Qd * A/12

Cp_v = 6.6 ac-ft

Cpv = **285,617 ft³**

Avg Discharge = 3.3 CFS over 24-hours

Reference: NYDEC Stormwater Management Design Manual, August 2003

Exhibit 4-III Unit peal discharge (q_u) for NRCS (SCS) type III rainfall distribution

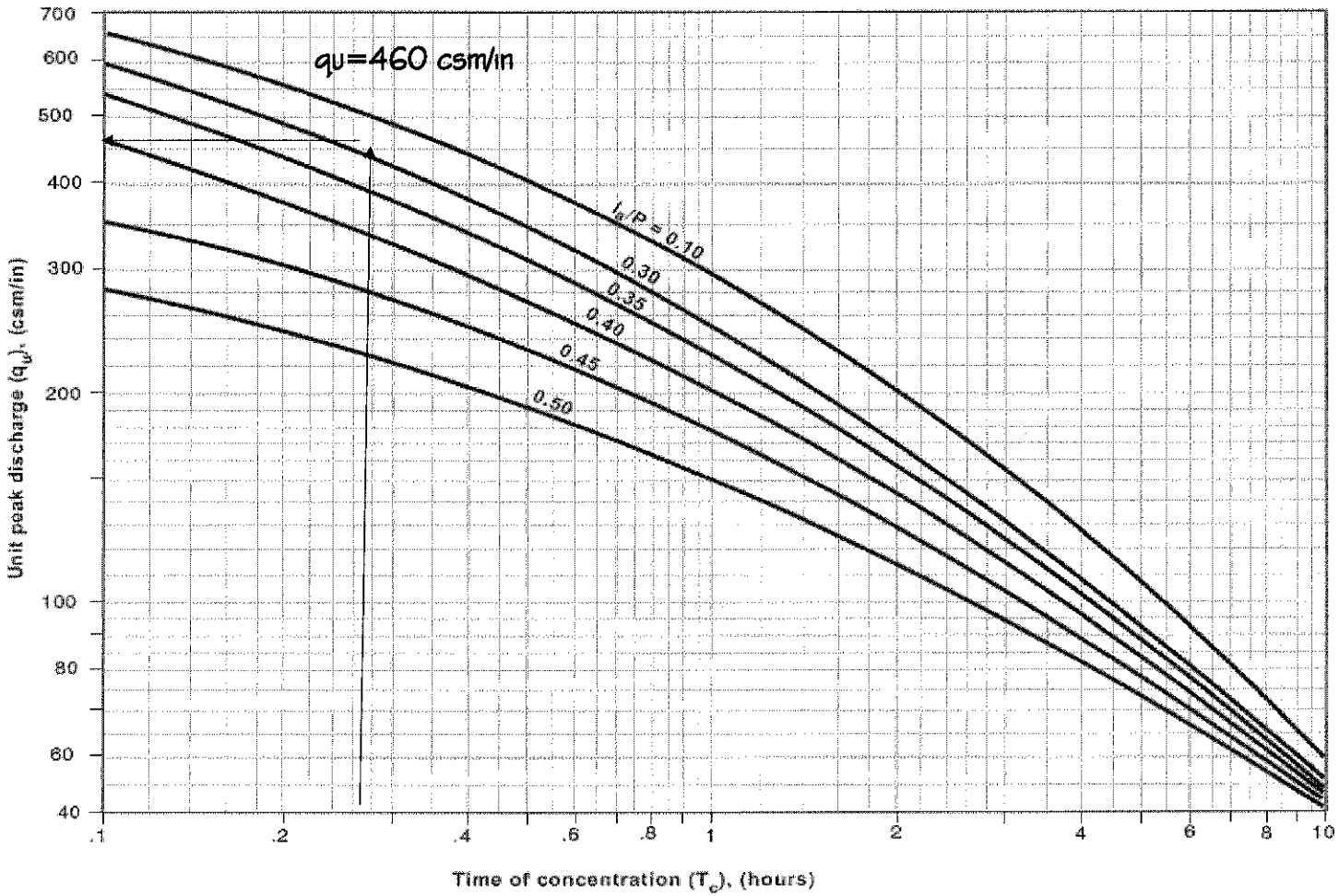


Figure 8.5 Detention Time vs. Discharge Ratios (Source: MDE, 2000)

