Exterior Renovations,

Fine Arts Building
University of Connecticut
Storrs, CT
28 June 2011

SGH Project 110416

SIMPSON GUMPERTZ & HEGER

Engineering of Structures and Building Enclosures

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28 June 2011

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Project 110416 – Exterior Renovations, Fine Arts Building, University of Connecticut, Storrs, CT

Dear Mr. Libby:

In May 2011, we completed the condition assessment of the Fine Arts Building. Our review focused on the ribbed-concrete-block veneer walls and various fenestrations, the concrete terraces, low-slope built-up membrane roofs, batten-seam metal panel roofs and soffits, and the sloped glazing system. Additionally, we reviewed the existing landscaping, site drainage, and performed a site survey. The attached report provides a summary of our observations, discussion of our findings, and our recommendations for remedial work. Photographs are included in Appendix A.

Overall, we found the following:

- The ribbed concrete masonry unit (CMU) facade typically is in sound condition and requires only minimal repairs to damaged masonry and sealant joints. Repairs are also required at the terrace retaining walls, where we also recommend incorporating a cap flashing to limit water entry into the wall system and providing flashing at the scuppers.

- The facade walls incorporate a backup waterproofing for secondary water management, but the base flashing is damaged. While this limits the functionality of the backup waterproofing system, it does not appear to result in interior damage or significant deterioration of the wall system. For our pricing, we included replacement of the base flashing as an alternate.

- Building fenestrations (windows, doors, and louvers) only require maintenance-type repairs to the doors, insulating glass units (IGUs), sealants, and weatherstripping. Above the main entrance and east elevations louvers, we also noted deterioration of the metal lintels and recommended removal and replacement of the lintels.

- The batten-seam metal panel roofs are worn and require replacement to reliably correct deficiencies. Associated gutters and down leaders are also missing or deteriorated and need to be replaced. The associated gutter and down-leader system should be tied into improvements to the site drainage system to extend the lifespan of the terrace areas.

- The built-up roofs are worn and require replacement. Multiple system options are available for replacement, but EPDM was selected as the basis for design based on the University’s current practice.

- The translucent Kalwall panels (i.e., sloped glazing) are aged and require replacement. Replacing the frame as well as the infill panels will provide an opportunity to provide a secondary drainage system; we priced the system assuming complete replacement of the sloped glazing (panels and frame).

- The terrace and courtyard paving including the sub-base are in poor condition and require replacement. Repairs are currently required to terrace drainage, landscape edging, scupper flashing, and retaining-wall weep holes.

- The parking-lot paving and curbing are in fair condition, but require maintenance to repair damaged curbs and pavement. Such repairs should extend the overall system lifespan. The maintenance-area paving is in poor condition and requires replacement. Repairs are also necessary in this area to improve drainage and to protect building utility connections.

- Concrete sidewalks are generally in fair condition and require maintenance-type repairs to minor cracks, except for full replacement at areas of severe cracking.

- To improve the performance of the existing stormwater management system, we recommend preparation of an Operations and Maintenance Plan. This plan should outline routine inspection and maintenance to the existing system, good house-keeping measures and what improvements are recommended. Maintenance should include cleaning of sumps and further inspection. We also recommend that hoods be placed over all catch-basin outlets and that new catch basins be installed as needed.

- The existing landscaping at the project site is characterized by mature plantings that are in various states of health and decline. Repairs are necessary to provide cohesion to the overall building site plan.

We included pricing for the recommended facade, roofing, drainage, and landscaping repairs. Given the volatility in the current construction market, prices may change. The estimated cost is approximately $2,865,000, broken down as follows approximately $1,801,000 for roof repairs ($1,145,000 for low-slope built-up roofs, $270,000 for batten-seam metal panel roofs, and $386,000 for sloped glazing replacement), $234,000 for masonry repairs, $399,000 for drainage repairs, and $216,000 for landscaping. In addition to the pricing above, we priced one alternate for the replacement of the through-wall flashing at approximately $358,000. If pricing costs exceed the University's current budget, it is possible to phase the recommended repairs, with roof and terrace repairs as the highest priority given their level of deterioration and likelihood of causing related damage if not addressed.

Sincerely yours,

Susan L. Knack-Brown
Associate Principal

Jason S. Der Ananian
Senior Staff I – Building Technology

Paul Alunni
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Table of Contents

Letter of Transmittal

CONTENTS **Page**

1. BACKGROUND 1

2. SUMMARY OF FINDINGS 2
2.1 Interior Observations 2
2.2 Exterior Observations 3
2.2.1 Masonry Facade and Fenestrations 3
2.2.2 Steep-Slope Batten-Seam Metal Panel Roofs 4
2.2.3 Kalwall Panel Roofs 5
2.2.4 Gutters and Down leaders 5
2.2.5 Thermographic Inspection of Low-Slope BURs 6
2.2.6 Low-Sloped Built-Up roofs 7
2.2.7 Site and Drainage 9
2.2.8 Landscape 15

3. DISCUSSION AND CONCLUSIONS 16
3.1 Masonry Facade and Fenestrations 16
3.2 Batten-Seam Metal Panel Roofs 18
3.3 Kalwall Panel Roofs 20
3.4 Gutters and Down Leaders 20
3.5 Low-Sloped Built-Up Roofs 20
3.6 Site and Drainage 21
3.6.1 Terraces 21
3.6.2 Courtyards 23
3.6.3 Parking Lots, Roadways, Sidewalks, and Maintenance Area 24
3.6.4 Stormwater Management System 26

4. RECOMMENDATIONS 32
4.1 Masonry Facade and Fenestrations 32
4.2 Batten-Seam Metal Panel Roof 32
4.3 Gutters and Down Leaders 33
4.4 Low-Sloped Built-Up Roofs 33
4.5 Kalwall Panels 34
4.6 Site and Drainage 35
4.7 Landscaping 36

5. COST ESTIMATE 37

6. REFERENCES 38

APPENDIX

APPENDIX A – Photos
APPENDIX B – Plans
APPENDIX C – Landscape
APPENDIX D – Cost Estimate

APPENDIX E – Gradation Testing Results
APPENDIX F – Scope of Work Submitted to VJ Associates

1. BACKGROUND

The Fine Arts Building is a masonry building constructed in 1974. The building is primarily used as classroom, studio, and office space. The building is comprised of three wings (north, east, and west wings) constructed in a U-shape around a central courtyard (Photos 1 – 7). The south elevation of the building faces Bolton Road, and the central courtyard is accessible from the south elevation (Photo 8). The main entrance is located on the east elevation (Photo 9). The building is typically two stories in height, with an additional basement level partially below grade. The building facade is primarily constructed with ribbed-concrete-block masonry. The building fenestrations include second-floor strip windows, first-floor storefronts, and various doors (Photo 10).

The main roof is a low-slope built-up roof (BUR) (Photo 11), which drains to internal roof drains (Photo 12). Perimeter roofs are steep-slope batten-seam metal panels (Photo 13). The batten-seam metal panel roofs drain to gutters and down leaders at the roof eaves (Photo 14). Art studios located adjacent to the north elevation terrace are clad with steep-slope Kalwall panels with translucent glazing (Photo 15). Various smaller roofs throughout the building include steep-slope Kalwall and batten-seam metal panels (Photo 16).

2. SUMMARY OF FINDINGS

On 10 and 11 May 2011, Vinay V. Badami of Simpson Gumpertz & Heger Inc. (SGH) visited the site and performed an investigation of the facade and roof at the Fine Arts Building. Jason S. Der Ananian of SGH visited the site on 10 May 2011. Susan L. Knack-Brown and Paul M. Alunni, also of SGH, visited the site on 11 May 2011. Laura Knosp of Landworks Studio visited the site on 10 May 2011 to review the existing plantings, and Kevin W. Murphy of Thompson Engineering visited the site on 11 May 2011 to review the existing solar panel installation. For our investigation, we retained a local contractor, Consigli Construction Company, to provide ladder and aerial lift access and to make and repair exploratory openings in the existing building construction.

Our investigation included an infrared (IR) survey of the BUR; an investigation and hands-on survey of the masonry facade (including exploratory masonry openings), fenestrations, and roofing; and exploratory roof openings in the BUR and metal roofs. Lewis Associates of Monroe, Connecticut, performed a site survey and prepared an existing site/topographic plan of the immediate area around the Fine Arts Building, to be provided under a separate cover.

Additionally, we collected four grab samples of the soils below the North Terrace paving to determine the soil gradation. We engaged Geotesting Express, Inc., in Acton, Masschusetts, to perform gradation testing based on ASTM D422 (sieve and hydrometer). The results of the testing are attached in the Appendix E and the location of the test pits is shown on the Key Plan in Appendix B.

We reviewed the architectural drawings provided by UCONN and prepared by A.J. Palmieri, Architect and Associates, P.C., and revised through 21 December 1983 to understand the general existing site conditions. We also reviewed the surficial geology report from the Soil Conservation Service. The report indicated that the soil classification at the project site is “Urban Fill.”

Our investigation did not include water testing of the facade or roofs. Our findings are summarized below.

2.1 Interior Observations

We performed a limited interior survey of the art studios located adjacent to the north elevation terrace; we did not perform a comprehensive building-wide interior survey. We typically found damaged (i.e., missing, delaminated) tile floors directly adjacent to art studio entry doorways along the north elevation terrace (Photo 17). Observed damage to interior finishes related to leakage or other building-envelope defects was otherwise minor.

2.2 Exterior Observations

2.2.1 Masonry Facade and Fenestrations

The masonry facade is ribbed-concrete-block masonry veneer with a drainage cavity, rigid insulation, waterproofing membrane, and backup concrete masonry units (CMU). Overall, the masonry facade is sound, though we noted a number of areas of isolated deterioration. Typical damage in the facade includes the following:

- Isolated mortar-joint deterioration, including missing mortar (Photo 18) and separation between the mortar and surrounding masonry (Photo 19).

- Ribbed-concrete-block veneer is cracked and open at roof-eave intersections with batten-seam metal roof rake flashing (Photo 20).

- In several locations, the terrace side of the retaining-wall contains vertical cracks and displaced concrete and masonry (Photos 21 and 22).

- Existing retaining-wall weeps are filled with soil and debris (Photo 23).

- Numerous locations of minor cracked or spalled ribbed masonry, generally on the east elevation (Photo 24). Masonry spalling typically occurs below weep tubes for interior mechanical equipment (Photo 25).

- Open head joints (i.e., missing mortar) in the stone coping at the retaining walls (Photo 26).

