Green Infrastructure Enhancements at the Monroe Community College Downtown Campus

Feasibility Study

Monroe County
50 West Main Street
Rochester, NY 14614

Prepared by:

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and

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APPENDICES

1.0 EXECUTIVE SUMMARY

The proposed Monroe Community College (MCC) Downtown Campus project entails the renovation and improvement of multiple buildings within former portions of the Eastman Kodak worldwide headquarters in Rochester, NY. The project is focused wholly on the existing buildings and will create an innovative, signature campus that is a destination and resource for the local community.

The Green Infrastructure (GI) improvements detailed herein are enhancements to the MCC project, intended to significantly improve stormwater management on the former Kodak campus. These improvements are specifically the installation of vegetated roof systems over portions of the existing building complex. Monroe County and MCC envision this initiative to reduce the amount of stormwater runoff from the buildings, and to enhance the college's community with a valuable educational and aesthetic resource.

The project site is located at 321 State Street, bordered by public streets North Plymouth Avenue, Morrie Silver Way, and State Street, and private Kodak Way, in the High Falls District of Rochester, New York.

Based upon the analysis conducted for this study, vegetated roof systems are a viable option, though with limitations in storm water retention potential due to the reserve load-bearing capacities of the existing roof structures. This conclusion is also based upon required enabling work, outlined further in this study.

The project is anticipated to be completed concurrently with the main building construction project (MBCP), with design already underway, completion scheduled for March 2017, and classes starting in September 2017. The *current* total cost for the vegetated roofing, including demolition and abatement, is estimated to be $1,941,775.

2.0 PROJECT OBJECTIVES

The proposed GI improvements at the MCC Downtown Campus are intended to significantly reduce storm water runoff and pollution.

The proposed vegetated roof systems for the MCC complex will reduce storm water run off by retaining rain water in the growing medium, thereby reducing flow to roof drains, as with a typical low-slope roof application. The retained water is used to irrigate the plant material installed as part of the system. In the event that the rainfall exceeds the capacity of the growing medium to retain water, overflow will be filtered by the plant material prior to entering the roof drains. This filter reduces storm water pollution.

Additionally, beyond storm water management, this initiative will reduce urban heat island effect within the local microclimate. Dark-colored roofing and paving surfaces can produce temperatures far in excess of the ambient air temperature due to insolation and emissivity of the materials. Areas of vegetation maintain a more consistent environment via evapotranspiration, and on the roof of a building this cooling effect combined with the thermal mass of the growing medium can reduce summertime cooling load, thereby decreasing power consumption and emissions of the building plant.

3.0 EXISTING CONDITIONS

The project site, a collection of former Eastman Kodak office buildings, is located at 321 State Street in the High Falls District of Rochester, New York. The site covers approximately 2.8 acres, and has public frontage on North Plymouth Avenue, Morrie Silver Way, and State Street. The complex also borders on private Eastman Kodak property along Kodak Way.

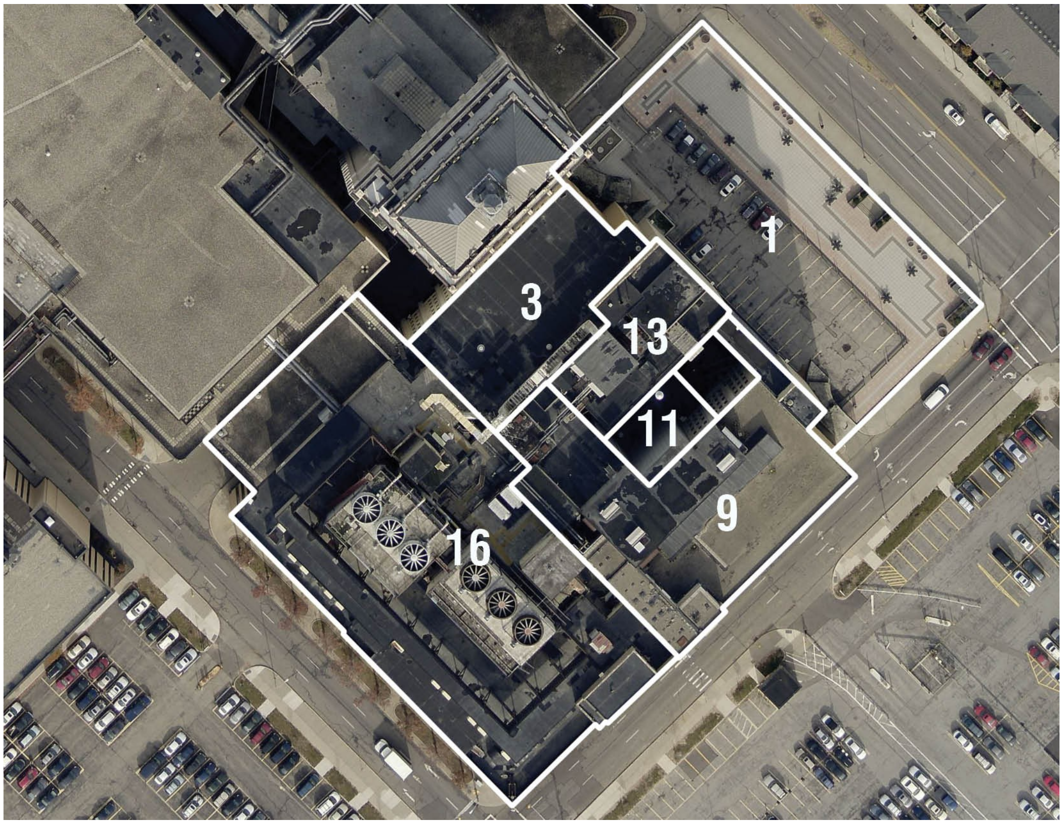


Figure 1: Arrangement of buildings in MCC Downtown Campus, formerly Eastman Kodak.

There are six buildings within the overall project site under consideration for vegetated roof systems, as referred to by the Eastman Kodak designations: Buildings 1, 3, 9, 11, 13, and 16 (see Figure 1). These are predominantly reinforced concrete construction, and range up to seven stories in height, with additional height for elevator and mechanical penthouses, and various pieces of mechanical equipment.

The building site is set over two zoning districts. Buildings 1, 3, 9, and 13 to the east are within the Center City Riverfront (CCD-R) zoning district, and Building 16 is within the Center City Cascade-Canal (CCD-C) zoning district.

The total roof area of these combined buildings is approximately 73,500 square feet. Due to the fact that the original buildings were constructed over a period of 30+ years beginning in the early 1900s, and various penthouses and equipment were constructed or modified in the intervening time, the roof comprises multiple levels, types, and conditions. For the purposes of this study, three major roof areas were considered: the main roof area of Building 3 on the northeast corner of the site; the main roof of Building 9 on the southeast corner of the site, and the upper roof of Building 16 on the southwest edge of the site (see Figure 2).

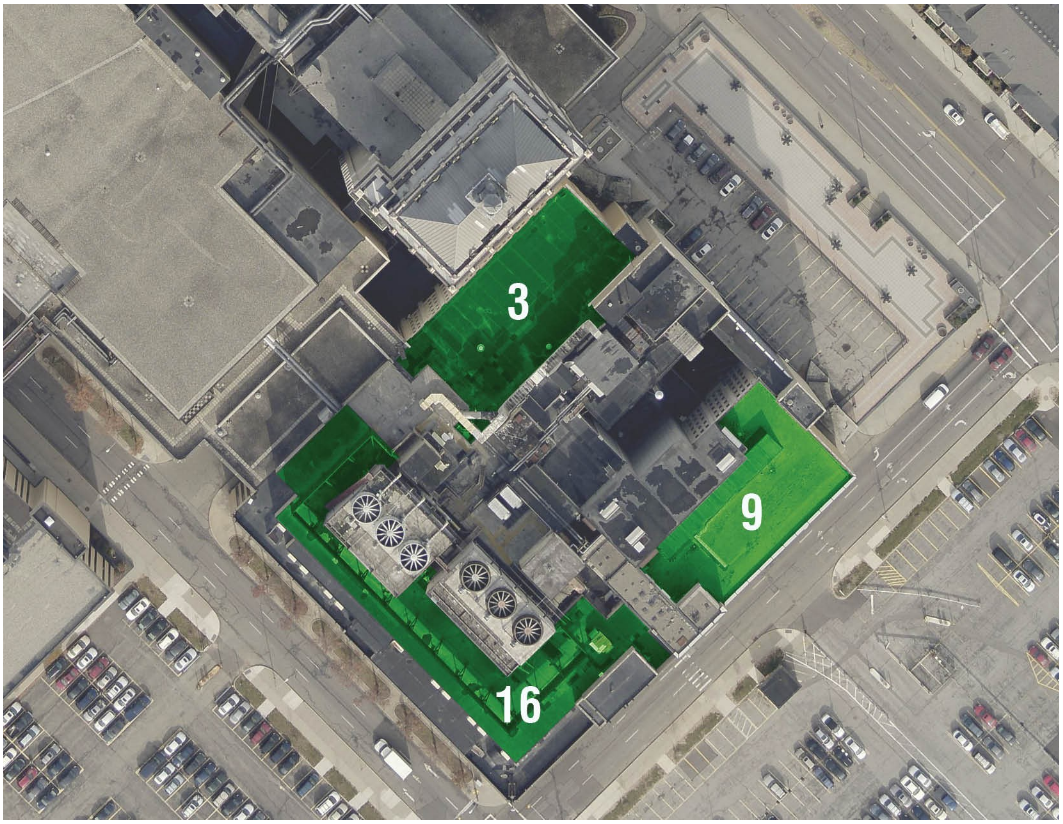


Figure 2: Location of proposed vegetated roofing systems on Buildings 3, 9, and 16.

The remaining buildings in the complex, 1, 11, and 13, were not initially chosen for various reasons. Building 1 is an underground parking garage adjacent to State Street that is still being used by Kodak employees. A portion of the roof includes a plaza facing the street, however this plaza is still in good condition and usable; it will be considered an alternative to the upper roof areas. Building 11 is comprised primarily of a boiler addition within the courtyard of the complex, and as a lower roof it is surrounded by much higher building mass and does not receive sunlight, and would not provide a suitable environment for plant life. Building 13, while fully exposed, is composed of various levels and smaller roof projections with significant mechanical equipment in place, and does not facilitate ease of installation or maintenance of a vegetated roof.

Please note that because vegetated roofs are the primary consideration of this study, existing conditions related to grade-level storm water improvement initiatives are not discussed here. This includes, for example, site topography, subsurface investigations, and storm water flowpath. In light of this, every effort has been made to maximize the value of the proposed solutions.

3.1 BUILDING 3

The main roof of Building 3 encompasses approximately 9,500 square feet on the northeast corner of the MCC Downtown Campus site. The roof is open with parapets to the northwest and northeast facing Kodak Street and State Street, respectively, and bounded by Building 13 to the southeast and Building 16 to the southwest, at various heights. A 42” high steel pipe guardrail provides fall protection on the northwest edge.

The roof is low-slope with EPDM membrane, laid in 4’x8’ sheets with welded edges, installed in the mid -1980s. The membrane was installed over roofing insulation, which in turn was laid on a cementitious topping layer. Although originally assumed to be the surface of the deck, this topping layer was actually placed over a course of pumice and slag aggregate, apparently compacted to produce the slope that's visible on the roof surface. It is not known whether this was original or added to the roof at a later date. This course was placed over the concrete roof slab.

The perimeter of the roof is comprised of EPDM flashing on the various adjacent vertical surfaces, and over the top of the parapet and pilasters on the northwest edge. The roof area is relatively open, with few penetrations and rubber walkway mats for maintenance.

On two separate occasions following moderate rain activity, the roof did not exhibit ponding or significant failure to drain.

3.2 BUILDING 9

The central roof area of Building 9 covers approximately 7,500 square feet on the southeast corner of the site. The roof area is open with parapets, on the northeast and southeast edges, and bounded by various penthouses on the remaining sides. These include an open court to the northwest, and a sawtooth skylight which was previously overbuilt with a mechanical penthouse. A steel pipe guardrail provides fall protection adjacent to the open court, but there is none provided elsewhere.

The roof is low-slope, and the pitch is achieved via insulation over the existing flat concrete deck. The roofing system appears to be EPDM overlaid with 12" square pavers. The perimeter vertical flashing appears to be EPDM, as is the membrane over the skylight. A metal coping caps the perimeter flashing at the parapet. There are few visible penetrations, and the pad for an apparently demolished penthouse, covering roughly 750 square feet. Upper roofs from the adjacent penthouses drain directly onto this roof, or indirectly via the skylight.

The pavers are in relatively poor condition, exhibiting widespread damage and disintegration. There is significant moss and sediment or ballast built up at the base of the skylight, and vegetation growing from a roof drain.

Due to proximity to access, and the panoramic view of downtown Rochester, this roof was considered a prime location for public access.

3.3 BUILDING 16

The upper roof area of Building 16 encompasses approximately 13,200 square feet on primarily the southwest edge of the site. The roof is open to the exterior for the most part, with the exception of some areas bounded by penthouses in the southeast corner. The interior of the roof is adjacent to two large cooling towers, which are both supported on steel framing over a lower portion of roofing not being considered in this study. At the northern cooling tower, the support steel bears directly onto the roof area being considered, at a structural column line. At various points along the interior edge of this roof, the cooling tower structures interface with the existing roof system.

At the exterior edges , there is no parapet and no fall protection. An aluminum equipment screen attached to steel framing is set back from the roof edge, and acts as a visual barrier to the cooling towers on four sides. The screen panels are mounted roughly 7'-0" above the roof surface and extend approximately 20'-0" vertically.

The roof is low-slope, and drainage is achieved via insulation rather than roof deck. The roofing system is EPDM, laid in sheets with the edges welded. This roofing is laid over a cover board, with foam insulation below. Over the top of the concrete deck is a cementitious topping layer on a two-ply membrane. This topping layer and membrane would not be removed as part of the vegetated roof installation.

There are minimal walkway pads located adjacent to the cooling towers for access. There are multiple mechanical penetrations, which appear to be capped, and approximately 40 penetrations at the anchors for the equipment screen. (This does not include any bearing points of the cooling towers in the field or on the edges of the roof system.) Each of these latter penetrations is individually flashed.

3.4 STRUCTURAL ANALYSIS

Building 3. Since there are no existing structural drawings for the roof of Building 3, a site visit was performed to determine the framing layout. The existing roof structure consists of a one-way concrete slab supported by concrete beams. The thickness of the roof slab could not be determined during the site visit. Additionally, due to the ceiling type, only a small area of the roof framing was able to be observed.

Due to the lack of structural record drawings, the material properties, slab thickness and reinforcing, and beam dimensions and reinforcing are unknown. Openings in the existing roofing were made on June 11, 2014 to attempt to obtain three concrete cores., Two pilot holes drilled prior to the cores revealed that the roof slab is only 2 1/2” thick, which is not a sufficient thickness for obtaining a concrete core for compressive strength testing. There were three various cementitious and loose aggregate layers above the slab that are not structural. Based on these findings, the existing roof slab will not be viable for supporting a new green roof system.

Because it is unlikely that the roof slab will meet current code requirements without structural reinforcement, the County will endeavor to provide secondary support for the roof slab in order to meet code, and in doing so provide enough reserve capacity for a vegetated roof. The cost of this reinforcement will be covered by either the local match, or the main construction project.