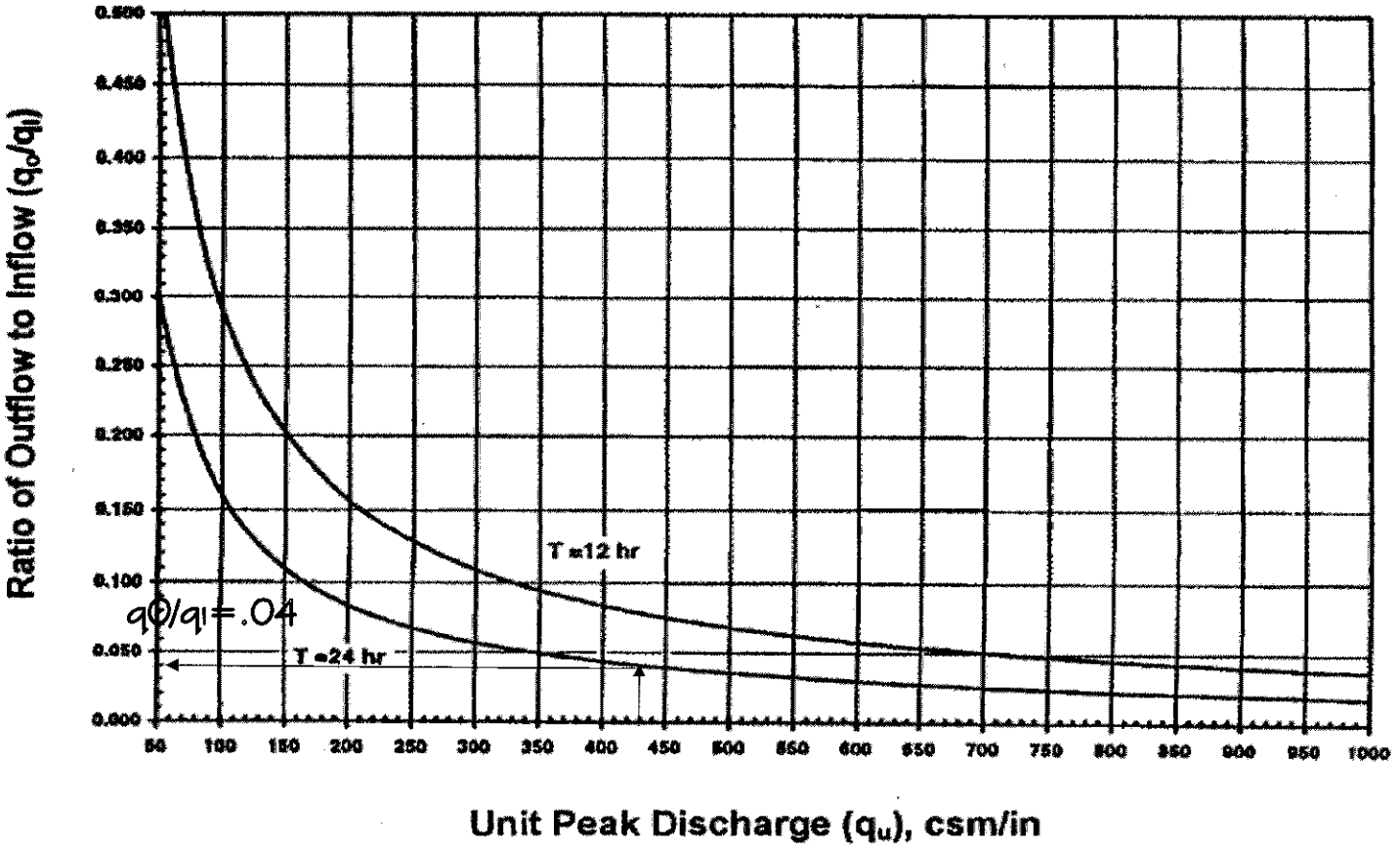