- Abandoned piping and light fixtures in the ribbed-concrete-block veneer (Photos 27 and 28).

- Staining on the ribbed-concrete-block surface, primarily below retaining-wall weeps and scuppers (Photo 29). Staining is also visible on the north and west elevation terraces at the base of masonry walls and on the terrace side of retaining walls (Photo 30).

- Sealant joints in the masonry control joints on all elevations are typically hard, protruding, cracked, or missing (Photo 31).

- Louver perimeter sealant joints (east and west elevation) are hard, cracked, or missing (Photo 32). Louvers are corroded (Photo 33).

- Corroded and damaged exterior doors on the north, south, and west elevations (Photos 34 and 35).

- Surface corrosion on structural steel supporting the masonry above the main building entrance on the east elevation (Photo 36).

- Hard, cracked, and crazed sealant at all strip window and storefront perimeters and frame joints at all elevations on the first and second floors of the building (Photo 37). Several of the insulated glass units (IGUs) are fogged. We noted a date stamp on the IGUs indicating that the units date from 1980.

We made five exploratory openings in the masonry veneer walls on the north and south elevations. The masonry wall assembly consists of the following components (listed from exterior to interior): ribbed-concrete-block veneer, drainage cavity (varies 1 to 1-1/2 in.), rigid insulation (approximately 1 in.), and fluid-applied backup waterproofing applied to a CMU backup wall. We observed the following:

- At the base of masonry walls, fabric through-wall flashing is installed. The flashing extends from the CMU backup wall onto the bed joint above the bottom course of masonry as shown on Drawing 3/A-8 of the original architectural drawings. The flashing bridges the cavity unsupported and does not daylight at the exterior plane of the wall. At the CMU backup wall, the flashing extends vertically approximately 8-1/2 in. and terminates in a reglet. The fluid-applied waterproofing membrane shingles over the top edge of the fabric flashing. The fabric flashing was brittle and discontinuous across the cavity between the masonry veneer and the CMU backup (Photo 38).

- Except on the north elevation, weeps for the masonry veneer are located at the bottom course of masonry, below the elevation of the fabric through-wall flashing (Photo 39). On the north elevation, weeps are located at the same elevation as the fabric through-wall flashing.

- The fluid-applied waterproofing membrane appears to be continuous and well bonded to the CMU backup.

2.2.2 Steep-Slope Batten-Seam Metal Panel Roofs

The steep-sloped roofs are clad with batten-seam metal panels (Photo 40) and have metal rising-wall flashing (Photo 41). At our exploratory opening in the metal roof (west elevation), we found that the existing underlayment is asphalt-saturated felt on plywood sheathing, with asphalt-faced semirigid fiberglass insulation over metal deck. The plywood sheathing was slightly damp to the touch (Photo 42). The metal panels are elevated above the felt by a metal furring, creating an air space beneath the metal panels. At the roof eave, metal soffit vents are installed above doorways. The soffit vents are typically corroded (Photo 43). At the roof ridge, ventilation slots are provided in the Z-closure metal flashing. The felt underlayment terminates short of the roof-eave flashing, resulting in a discontinuity in the water-resistive barrier beneath the metal panels (Photo 44).

On the south elevation, the existing solar hot water heating arrays and associated structural supports are no longer functional, and exhibit significant deterioration. The solar panel frames are broken and some arrays are filled with water (Photo 45).

The metal roofing is generally deteriorated. We observed a number of holes in the panels (Photo 46), and the ends of the batten seams at roof eaves frequently are damaged. On the south elevation below the existing solar panels, the metal panels are heavily stained (Photo 47). On the west elevation, the metal roof contains a transverse; the joint is loose locked with no sealant (Photo 48). Additionally, the west elevation gutter is missing, which results in an open void in the roof assembly at the eave (Photo 49). A patch in the metal roofing on the west elevation is corroding (Photo 48).

Typically, the metal flashing at the rising walls is sound, but relies on sealants for watertightness, which typically are failed. In several locations, the flashing is gapped and displaced from the masonry wall (Photo 50).

2.2.3 Kalwall Panel Roofs

The existing Kalwall panels on the north and south elevations are installed directly over the structural roof framing with no separate structure visible from interior (Photos 51). The Kalwall is a translucent fenestration system whose primary element is a structural composite panel formed by bonding under heat and pressure, a specially formulated fiberglass reinforced translucent face to a structural core. The Kalwall system frame does not include an integral drainage system; however, we understand that there is no reported leakage through the Kalwall system.

The Kalwall translucent panels are in poor condition. Generally, the fiberglass reinforcement within the exterior face of the translucent panel is friable and exposed (Photo 52). Sealant at the frame, joints, and perimeter of the Kalwall system are hard, cracked, and crazed (Photo 53).

2.2.4 Gutters and Down leaders

Water flowing down the metal roof and Kalwall panels is collected in hung gutters along the eaves. The gutters are supported by metal braces fastened back to the roof-eave framing (Photo 54). Gutters are typically in poor condition and the metal braces are corroded. Transverse gutter joints are open and appear unsealed (Photo 55). The north elevation gutter is partially collapsed (Photo 56). On the west elevation, the gutter and down leaders at the metal panel roof eave are missing Photo 57). We also observed a significant amount of debris inside the gutter obstructing drainage on the south elevation (Photo 58).

The down leaders are connected to the gutters and drain to a location below the terrace pavers (Photo 59). Joints in the down leaders are soldered. Down leaders are deformed or broken on the north elevation and are missing on the west elevation (Photo 60).

2.2.5 Thermographic Inspection of Low-Slope BURs

On 10 May 2011, we performed an infrared (IR) survey of the existing low-slope BUR to help identify potential areas of wet roofing and other thermal anomalies. We did not include the metal roofs in the IR survey due to their low emissivity and inability of the IR camera to provide accurate thermograms. The following provides a summary of our observations and findings.

SGH General Inspection Information

- Type of Survey: Ground-based walkover survey
- Thermal Imaging Device: ThermaCAM E50 bx by FLIR Systems Inc.
- Spectral Range of Device: 7.5 to 13 μm
- Emissivity: 0.90
- Date of Survey: 10 May 2011
- Time of Survey: 8:57 p.m. to 10:03 p.m.
- Outside Air Temperature: 54°F, Clear Sky
- Outside Relative Humidity: 66.8%
- Wind Velocity: 10 mph
- Sunset: 8:01 p.m.
- Daytime Weather: Sunny and windy, 65°F
- Precipitation in Prior 24 Hrs: None
- Interior Air Temperature: 73.6°F
- Interior Relative Humidity: 32.5%

Observations

By detecting radiation emitted from surfaces, an IR camera allows the user to visualize temperatures on those surfaces. Roofing materials will absorb heat during the day, primarily due to solar exposure. At night, as solar exposure ceases and air temperatures drop, the roof materials will slowly release the heat that they absorbed during the day. Wet materials, primarily cover board and insulation, will release heat more slowly than dry materials due to the increased heat capacity of water. As a result, the roof surface temperatures in wet locations will remain higher for longer periods of time, with dry locations cooling more quickly. The concept behind IR roof surveys is that visualizing these “warm spots” on the roof will identify approximate locations of wet roofing materials.

Overall, we identified warm areas over a majority of the BURs. See Figure 1 in Appendix B for observed warm spots and photograph locations. The color scale at the right side of the photos listed below show increasing temperatures from bottom to top. We typically observed the following:

- BUR roof materials appear significantly warmer at the tapered insulation crickets aligned with the roof drains (Photos 61 and 62).
- On the east-wing low BUR, roof materials appear significantly warmer adjacent to rising masonry and glass curtain walls (Photos 63 and 64).
- On the west-wing low BUR, roof materials appear warmer at the roof perimeter tapered insulation crickets (Photos 65 and 66).
- On the east-wing high BUR, roof materials appear warmer adjacent to the expansion joint curb between the east and north wings (Photos 67 and 68).
- Isolated warm areas appear near mechanical equipment penetrations on the west-wing high BUR (Photos 69 and 70).

Note that we also observed thermal anomalies at roof patches or coating repairs, membrane surface stains, roof surfaces adjacent to parapets or rising walls, and rooftop-equipment curbs and penetrations, which we expect are not indicative of wet roofing materials.

2.2.6 Low-Sloped Built-Up roofs

General defects in the various BUR roofs are noted below. We utilized the results of our IR survey and observed “warm spots” to select locations for exploratory openings. Refer to Figure 1 of Appendix B for a summary of the exploratory roof openings.

The BUR is visibly worn. In several areas the gravel is displaced, resulting in BUR membrane exposed to UV radiation. We identified numerous soft spots in the BUR, indicative of delaminated BUR or water trapped within the roof assembly. Several areas of the BUR are split allowing water to enter the roof system (Photo 71).

Based on our eight exploratory openings, we found that the building roof typically consists of (from interior to exterior) 1-1/2 in. metal deck, asphalt vapor retarder, 1-1/2 in. polyisocyanurate insulation, 1 to 4 in. of fiberboard depending on location of the opening, and four-ply asphalt impregnated felt set in hot-applied asphalt and covered with gravel as the wearing surface and for UV protection (Photos 72).

All except one of our exploratory openings identified wet BUR components. The wet openings included water-saturated fiberboard and polyisocyanurate insulation (Photo 73). Most of the trapped moisture occurs in the upper layers of fiberboard or insulation, and it does not reach the metal deck. However, the metal deck was wet at two exploratory roof openings. Additionally, we noted multiple previous BUR repair patches in the roof, which were either wet or soft.

The BUR contains various penetrations throughout the field of the roof, including pipe penetrations, roof fan and gooseneck penetrations, and mechanical equipment related penetrations. Typically, the top edge of the BUR flashing is counterflashed by the mechanical equipment, but the exposed flashing is cracked and crazed (Photo 74).

At multiple locations, the roof-edge metal flashing appears to be repaired, resulting in voids and unsealed laps in the flashing (Photo 75). At the base of masonry walls, solder joints in the existing skirt flashing are typically broken (Photo 76). Additionally, we observed hard, cracked surface-applied sealant at the broken solder joints presumably installed to function as a temporary repair. The sealant at these joints are split (Photo 77).

We understand that Independent testing of roofing material samples from the exploratory openings by ATC Associates Inc. show that the BUR field and flashing components are asbestos containing.