Building 9. Record drawings depicting the structure type were available for review. The roof structure is a 6 in. thick two-way reinforced concrete flat slab with drop panels at concrete support columns. The bay sizes are approximately 20 ft. x 20ft. Concrete and reinforcing material properties were NOT noted on the drawings, therefore, we assumed a 40,000 psi yield strength for the steel reinforcing and 3,000 psi compressive strength for the concrete, which are both typical for concrete construction circa 1919 which is the date on the record drawings. A Direct Design method analysis of the two-way roof slab was performed applying dead and snow loads. Direct Design Analysis Method and Equivalent Frame Analysis Method were calculated but the Direct Design method gave slightly higher results so this was used as the preferred method. The following are the loads applied and the results obtained for Building 9:

Dead Load:

Roofing Membrane	1 psf
Insulation	6 psf
6” concrete slab	75 psf
MEP systems	5 psf

Misc (ceiling, etc.)	3 psf

Snow Load:	31 psf (per current NYS Building Code)

Results:

With all dead loads and snow load applied	Reserve capacity of 9 psf
With all dead loads, snow load, and *30 psf green roof* applied	Max. 18.5% overstress

The results obtained show there is little reserve load capacity, therefore, this building is not considered viable for a new green roofing system.

Building 16. Record drawings depicting the structure type were available for review. The roof structure is a 6 1/4 in. thick two-way reinforced concrete flat slab with drop panels at concrete support columns. The bay sizes are approximately 20 ft. x 20ft. Concrete and reinforcing material properties were noted on the drawings with a 40,000 psi yield strength for the steel reinforcing and a 3,000 psi compressive strength for the concrete. A Direct Design method analysis of the two-way roof slab was performed applying dead and snow loads. Direct Design Analysis Method and Equivalent Frame Analysis Method were calculated but the Direct Design method gave slightly higher results so this was used as the preferred method. The following are the loads applied and the results obtained for Building 16:

Dead Load:

Roofing Membrane	1 psf
Insulation	6 psf
6 ¼" concrete slab	79 psf
MEP systems	5 psf
Misc (ceiling, etc.)	3 psf

Snow Load:	31 psf (per current NYS Building Code)

Results:

With all dead loads and snow load applied	Reserve capacity of 20 psf
With all dead loads, snow load, and *30 psf green roof* applied	Max. 12% overstress

The original one-way slab and concrete beam roof system at the Building 16 "Bridge" has a reserve capacity of 10 psf, however the eastern infill section consisting of steel bar joists spanning between steel beams has no additional reserve capacity. Two concrete cores are extracted on June 11, 2014 to verify the slab thickness and concrete compressive strength that was provided on the record drawings.

The results obtained for Building 16, excluding the bridge area, show there is sufficient reserve load capacity for a new green roofing system that is approximately 20 to 25 psf in weight.

Other Roof Slab Testing Considered

- In order to determine/verify the sizes and layout of the existing reinforcing in the roof slabs and beams, the use of Ground Penetrating Radar was considered. However, due to accessibility and timing concerns, we determined that the use of the GPR would not be feasible at this time.
- No specimen of rebar will be taken since requires a 24" long section to check its yield strength and we don't want to disturb that extent of slab at this time.

3.5 ASBESTOS INSPECTION FINDINGS

The existing roof systems on the buildings being considered were installed in the mid-1980s, based on anecdotal evidence. Because the age of the roofs and their condition, they must be removed prior to installation of a new vegetated roof system. As with any existing building assemblies of this vintage, it is prudent to take samples to test for asbestos-containing materials (ACM) for the health and safety of the construction personnel and building occupants.

As part of the larger, future construction project, LaBella Associates is conducting testing over the entire roof area (and interior, MEP systems, etc.) of the multi-building complex. The roof areas of Buildings 3, 9, and 16 were prioritized to facilitate early results for this study.

Each roof consists of a rubber roof system installed over an old built-up roof system. As such, it is not possible to observe the built-up roof to visually examine the materials used to make up this roof for purposes of determining the types of materials to sample for asbestos.

Therefore, representative cuts through the rubber roof were made in areas generally expected to yield different types of suspect asbestos-containing materials; such as the main field of the roof and perimeter/penetration flashings.

Based on laboratory analyses of built-up roofing samples collected, the following materials were determined to contain greater than 1% asbestos:

Table 3.1

Building 3 ACM Report

Type of Material	Typical Location	Estimated Amount	Friability	Condition
Built-up Roofing (Entire Main Field of Roof)	Under Rubber Membrane and Foam Insulation Board, Applied to Directly to Concrete Deck	9,500 SF	Non-Friable	Good
Flashing Felts and Tar	Under Rubber Membrane, Installed Around Roof Perimeter (i.e., on parapet walls) and Penetrations (on curbs, around drains, etc.)	950 SF	Non-Friable	Good

Table 3.2
Building 9 ACM Report

Type of Material	Typical Location	Estimated Amount	Friability	Condition
Built-up Roofing (Entire Main Field of Roof)	Under Rubber Membrane and Fiber Insulation Board, Applied over Perlite Board and Tar Vapor Barrier on Concrete Deck	7,500 SF	Non-Friable	Good
Flashing Felts and Tar	Under Rubber Membrane, Installed Around Roof Perimeter (i.e., on parapet walls) and Penetrations	900 SF	Non-Friable	Good

Table 3.3
Building 16 ACM Report

Type of Material	Typical Location	Estimated Amount	Friability	Condition
Flashing Felts and Tar	Under Rubber Membrane, Installed Around Roof Perimeter (i.e., on parapet walls) and Penetrations (on	2,000 SF	Non-Friable	Good
Roofing Cement	On Top Edge of Termination Bar in Repaired Area by Access Door	10 LF	Non-Friable	Good

Please see Appendix A for complete asbestos sampling analytical reports.

4.0 PROPOSED IMPROVEMENTS

The main proposed improvement to storm water management is the addition of vegetated roofing to the two aforementioned roof areas at the MCC Downtown Campus—Buildings 3 and 16. Based on analysis and observation of the existing conditions by Tremco Roofing and Building Maintenance, a vegetated roof comprised of 3” of growing media was recommended, limited specifically by the reserve capacity of the structural roof deck. This system would provide water retention in the range of 0.80-1.10 gallons per square foot. See Appendix C for a matrix of roof cross sections.

Based on the current structural analysis of the existing roof decks (see previous Section 3.4), this is a feasible approach for Building 3 (with structural reinforcement) and Building 16. The saturated weight of a proposed 3” vegetated roof is 20 - 23 lbs per square foot, which is an overburden on the existing deck. In addition, the current equipment screen at Building 16 would be removed to facilitate roof system installation, exposure, and public access.

The roof system is composed of a base roofing assembly (including insulation) installed on the existing deck, over which protective materials are placed. This would include a cover board to reduce compaction of the insulation and penetration of the waterproof membrane, as well as a root barrier to combat any plant material from working into the system and creating a potential for leaks. In addition, a leak detection system, also known as vector mapping, would be installed with the roof system to provide not only detection but location of a possible penetration.

In addition to the storm water advantages, the proposed roofs can provide an aesthetic benefit if accessible to members of the public; that is, MCC students, faculty, staff, and visitors. The roof of Building 3 is easily accessible from an occupiable level in Building 13, which makes the location attractive from a programmatic standpoint. There is existing access, and so minimal work would be required to provide an updated entrance to the roof area. Railings at the perimeter to guard against accidental falls would need to be added at the northwest sides of the roof, and attachment would be to the structural deck. Because the area could be used in the evening for casual access, or for events, additional lighting in the form of landscape fixtures or bollards would be advantageous given the size of the roof.

Building 16 could be made accessible to the public, although it would require occupants to traverse an additional set of stairs. Because of the size of this roof area and the proximity to the existing cooling towers, only a small portion could be made into a public area. As part of the future construction project, the size and number of the cooling tower cells made be reduced, and so more space may be made available for public access. In this case, the new mechanical equipment should be intentionally located towards the north end of the roof to allow the most open area near the easiest access, adjacent to the main elevator core along Morrie Silver Way. As with Building 3, railings for fall protection would be added, as would lighting to encourage use.

4.1 FEASIBLE ALTERNATIVES

In the event that vegetated roof systems are not feasible for the areas discussed, another area to be considered is the roof and plaza on Building 1 adjacent to State Street. Initial research indicates that this structure may be able to support a larger overburden because it was designed to take vehicular traffic, and is currently supporting plaza deck pavers. This is a more prominent area in terms of visibility and public access, and smaller than the proposed locations, but perhaps able to offset a larger percentage of runoff if an intensive roof system is feasible.

Two additional alternatives could be considered on the site outside the footprint of the building complex. The first is bioretention areas within the right-of-way along Morrie Silver Way, across from Building 16. There is currently an eight foot sidewalk and a six-foot grass buffer zone between the curb line and the existing parking lot owned by MCC. Because the site slopes at approximately 2.5% along parallel to the street, the bioretention areas would need to be depressed in order to gather as much storm water runoff as possible. This runoff would be from the adjacent parking lot, sidewalk, and the roadway surface. Guardrails would be necessary to provide fall protection for pedestrians.

The second site alternative is permeable asphalt or concrete paving over a section of the MCC-owned parking lot. Porous pavers may also be a consideration for this area, but pose various negative factors such as frost heaving, damage from snowplowing and traffic, and cost for vehicle-rated paver products. A pervious paving system would allow a substantial amount of stormwater infiltration over a large area, likely a third of the existing parking area, providing a significant amount of filtering of runoff. This system would consist of asphalt top courses over a deeper crushed stone reservoir, all of which is placed over a filter fabric. The effective depth of the system has a large impact on initial cost, due to the necessary excavation. A permeable paving installation also requires seasonal vacuuming to clear pollutants from the voids in the paving material, affecting life-cycle costs.

5.0 PROJECT COST ESTIMATE

The projected cost of the vegetated roofing is $30-$40 per square foot, over a new base roofing system, with a square foot cost of $20. For the purposes of this estimate, a combined $57/sf was used. This is based on roof areas of 9,500 sf and 13,200 sf for Buildings 3 and 16, respectively. This unit cost also includes vegetation-free areas such as pavers and gravel used for maintenance access.

The project cost estimate considers all work necessary to create viable vegetated roofing systems, and thus improved storm water management. This includes demolition of all existing roofing and flashing within the proposed areas, and abatement of ACMs within this area. This will provide clean substrate materials to facilitate installation of the vegetated systems, without the need to interface with any existing system. This also allows considerations for public access, made easier than attempting to retrofit current conditions.

Please note that the demolition costs for Building 3 will be higher than Building 16, as this includes removal of the pumice/slag course that was discovered during core sampling tests. The local match assigned to the construction on Building 3 is intended to cover structural reinforcement necessary to bring the roof deck to code, as well as to support a vegetated roof system.

Figure 5.1

Project Cost Summary

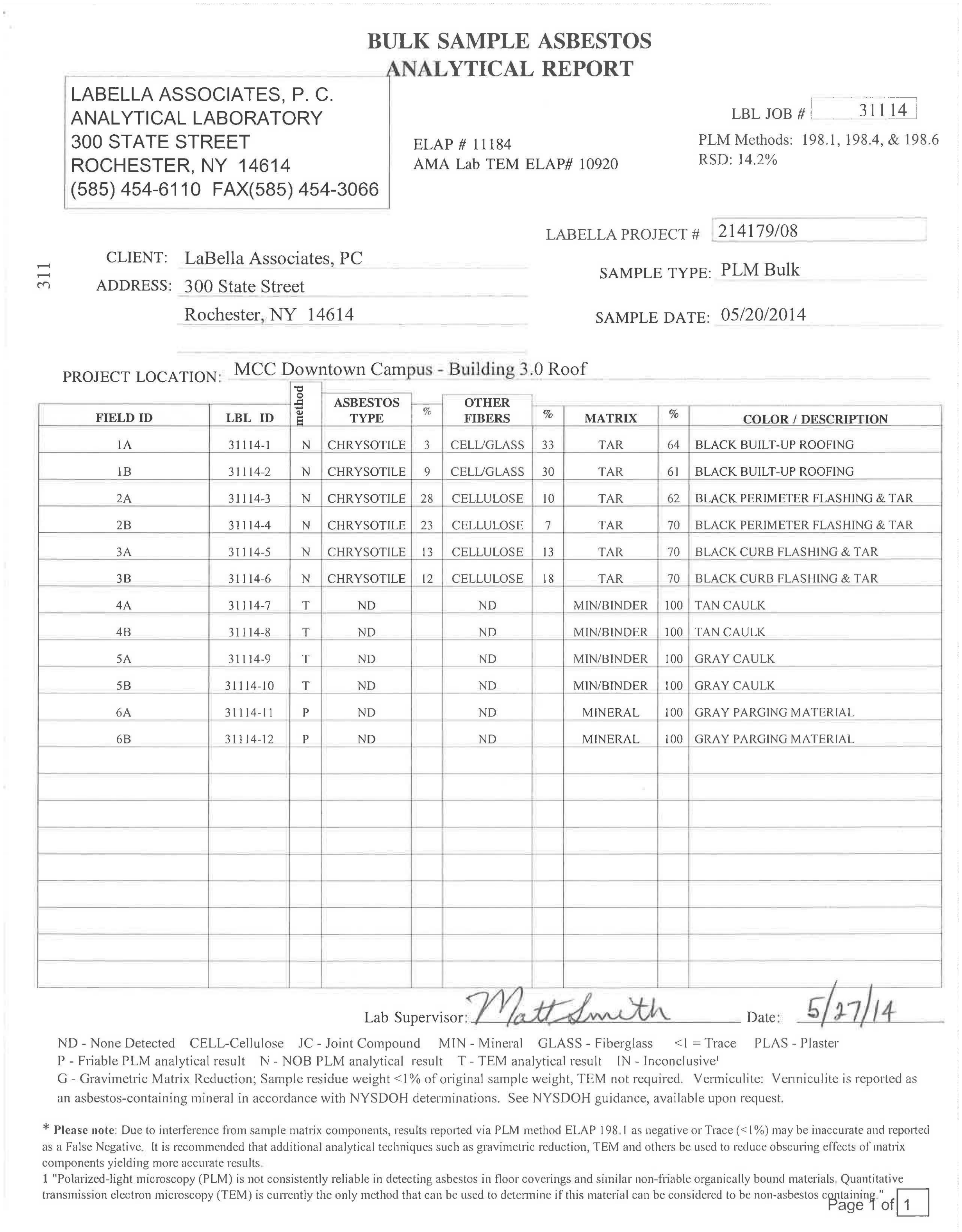
Budget Items	Grant Request	Local Match
Asbestos Abatement	$ 192,000	$ -
Demolition	$ 96,600	$ -
Construction - Vegetated Roofing	$ 1,306,900	$ 194,178
Construction - Public Access	$ 93,000	$ -
Engineering/Design	$ 168,850	$ -
Equipment	$ -	$ -
Legal	$ -	$ -
Administrative Force Account	$ -	$ -
Technical Force Account	$ -	$ -
Contingency (5%)	$ 84,425	$ -
	$ 1,941,775	$ 194,178

Appendix A

ASBESTOS ANALYTICAL REPORTS AND FIELD SURVEY SHEETS

Figure A.1

Building 3 ACM Analysis



BULK SAMPLE ASBESTOS ANALYTICAL REPORT

LABELLA ASSOCIATES, P. C.
ANALYTICAL LABORATORY
300 STATE STREET
ROCHESTER, NY 14614
(585) 454-6110 FAX(585) 454-3066

ELAP # 11184
AMA Lab TEM ELAP# 10920

LBL JOB # 31114
PLM Methods: 198.1, 198.4, & 198.6
RSD: 14.2%

LABELLA PROJECT # 214179/08

311

CLIENT: LaBella Associates, PC
ADDRESS: 300 State Street
Rochester, NY 14614

SAMPLE TYPE: PLM Bulk

SAMPLE DATE: 05/20/2014

PROJECT LOCATION: MCC Downtown Campus - Building 3.0 Roof

FIELD ID	LBL ID	method	ASBESTOS TYPE	%	OTHER FIBERS	%	MATRIX	%	COLOR / DESCRIPTION
1A	31114-1	N	CHRYSOTILE	3	CELL/GLASS	33	TAR	64	BLACK BUILT-UP ROOFING
1B	31114-2	N	CHRYSOTILE	9	CELL/GLASS	30	TAR	61	BLACK BUILT-UP ROOFING
2A	31114-3	N	CHRYSOTILE	28	CELLULOSE	10	TAR	62	BLACK PERIMETER FLASHING & TAR
2B	31114-4	N	CHRYSOTILE	23	CELLULOSE	7	TAR	70	BLACK PERIMETER FLASHING & TAR
3A	31114-5	N	CHRYSOTILE	13	CELLULOSE	13	TAR	70	BLACK CURB FLASHING & TAR
3B	31114-6	N	CHRYSOTILE	12	CELLULOSE	18	TAR	70	BLACK CURB FLASHING & TAR
4A	31114-7	T	ND		ND		MIN/BINDER	100	TAN CAULK
4B	31114-8	T	ND		ND		MIN/BINDER	100	TAN CAULK
5A	31114-9	T	ND		ND		MIN/BINDER	100	GRAY CAULK
5B	31114-10	T	ND		ND		MIN/BINDER	100	GRAY CAULK
6A	31114-11	P	ND		ND		MINERAL	100	GRAY PARGING MATERIAL
6B	31114-12	P	ND		ND		MINERAL	100	GRAY PARGING MATERIAL

Lab Supervisor: Matt Smith Date: 5/27/14

ND - None Detected CELL-Cellulose JC - Joint Compound MIN - Mineral GLASS - Fiberglass <I = Trace PLAS - Plaster
P - Friable PLM analytical result N - NOB PLM analytical result T - TEM analytical result IN - Inconclusive¹
G - Gravimetric Matrix Reduction; Sample residue weight <1% of original sample weight, TEM not required. Vermiculite: Vermiculite is reported as an asbestos-containing mineral in accordance with NYSDOH determinations. See NYSDOH guidance, available upon request.