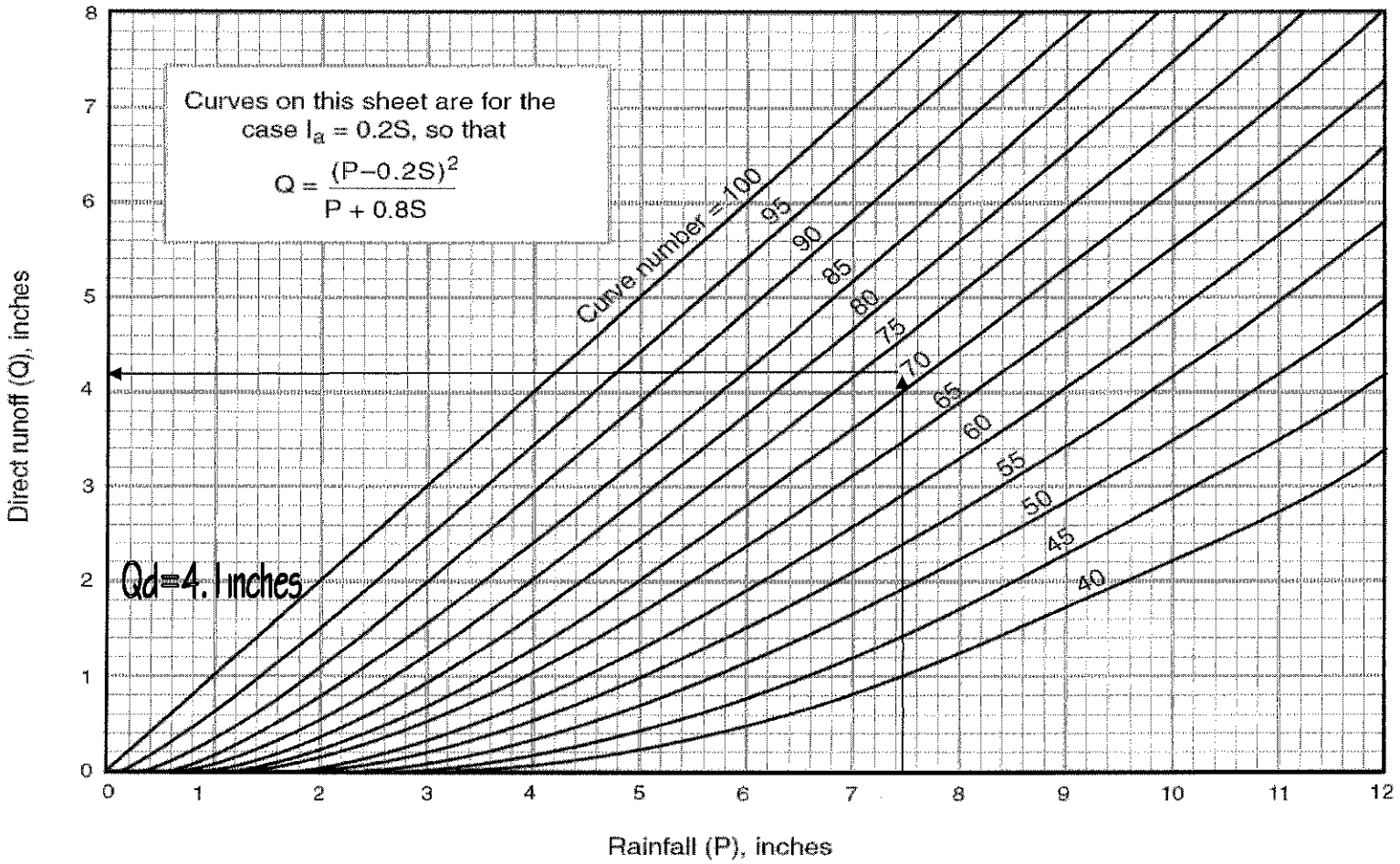