2.2.7 Site and Drainage

2.2.7.1 Terraces and Retaining Walls

Two elevated terraces that are located along the north and west face of the building. Cast-in-place concrete retaining walls with 40 in. high parapets surround each terrace. The exterior side of the retaining walls is clad with split-rib CMU veneer. The following summarizes our observations at each terrace.

North Terrace and Retaining Wall

- The terrace-paving slope (less than 1/4 in. per foot) down from the building face to the edge of the parapet wall. Significant settlement of the terrace paving occurs along the perimeter of the terrace adjacent to the retaining wall predominantly in the general vicinity of the scuppers (Photo 78). A line was visible on the retaining-wall parapet, indicating the likely elevation of the terrace paving when it was originally constructed.

- The terrace paving contains control joints located at about 4 ft o.c.

- The difference in ground surface elevation between the low (toe) and high (heel) side of the retaining wall varies from 5 to 11 ft.

- A hung gutter with four downspouts is located at the batten-seam roof eave above the terrace. As previously noted, the gutter is severely damaged and is ineffective with respect to roof run off collection Two 6 in. dia. subsurface piping connections exist at the paving level where gutter downspouts likely once attached. It is unclear where the other two downspouts connected.

- Seven 16 in. wide x 9 in. high scuppers occur through the retaining-wall parapet. The scupper inverts are slightly higher than the top of the finish-grade elevation on the terrace causing water to pond on the terrace paving prior to discharging.

- Consigli performed a 4 ft long x 3 ft wide x 4 ft deep test pit through the existing concrete terrace paving. We extracted soil grab samples from each sub-base layer encountered below the paving and in the frost susceptible zone for soil gradation testing. A test-pit log is provided on the Key Plan in Appendix B and the results of the gradation testing are attached in Appendix E. The terrace consisted of 4 in. thick concrete paving with welded wire reinforced (WWR), above a 1 in. thick seam of silty sand with gravel (12% fines), above a 3 in. seam of silty sand with gravel (20% fines), above a 7 in. layer of silty sand with gravel (16% fines), above a 36 in. layer of silty sand with gravel (30% fines). The WWR was located at the base of the concrete paving.

- Distorted sections of concrete and cracking indicate frost heaving of the terrace paving at several scupper locations (Photo 79). The terrace paving contains several cracks varying in width from about 0.5 to 1.5 in.; in some cases, cracked portions of the paving settled and heaved relative to each other causing tripping hazards.

- The entire terrace-paving surface exhibits minor wear and surface weathering[1] (Photo 80).

- Weep holes are located at the base of the retaining wall on the low (toe) side. Sand accumulated underneath a majority of weep holes.

- Staining from water ponding on the terrace paving is evident at the base of the parapet wall (Photo 81).

- Runoff from the scupper outlets travels overland to catch basins located around the building.

West Terrace and Retaining Wall

- The West Terrace is constructed similar to the North Terrace.

- The West Terrace is generally flat and does not appear to be sloped to effectively drain water collecting on the surface.

- The difference in ground surface elevation between the toe and heel side of the retaining wall varies from 6 to 12 ft.

- Seven 16 in. wide x 9 in. high scuppers occur through the retaining-wall parapet. The scupper inverts are slightly higher than the top of finish grade elevation on the terrace paving.

- Minor settlement of the terrace paving is evident along the perimeter of the terrace adjacent to the retaining wall predominantly in the general vicinity of the scuppers, in some locations at the center of the terrace, and in areas close to the building walls (Photo 82). In some cases the settlement caused tripping hazards.

- The entire terrace-paving surface exhibits minor wear and surface weathering (Photo 83).

- Four 6 in. dia. subsurface piping connections occur at the paving level where gutter downspouts were likely once attached.

- Weep holes are located at the base of the retaining wall on the low (toe) side. Sand has accumulated underneath a majority of weep holes.

- Staining from water ponding on the terrace paving is evident at the base of the retaining-wall parapet, interior portions of the terrace, and at the building wall.

- Ground-light-fixture casings in the terrace paving are missing covers and are full of debris (Photo 84).

2.2.7.2 Courtyards

A courtyard is located in an outdoor alcove with access from the building interior and the southerly side of the building on Bolton Road (see Key Plan in Appendix B). The courtyard is

[1]Surface Weathering – Refer to Reference [2] for definition and summary of damage classification.

comprised of two rectangular areas. Courtyard Area 1 and Courtyard Area 2 are approximately 1,300 sq ft and 2,100 sq ft, respectively. The following is our detailed observations at each courtyard.

Courtyard Area 1

- Courtyard Area 1 consists of concrete paving, small landscape planters, and a landscaped island.
- The area slopes slightly down from the building face to a low point in the center of the courtyard, near an existing drain inlet.
- Settlement of the concrete paving is evident around the landscape island located at the center of the courtyard and at the doorway entrance at the building face on the south side of the courtyard creating low areas with no apparent drain inlet (Photo 85).
- The concrete paving settled about 1 to 1.5 in. at the northwest corner of the courtyard creating a tripping hazard (Photo 86) and an area with poor drainage.
- A drain inlet with an 8 in. dia. reinforced concrete pipe (RCP) outlet is located in the courtyard. The sump is completely full and 2 in. of sediment, debris, and/or organic matter obstructs about 25% of the discharge pipe.
- Landscape edging is missing around the landscape island causing organic matter from the landscaped island and other miscellaneous debris to spread throughout the courtyard (Photo 87).
- Staining from ponded water is evident along the base of the building facade (Photo 88).

Courtyard Area 2

- Courtyard Area 2 consists of concrete paving, a center landscape island, and landscape planters around the perimeter of the courtyard adjacent to the building face.
- The courtyard slopes slightly in two directions. A portion of the area (approximately 1,000 sq ft) slopes to a low area along the building face at the east side of the courtyard; no drain inlet was apparent at this low lying area. The remaining portions (approximately 1,100 sq ft) of the courtyard is sloped toward drain inlets located along the south edge of the courtyard and a drain inlet in a landscaped island in the southeast corner of the courtyard.
- Settlement of the concrete paving occurred creating a low section along the building face at the east end of the courtyard. Staining from ponded water is evident at the base of the building facade (Photo 89).
- The drain inlet in the landscaped island (southeast corner of the courtyard) is full of sediment, debris, and/or organic matter and obstructs a majority of the discharge pipe.
- Landscape edging is missing around the landscape island causing material from the landscaped island to spread throughout the courtyard (Photo 90).

- Portions of the courtyard paving are pitched to low points at the east building face with no apparent inlets.

2.2.7.3 Parking Lots, Roadways, Sidewalks, and Maintenance Area

The following summarizes our detailed observations of the parking lots, roadways, and walkways that surround the building.

North Parking Lot and Coventry Road

- The North Parking Lot consists of bituminous concrete paving with concrete curbs.

- The parking area slopes from a high point located in the east corner of the parking lot (in the vicinity of the handicap parking spaces) toward the northwest. Catch basins are not installed in the parking lot.

- Several sections of concrete curbing particularly in the east corner are deteriorated (Photo 91). This section is noted as NP-C1 on the Key Plan in Appendix B.

- A section of concrete curbing in the northeast section is damaged and the steel reinforcing is exposed (Photo 92). This section is noted as NP-C2 on the Key Plan in Appendix B.

- The majority of the concrete curb along the north side of the building (approximately 160 lf of curbing) is severely deteriorated (Photo 93). This section is noted as NP-C3 on the Key Plan in Appendix B.

- A section of concrete curbing in the center island of the Coventry Road cul-de-sac is deteriorated (Photo 94). This section is noted as NP-C4 in the Key Plan in Appendix B.

- Low to medium-severity block cracking[2] occurs throughout the entire parking lot.

- Low-severity alligator scaling[3] occurs in two sections of the main drive aisle parallel with the building face. These sections are noted as NP-P1 and NP-P2 on the Key Plan in Appendix B.

- Medium-severity alligator scaling occurs in the westerly parking aisle. This section is noted as NP-P3 on the Key Plan in Appendix B.

- A 10 ft x 30 ft pavement patch is located in the vicinity of NP-P3 (Photo 95).

- The catch-basin sumps in the cul-de-sac are filled with sediment, debris, and organic matter.

- The concrete sidewalk along the north side of the building contains low-severity cracks (less than 1/2 in.) in multiple locations. In addition, we noted a few medium-severity (between 1/2 to 1 in.) and high-severity (greater than 1 in.) cracks. Surface distress and deterioration occurs at several locations.

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[2]Block Cracking – Refer to Reference [2] for definition and summary of damage classification.
[3]Alligator Scaling – Refer to Reference [2] for definition and summary of damage classification.

- Several sidewalk panels and handicap access ramps surrounding the cul-de-sac at the end of Coventry Road contain joint spalling at the paving expansion joints and exhibit medium-to-high-severity cracking (Photo 96). This section is noted as NB-S1 on the Key Plan in Appendix B.

- Several sidewalk panels at the northwest corner of the building exhibit notable signs of distress, multiple low-severity cracks, and a few medium-severity cracks (Photo 97). This section is noted as NB-S2 on the Key Plan in Appendix B.

- Multiple low-severity cracks occur along the length of the sidewalk at the north building face. This section is noted as NB-S3 (Photo 98) on the Key Plan in Appendix B.

- Low-to-medium-severity cracks and deterioration of the expansion joints in the paving occur at the loading dock for the Nafe Katter Theatre House (Photo 99).

West Parking Lot and Main Access Drive

- The west parking lot consists of bituminous concrete paving with concrete curbs.

- The west parking lot slopes from a high point located in the south corner of the parking lot (adjacent to Bolton Road) toward the north. Multiple catch basins are located along the curb line between the parking lot and the Main Access Drive.

- Low-severity block cracking occurs throughout the entire parking lot.

- A section of concrete curb is broken at the parking-lot entrance (Photo 100). This section is noted as WP-C1 on the Key Plan in Appendix B.

- Sections of concrete curbing with minor chips and deterioration occur at the north portion of the parking lot (Photo 101). This section is noted as WP-C2 on the Key Plan in Appendix B.

- Sections of concrete curbing with several minor chips, slight weathering, and deterioration (Photo 102). This section is noted as WP-C3 on the Key Plan in Appendix B.

- Pavement exhibits low-severity bumps[4] and sagging around the catch basin in the north portion of the parking lot (Photo 103). This area is noted as WP-P1 on the Key Plan in Appendix B.

- Bituminous pavement exhibits medium-severity cracking at the parking lot entrance (Photo 104). These sections are noted as WP-P2 on the Key Plan in Appendix B.

