

Metro Green Garage

Green Design Elements

September 19, 2013

Joseph Canas, PE, LEED AP, CFM

jacanas@tighebond.com



Jonathan Rose Companies

MALKIN
PROPERTIES

Tighe&Bond

About Metro Green

- **Development by Malkin Properties and Jonathan Rose Companies**
- **Adjacent to the Stamford Transportation Center**
- **232 residential units in three buildings**
- **325,000 square foot office tower**
- **Residential parking garage**
- **Multiple green infrastructure strategies**



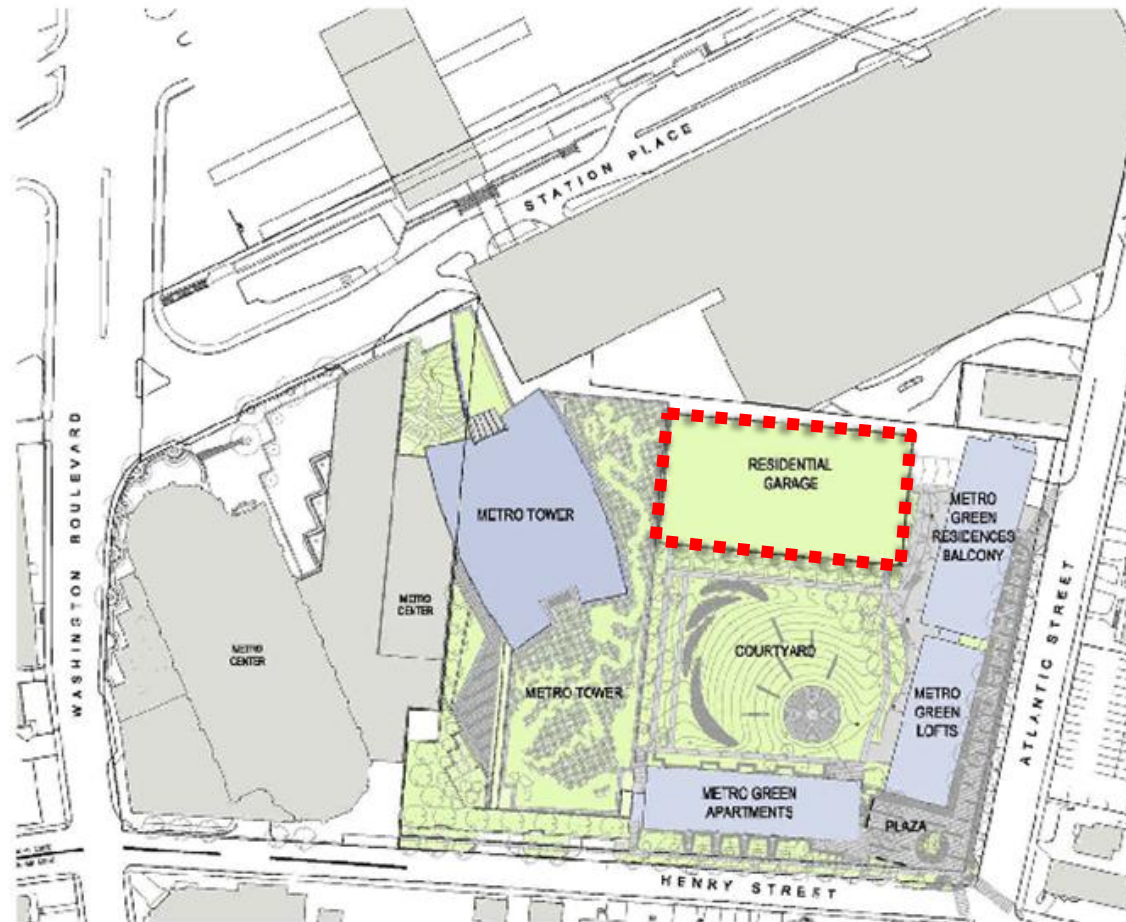
Jonathan Rose Companies

MALKIN
PROPERTIES

Tighe&Bond

Metro Green

METRO GREEN: SITE PLAN



Jonathan Rose Companies

MALKIN
PROPERTIES

Tighe&Bond

Sustainable Features

1. Rainwater Harvesting

- Storm water diverted from City storm system
- Reduction of potable water demand