* **Please note**: Due to interference from sample matrix components, results reported via PLM method ELAP 198.1 as negative or Trace (<1%) may be inaccurate and reported as a False Negative. It is recommended that additional analytical techniques such as gravimetric reduction, TEM and others be used to reduce obscuring effects of matrix components yielding more accurate results.

1 "Polarized-light microscopy (PLM) is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can be used to determine if this material can be considered to be non-asbestos containing."

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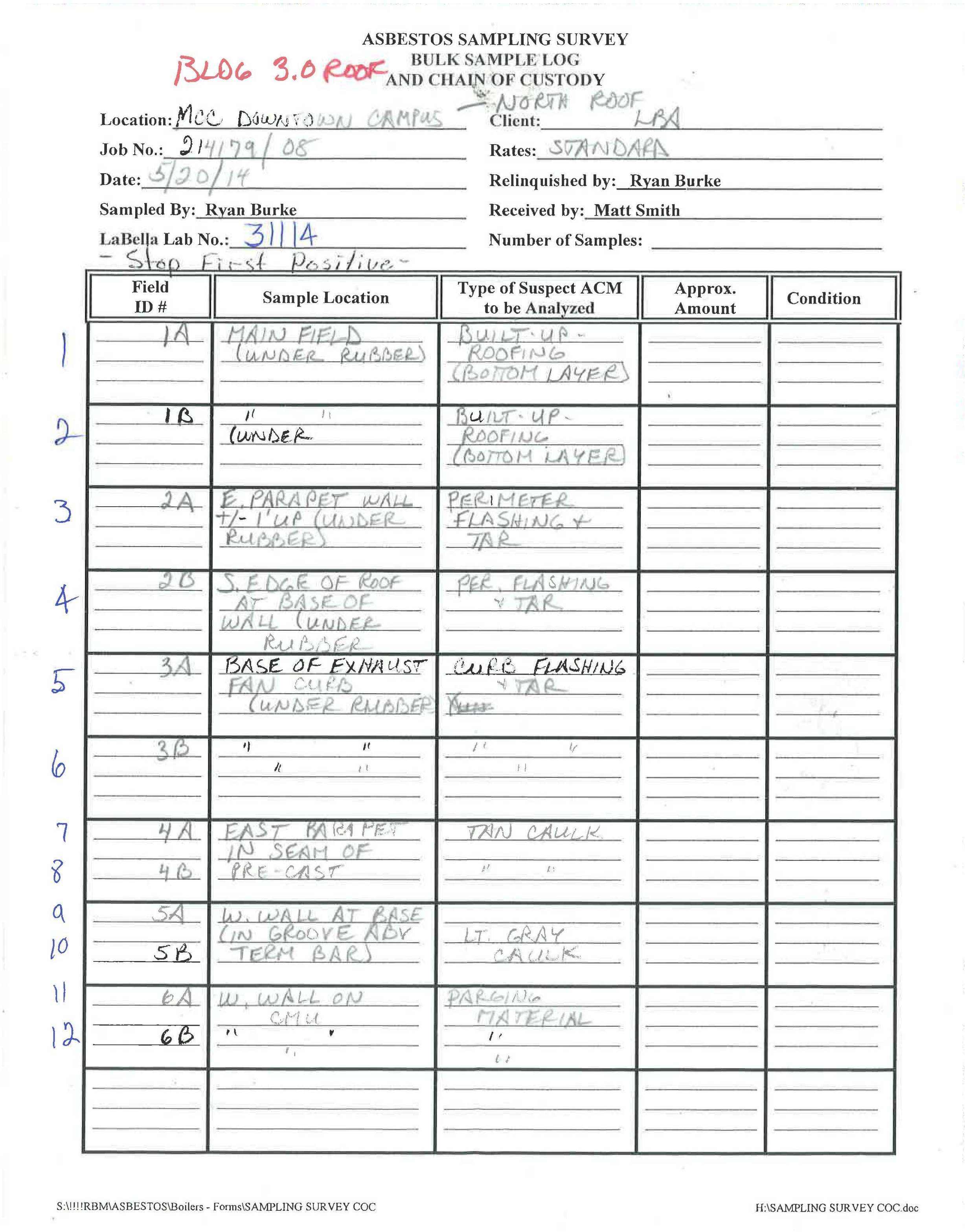
Figure A.2

Building 3 Field Survey Sheet



BLDG 3.0 ROOF

ASBESTOS SAMPLING SURVEY
BULK SAMPLE LOG
AND CHAIN OF CUSTODY

Location: MCC DOWNTOWN CAMPUS – NORTH ROOF
Client: LBA
Job No.: 214179/08
Rates: STANDARD
Date: 5/20/14
Relinquished by: Ryan Burke
Sampled By: Ryan Burke
Received by: Matt Smith
LaBella Lab No.: 31114
Number of Samples:

- Stop First Positive -

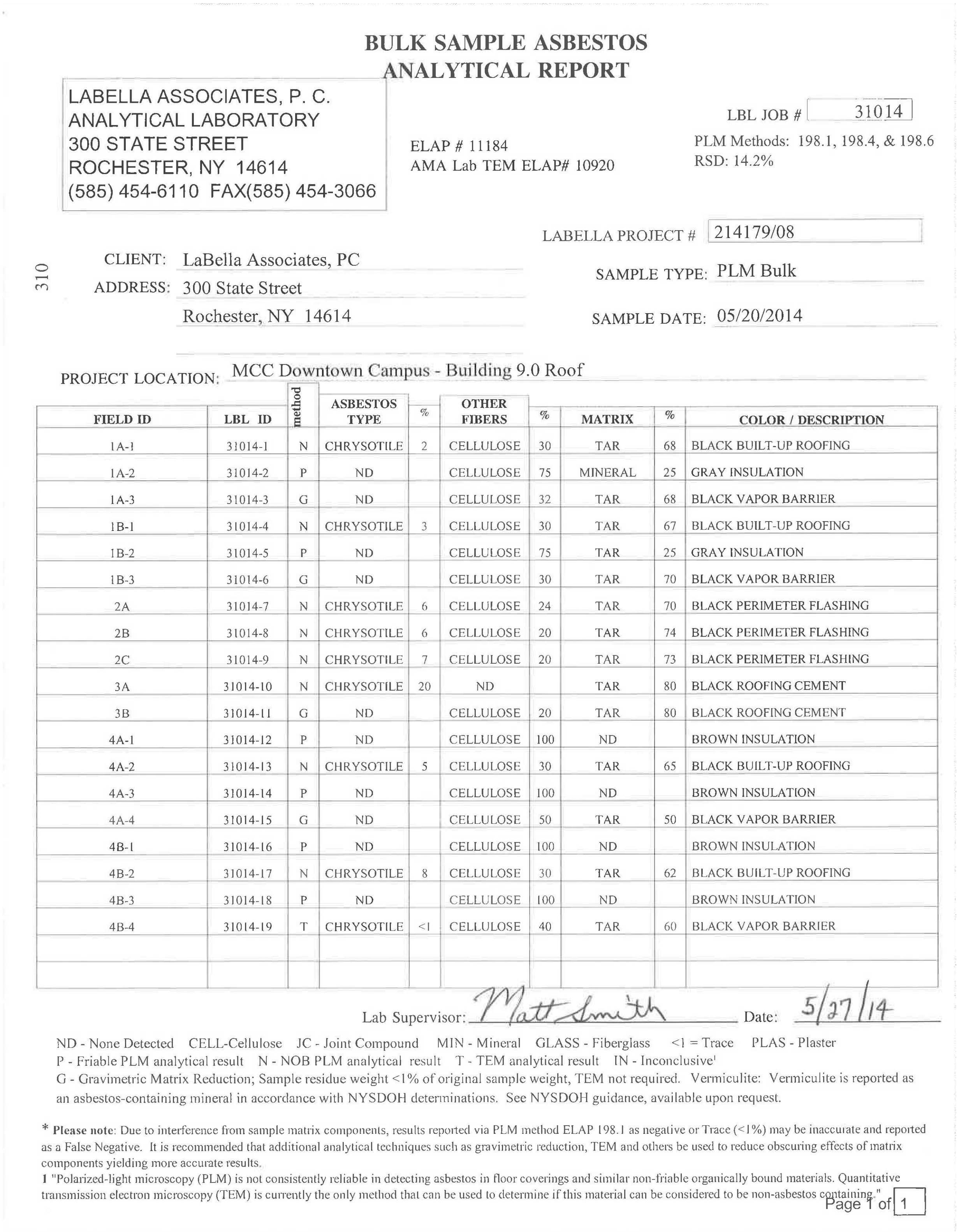
	Field ID #	Sample Location	Type of Suspect ACM to be Analyzed	Approx. Amount	Condition
1	1A	MAIN FIELD (UNDER RUBBER)	BUILT-UP-ROOFING (BOTTOM LAYER)		
2	1B	" " (UNDER	BUILT-UP-ROOFING (BOTTOM LAYER)		
3	2A	E. PARAPET WALL +/- 1' UP (UNDER RUBBER)	PERIMETER FLASHING + TAR		
4	2B	S. EDGE OF ROOF AT BASE OF WALL (UNDER RUBBER	PER. FLASHING + TAR		
5	3A	BASE OF EXHAUST FAN CURB (UNDER RUBBER)	CURB FLASHING + TAR		
6	3B	" " " "	" " "		
7 8	4A 4B	EAST PARAPET IN SEAM OF PRE-CAST	TAN CAULK " "		
9 10	5A 5B	W. WALL AT BASE (IN GROOVE ABV TERM BAR)	LT. GRAY CAULK		
11 12	6A 6B	W. WALL ON CMU " " "	PARGING MATERIAL " "		

S:\!!!!RBM\ASBESTOS\Boilers - Forms\SAMPLING SURVEY COC

H:\SAMPLING SURVEY COC.doc

Figure A.3

Building 9 ACM Analysis



BULK SAMPLE ASBESTOS ANALYTICAL REPORT

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ELAP # 11184
AMA Lab TEM ELAP# 10920

LBL JOB # 31014
PLM Methods: 198.1, 198.4, & 198.6
RSD: 14.2%

310

LABELLA PROJECT # 214179/08

CLIENT: LaBella Associates, PC
ADDRESS: 300 State Street
Rochester, NY 14614

SAMPLE TYPE: PLM Bulk

SAMPLE DATE: 05/20/2014

PROJECT LOCATION: MCC Downtown Campus - Building 9.0 Roof

FIELD ID	LBL ID	method	ASBESTOS TYPE	%	OTHER FIBERS	%	MATRIX	%	COLOR / DESCRIPTION
1A-1	31014-1	N	CHRYSOTILE	2	CELLULOSE	30	TAR	68	BLACK BUILT-UP ROOFING
1A-2	31014-2	P	ND		CELLULOSE	75	MINERAL	25	GRAY INSULATION
1A-3	31014-3	G	ND		CELLULOSE	32	TAR	68	BLACK VAPOR BARRIER
1B-1	31014-4	N	CHRYSOTILE	3	CELLULOSE	30	TAR	67	BLACK BUILT-UP ROOFING
1B-2	31014-5	P	ND		CELLULOSE	75	TAR	25	GRAY INSULATION
1B-3	31014-6	G	ND		CELLULOSE	30	TAR	70	BLACK VAPOR BARRIER
2A	31014-7	N	CHRYSOTILE	6	CELLULOSE	24	TAR	70	BLACK PERIMETER FLASHING
2B	31014-8	N	CHRYSOTILE	6	CELLULOSE	20	TAR	74	BLACK PERIMETER FLASHING
2C	31014-9	N	CHRYSOTILE	7	CELLULOSE	20	TAR	73	BLACK PERIMETER FLASHING
3A	31014-10	N	CHRYSOTILE	20	ND		TAR	80	BLACK ROOFING CEMENT
3B	31014-11	G	ND		CELLULOSE	20	TAR	80	BLACK ROOFING CEMENT
4A-1	31014-12	P	ND		CELLULOSE	100	ND		BROWN INSULATION
4A-2	31014-13	N	CHRYSOTILE	5	CELLULOSE	30	TAR	65	BLACK BUILT-UP ROOFING
4A-3	31014-14	P	ND		CELLULOSE	100	ND		BROWN INSULATION
4A-4	31014-15	G	ND		CELLULOSE	50	TAR	50	BLACK VAPOR BARRIER
4B-1	31014-16	P	ND		CELLULOSE	100	ND		BROWN INSULATION
4B-2	31014-17	N	CHRYSOTILE	8	CELLULOSE	30	TAR	62	BLACK BUILT-UP ROOFING
4B-3	31014-18	P	ND		CELLULOSE	100	ND		BROWN INSULATION
4B-4	31014-19	T	CHRYSOTILE	<1	CELLULOSE	40	TAR	60	BLACK VAPOR BARRIER

Lab Supervisor: Matt Smith Date: 5/27/14

ND - None Detected CELL-Cellulose JC - Joint Compound MIN - Mineral GLASS - Fiberglass <1 = Trace PLAS - Plaster
P - Friable PLM analytical result N - NOB PLM analytical result T - TEM analytical result IN - Inconclusive[1]
G - Gravimetric Matrix Reduction; Sample residue weight <1% of original sample weight, TEM not required. Vermiculite: Vermiculite is reported as an asbestos-containing mineral in accordance with NYSDOH determinations. See NYSDOH guidance, available upon request.