- A medium-severity pothole with low-severity cracking occurs at the parking-lot entrance (Photo 105). These sections are noted as WP-P3 on the Key Plan in Appendix B.

- Medium-severity cracking occurs at the south end of the parking lot (Photo 106). These sections are noted as WP-P4 on the Key Plan in Appendix B.

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[4]Bumps – Refer to Reference [2] for definition and summary of damage classification.

- Low-severity bumps and sagging[5] occurs in the bituminous pavement along the curb edge. This section is noted as WP-P5 on the Key Plan in Appendix B.

- Low-severity alligator scaling of the bituminous pavement occurs in the Main Access Drive at the entrance to the West Parking Lot (Photo 107). This area is noted as WP-P6 on the Key Plan in Appendix B.

- Low-severity block cracking of the bituminous pavement occurs in the Main Access Drive. This area is noted as WP-P7 on the Key Plan in Appendix B.

- Medium-severity alligator scaling occurs in the Main Access Drive. This area is noted as WP-P8 on the Key Plan in Appendix B.

- Overall, the sidewalks and ramps along the west and south building facade are in good condition with minor low-severity (less than 1/2 in.) cracks in very few locations.

- Catch basins are in good structural condition. Oil was evident in sumps of catch basins located in the west parking lot. Catch-basin sumps in the parking lot and access drive contain sediment, debris, and organic matter.

Maintenance Area

- Low-severity alligator scaling and small amounts of vegetation growing through the paving occurs throughout the maintenance area (Photo 108).

- Two existing bollards next to the gas meter exhibit significant damage

- Trash and debris cover the existing catch-basin inlet grate (Photo 109).

South of Building and East Corridor

- The concrete curbing, sidewalks, and patios to the south of the building and the concrete corridor between the building and the Nafe Katter Theatre Building appear to be in good condition with very few chips and low-severity cracking (less than 1/2 in. wide).

- A majority of surface runoff from the sidewalks and landscaped areas in the east corridor, between the building and the Nafe Katter Theater Building, collect in two catch basins located in the Coventry Road cul-de-sac. This system drains to the north (toward Mirror Lake).

2.2.7.4 Stormwater Management System

The following summarizes our observations and understanding of the existing local stormwater management system(s):

- Catch basins and buried storm drain piping at the west and south elevations collect the surface runoff from the sidewalks and landscaped areas immediately adjacent to the building face. This portion of the site drainage system connects to an existing 48 in.

[5] Sagging – Refer to Reference [2] for definition and summary of damage classification.

dia. RCP located in the west parking lot. The RCP appears to flow to the north likely to a discharge at Mirror Lake.

- All catch basins appear to be in good structural condition and contain a shallow sump. However, we were unable to observe the condition of or measure the depth of sump because the catch basins contain sediment, debris, and organic matter. Grates in landscaped islands are flush with the finished grade.

- The two existing trench drains located to the south of the building contain sediment, debris, and organic matter obstructing the outlet pipe.

The majority of surface runoff from each parking lot (north and west within 100 ft of the building) collects in multiple catch basins located west of building and discharge to the aforementioned 48 in. dia. RCP (toward Mirror Lake).

2.2.8 Landscape

Landworks Studio evaluated the existing landscape surrounding the UCONN Fine Arts Building. Overall, they found that the overall site plan lacks cohesion and does not provide character or identity for the Fine Arts Building. Additionally, the landscape planting does not provide screening or shading for patio areas, and existing plantings need to be evaluated by a certified arborist to determine the health of the plantings. Poor drainage also contributes to erosion and damage to existing plantings. See Appendix C for Landworks Studio's full report and recommendations.

3. DISCUSSION AND CONCLUSIONS

In general, the building systems are original construction and have typically met or exceeded their life (in service now for thirty-seven years). Overall, the building's construction met the design and construction standards for 1970s buildings and the general intent of the 1974 design drawings. While system improvement are recommended below (ex. inclusion of flashings to keep water out of the wall system), we saw no systemic defects that will be detrimental to the long-term performance of the building, assuming that repairs are performed to address worn and aged components and to upgrade isolated areas.

Specific conditions are discussed below.

3.1 Masonry Facade and Fenestrations

Masonry Veneer

The building walls are constructed as a cavity wall system, with a veneer of ribbed concrete block, waterproofing, flashing, and insulation in the air space between the veneer and backup masonry. This system is designed to manage water in the wall system; the exterior veneer screens the rain and the backup waterproofing and flashing is meant to collect water that penetrates through the masonry facade and drain it back to the exterior. For a cavity wall system to function well, the veneer should be free from cracks, openings, or unsealed joints which will allow a greater volume of water into the wall system. In addition, an air cavity is incorporated into the system to allow water to flow through the system and limit wetting of the backup waterproofing. As cavity wall systems incorporate redundant design features to manage water, they have long-term durability.

The masonry facade at the Fine Arts Building is generally in good condition. We observed a number of defects in the masonry veneer, including isolated mortar deterioration, displaced or damaged ribbed concrete block, cracking, water staining, and efflorescence. These defects in the building walls are isolated and require pointing or replacement of isolated ribbed concrete block to limit the amount of water that bypasses the masonry veneer.

One systemic deficiency, we observed is with the base of wall flashing and weeps. The weeps are typically incorrectly located below elevation of the through-wall flashing, except on the north elevation and at low built-up roofs, where weeps are correctly installed at the through-wall-flashing elevation. Lack of sufficient weeps above the flashing level can result in water ponding on the through-wall fabric flashing, which in turn can result in water bypassing flashing joints or other defects. Our exploratory openings also revealed the condition of the waterproofing membrane and through-wall flashing within the masonry wall cavity. The backup waterproofing appeared continuous and well bonded to the backup wall; however, the through-wall flashing, which was constructed with a thin, flexible fabric material, was embrittled and discontinuous and does not daylight. In addition, fabric flashing typically lacks end dams and relies on sealant at joints and terminations for watertightness. As a result, it is ineffective at draining water from the wall cavity. Our interior survey did not indicate widespread water damage at the base of masonry walls, which suggests that missing weeps and flashing defects are currently not a significant source of water leakage to the interior, but we did see more widespread masonry staining at the base of wall, which could relate to water bypassing the flashing and soaking the wall below.

More-effective through-wall flashing is constructed with sheet metal that extends from the backup wall to the face of the veneer and terminates with an exposed drip edge. Metal flashings can easily span the cavity, are less prone to damage during installation and are more durable, can be soldered watertight (if a copper or stainless steel material is selected) to provide more reliable joints, can be formed to create end dams, and can be daylighted to prevent water from wrapping around the end of the flashing and running back into the wall system. Providing a slight outward slope to the horizontal part of the flashing to promote drainage and avoid ponding further enhances the flashing's reliability and durability.

The other widespread deficiency is with the sealant in masonry control joints and around fenestration perimeters. Most of this sealant is in poor condition and will admit water into the cavity and increase the risk of interior leakage and associated masonry damage. Replacement of the sealant joints will improve the overall performance of the cavity wall system. Note that given the age of the building, it is possible the sealants contain hazardous materials. This material was not tested when we were on site and we are not aware if the University has previously tested; testing will be required before replacement work is implemented.

Retaining Walls

The most-extensive masonry damage occurs at the retaining walls. On the terrace side of the retaining walls, the concrete is heavily stained and is cracked in numerous locations. Scuppers and weeps in the retaining wall contain gaps between the ribbed concrete block and backup wall allowing water to enter the wall cavity, exacerbating the efflorescence and masonry staining below. At retaining walls, exploratory openings revealed a lack of backup waterproofing within the wall cavity and no system to drain out water that enters the wall. Furthermore, open skyward-facing head joints in the coping at the top of wall readily allow water to enter the cavity and wet the backup wall and masonry veneer. We observed efflorescence and staining caused by water draining from the scuppers and weeps and by uncontrolled water entering the retaining-wall cavity.

To prolong the lifespan of the wall, flashing should be provided to limit the amount of water that enters the wall system. One approach is remove the coping and install a continuous sheet metal flashing beneath the coping and a prefabricated, soldered sheet metal liner in the scuppers to prevent water from entering the wall cavity below.

In addition to the improvements listed above, routing and sealing cracks in the terrace side of the retaining wall will reduce water infiltration and subsequent damage.

Fenestrations

Typically the windows are worn but appear to be functioning, though perimeter and glazing sealants are deteriorated. In addition, we noted some fogged IGUs, which are caused by condensation collecting between the lites of glass due to failure of the hermetic seal. The typically lifespan for IGUs is approximately twenty to thirty years; based on the one date stamp observed the IGUs are approximately thirty years old, and we therefore anticipate that additional fogging will begin to occur in other lites as well. We did not observe weeps at the windows, which are generally recommended to control water that enters the window system over time and to prolong the life of the IGUs by preventing water from ponding against the seal at the spacer between lites. We did not see staining around the interior of windows though to indicate that leakage through the windows is a significant problem.

Several louvers and exterior doors have some corrosion. These will continue to corrode unless they are refinished and painted. At exterior doors, the door thresholds and perimeter gaskets have failed allowing water infiltration and damage to interior floor finishes.

3.2 Batten-Seam Metal Panel Roofs

The perimeter roofs are coated batten-seam roofs constructed with metal panels installed between battens with an air space and underlayment between the metal panels and the top of the roof deck below. This type of roofing system is a water-shedding system that relies on proper roof slope to drain water from the roof. Inlet vents at the eave and outlet vents at the ridge provide ventilation air between the underside of the metal panel and the roof underlayment. The shed-lapped asphalt-saturated felt underlayment below acts as a water-resistant backup membrane that serves to protect the roof deck and provides a drainage plane to control incidental water leakage.

Critical for a water-shedding system such as the batten-seam roof is for water to quickly drain from the system and to not pond on either the metal roofing or the underlayment. Ponded water due to either poor roof slope or ice-damming effects can travel through seams and terminations. Providing a self-adhered membrane underlayment at roof eaves and other areas of potential ice damming can provide some additional redundancy as the seams are more resistant to water infiltration. Gutters at the roof eaves can exacerbate the risk of ice dams by allowing snow/ice to accumulate instead of sliding off the roof assembly, and it is therefore critical to manage the amount of snow that accumulates at the eave by providing snow guards or fences and to also provide proper slope to drain in the gutters.