2. Reduction of Heat Island Effect

- Solar reflective index (SRI) of proposed design exceeds LEED requirements

3. Green Screens

- Further reduction of the heat island effect
- Green beautification

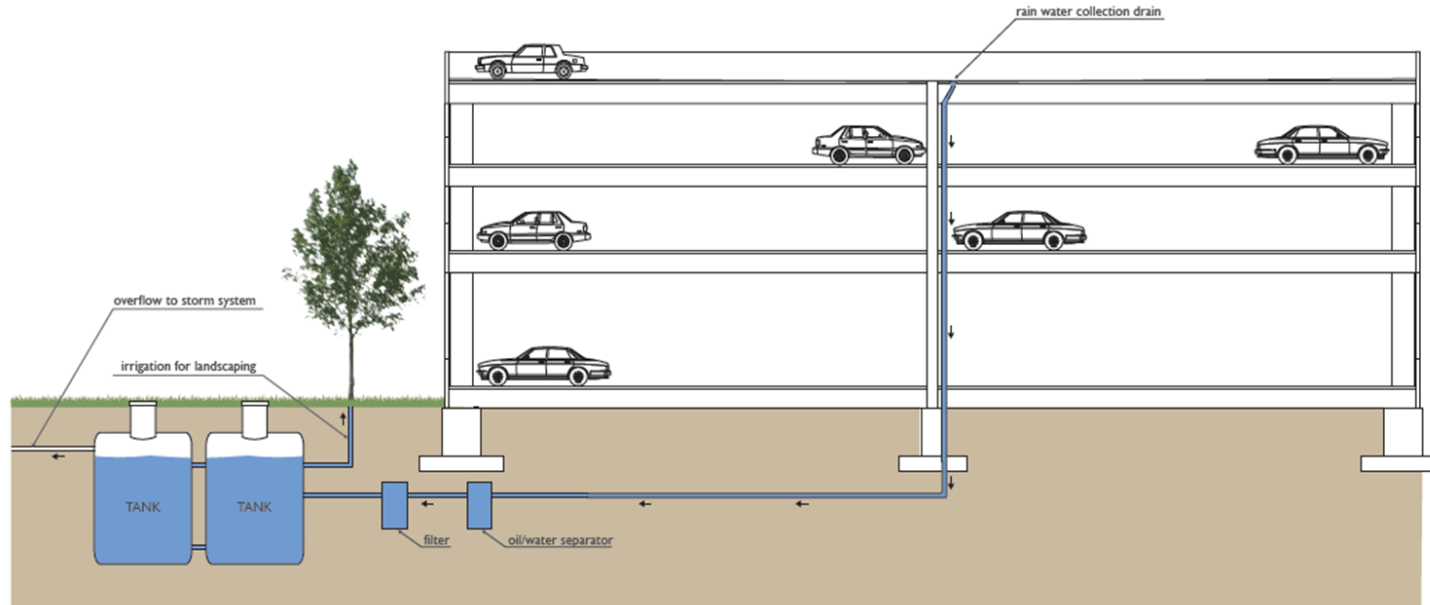
4. Controlled Rainwater Collection and Release

- Reduces peak flow rates and volumes to the City system during major storm events



Rainwater Harvesting System

- 106,000 gallon system to meet peak summer irrigation demand
- Similar system employed at two of the three apartment buildings



Jonathan Rose Companies

MALKIN
PROPERTIES

Tighe&Bond

Sizing the System

- Gathered rainfall data from 1895 to present
- Statistical analysis to determine the 10th percentile rainfall total for each month
- Obtain monthly irrigation demand from project irrigation consultant
- Develop water balance computation



Sizing the System

Tighe&Bond

Job No. 19-0040-1 Sheet 1 of 1
 Client Jonathan Rose Companies
 Subject Metro Green Garage Rainwater Harvesting Study
 Water Balance Calculations - 90% Probability Rainfall
 Prepared By JAC Date 7/7/2010 Checked By Date