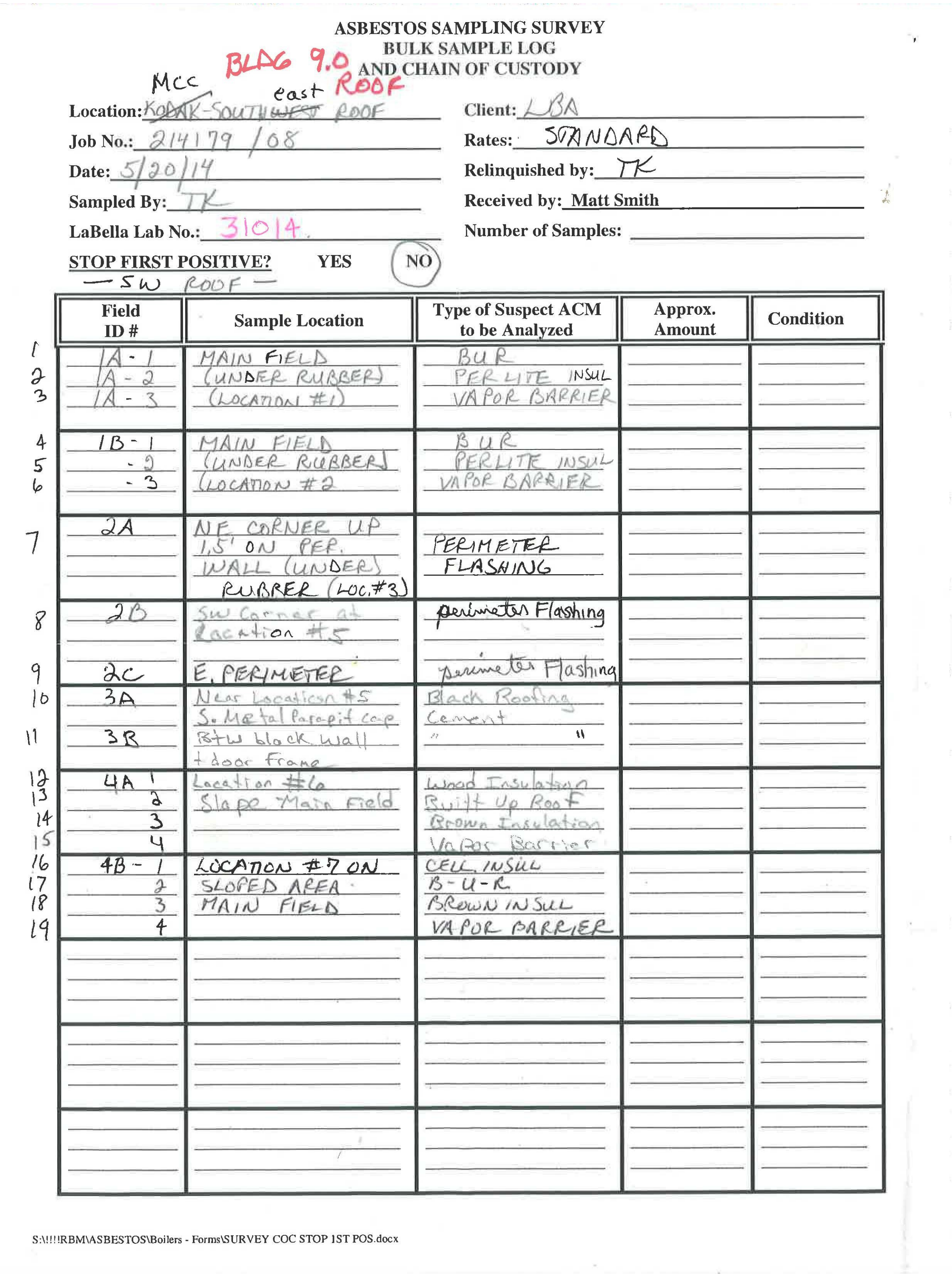
* **Please note**: Due to interference from sample matrix components, results reported via PLM method ELAP 198.1 as negative or Trace (<1%) may be inaccurate and reported as a False Negative. It is recommended that additional analytical techniques such as gravimetric reduction, TEM and others be used to reduce obscuring effects of matrix components yielding more accurate results.

[1] "Polarized-light microscopy (PLM) is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can be used to determine if this material can be considered to be non-asbestos containing."

Page 1 of 1

Figure A.4

Building 9 Field Survey Sheet



BLDG 9.0 ROOF

ASBESTOS SAMPLING SURVEY
BULK SAMPLE LOG
AND CHAIN OF CUSTODY

Location: ~~KODAK~~ MCC -SOUTH~~WEST~~ east ROOF
Job No.: 214179 /08
Date: 5/20/14
Sampled By: TK
LaBella Lab No.: 31014.
Client: LBA
Rates: STANDARD
Relinquished by: TK
Received by: Matt Smith
Number of Samples:

STOP FIRST POSITIVE? YES [✓ NO]

— SW ROOF —

	Field ID #	Sample Location	Type of Suspect ACM to be Analyzed	Approx. Amount	Condition
1	1A-1	MAIN FIELD	BUR		
2	1A-2	(UNDER RUBBER)	PERLITE INSUL		
3	1A-3	(LOCATION #1)	VAPOR BARRIER		
4	1B-1	MAIN FIELD	BUR		
5	-2	(UNDER RUBBER)	PERLITE INSUL		
6	-3	(LOCATION #2	VAPOR BARRIER		
7	2A	NE CORNER UP 1.5' ON PER. WALL (UNDER) RUBBER (LOC.#3)	PERIMETER FLASHING		
8	2B	SW Corner at Location #5	perimeter Flashing		
9	2C	E. PERIMETER	perimeter Flashing		
10	3A	Near Location #5 S. Metal Parapit cap Btw block wall + door Frame	Black Roofing Cement		
11	3B		" "		
12	4A 1	Location #6 Slope Main Field	Wood Insulation		
13	2		Built Up Roof		
14	3		Brown Insulation		
15	4		Vapor Barrier		
16	4B-1	LOCATION #7 ON SLOPED AREA MAIN FIELD	CELL. INSUL		
17	2		B-U-R		
18	3		BROWN INSUL		
19	4		VAPOR BARRIER		

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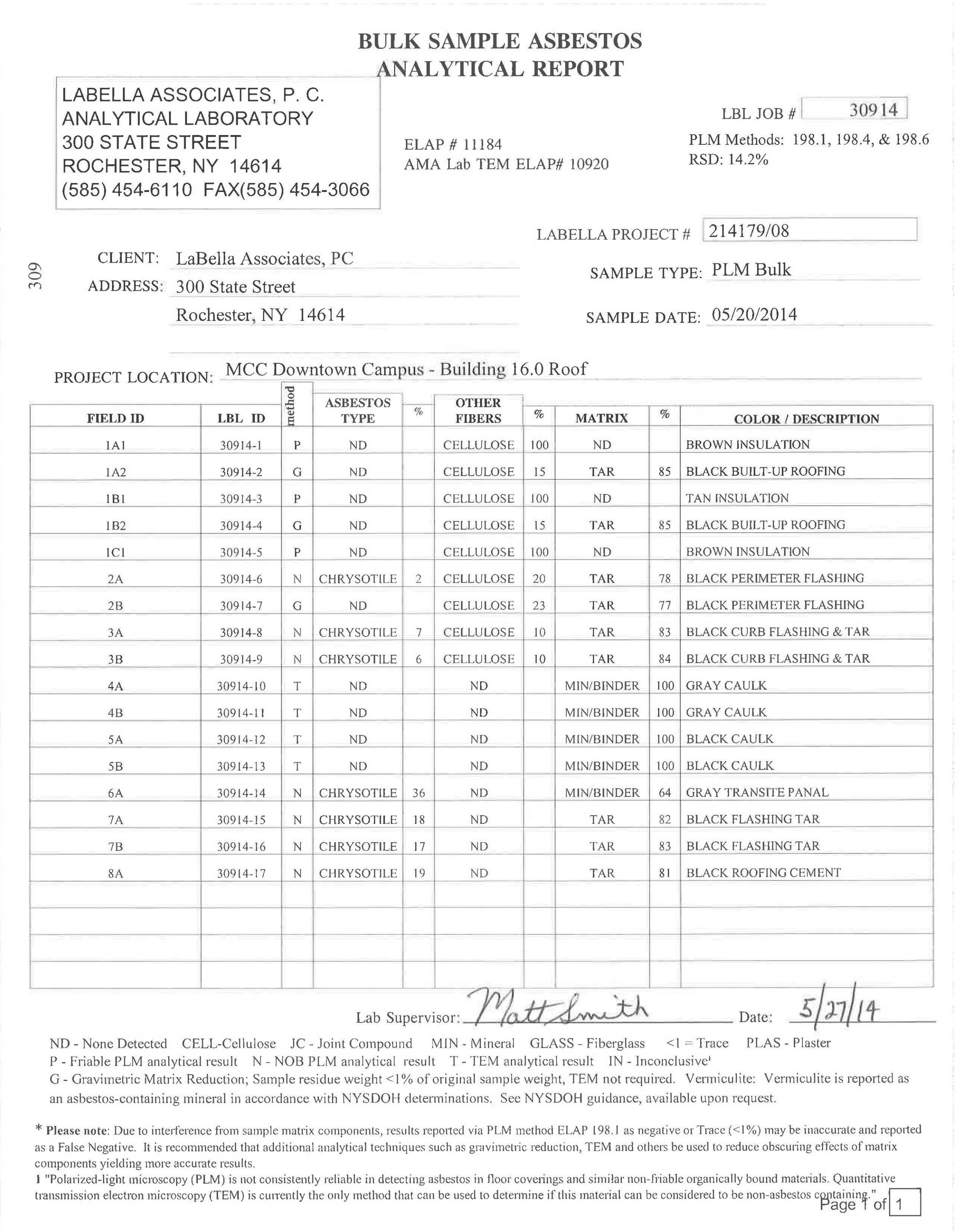
Figure A.5

Building 16 ACM Analysis



BULK SAMPLE ASBESTOS ANALYTICAL REPORT

LABELLA ASSOCIATES, P. C.
ANALYTICAL LABORATORY
300 STATE STREET
ROCHESTER, NY 14614
(585) 454-6110 FAX(585) 454-3066

ELAP # 11184
AMA Lab TEM ELAP# 10920

LBL JOB # 30914

PLM Methods: 198.1, 198.4, & 198.6
RSD: 14.2%

LABELLA PROJECT # 214179/08

309

CLIENT: LaBella Associates, PC
ADDRESS: 300 State Street
Rochester, NY 14614

SAMPLE TYPE: PLM Bulk

SAMPLE DATE: 05/20/2014

PROJECT LOCATION: MCC Downtown Campus - Building 16.0 Roof

FIELD ID	LBL ID	method	ASBESTOS TYPE	%	OTHER FIBERS	%	MATRIX	%	COLOR / DESCRIPTION
1A1	30914-1	P	ND		CELLULOSE	100	ND		BROWN INSULATION
1A2	30914-2	G	ND		CELLULOSE	15	TAR	85	BLACK BUILT-UP ROOFING
1B1	30914-3	P	ND		CELLULOSE	100	ND		TAN INSULATION
1B2	30914-4	G	ND		CELLULOSE	15	TAR	85	BLACK BUILT-UP ROOFING
1C1	30914-5	P	ND		CELLULOSE	100	ND		BROWN INSULATION
2A	30914-6	N	CHRYSOTILE	2	CELLULOSE	20	TAR	78	BLACK PERIMETER FLASHING
2B	30914-7	G	ND		CELLULOSE	23	TAR	77	BLACK PERIMETER FLASHING
3A	30914-8	N	CHRYSOTILE	7	CELLULOSE	10	TAR	83	BLACK CURB FLASHING & TAR
3B	30914-9	N	CHRYSOTILE	6	CELLULOSE	10	TAR	84	BLACK CURB FLASHING & TAR
4A	30914-10	T	ND		ND		MIN/BINDER	100	GRAY CAULK
4B	30914-11	T	ND		ND		MIN/BINDER	100	GRAY CAULK
5A	30914-12	T	ND		ND		MIN/BINDER	100	BLACK CAULK
5B	30914-13	T	ND		ND		MIN/BINDER	100	BLACK CAULK
6A	30914-14	N	CHRYSOTILE	36	ND		MIN/BINDER	64	GRAY TRANSITE PANAL
7A	30914-15	N	CHRYSOTILE	18	ND		TAR	82	BLACK FLASHING TAR
7B	30914-16	N	CHRYSOTILE	17	ND		TAR	83	BLACK FLASHING TAR
8A	30914-17	N	CHRYSOTILE	19	ND		TAR	81	BLACK ROOFING CEMENT

Lab Supervisor: Matt Smith Date: 5/27/14

ND - None Detected CELL-Cellulose JC - Joint Compound MIN - Mineral GLASS - Fiberglass <1 = Trace PLAS - Plaster
P - Friable PLM analytical result N - NOB PLM analytical result T - TEM analytical result IN - Inconclusive[1]
G - Gravimetric Matrix Reduction; Sample residue weight <1% of original sample weight, TEM not required. Vermiculite: Vermiculite is reported as an asbestos-containing mineral in accordance with NYSDOH determinations. See NYSDOH guidance, available upon request.

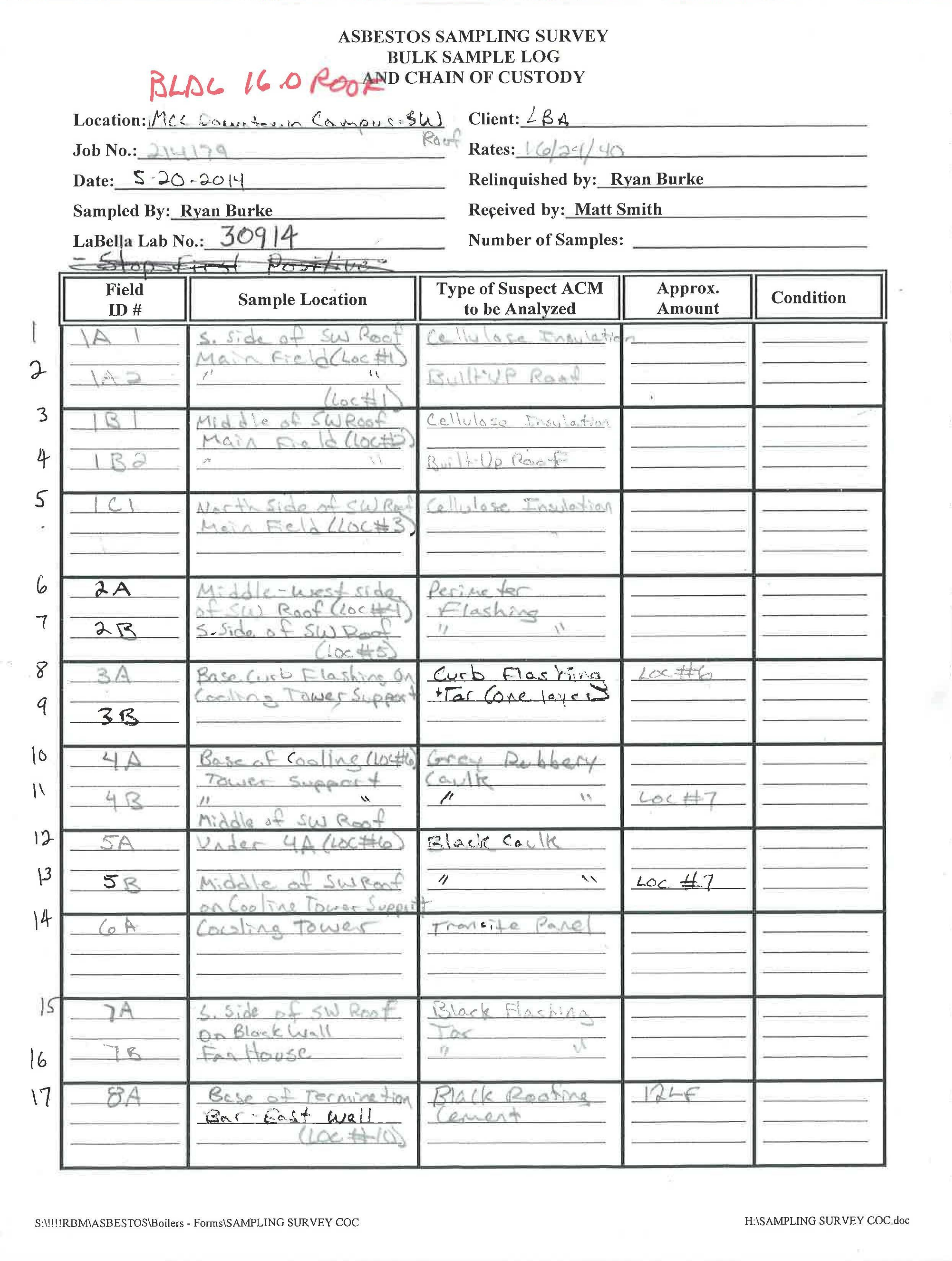
* **Please note**: Due to interference from sample matrix components, results reported via PLM method ELAP 198.1 as negative or Trace (<1%) may be inaccurate and reported as a False Negative. It is recommended that additional analytical techniques such as gravimetric reduction, TEM and others be used to reduce obscuring effects of matrix components yielding more accurate results.