The batten-seam metal panel roofs, and soffit areas are generally deteriorated, and water has multiple paths through the metal roofing. Gutters and down leaders are missing or are inadequately supported. The metal roof lacks snow guards to control snow from sliding off the roof. Additionally, we identified numerous holes in the metal panels, consistent damage to the batten seams, and staining on all elevations. The batten-seam metal panel gable ends include a rake flashing at masonry walls. At the roof eave, the rake flashing is typically damaged and the adjacent ribbed concrete block is cracked and displaced, allowing water to enter the masonry wall cavity. Defects at the rake flashing also include holes, gaps, and joints, which rely on sealant to remain watertight. The sealant joint along the head of the metal panel system is also cracked and crazed. Once water bypasses these various defects, water is wetting the decking below because of the discontinuity in the felt underlayment at the eave, which prevents the system from reliably draining any incidental leakage. Self-adhered membrane underlayment is not installed at the eave to provide additional ice-damming protection. Reliably correcting these deficiencies requires replacing the roof system; when the roof system is replaced, improvements in snow management and underlayment can be incorporated.

Replacing the roofs will require removing the existing solar hot water heating arrays mounted on the batten-seam metal panel roof. As these are not functional and are deteriorating, they need to either be replaced or the system abandoned. We understand that the University wishes to eliminate the system.

3.3 Kalwall Panel Roofs

The existing Kalwall panels are in poor condition. On most panels, the fiberglass-reinforced panels are severely weathered due to prolonged UV exposure and perimeter and glazing seals are hard, crazed, or cracked. The minimum level of repairs should include replacing the panels and the related glazing and perimeter seals. The panels can be replaced with a similar translucent panel or with IGUs (if different light levels are desired).

When the Kalwall panels are replaced, there is an opportunity to upgrade the system. Currently, the system lacks a secondary drainage system in the Kalwall framing. Modern skylights typically incorporate secondary drainage channels that collect incidental leakage and condensation and drain it to the exterior through weeps and a sill flashing. If the system lacks these provisions, it relies on the exposed sealants to remain weathertight and must be maintained more frequently to remain functional. Replacing the framing in addition to the panels provides an opportunity to introduce redundancy into the system.

3.4 Gutters and Down Leaders

The gutters and down leaders are in poor condition (deteriorated joints, and partially collapsed sections) or are missing. Damage is attributable to sliding snow, water, and ice accumulation in the gutters and to inadequate anchorage to resist the forces. Debris collecting in the gutters further hampers gutter performance by impeding drainage. Addressing this requires replacing the gutters and down leaders with a system that is designed to resist the anticipated forces. In addition, snow guards or snow fences should be incorporated to control snow and ice from sliding off the roof. The work needs to be coordinated with the overall repairs at the batten-seam roofs and with upgrades to the terrace drainage (discussed below).

A consequence of the poor gutter condition is that water now flows off the roof and saturates the wall below, which can cause water staining and deterioration of the terrace and masonry walls below. Repairs therefore will improve both the wall and roof performance.

3.5 Low-Sloped Built-Up Roofs

The existing built-up roof (BUR) is worn with water trapped in the system. We noted deterioration both in the field of the roof and at perimeter and penetration flashing. While we understand that the University has not reported leakage on the interior, based on the widespread severity of the deterioration, we conclude that this roof is at the end of its useful service life and should be replaced. Patching the existing roofing is not likely to be successful given the overall condition of the roof. We recommend that the existing roof system is fully removed when the roof is replaced to remove wet materials; removal will require compliance with government regulations related to the abatement of hazardous materials based on the test results reported by the University testing agency.

Numerous options are available for low-slope roofing materials, including EPDM, PVC, modified-bitumen, and built-up roofs. The most-appropriate roof selection depends upon issues of costs, durability, puncture resistance, application logistics, etc.; we would advise selecting a roof system after discussing these issues with you. We understand that the University's standard is a fully adhered EPDM roof system, and we used this system as the base system for pricing.

A replacement adhered membrane roofing system may be subject to new "low VOC" requirements that go into effect this summer in the state of Connecticut. The new law restricts the volatile organic compound (VOC) emissions of common construction materials, including roofing adhesives and primers. As a result, the manufacturers may need to change their existing formula to meet the new restrictions. Within the last ten years, some manufacturers have developed "low VOC" formulations to meet other state VOC restrictions, and these materials may be suitable for use here. The long-term performance of the existing and new formulations of "low VOC" products is generally untested and unknown. Careful research of the manufacturer's published laboratory testing data and investigation of the performance of currently installed roofs with the new materials should be an integral part of the selection of a new roofing system.

3.6 Site and Drainage

3.6.1 Terraces

North Terrace

The concrete paving for the North Terrace, particularly in the proximity of the retaining wall, is in poor condition. The damage is mainly due to poor drainage and poor base materials below the terrace paving. The primary causes of the poor condition and possible solutions to remediate the issues include the following:

- **Lack of Functional Roof Gutters:** The gutter is significantly damaged and the roof runoff currently overflows the gutter onto the terrace. This significantly increases the volume of water flowing onto the terrace and burdens the existing drainage system. The gutter should be replaced (see roof discussion and recommendations), and the leaders should be connected to the existing buried stormwater system. It is unclear where this buried piping system drains into; video inspection and tracing is necessary to confirm the discharge location and to determine if the piping system is serviceable. Installing cleanouts at all connections and bends in the buried piping system will allow for maintenance of this system.

- **Lack of Drainage Inlets at Paving-Surface Low Points:** It appears that the terrace paving settled relative to the scupper elevations through the retaining-wall parapet. The settlement was likely due to the immediate settlement and consolidation of the original base materials and retaining-wall backfill shortly after being installed. Settlement of paving caused surface water to pond to the elevation of the scuppers (2 in. in some cases) prior to discharging; stains along the base of the retaining-wall parapet confirm the ponding condition. Typically when scuppers are used to drain a terrace they are set in small depressions and the paving is locally depressed to accommodate for settlement of the surface and maintain the low point at the scupper. This detail was not used. There are two options for addressing the drainage: cutting larger holes in the retaining wall to lower the scuppers, or adding area drains at new low points in the terrace paving. Providing area drains provides immediate surface drainage and can be connected into the stormwater system through new buried piping. If drains are providing, the scuppers may remain to function as overflow drains.

- **Frost Heaving:** The test pit through the terrace paving revealed several frost susceptible and poorly draining sub-base materials. We confirmed the materials in the 4 ft approximate frost zone have a “medium” frost susceptibility rating based on the gradation test results (see Appendix E) and Reference [1]. The poor drainage of the terrace surface outlined led to additional water infiltrating the base and increased the potential for frost heave. Removing and replacement base materials will reduce the risk of frost heave of a new terrace. One option to reduce the depth of removal of the existing unsuitable materials is to install a layer of insulation with suitable materials above to limit the frost-depth penetration.

- **Terrace-Base Erosion through Retaining-Wall Weeps:** A small pile of sand (i.e., fines) was located below many of the weep holes. Water that penetrates the terrace paving currently flows through the backfill and exits the weep holes carrying some of the fines with it. The loss of sub-base and retaining-wall-backfill materials likely increased settlement of the terrace paving at the weep-hole locations. Excavating at each weep hole and installing a geotextile fabric with crushed stone will prevent migration of fines and loss of material.

Once the items above are corrected the terrace paving should be replaced; during replacement, the surface should be sloped at a minimum of 1/8 in. per foot slope. The new terrace paving will need to be incorporated with proposed landscaping modifications.

West Terrace

The concrete paving at the West Terrace is in fair condition and slightly better than the North Terrace, but requires repair. We recommend that an approach similar to that outlined above for the North Terrace be considered to provide a long-term service life and minimize future maintenance. In addition, the terrace ground-light fixtures should be replaced. We do not know if these are currently used and connected to a power source; however, we suspect it is prudent to replace the wiring and conduits during the terrace-paving replacement.

3.6.2 Courtyards

Courtyard Area 1

The concrete paving at Courtyard Area 1 is in poor condition. The primary causes of the poor condition and the possible solutions to remediate the issues include the following:

- **Settlement of the Concrete Paving and Poor Drainage:** Settlement of the concrete paving is apparent which has caused 1 in. depressions with no drain inlets in the areas around the landscaped island and along the building wall at the north side of the courtyard; stains on the building facade confirm water ponds in these locations. The courtyard paving should be replaced. During replacement, the sub-base should either be replaced or regraded depending on if it is suitable non-frost-susceptible material. The surface of the paving should slope to the catch-basin inlet at a slope of not less than 1% and not greater than 2%. In addition, the existing drain inlet sump should be cleaned, and the frame and grate reset to match the new paving surface.

- **Landscape Edging is Missing around the Landscape Areas:** The landscape material easily spreads throughout the courtyard clogging the inlet drain sump. A curb or edging should be installed to prevent the migration of material throughout the courtyard.

Again, this courtyard work will need to be incorporated into the final landscaping plan.

Courtyard Area 2

The concrete paving at Courtyard Area 2 is in fair condition. Settlement of the concrete paving, poor drainage, and missing edging are contributors to the poor performance similar to Courtyard Area 1. In particular, the area of the paving near the east side of the courtyard is not appropriately sloped to drain. A new drain inlet should be installed in this area since it does not appear the final grade can be sloped to achieve positive drainage to the existing drain inlet.

The remaining portions of the concrete paving for this area appear to be in good condition and properly drained; however, we recommend replacing the entire concrete paving since the majority of the area will require replacement. During the replacement, the base materials should be evaluated for their frost susceptibility.

3.6.3 Parking Lots, Roadways, Sidewalks, and Maintenance Area

North Parking Lot and Coventry Road

The curbing is in fair condition; however there are several sections of concrete curbing that are in poor condition, and in some cases, completely deteriorated. Deterioration can be caused by environmental factors, unsuitable concrete materials, and construction methods. Intact curbs are needed to control water runoff and traffic as well as provide a separation to landscaped areas. The following curb repairs are needed:

- The deteriorated curb sections noted as NP-C1, NP-C3, and NP-C4 and the section with medium-to-high-severity cracking noted as NP-C2 should be replaced with reinforced extruded concrete curbs or precast-concrete curbing (see Appendix B). If the pavement is flat enough the new curbs can be bonded to the existing pavement using an approved concrete to asphalt adhesive or a two-component epoxy. If the existing pavement is not flat enough the pavement can be removed and replaced locally to accept the new curb sections. At all new curbing, a control joint should be installed every 9 ft to allow for shrinkage during curing.

- Repair all curb sections with “low severity” cracks (less than 1/2 in.). The repairs should include cleaning to remove all dust, loose concrete, and grease/oil prior to being filled with cement grout or patched with concrete as necessary.