Figure 2-1 Solution of runoff equation.



JOB:	Live! New York		
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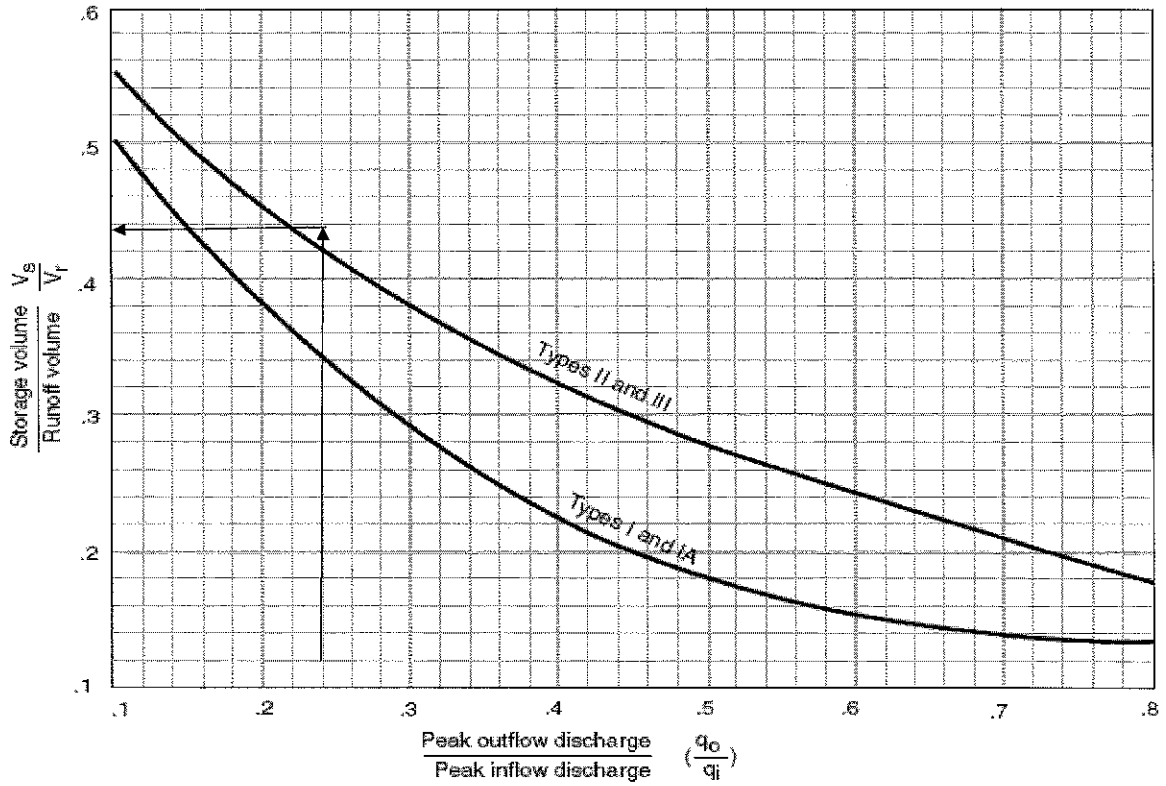
100-Year Detention Volume
Type III Storm

Figure 6-1 Approximate detention basin routing for rainfall types I, IA, II, and III



100-year

Peak Outflow Discharge (Existing)		69.5 cfs
Peak Inflow Discharge (Proposed)		288.4 cfs

Qo/Qi	=	0.24
Vs/Vr	=	0.42

Runoff Volume (Prop) = 4.5 inch
Table 2-1 TR 55

Approx Storae Volume = 0.42 * (4.5/12) * 72.8
11.5 ac feet