90% Precipitation Probability (in)	
Month	
January	1.71
February	1.90
March	2.13
April	1.86
May	1.67
June	1.65
July	2.02
August	1.94
September	1.68
October	1.59
November	1.77
December	1.06
Yearly Totals	21.88

Total Annual Rainfall	35.52	
1.27	0.082790091	1.71
1.25	0.08148631	1.90
1.86	0.12125163	2.13
1.47	0.095827901	1.86
1.49	0.0977131682	1.67
0.89	0.0573151239	1.65
0.90	0.058670143	2.02
1.17	0.075271186	1.94
1.29	0.084938072	1.68
1.33	0.086701434	1.59
1.34	0.086834542	1.77
1.27	0.081790091	1.06
15.34		21.88

Stormwater Volume (Full Roof)				
Month	Area (sf)	Weighted C	Volume (cf)	Volume (gal)
January	29,154	0.90	3,700	28,000
February	29,154	0.90	4,600	31,000
March	29,154	0.90	4,700	35,000
April	29,154	0.90	4,100	31,000
May	29,154	0.90	3,700	28,000
June	29,154	0.90	3,600	27,000
July	29,154	0.90	4,400	33,000
August	29,154	0.90	4,200	31,000
September	29,154	0.90	3,700	28,000
October	29,154	0.90	3,500	26,000
November	29,154	0.90	3,900	29,000
December	29,154	0.90	4,300	32,000

Total Watershed Stormwater Volume (Full Roof)			
Month	W.shed 1 - Col#13 (gal)	W.shed 2 - Col#14 (gal)	Total Rainfall Coll. (gal)
January	28,000	0	28,000
February	31,000	0	31,000
March	35,000	0	35,000
April	31,000	0	31,000
May	28,000	0	28,000
June	27,000	0	27,000
July	33,000	0	33,000
August	31,000	0	31,000
September	28,000	0	28,000
October	26,000	0	26,000
November	29,000	0	29,000
December	32,000	0	32,000
Total Vol Gallons	359,000	0	359,000

Garage 100% Irrigation			
% Non-Potable	Trial (%/100)	Tank Trial (gal)	Tank Size (gal)
100	0.00	108,000	NA
90			95,400
80			84,600
70			74,200
60			63,600
50			53,000
40			42,400
30			31,800
20			21,200
10			10,600
0			0

100% Irrigation			
% Non-Potable	Trial (%/100)	Tank Trial (gal)	Tank Size (gal)
100			NA
90			0
80			0
70			0
60			0
50			0
40			0
30			0
20			0
10			0
0			0

Monthly Irrigation demand provided by Project Landscape Architect

Ir. Demand	Reduce 50%	Reduce 20%
23,139	11569.5	4627.8
43,044	21522	8608.8
57,353	28676.5	11470.8
65,500	32750	13100
55,810	27905	11182
30,466	15232	6092.1
13,099	6549.5	2619.8

Water Balance Calculation - Garage Roof											
Month	Toilet Flushing Demand (gal)	Ir. Demand (gal)	Total Demand (gal)	Cumulative No. Demand (gal)	Rainfall Collected (gal)	Cumulative Rainwater Storage (gal)	Non-Potable Demand (gal)	Total Demand (gal)	IL#1 Rainfall Collected (gal)	Void Space in Tank (gal)	Amount of Rainfall Bypassed (gal)
January	0	0	0	0	28,000	28,000	0	0	28,000	106,000	0
February	0	0	0	0	31,000	59,000	0	0	31,000	106,000	0
March	0	0	0	0	35,000	94,000	0	0	35,000	106,000	0
April	23,139	23,139	23,139	23,139	31,000	125,000	0	23,139	31,000	106,000	0
May	43,044	43,044	43,044	66,183	28,000	153,000	0	43,044	28,000	90,956	15,044
June	57,353	57,353	57,353	123,536	27,000	180,000	0	57,353	27,000	60,603	45,397
July	65,500	65,500	65,500	189,036	33,000	213,000	0	65,500	33,000	28,103	77,897
August	55,810	55,810	55,810	244,846	31,000	244,000	0	55,810	31,000	3,293	102,707
September	30,466	30,466	30,466	275,312	28,000	272,000	0	30,466	28,000	827	106,173
October	13,099	13,099	13,099	288,411	26,000	298,000	0	13,099	26,000	13,728	92,772
November	0	0	0	288,411	29,000	327,000	0	0	29,000	42,728	63,272
December	0	0	0	288,411	32,000	359,000	0	0	32,000	74,728	31,272
	288,411	288,411			359,000						138,694