[1] "Polarized-light microscopy (PLM) is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can be used to determine if this material can be considered to be non-asbestos containing."

Page 1 of 1

Figure A.6

Building 16 Field Survey Sheet



ASBESTOS SAMPLING SURVEY
BULK SAMPLE LOG
AND CHAIN OF CUSTODY

BLDG 16 0 ROOF

Location: MCC Downtown Campus SW Roof
Job No.: 214179
Date: 5-20-2014
Sampled By: Ryan Burke
LaBella Lab No.: 30914

Client: LBA
Rates: 16/24/40
Relinquished by: Ryan Burke
Received by: Matt Smith
Number of Samples:

~~- Stop First Positive~~

	Field ID #	Sample Location	Type of Suspect ACM to be Analyzed	Approx. Amount	Condition
1	1A 1	S. Side of SW Roof Main Field (Loc #1)	Cellulose Insulation		
2	1A 2	" " (Loc #1)	Built-UP Roof		
3	1B 1	Middle of SW Roof Main Field (Loc #2)	Cellulose Insulation		
4	1B 2	" "	Built-Up Roof		
5	1C 1	North Side of SW Roof Main Field (Loc #3)	Cellulose Insulation		
6	2A	Middle-west side of SW Roof (Loc #4)	Perimeter Flashing		
7	2B	S. Side of SW Roof (Loc #5)	" "		
8	3A	Base Curb Flashing On Cooling Tower Support	Curb Flashing +Tar (One layer)	Loc #6	
9	3B				
10	4A	Base of Cooling (Loc #6) Tower Support	Grey Rubbery Caulk		
11	4B	" " Middle of SW Roof	" "	Loc #7	
12	5A	Under 4A (Loc #6)	Black Caulk		
13	5B	Middle of SW Roof on Cooling Tower Support	" "	Loc #7	
14	6A	Cooling Tower	Transite Panel		
15	7A	S. Side of SW Roof On Block Wall	Black Flashing Tar		
16	7B	Fan House	" "		
17	8A	Base of Termination Bar - East Wall (Loc #10)	Black Roofing Cement	12 LF	

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Appendix B

1. SUPPLEMENTAL SOIL DATA
2. US EPA MODEL INPUT DATA SERVER INFORMATION
3. WATER QUALITY VOLUME WORKSHEETS

SUPPLEMENTAL SOIL DATA

The USDA-NRCS Web Soil Survey indicates that the project site is composed of urban fill. The US EPA's STEPL Model Input Data Server indicates that the project is located within the Genesee River watershed, and that the primary soil composition is Hydrologic Soil Group D.

US EPA MODEL INPUT DATA SERVER INFORMATION

Selected Watershed Information

State	County	FIPS	Watershed Name	HUC12	Watershed Total Area (acre)
New York	Monroe	36055	Genesee River	41300030704	14340.63

Landuse area (acres)

Watershed Name	HUC12	Urban	Cropland	Pasture-land	Forest	User Defined	Feedlots	Water	Others
Genesee River	41300030704	12565.037	14.9	146.335	684.084	0	0.007	442.564	487.71

Agricultural Animals

Watershed Name	HUC12	Beef Cattle	Dairy Cattle	Swine	Sheep	Horse	Chicken	Turkey	Duck
Genesee River	41300030704	1	3	1	1	3	2	2	0

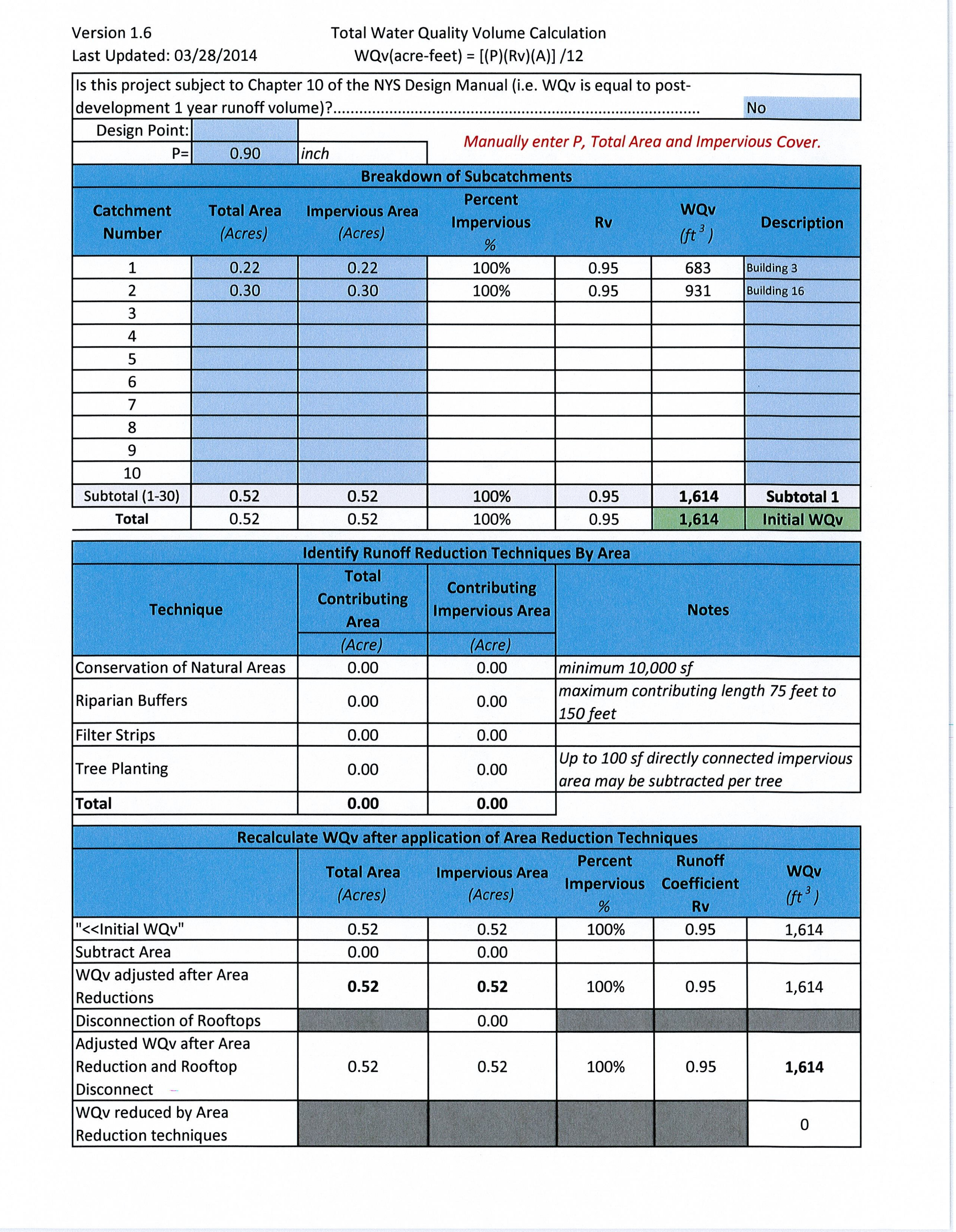
Septic System data

Watershed Name	HUC12	Septic Systems	Population per Septic System	% Septic Failure Rate
Genesee River	41300030704	3362	3	0.19

Hydrologic Soil Group

Watershed Name	HUC12	Hydrologic Soil Group
Genesee River	41300030704	D

WATER QUALITY VOLUME (WQv) WORKSHEETS



Version 1.6
Last Updated: 03/28/2014

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?.. No

Design Point:
P= 0.90 inch

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

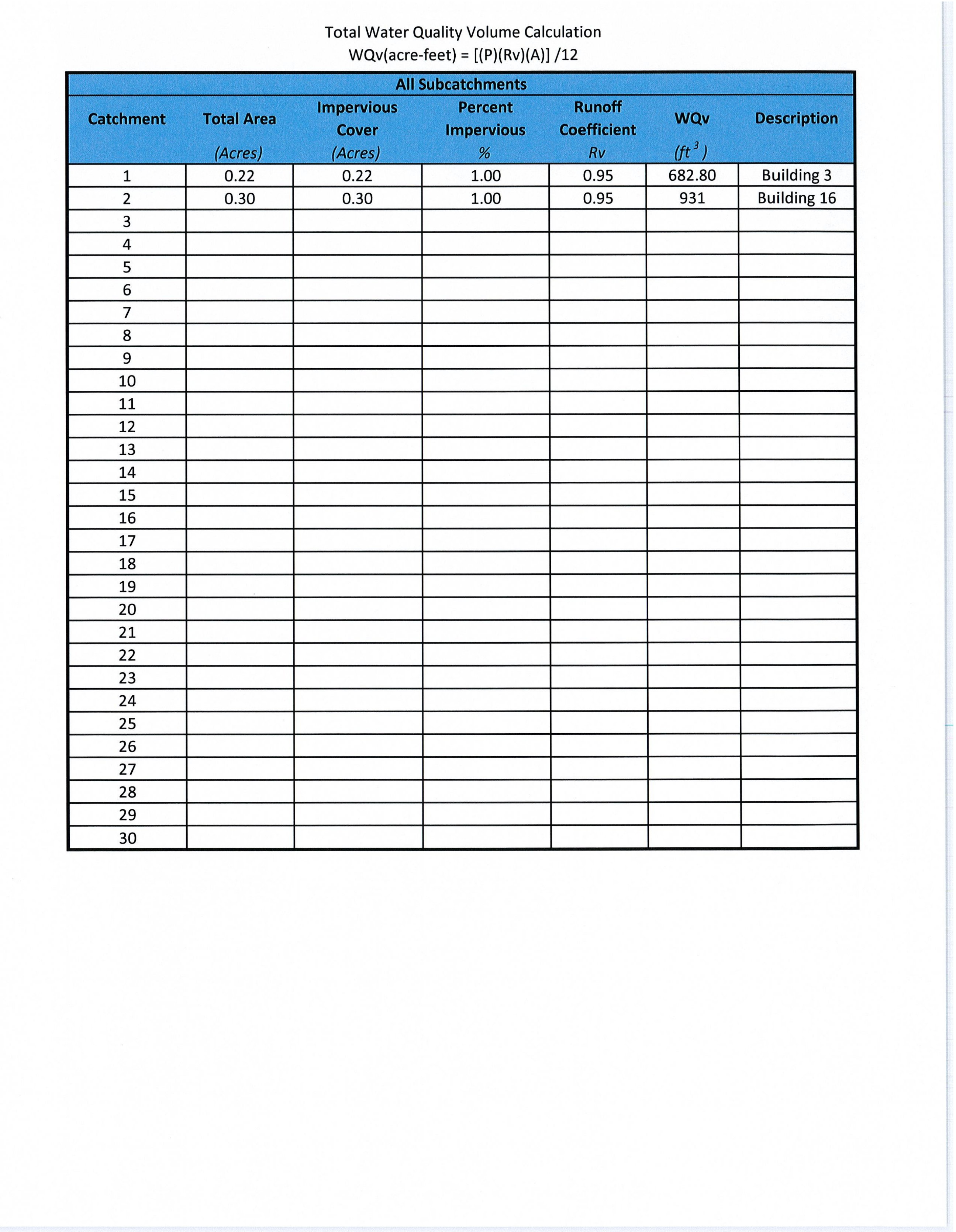
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Description**
1	0.22	0.22	100%	0.95	683	Building 3
2	0.30	0.30	100%	0.95	931	Building 16
3						
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	0.52	0.52	100%	0.95	**1,614**	**Subtotal 1**
Total	0.52	0.52	100%	0.95	**1,614**	**Initial WQv**

Identify Runoff Reduction Techniques By Area

Technique	**Total Contributing Area** *(Acre)*	**Contributing Impervious Area** *(Acre)*	**Notes**
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient Rv**	**WQv** *(ft^3)*
"<<Initial WQv"	0.52	0.52	100%	0.95	1,614
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**0.52**	**0.52**	100%	0.95	1,614
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	0.52	0.52	100%	0.95	**1,614**
WQv reduced by Area Reduction techniques					0



Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

All Subcatchments						
Catchment	**Total Area** *(Acres)*	**Impervious Cover** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient** *Rv*	**WQv** *(ft^3)*	**Description**
1	0.22	0.22	1.00	0.95	682.80	Building 3
2	0.30	0.30	1.00	0.95	931	Building 16
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
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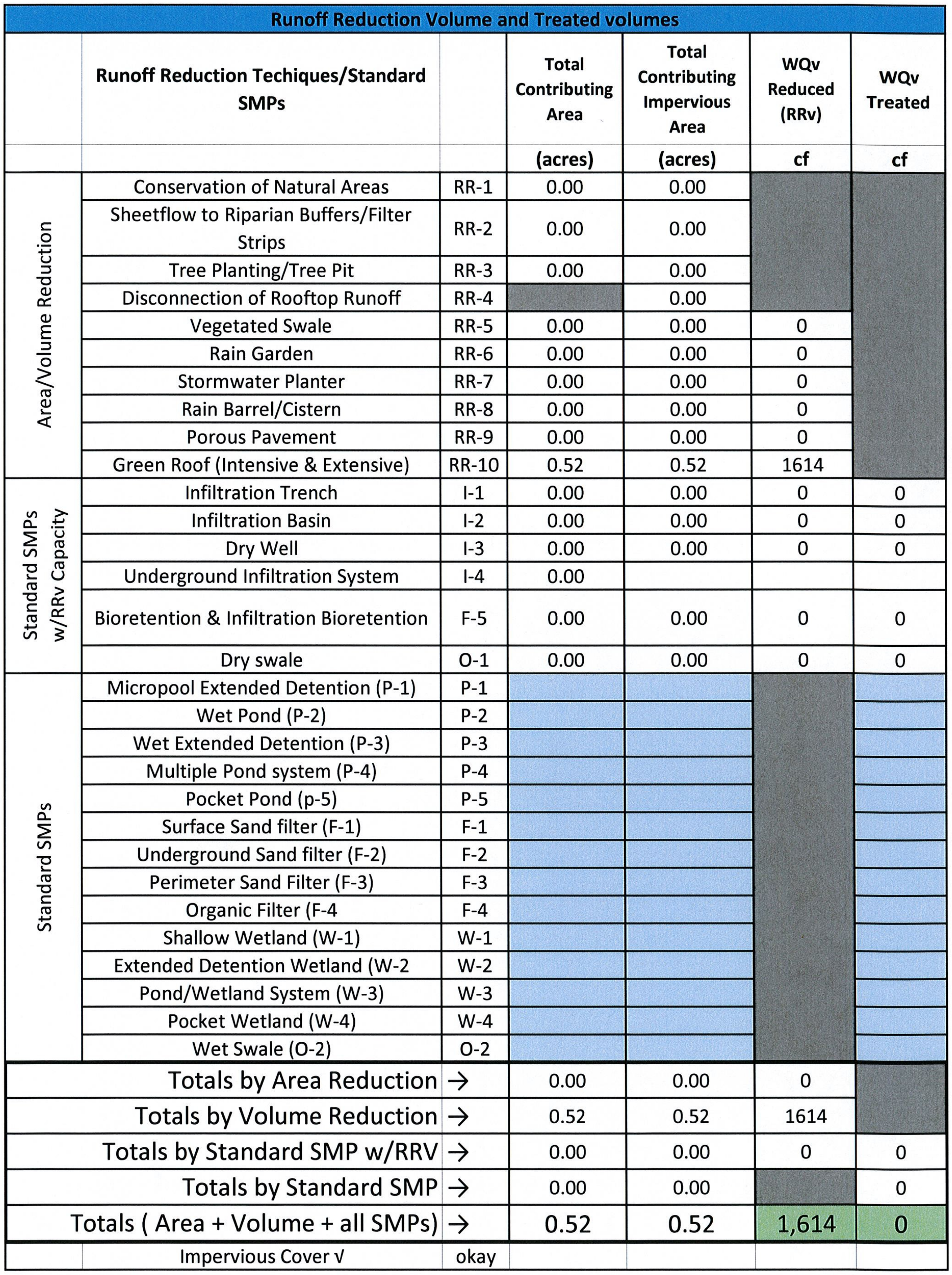
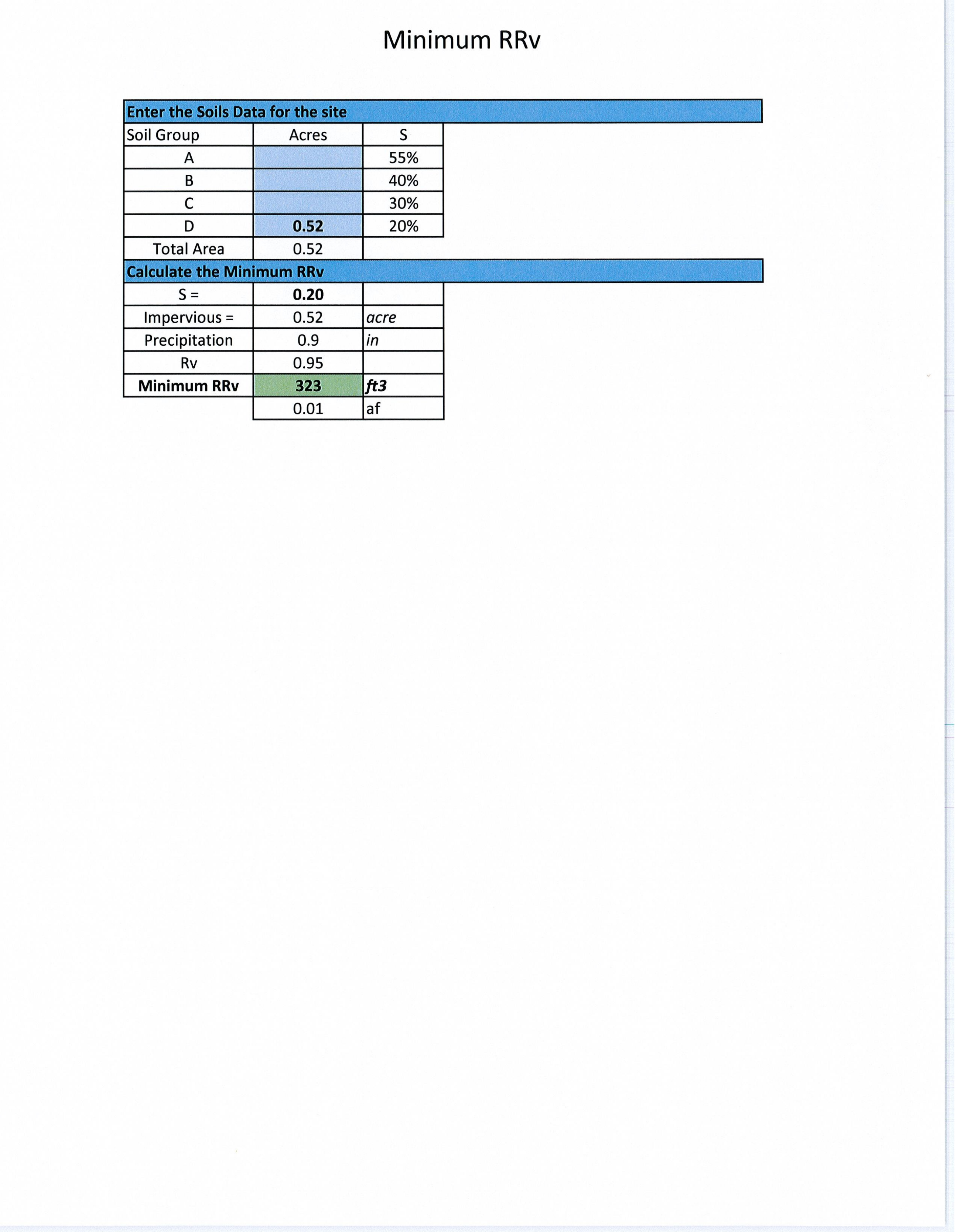
28						
29						
30						



Runoff Reduction Volume and Treated volumes

	Runoff Reduction Techiques/Standard SMPs		Total Contributing Area	Total Contributing Impervious Area	WQv Reduced (RRv)	WQv Treated
			(acres)	(acres)	cf	cf
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.52	0.52	1614	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	0.00	0.00	0	0
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction		→	0.00	0.00	0	
Totals by Volume Reduction		→	0.52	0.52	1614	
Totals by Standard SMP w/RRV		→	0.00	0.00	0	0
Totals by Standard SMP		→	0.00	0.00		0
Totals (Area + Volume + all SMPs)		→	0.52	0.52	1,614	0
	Impervious Cover √	okay				



Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A		55%
B		40%
C		30%
D	**0.52**	20%
Total Area	0.52	
Calculate the Minimum RRv		
S =	**0.20**	
Impervious =	0.52	*acre*
Precipitation	0.9	*in*
Rv	0.95	
Minimum RRv	**323**	***ft3***
	0.01	af

NOI QUESTIONS

#	**NOI Question**	**Reported Value**	
		cf	af
28	Total Water Quality Volume (WQv) Required	1614	*0.037*
30	Total RRV Provided	1614	*0.037*
31	Is RRv Provided ≥WQv Required?	Yes	
32	Minimum RRv	323	*0.007*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	0	*0.000*
34	Sum of Volume Reduced & Treated	1614	*0.037*
34	Sum of Volume Reduced and Treated	1614	*0.037*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?	*Yes*	Plan Completed

Extensive Green Roof Worksheet

$WQv \le VSM + VDL + (DP \times AGR)$ $VSM = AGR \times DSM \times nSM$ $VDL = AGR \times DDL \times nDL$

Design Point:	

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft³)*	**Precipitation** *(in)*	**Description**
1	0.22	0.22	1.00	0.95	682.80	0.90	Building 3

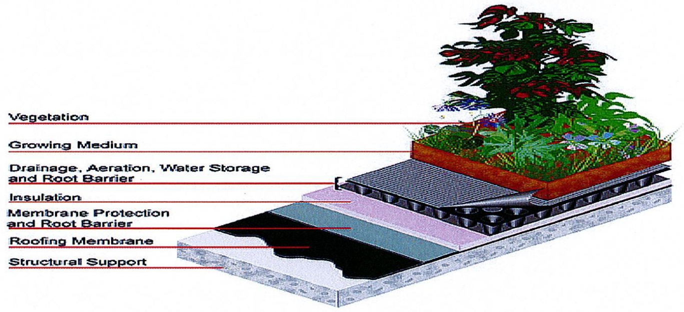
Enter Parameters for Proposed Green Roof

				Notes
Green Roof Surface Area	AGR	9500	*ft²*	
Depth of Soil Media	DSM	0.25	*ft*	*0.25-0.5*
Depth of Drainage Layer	DDL	0.04	*ft*	
Depth of Ponding Above Surface	DP	0.02	*ft*	
Porosity of the Soil Media	nSM	20%		*Max 20%*
Porosity of the Drainage Layer	nDL	25%		*Max 25%*

Calculations

Volume Provided In Soil Media	VSM	475	*ft³*	
Volume Provided In Drainage Layer	VDL	95	*ft³*	
Volume in Ponding Layer		190	*ft³*	
Storage Volume Provided in Green Roof		760	*ft³*	

Runoff Reduction	**683**	ft³	



Extensive Green Roof Worksheet

$WQv \leq VSM + VDL + (DP \times AGR)$ $VSM = AGR \times DSM \times nSM$ $VDL = AGR \times DDL \times nDL$

Design Point:	

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	0.30	0.30	1.00	0.95	931.10	0.90	Building 16

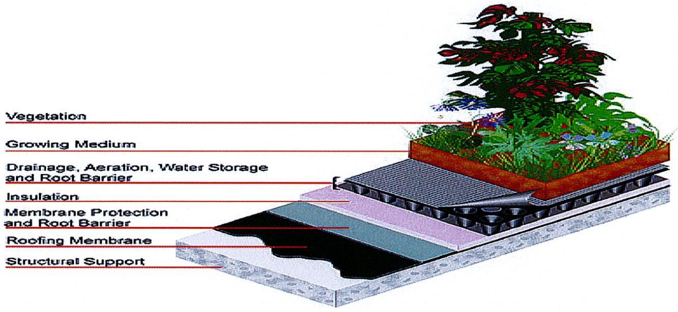
Enter Parameters for Proposed Green Roof

				Notes
Green Roof Surface Area	AGR	13200	ft^2	
Depth of Soil Media	DSM	0.25	ft	*0.25-0.5*
Depth of Drainage Layer	DDL	0.04	ft	
Depth of Ponding Above Surface	DP	0.02	ft	
Porosity of the Soil Media	nSM	20%		*Max 20%*
Porosity of the Drainage Layer	nDL	25%		*Max 25%*

Calculations

Volume Provided In Soil Media	VSM	660	ft^3	
Volume Provided In Drainage Layer	VDL	132	ft^3	
Volume in Ponding Layer		264	ft^3	
Storage Volume Provided in Green Roof		1,056	ft^3	

Runoff Reduction	**931**	**ft^3**	

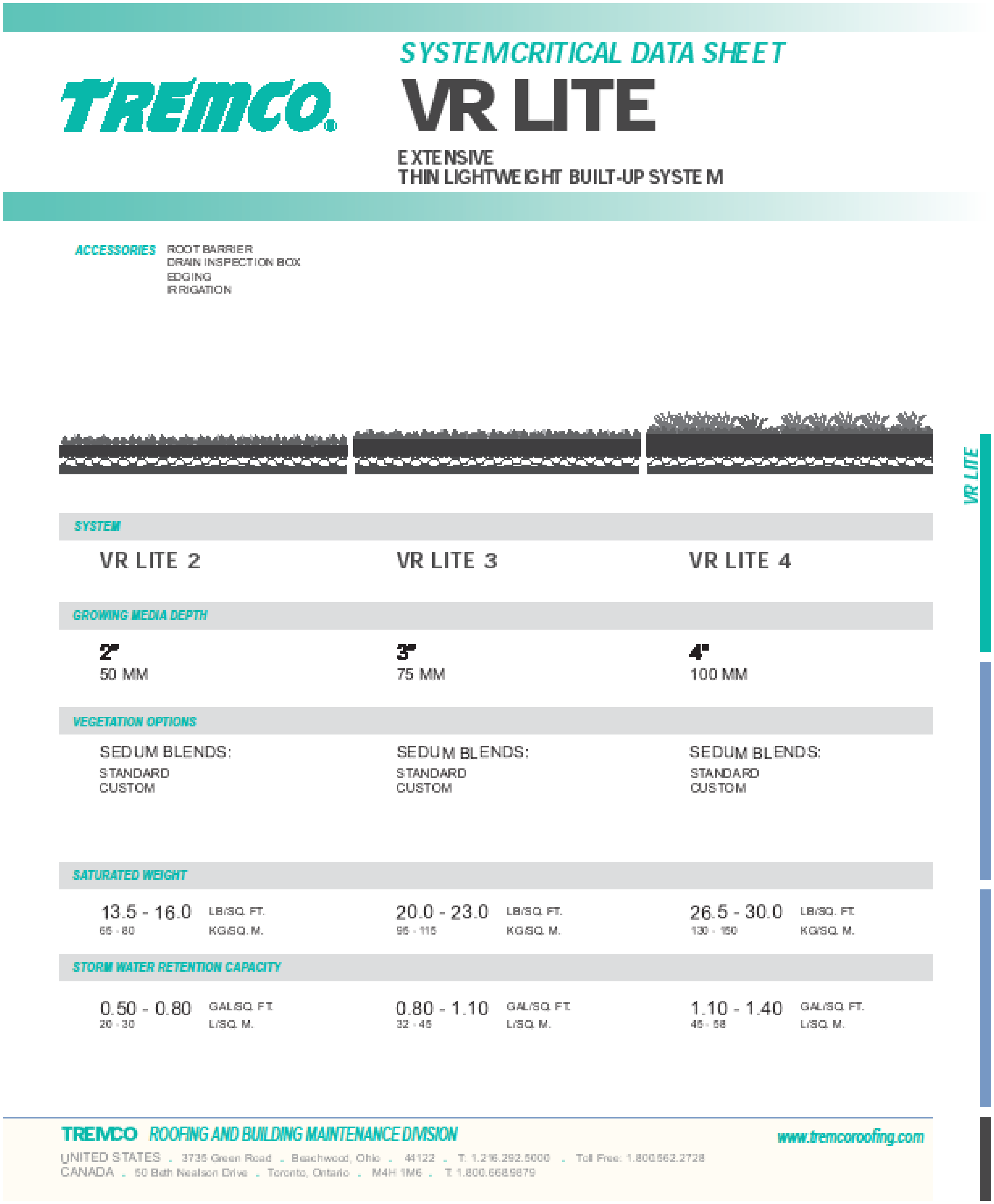


Appendix C

PROPOSED STORM WATER MANAGEMENT SYSTEM DETAILS

Figure C.1

Proposed Vegetated Roofing System—VR LITE 3



SYSTEM CRITICAL DATA SHEET

TREMCO

VR LITE

EXTENSIVE
THIN LIGHTWEIGHT BUILT-UP SYSTEM

ACCESSORIES
ROOT BARRIER
DRAIN INSPECTION BOX
EDGING
IRRIGATION

SYSTEM	VR LITE 2	VR LITE 3	VR LITE 4
GROWING MEDIA DEPTH	2" 50 MM	3" 75 MM	4" 100 MM
VEGETATION OPTIONS	SEDUM BLENDS: STANDARD CUSTOM	SEDUM BLENDS: STANDARD CUSTOM	SEDUM BLENDS: STANDARD CUSTOM
SATURATED WEIGHT	13.5 - 16.0 LB/SQ. FT. 65 - 80 KG/SQ. M.	20.0 - 23.0 LB/SQ. FT. 95 - 115 KG/SQ. M.	26.5 - 30.0 LB/SQ. FT. 130 - 150 KG/SQ. M.
STORM WATER RETENTION CAPACITY	0.50 - 0.80 GAL/SQ. FT. 20 - 30 L/SQ. M.	0.80 - 1.10 GAL/SQ. FT. 32 - 45 L/SQ. M.	1.10 - 1.40 GAL/SQ. FT. 45 - 58 L/SQ. M.