The bituminous concrete pavement in the parking lot is in poor condition. The entire paved area of the parking lot extends beyond the requested focus of our investigation; however, we observed low-to-medium block cracking throughout the parking lot. The inadequate grading of the parking lot, lack of routine maintenance, and poor stormwater management all likely contributed to the poor performance. Several low points exist throughout the parking lot, causing areas of ponded water and/or icing after rainfall events or snow melt. This ponded water allows water to easily infiltrate into the base materials, increasing the likelihood and magnitude of frost heaving. Regular maintenance and repair of a parking lot can also extend the service life as well as be beneficial to driver comfort, safety, and stormwater pollution prevention. Maintenance items such as crack sealing appears infrequent; therefore, water readily enters into the base materials. Several core samples of the pavement section should be performed to determine if a pavement overlay or full-depth reconstruction is necessary if the repairs to the parking lot are pursued. In addition, the testing should include several test pits to confirm whether the sub-base is acceptable. The following options should be considered depending on the outcome of the pavement and base testing:

- **Pavement Overlay:** If a pavement overlay is determined adequate, we recommend repairing the entire parking lot at the same time. Partial full-depth reconstruction may be needed in some areas to regrade several poorly draining areas.

- **Full-Depth Reconstruction:** If full-depth reconstruction is required, we recommend regrading the entire northerly parking lot to effectively shed water to existing catch-basin locations. We also recommend replacing all concrete curbing and adding a catch basin at the low point in the vicinity of NP-P3. Grading and surface treatment in the vicinity of the handicap parking spaces should be in compliance with all federal and state regulations.

The bituminous concrete pavement for Coventry Road is in fair condition. We suggest repairing the few sections of low-severity cracks that exist along the edging for the cul-de-sac center island and outer curb edges to prevent further damage to the surface. Also, a small section of curbing around the cul-de-sac exhibits deterioration; we suggest replacement of this section of deteriorated curb.

The concrete sidewalk along the north side of the building, and around the Coventry Road cul-de-sac contains low-severity cracking (< 1/2 in.), medium-severity cracking (between 1/2 to 1 in.), some high severity (greater than 1 in.), and several signs of surface deterioration. Deterioration can be caused by environmental factors, unsuitable concrete materials, and construction methods. The damaged concrete sidewalk sections should be replaced.

West Parking Lot and Main Access Drive

The West Parking Lot is in fair condition. The curbs are in need of minor repairs and replacement; there is a broken curb section (WP-C1) and several curb locations with minor chips and slight deterioration (WP-C2 and WP-C3). The damaged curb sections likely occurred due to a combination of vehicular traffic, snow removal operations, and/or environmental factors. The curbs should be repaired similar to the repairs outlined for the North Parking Lot.

The grading and drainage system in the West Parking Lot appears to be performing well; however, there are multiple areas of medium-severity block cracking, a medium-severity pothole, and sagging in the pavement which require repair. The areas of damage extend beyond the requested focus of our study; however, we recommend that the entire parking lot be repaired at the same time. A core sample and test pit should be performed to confirm if a pavement overlay/patching is adequate or if full-depth reconstruction is needed. The main access drive along the west face of the building is in fair condition. There are several sections of low-severity block cracking and alligator scaling of the bituminous pavement around the entrance to the West Parking Lot that will require repair. The damaged pavement sections likely occurred over time from vehicular traffic, environmental factors, and lack of maintenance.

The sidewalks and ramps on the west side of the building are in good condition with low-severity (less than 1/2 in.) cracks in a few locations; adequate drainage appears to exist at these locations.

Maintenance Area

The existing bituminous paving in the maintenance area is completely deteriorated. Vegetation is growing through the pavement surface and rutting, sagging, and cracking are present throughout the area. In addition, several large items of trash and debris surround the existing catch basin, which can be a source of pollutant load to the stormwater system. The pavement system requires full-depth reconstruction and the base materials should be evaluated for reuse prior to repairs. The drain inlet appears serviceable and should be cleaned. The frame and grate should be reset during the pavement repairs. The damaged bollards around the above-ground gas line should also be replaced to prevent a vehicular impact with the gas line and a concrete pad should be installed at the dumpster area to prevent damage due to the heavy loads and truck traffic.

South of Building and East Corridor

The sidewalks and ramps on the east and south sides (along Bolton Road) of the building are in good condition with low-severity (less than 1/2 in.) cracks in a few locations. Adequate drainage appears to exist at these locations, and most sections adjacent to Bolton Road and in the East Corridor appear newer than the sidewalks in the other areas. No major repairs appear necessary. Repairing some of the cracks found along the sidewalks and ramp locations should be considered to prevent further damage in these areas.

3.6.4 Stormwater Management System

The existing stormwater management system local to the building consists of twenty-three catch basins with sumps, two trench drains, and buried stormwater piping that drain to a 48 in. dia. RCP trunk line that ultimately appears to discharge into Mirror Lake. The following summarizes our review of the local Total Maximum Daily Load requirements for the local watersheds, the existing Best Management Practices (BMPs) currently in place, the proposed Nonstructural BMPs, and the proposed Structural BMPs.

Total Maximum Daily Load (TMDL)

We reviewed the Environmental Protection Agency's (EPA) and the Connecticut Department of Environmental Protection Agency (CTDEP) database to confirm any TMDL requirements for the local watersheds. The University of Connecticut (UCONN) campus is located in two main watershed areas. The following is a summary of the requirements in these two watersheds:

- **Willimantic River Watershed:** Stormwater runoff from a portion of the UCONN campus drains to the Willimantic River via the Eagleville Brook. Substandard water quality levels prompted the CTDEP to issue a Total Maximum Daily Load (TMDL) for the Eagleville Brook. This TMDL is not specific to any particular pollutant, but a limit on the percentage of impervious coverage in the watershed.

- **Fenton River Watershed:** This watershed does not have a TMDL listed with the CTDEP or Environmental Protection Agency (EPA).

The local watershed for the building site is the Fenton River Watershed since the site appears to drain to Mirror Lake (an artificial lake). This lake drains to the east to an unnamed stream and eventually to the Fenton River. Although there is no TMDL associated with Mirror Lake or the Fenton River, a relatively high percentage of impervious coverage exists in the vicinity of the building, which discharges virtually untreated stormwater to Mirror Lake. Since there is no TMDL and a high amount of imperviousness, traditional Best Management Practices should be implemented.

Existing Best Management Practices

The existing BMPs currently employed appear to be limited to catch-basin sumps; the condition and depth of each sump could not be measured due to amount of sediment, debris, and organic matter in each. In the vicinity of the building there are approximately twenty-three existing catch basins and two existing trench drains. Catch basins with sumps typically are considered a secondary treatment BMP; when used alone, they are ineffective in removing pollutants typically associated with impervious areas such as parking lots, sidewalks, and building rooftops. Unless they are designed properly with deep sumps and hooded outlets, are frequently maintained, and are combined with multiple nonstructural practices (i.e., regular street sweeping, fertilizer/ pesticide management, and snow management), catch basins easily can become the source of pollutants discharging to receiving waters due to trapped sediments which are resuspended and discharged downstream during a rainfall event.

Existing catch-basin sumps surrounding the building and in the parking lot are more than half, if not completely, full of sediment, debris, and/or organic matter. The primary function of the sump is to trap potential pollutants from reaching downstream receiving water; however, the sumps need to be cleaned to allow the BMPs to function properly. Regular maintenance and cleaning of catch basins can prevent already settled pollutants (total solids, sediment, debris, nutrients, etc.) to discharge to critical downstream receiving waters.

Since the existing sumps offer little, if any, water quality benefit we outlined options for nonstructural and structural BMPs in the sections below.

Nonstructural Best Management Practices (Operations and Maintenance Plan)

An effective method for limiting and preventing stormwater pollutant discharge at an existing development is through routine inspection, maintenance, repair, good housekeeping measures (i.e., source control), and implementing nonstructural BMPs. A written Operations and Maintenance Plan should be developed for the existing BMPs at the site. The Operation and Maintenance Plan should include the following:

- **Catch-Basin Sumps:**
    - **Inspection:** Inspect semiannually and after major storm events (3.2 in. or more in a 24 hr period). Structural damage and other malfunctions should be noted and reported.
    - **Maintenance:** Clean annually or when the sump is half full by a licensed contractor. Sediment and hydrocarbons should be properly handled and legally disposed of offsite in accordance with local, state, and federal guidelines and regulations. Any structural damage to catch basins and/or castings should be repaired upon discovery.

- **Sweeping and Site Clean-Up:** Routine sweeping of paved areas is an effective method to provide important nonpoint source pollution control and, when available, performed by mechanical sweepers. Most stormwater pollutants travel with the suspended solids contained in the stormwater runoff and regular sweeping will help reduce a portion of this load. Sweeping, especially during the period immediately following winter snowmelt (March/April) when road sand and other debris has accumulated on the pavement, will capture a peak sediment load before spring rains wash residual sand from winter applications into nearby resource areas.
    - **Inspection:** Paved areas should be inspected for litter on a biweekly basis and picked up and properly disposed of immediately.
    - **Maintenance:** All parking areas, sidewalks, driveways, and other impervious surfaces (except roofs) should be swept clean of sand, litter, trash, etc., on a semiannual basis. Separate cleanup services should be conducted at least twice a year, once between 14 November and 15 December (after leaf fall) and once during the month of May (after snow melt). Additional cleanup services will be conducted as necessary.

Structural Best Management Practices

At this time, no increase in impervious surfaces is proposed for the building. Since this watershed is not associated with the TMDL for Eagleville Brook the retrofit of stormwater BMPs is not required by local, state, or federal agencies. However, given the high percentage of impervious coverage and lack of primary treatment controls, we recommend that primary BMPs be implemented for runoff from impervious surfaces. Primary-treatment BMPs include the following:

- Stormwater Ponds (e.g., wet ponds, micropool extended detention ponds, etc.)
- Constructed Stormwater Wetlands (e.g., shallow wetlands, gravel wetlands, etc.)
- Infiltration Practices (infiltration basins, infiltration trenches, etc.)
- Filtering Practices (bioretention, sand filters, etc.)
- Water Quality Swales

Several factors are considered when determining the appropriate BMP for a site. These factors include the following:

- **Land Use and Target Pollutant Removal:** Target pollutants typically associated with land uses similar to the building include total suspended solid (TSS), nutrients (e.g. phosphorous and nitrogen), oil and grease, and heavy metals.
- **Sensitivity of the Receiving Water:** Campus reports have indicated Mirror Lake had prior problems with algal blooms and growth of invasive species. Algal blooms can be caused by excessive nutrients carried in stormwater runoff.
- **Subsurface Soil Conditions:** Textural classes, depth of naturally occurring pervious material, and depth to estimated high seasonal groundwater not only dictate feasibility and location but also the use of filtration and detention systems versus infiltration systems.