Jonathan Rose Companies

MALKIN
PROPERTIES

Tighe&Bond

Rainwater Harvesting

- 290,000 gallons of runoff (56% from roof) diverted from City stormwater system for on-site re-use
- 25% more rainfall diverted than a typical 4" – 6" green roof



Potable Water Demand Reduction

- Reduction in potable water use during average year: 290,000 gallons

Area to be Irrigated by Garage Rainwater Harvesting System



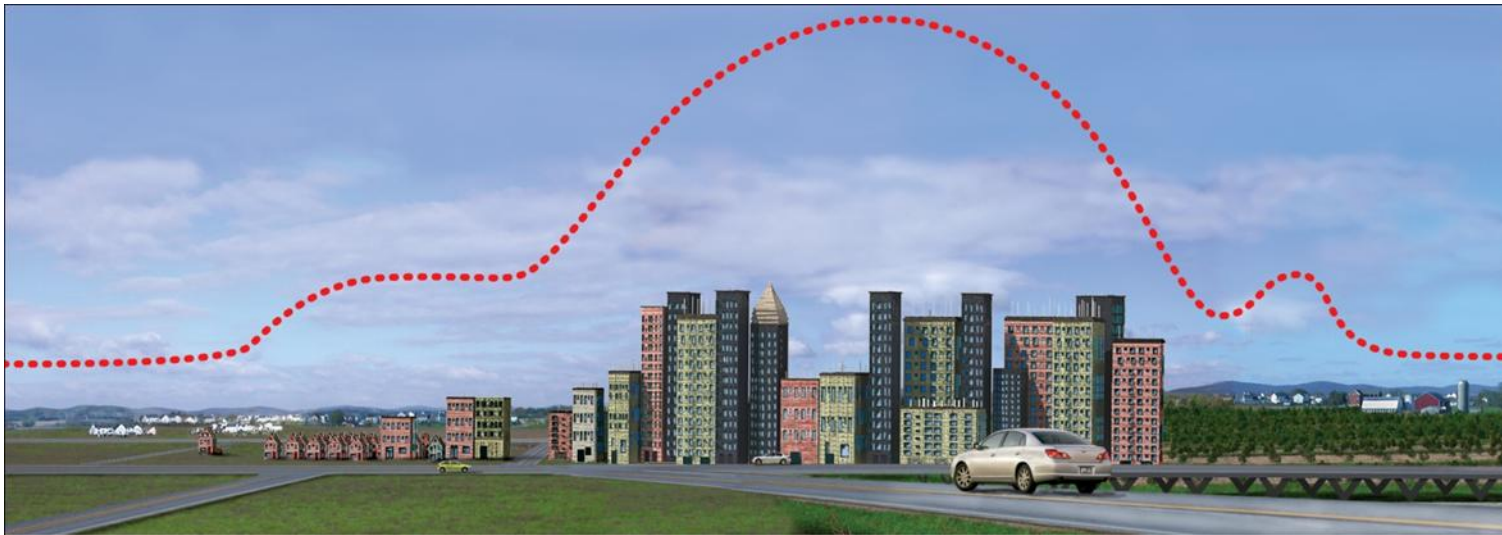
Jonathan Rose Companies

MALKIN
PROPERTIES

Tighe&Bond

Reducing the Heat Island Effect

- The concrete surface of the new parking structure will have a solar reflective index (SRI) of 35.
- USGBC LEED SSc7.1 requires a minimum of 29