VR LITE

TREMCO ROOFING AND BUILDING MAINTENANCE DIVISION www.tremcoroofing.com

UNITED STATES . 3735 Green Road . Beachwood, Ohio . 44122 . T: 1.216.292.5000 . Toll Free: 1.800.562.2728
CANADA . 50 Beth Nealson Drive . Toronto, Ontario . M4H 1M6 . T: 1.800.668.9879

Figure C.2

Proposed Vegetated Roofing System—Growing Media

TREMCO
ROOFING & BUILDING MAINTENANCE

PRODUCT SPECIFICATION DATA SHEET

VR AeroMix

ENGINEERED GROWING MEDIA
FOR VEGETATED ROOF ASSEMBLIES

PRODUCT DESCRIPTION

Description	Lightweight engineered growing media mix of organic and inorganic material that will support succulent and desert plantings.
Options	None

PRODUCT PROPERTIES

Particle Size Distribution	< 15%
Per FLL Guidelines	

Weight	
Minimum Weight (Dry Weight)	50 lb/ft³ (0.80 g/cm³)
Maximum Weight (Saturated Weight)	80 lb/ft³ (1.28 g/cm³)

Moisture	
Maximum Water Holding Capacity	45%
Air-Filled porosity	<13%
Water Permeability	> 36 inch/hr (> 0.02 cm/sec)

pH	6.0 - 8.0
EC	< 2.5
Organic Content	< 9%

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Figure C.3

Proposed Vegetated Roofing System—Drainage/Retention Panel

TREMCO
ROOFING & BUILDING MAINTENANCE

PRODUCT SPECIFICATION DATA SHEET

VR HydraPanel 0.40

WATER DRAINAGE/RETENTION PANEL FOR VEGETATED ROOF ASSEMBLIES

PRODUCT DESCRIPTION

Description	Three-dimensional high-flow retention/drainage sheet complete with filter fabric overlay
Options	None

PRODUCT PROPERTIES

Material	
Filter Fabric Overlay	Spunbonded Nonwoven Polypropylene
Drainage Sheet Core	High Impact Polystyrene

Dimensions	
Roll	4 ft x 50 ft (1.22 m x 15.24 m)
Thickness	0.44-inch (11 mm)

Dry Weight	45 lb/roll (20 kg/roll)
Fabric Weight	4.2 oz./yd² (142 g/m²)

Fabric	
UV Resistance	70% / 500 hrs
Grab tensile strength	130 lbf (578 N)
Water Flow Rate	150 gpm/ft² (6,113 Lpm/m²)
Trapezoidal Tear	- Typical Value: 60 lbs (267 N) - MARV: 50 lbs (222 N)

Core	
Compressive Strength	15,000 psf (718 kPa)
Moisture Retention	0.06 gal/ft² (2.4 L/m²)
Perforation Open Area	15.21 in²/ft² (105,612 mm²/m²) 10%
Horizontal Flow Rate:	
Gradient = 1.0	16 gpm/ft (200 Lpm/m)
Gradient = 0.1	6 gpm/ft (75 Lpm/m)

Additional Info	
Recycled Content	77% Post-Industrial Scrap

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TREMCO
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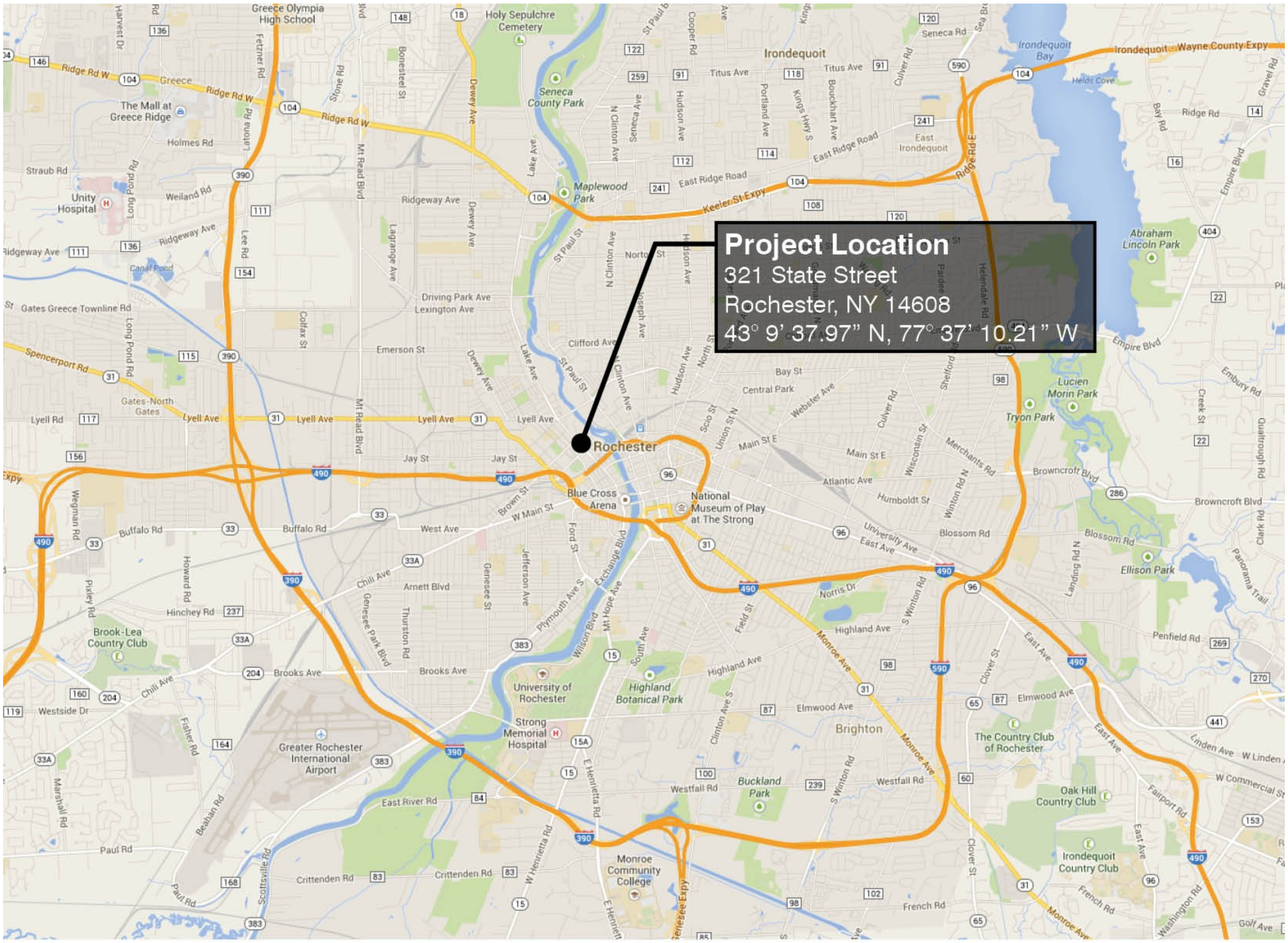
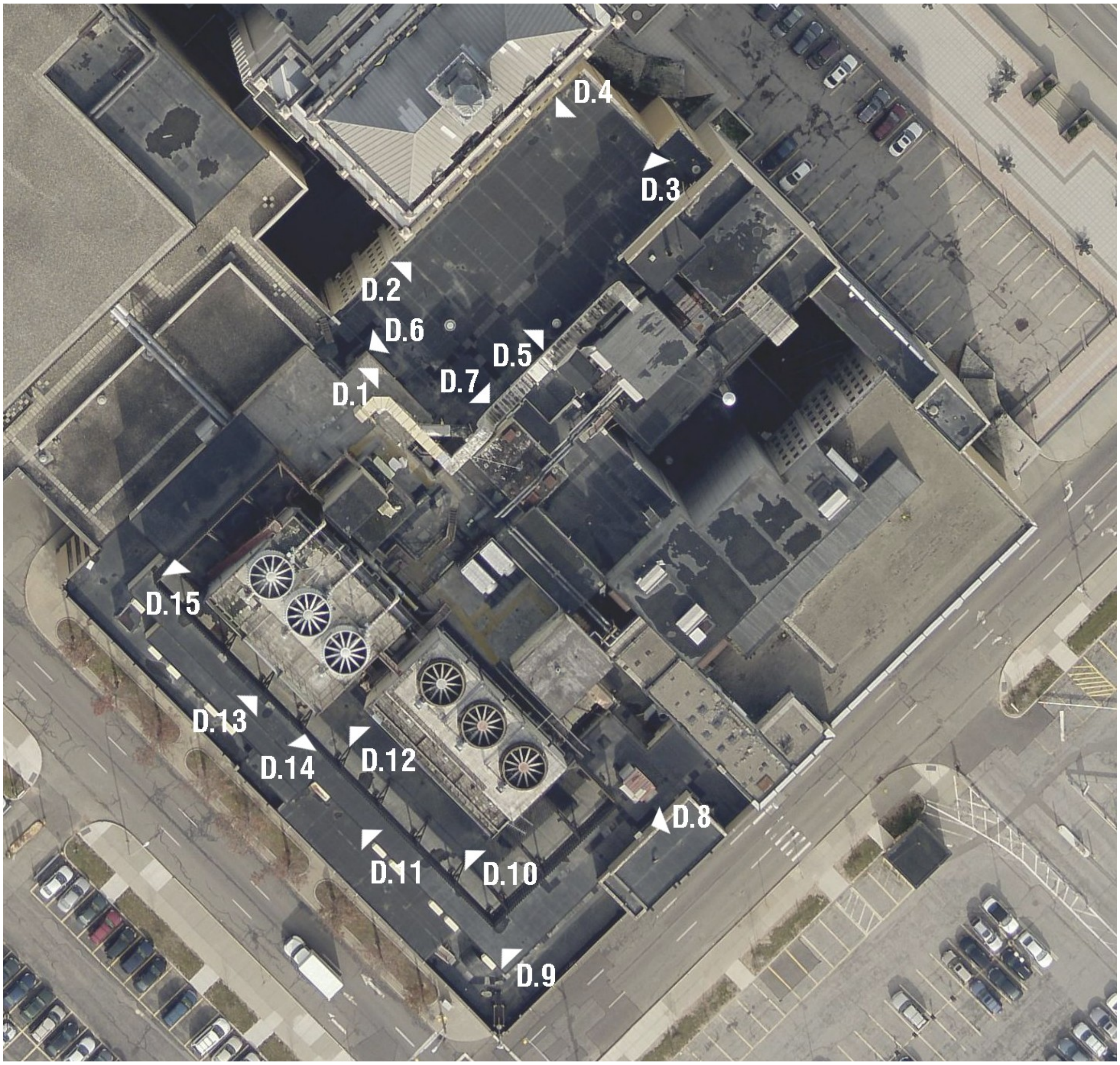
Appendix D

1. PROJECT LOCATION MAP
2. SITE PHOTOGRAPHS
3. PROPOSED VEGETATED ROOF PLAN
4. PROPOSED VEGETATED ROOF VIEWS

PROJECT LOCATION MAP



KEY PLAN FOR SITE PHOTOGRAPHS



SITE PHOTOGRAPHS

Figure D.1: Building 3—Overall view from above, looking east

Figure D.2: Building 3—Overall from roof level, looking east

Figure D.3: Building 3—Detail view of existing parapet at east roof edge

Figure D.4: Building 3—Detail view of existing guardrail at north roof edge

Figure D.5: Building 3—View of roof from entrance, looking east

Figure D.6: Building 3—Detail view of curbs at west edge of roof

Figure D.7: Building 3—View of entrance door from exterior

Figure D.8: Building 16—Overhead view of roof near entrance, looking west

Figure D.9: Building 16—Overall view of roof, looking north

Figure D.10: Building 16—Overall view of roof including cooling towers, looking north

Figure D.11: Building 16—Overall view of roof showing typical roof edge, looking north

Figure D.12: Building 16—View of cooling towers at interior roof edge

Figure D.13: Building 16—Detail view of equipment screen support

Figure D.14: Building 16—Detail view of cooling tower frame

Figure D.15: Building 16—View of northern end of roof, looking north

PROPOSED VEGETATED ROOF PLAN

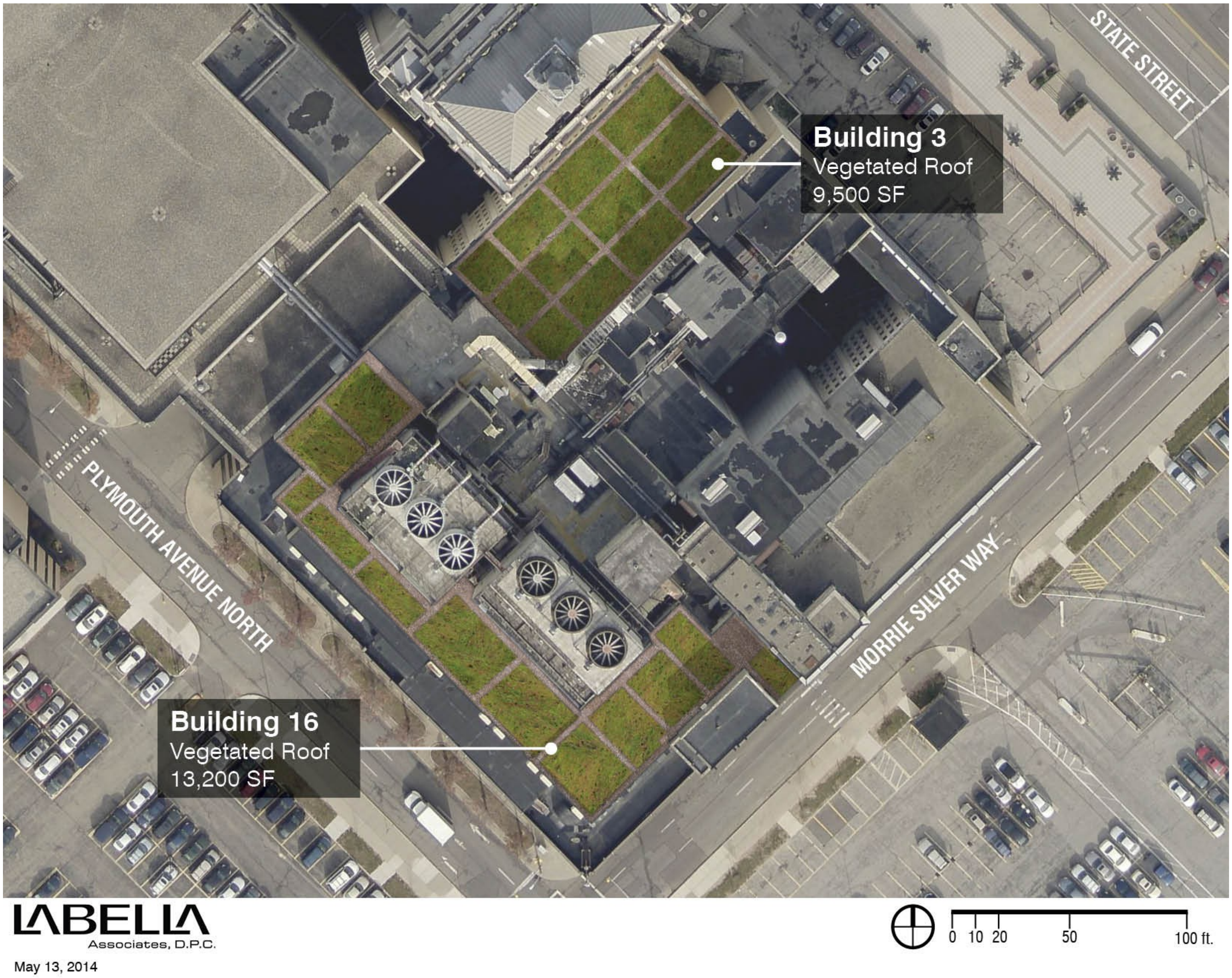


Figure D.16: Aerial plan view of proposed MCC Downtown Campus with vegetated roof systems superimposed on existing roof areas. Conceptual layout of gravel/paver pathways for public access and maintenance shown. In practice, visitors on the roof should not traverse planted areas.