The building site limits the practical BMP options that can be implemented. Stormwater ponds and constructed stormwater wetlands require a large open land area; the land needed to implement these is not currently available in this area. However, the use of infiltration practices, filtering practices, and water quality swales are appropriate in retrofit applications. We recommend that infiltration practices be considered for use at this site, since infiltration practices can be surface or subsurface and offer high targeted pollutant removal efficiency. The infiltration systems should be designed to temporarily store runoff, allowing all or a portion of the water to infiltrate into the ground. The BMP should be specifically designed to retain and infiltrate the entire Water Quality Volume, which is the first flush of runoff and typically equal to 1 in. of water over the impervious area draining to the system. An ideal location that an infiltration BMP could be constructed is in the grass island between Coventry Road and the North Parking Lot.

Field performance data for underground infiltration systems have been published by the Environmental Protection Agency (EPA, see Reference [3]) and by the University of New Hampshire (Reference [4]); these studies support their use as a primary treatment practice. In addition these systems meet the criteria for primary BMPs in the Stormwater Manual published by the State of Connecticut in 2004, Reference [5]. According to the University of New Hampshire (UNH), the annual pollutant removal achieved for a properly designed underground infiltration system are as follows:

Pollutant	% Removal
Total Suspended Solids	99%
Total Petroleum Hydrocarbons	99%
Zinc	99%
Total Phosphorus	81%

The UNH study also reported that this system's water quality treatment remained "strong in all seasons, reinforcing the conclusion that filtration and infiltration systems perform well, even in cold climates."

As described above, these systems, when combined with a secondary pretreatment device will provide treatment including greater than less than 80% TSS removal, phosphorous/nutrients removal, petroleum hydrocarbon removal, heavy metals removal, and groundwater recharge.

The use of an infiltration basin will depend heavily on subsurface soil conditions. Soil mapping available from the SCS indicated an urban fill for the entire study area. Urban fill is associated with man-altered landscapes that can affect the predictability of subsurface conditions. However, urban fill does not generally present any major limitations with respect to stormwater management. In order to confirm the feasibility of this option, a soil investigation should be conducted in the proposed area. The testing should include a deep-hole observation test pit and a percolation test. This will determine the suitability, textural class, and estimated depth to groundwater for proper design of the infiltration basin.

In addition to the primary BMP, hoods should be installed at each drain outlet to prevent oil and grease from reaching receiving waters and the primary BMP. At the trench drains, hydrodynamic separators or oil/particle separators should be considered once the trench drains are cleaned and confirm the presence and configuration of outlet pipes. Video inspect and trace outlet pipes as required.

4. RECOMMENDATIONS

We recommend the following scope of repairs for the building walls, roof, skylights, terraces, landscaping, and drainage. This scope of work was used as a basis for the cost estimate; Appendix F contains the annotated drawings and outline specifications sent to the estimator.

4.1 Masonry Facade and Fenestrations

As discussed above, the majority of damage noted on the masonry facades and retaining walls is isolated and requires some repair to maintain the integrity of the wall system. Specific repairs are outlined in Appendix F, but generally include the following:

- Repair or replacement of damaged ribbed concrete block and pointing of deteriorated mortar joints. Remove and infill of abandoned pipe penetrations and light fixtures.
- Replacement of deteriorated sealants, including sealants at control joints and fenestration perimeters.
- Incorporation of a cap flashing below the coping stones on the retaining walls and repairs to the concrete on the terrace side of the wall. Provide flashing at scuppers.
- Cleaning of the facade and retaining walls.
- Replacement of the corroded lintel over large east elevation louver with a new galvanized lintel and painting of the exposed lintels over other fenestrations. If additional protection is desired, provide metal flashing over replacement lintel.

In addition to these repairs, we recommend that the University consider replacing the new through-wall flashing at the base of the masonry walls to correct the flashing and weep deficiencies. As this is a more-invasive repair than the maintenance-level repairs described above, we have priced this as an alternative in our cost estimate.

In addition to the masonry veneer repairs, repairs are required at the various fenestrations. These include the following:

- Refinishing the existing exterior doors and replacing all door thresholds and gaskets with weathertight hardware.
- Replacing deteriorated glazing seals.
- Replacing fogged IGUs.

4.2 Batten-Seam Metal Panel Roof

We recommend replacing the existing batten-seam metal panel roofs, including underlayment, sheathing, insulation, and metal flashing. We suggest replacing the batten-seam metal panel roof, wall, and soffit areas with a vented zinc-tin-coated-copper standing-seam panel system. We selected a standing-seam roof system as we recommend providing snow fences, which can be clamped onto the seams to allow for better snow management as part of the new system. A zinc-tin-coated-copper system was selected as seams and critical transition flashing can be fully soldered watertight. When the batten-seam roof is replaced, perimeter flashing should also be replaced and incorporated with the existing through-wall flashing. The underlayment should include a self-adhered membrane system to provide more reliable seams that are resistant to water infiltration. The full system is described in Appendix F.

When the batten-seam roof is replaced, the existing four solar hot water heating arrays and associated structural supports should be removed. Based on the University's stated project goals, we do not recommend replacing the system.

4.3 Gutters and Down Leaders

We recommend replacing all gutters and down leaders. New gutters will need to be designed with expansion joints and a minimum 1/8 in. per foot slope to drain. Additionally, all existing gutter supports must be removed and replaced to accommodate anticipated loading from snow and water. See Site and Drainage recommendations in Section 4.5 for further recommendations.

4.4 Low-Sloped Built-Up Roofs

We recommend replacing all of the existing built-up roofs, as they are beyond their useful service life. We recommend providing tapered insulation to provide a minimum of 1/4 in. per foot slope to drain at all roofs. In addition to replacing the roof system, miscellaneous work is necessary to facilitate removal of the BUR and installation of the new roof membrane, including the disassembly of mechanical equipment, expansion joints, lightning protection system, and access ladder.

As noted above, a number of replacement roof systems are available. Four possible roof options are presented below:

- **Fully Adhered EPDM Membrane Roof:** EPDM roofs are very common and as such, many workers are skilled in this type of work. EPDM is also relatively inexpensive. The disadvantage of an EDPM roof system is that it is a single-ply roofing system and provides no redundancy, making it more prone to damage from abrasion, sliding snow and ice, and foot traffic. Walkway pads can be provided to help protect the membrane. Selecting a membrane with a greater thickness (EPDM is available in 45, 60 and 90 mil thicknesses) also provides greater projection. An EPDM roof relies on adhesive seams, which are not as durable as heat-welded seams. The anticipated useful service life of adhered EPDM roofing is twenty years. The adhesive used with adhered EPDM membrane roofing is subject to the new “low VOC” requirements. We understand that this is the typical roof system used by the University and so have provided pricing based on this system.

- **Fully Adhered or Mechanically Attached PVC Membrane Roof:** PVC roofs are also relatively common and workers are generally skilled in their application. PVC roofing has advantages and limitations that are similar to EPDM roofing systems, the chief difference is that PVC systems use welded seams as opposed to adhesive seams, which are easier to inspect and generally more reliable. PVC roofs are more expensive than EPDM roofs. The white PVC membranes generally provide better solar reflectance and less heat gain.

- **Modified-Bitumen Roof Systems:** This roofing system consists of two layers of modified-bitumen roof membrane, which are either set in hot asphalt or cold modified asphalt-based adhesive or torch applied. This system provides redundancy by multiple plies combined with the mineral surface cap sheet and can withstand foot traffic and sliding snow and ice better than single-ply systems. These systems are generally durable and low maintenance. A “low VOC” cold adhesive has been on the market for several years. The modified-bitumen roofs are more expensive than PVC or EPDM, but have less cost and easier construction logistics than built-up roofs. Modified bitumen roof systems commonly have life spans in excess of thirty years.

- **Built-Up Roofing Membrane (BUR):** Built-up roofing membrane consists of multiple plies of roofing felt set in hot-applied asphalt and is one of the longest used roofing materials. Built-up roofs typically have an anticipated useful service life of forty years or more. BUR systems provide a durable low-maintenance option because the multiple-ply systems provides redundancy and the gravel or mineral cap sheet offers impact, traffic, and UV protection. Hot asphalt, the adhesive used in BUR systems, is subject to the new low-VOC requirements; however, the existing formula currently meets the new restrictions (this is because the “curing” process is primarily based on cooling rather than a chemical reaction). The major disadvantage of the BUR system is that it is less commonly installed today as other roofing membranes, and thus fewer workers are skilled in the installation, which decreases the reliability of the workmanship, and may increase the cost. The construction logistics for BUR roofs are more complicated requiring coordination of kettles, and delivery of hot materials.

4.5 Kalwall Panels

As noted above, the translucent panels themselves are aged and need to be replaced (minimum scope of work). Alternatively, while the panels are being replaced and the interior space disrupted, the framing can also be replaced to incorporate a secondary drainage system. For pricing purposes, we have budgeted to replace the framing as well as the translucent panels. New perimeter flashing will be incorporated with the replacement system.

4.6 Site and Drainage

The specific repairs for each area are outlined in Appendix F. Generally, recommended repairs for each area are as follows.

North Terrace and Retaining Wall

- Complete the gutter repairs outlined above and incorporate into existing buried piping system.
- Provide new area drains in the terrace paving and connect to the stormwater system.
- Confirm the buried drainage system is serviceable and perform maintenance-level repairs including cleaning and video inspection.
- Excavate at each retaining-wall weep hole and provide geotextile fabric with crushed stone.
- Remove and replace the terrace paving and the base material below. For pricing purposes, we have assumed replacement in kind.

West Terrace and Retaining Wall

- Similar to items listed in North Terrace and Retaining Wall Section above.
- Replace ground-light fixtures and wiring as needed.

Courtyard Area 1

- Replace the courtyard paving coordinated with landscaping changes. For pricing, we have assumed replacement in kind.
- Determine if the base material is suitable either during construction or perform a test pit prior to the work.
- Clean the drain inlet sump and reset the frame and grate to match finish grade.
- Provide a curb or landscape edging between the landscaped areas and the paving.