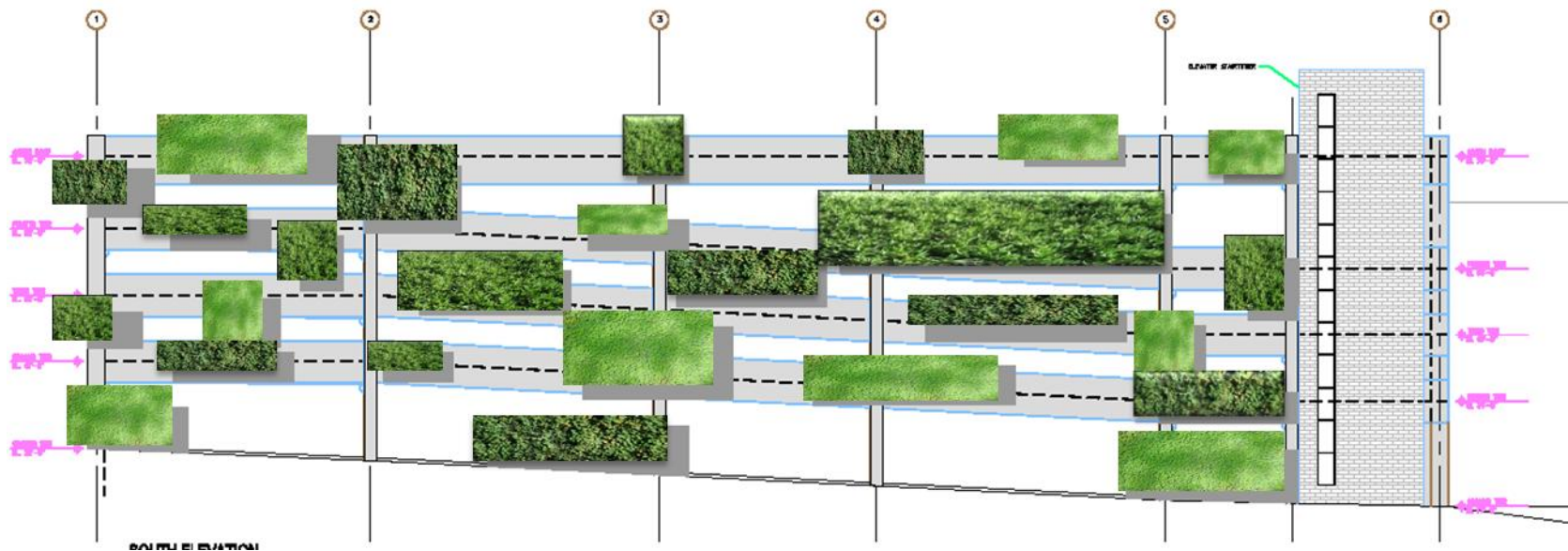
Jonathan Rose Companies

MALKIN
PROPERTIES

Tighe&Bond

Green Screens

- Green screens of live foliage
- Natural design element, further reduces heat island effect



Jonathan Rose Companies

MALKIN
PROPERTIES

Tighe&Bond

Controlled Rainwater Release

- Ability to control the flow rates and volumes to the City storm system by timing the collection and release of stored rainwater around major storm events.

Immediately after garage

Event (year)	Volume (cf)	Peak Flow (cf)
	Reduction %	Reduction %
2	100%	100%
5	100%	100%
25	100%	100%

Corner of Atlantic & Henry Streets

Event (year)	Volume (cf)	Peak Flow (cf)
	Reduction %	Reduction %
2	12%	10%
5	11%	8%
25	9%	7%



In Summary...

- Reduces strain on the City storm water system by diverting the water to be stored and used on site.
- Proposed Rainwater harvesting will divert 56% of annual storm water – 25% better than a green roof.
- Proposed Rainwater harvesting will reduce potable water demand by 290,000 gallons per year
- The proposed garage design includes light-colored concrete for reducing the heat island effect.
- Controlled collection and release of rainwater reduces volume and peak flow to the City system during major storm events.