PROPOSED VEGETATED ROOF VIEWS

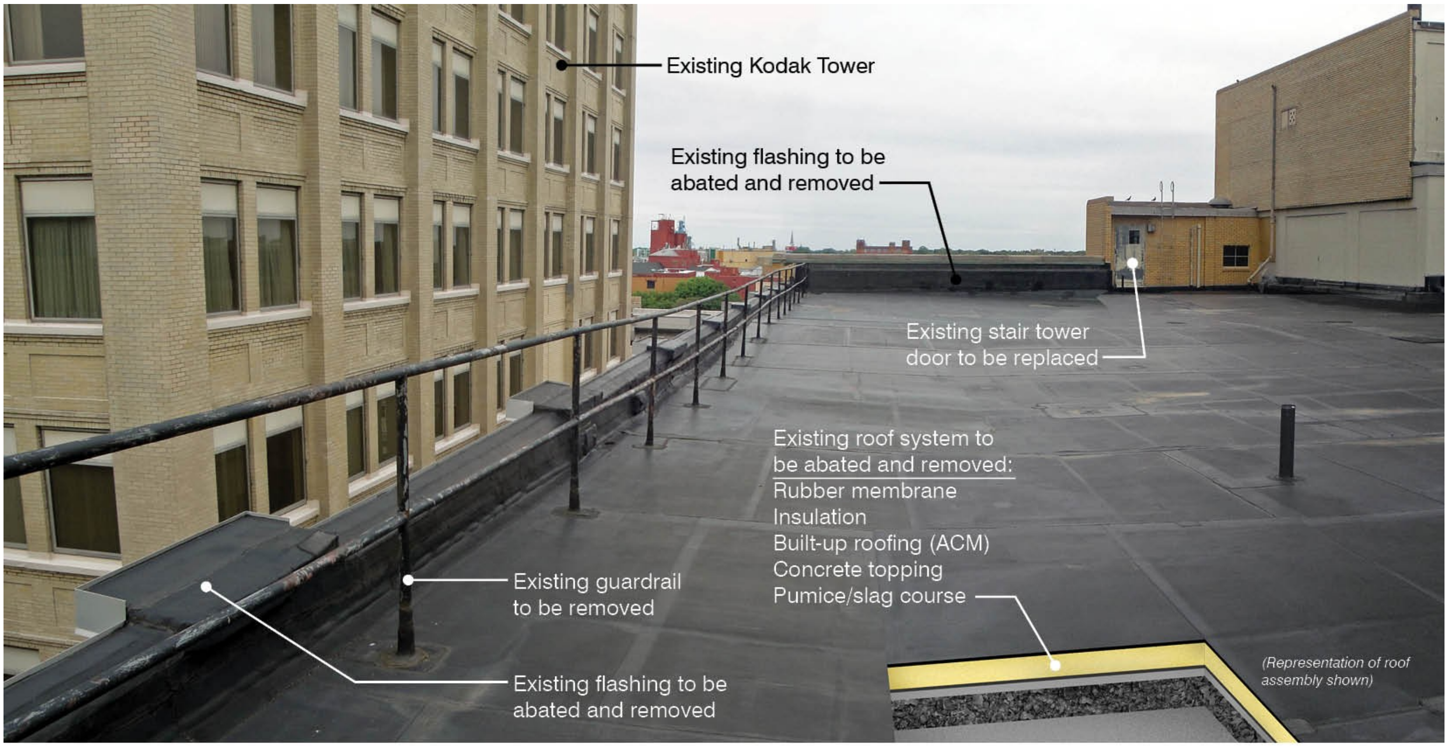


Figure D.17: Building 3. View of existing roof, looking north east. Notes indicate proposed demolition work necessary for installation of vegetated roof system.

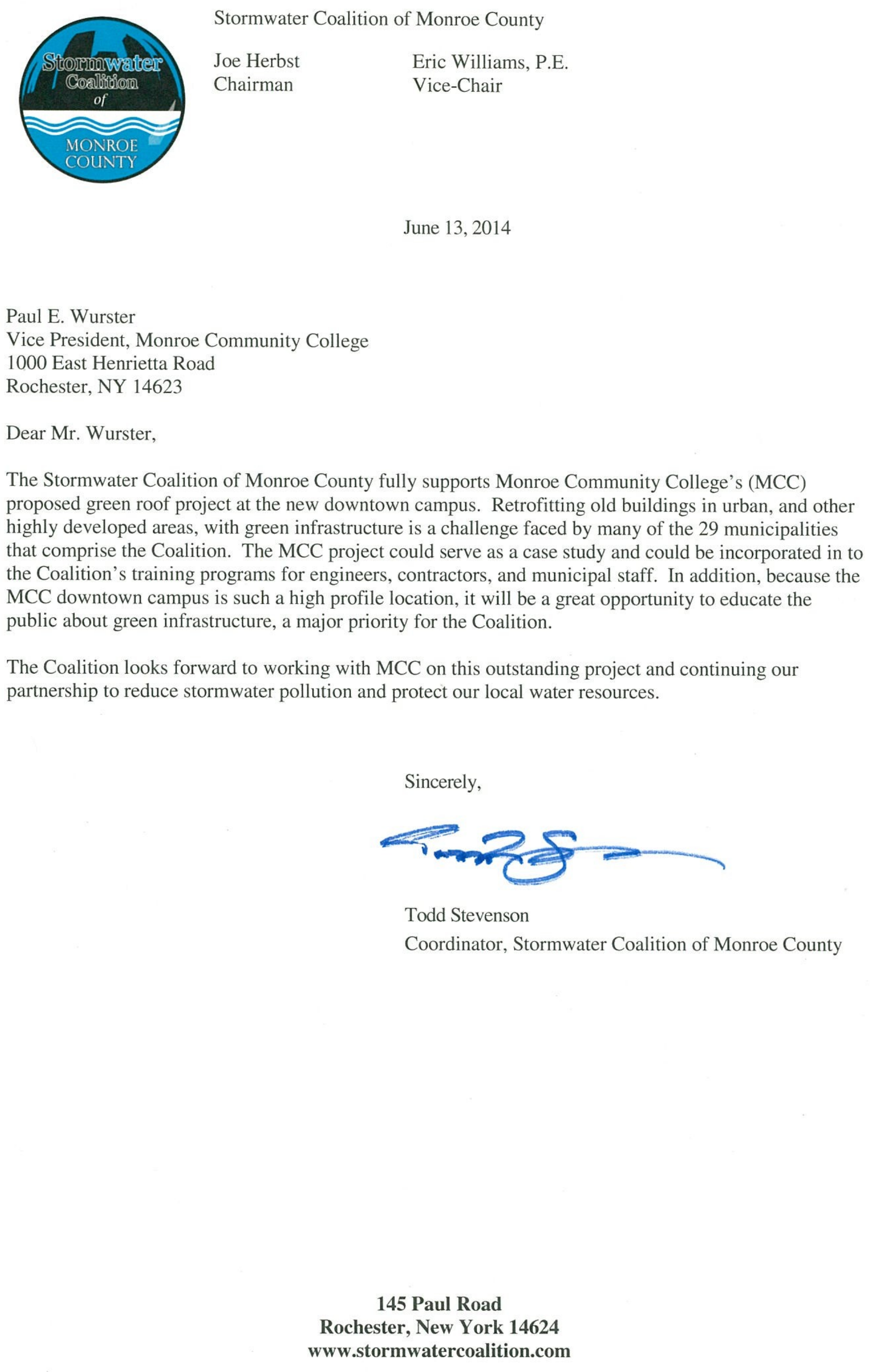
Figure D.18: Building 3. View of roof, looking north east, showing conceptual layout of proposed vegetated roof. Enhancements such as guardrail, lighted bollards, and exit door into stair tower provided in consideration of public roof access.

Figure D.19: Building 16. View of existing roof, looking south west. Notes indicate proposed demolition work necessary for installation of vegetated roof system.

Figure D.20: Building 16. View of roof, looking south west, showing conceptual layout of proposed vegetated roof. Enhancements such as guardrail and lighted bollards provided in consideration of public roof access.

Appendix E

LETTERS OF SUPPORT



Stormwater Coalition of Monroe County

Joe Herbst
Chairman

Eric Williams, P.E.
Vice-Chair

June 13, 2014

Paul E. Wurster
Vice President, Monroe Community College
1000 East Henrietta Road
Rochester, NY 14623

Dear Mr. Wurster,

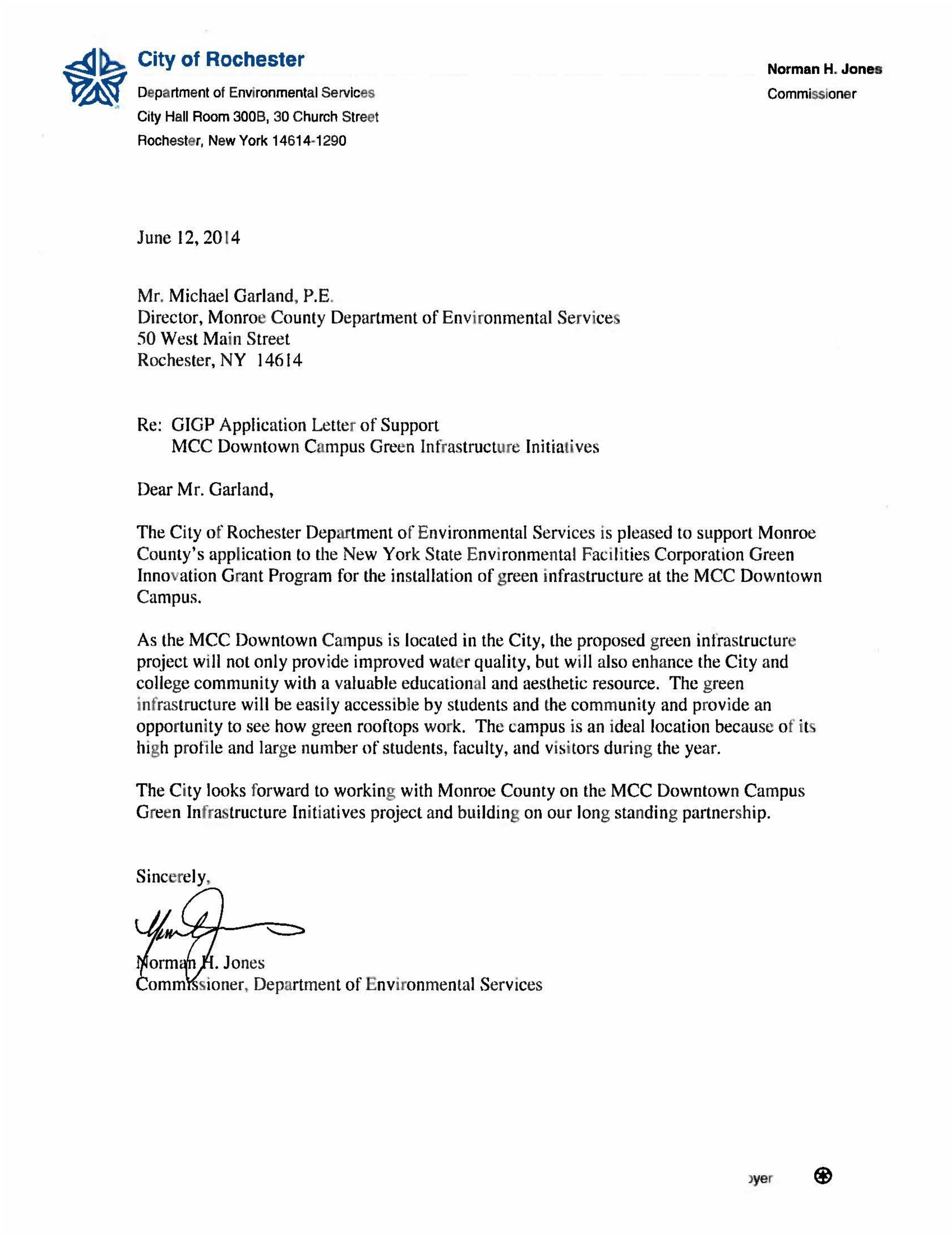
The Stormwater Coalition of Monroe County fully supports Monroe Community College's (MCC) proposed green roof project at the new downtown campus. Retrofitting old buildings in urban, and other highly developed areas, with green infrastructure is a challenge faced by many of the 29 municipalities that comprise the Coalition. The MCC project could serve as a case study and could be incorporated in to the Coalition's training programs for engineers, contractors, and municipal staff. In addition, because the MCC downtown campus is such a high profile location, it will be a great opportunity to educate the public about green infrastructure, a major priority for the Coalition.

The Coalition looks forward to working with MCC on this outstanding project and continuing our partnership to reduce stormwater pollution and protect our local water resources.

Sincerely,

Todd Stevenson
Coordinator, Stormwater Coalition of Monroe County

145 Paul Road
Rochester, New York 14624
www.stormwatercoalition.com



City of Rochester
Department of Environmental Services
City Hall Room 300B, 30 Church Street
Rochester, New York 14614-1290

Norman H. Jones
Commissioner

June 12, 2014

Mr. Michael Garland, P.E.
Director, Monroe County Department of Environmental Services
50 West Main Street
Rochester, NY 14614

Re: GIGP Application Letter of Support
MCC Downtown Campus Green Infrastructure Initiatives

Dear Mr. Garland,

The City of Rochester Department of Environmental Services is pleased to support Monroe County's application to the New York State Environmental Facilities Corporation Green Innovation Grant Program for the installation of green infrastructure at the MCC Downtown Campus.

As the MCC Downtown Campus is located in the City, the proposed green infrastructure project will not only provide improved water quality, but will also enhance the City and college community with a valuable educational and aesthetic resource. The green infrastructure will be easily accessible by students and the community and provide an opportunity to see how green rooftops work. The campus is an ideal location because of its high profile and large number of students, faculty, and visitors during the year.

The City looks forward to working with Monroe County on the MCC Downtown Campus Green Infrastructure Initiatives project and building on our long standing partnership.

Sincerely,

Norman H. Jones
Commissioner, Department of Environmental Services

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