Courtyard Area 2

- Similar to items listed in Courtyard Area 1 Section above.
- Provide a new drain inlet with sump on the east side of Courtyard Area 2 and reset the frames and grates of the two existing drain inlets to match the new finish grade.

Parking Lots, Roadways, and Sidewalks

- Replace deteriorated curb sections as noted with reinforced extruded concrete curbs or precast concrete curbing. Repair areas with “low severity” cracks with cement grout or patched with concrete as noted.

- Perform several cores and test pits in the parking lots to determine if a pavement overlay or full-depth reconstruction of the parking lot is necessary and confirm if the base materials are acceptable.

- Repair or replace the pavement in the West Parking Lot and at entrance with Main Access Drive as required. Repair or replace the pavement in the North Parking Lot by sealing cracks and replacing the pavement at the block cracking, pothole, and sagging conditions.

- Repair sidewalk sections with low-severity cracking with nonshrink grout.

- Replace concrete walkway sections with moderate to severe cracks.

Maintenance Area

- We recommend that the paved dumpster area be cleaned, that loose trash and debris be disposed of properly, and that the entire pavement section have full-depth reconstruction. A rigid concrete pad should be provided for the dumpster pad.

- Clean the existing drain inlet sump and reset the frame and grate to match the new surface.

- Install two new 4 in. dia. concrete filled steel pipe bollards adjacent to the gas meter.

South of Building and East Corridor

- Repair low-severity cracks in sidewalks and ramps.

Stormwater Management System

- Prepare a written Operations and Maintenance Plan and implement it for maintaining the existing and any new BMPs. Clean all catch-basin sumps.

- Once sumps are cleaned, inspect all catch basins to confirm if sumps are present. Install new catch basins with deep sumps as needed.

- Perform the testing and design required to implement an infiltration-type primary structural BMP.

- Confirm the presence and configuration of outlet pipes discharging from each trench drain and determine suitable oil/particle separator device. Video inspect and trace outlet pipes as required.

- Install hoods at each catch-basin drain outlet.

4.7 Landscaping

The landscaping recommendations include removal and replacement of multiple plantings, development of new planting beds, incorporation of additional plantings in existing bed, and pruning of existing plantings. Refer to annotated plan in Appendix F for full scope of work.

5. COST ESTIMATE

VJ Associates prepared a cost estimate based on schematic design scope developed by SGH and Landworks (Appendix F). Their estimated cost is approximately $2,650,000 for the repairs described above. This includes approximately $1,801,000 for roof repairs, $234,000 for masonry repairs, $399,000 for drainage repairs, and $216,000 for landscaping. In addition to the pricing above, VJ Associates priced one alternate for the replacement of the through-wall flashing at approximately $358,000.

These costs include a 15% allowance for design development and a 5% construction contingency. Actual bids may vary depending on the economic climate, contractors' workload, unforeseen conditions related to the existing construction, and other factors.

We assume that the building will remain operational and accessible to the community during construction. Scaffolding is included as required for the repairs detailed in the cost estimate. A full breakdown of our construction cost estimate by VJ Associates is included in Appendix D.

6. REFERENCES

[1] Technical Report 250 – Freezing Test for Evaluating Relative Frost Susceptibility of Various Soils, Cold Regions Research and Engineering Laboratory (CRREL), Hanover, New Hampshire, June 1974.

[2] Technical Manual TM 5-623 – Pavement Maintenance Management, Headquarters, Department of the Army, November 1982.

[3] Stormwater Best Management Practices (BMP) Performance Analysis, Prepared for USEPA – Region 1, Prepared by Tetra Tech, Inc. dated December 2008, revised through March 2010.

[4] University of New Hampshire Stormwater Center, 2009 Biannual Report.

[5] State of Connecticut Stormwater Quality Manual, Connecticut Department of Environmental Protection, 2004.

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APPENDIX A

PHOTOS

Photo 1

UCONN Fine Arts Building.

North elevation.

Photo 2

UCONN Fine Arts Building.

North elevation.

Photo 3

UCONN Fine Arts Building.

East elevation.

Photo 4

UCONN Fine Arts Building.

East elevation.

Photo 5

UCONN Fine Arts Building.

South elevation.

Photo 6

UCONN Fine Arts Building.

South elevation.

Photo 7

UCONN Fine Arts Building.

West elevation.

Photo 8

Central courtyard entrance on south elevation.

Photo 9

Main entrance on east elevation.

Photo 10

Strip windows and batten-seam metal panels on the second floor of the north elevation.

Photo 11

Low and high built-up roof areas.

Photo 12

Typical roof drain on the built-up roofs.

Photo 13

Steep-slope batten-seam metal panel roof on the west elevation.

Photo 14

Typical gutter and down leaders on the south elevation.

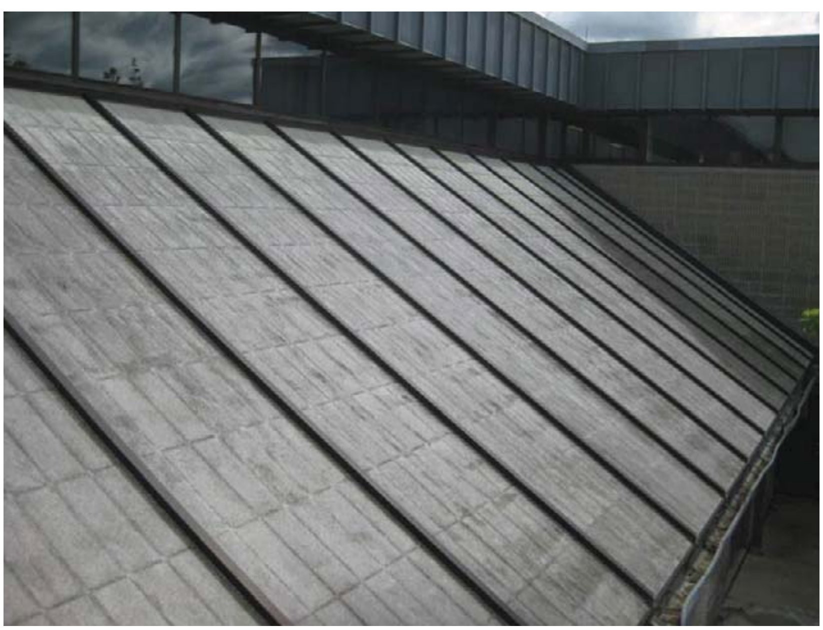


Photo 15

Sloped Kalwall panel system on the north elevation.

Photo 16

Small steep-slope Kalwall panel roof on the south elevation.

Photo 17

Broken and warped tile adjacent to north elevation terrace door.

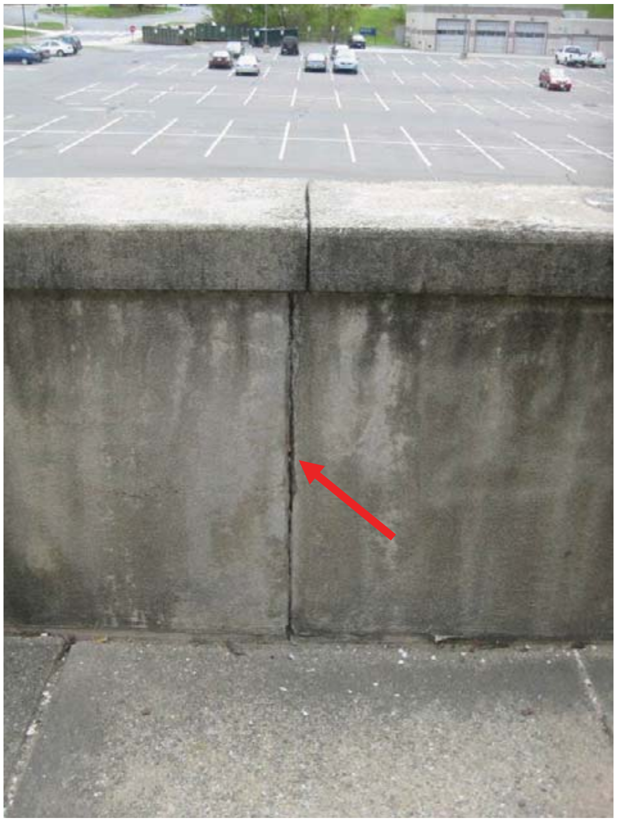


Photo 18

Missing mortar at west elevation retaining wall.

Photo 19

Horizontal crack in mortar at south elevation masonry wall.

Photo 20

Damaged batten-seam metal panel roof rake flashing termination.

Photo 21

Cracking and damaged masonry at terrace side of west elevation retaining wall.

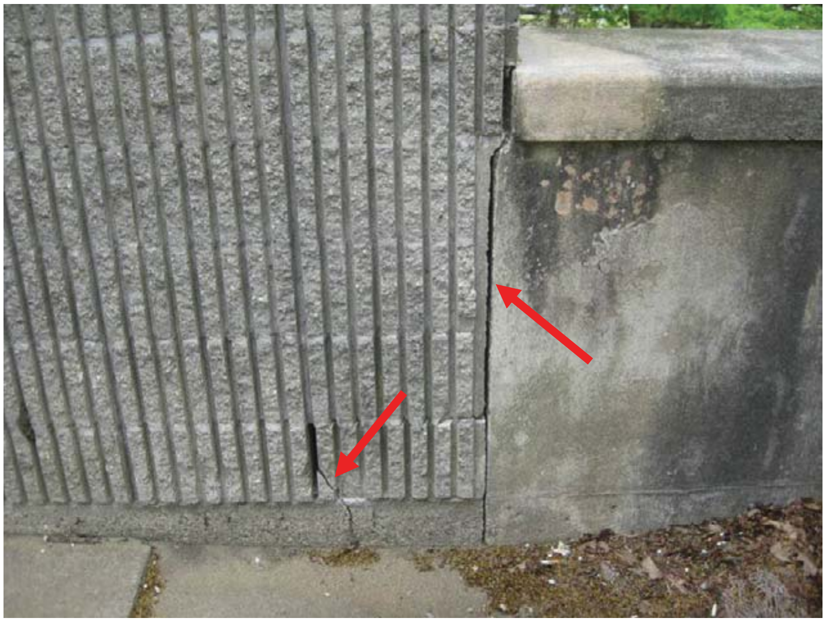


Photo 22

Cracking between retaining and building wall on the north elevation (right arrow).

Cracking and displaced masonry (left arrow).

Photo 23

Retaining-wall weep filled with soil and debris on the north elevation.

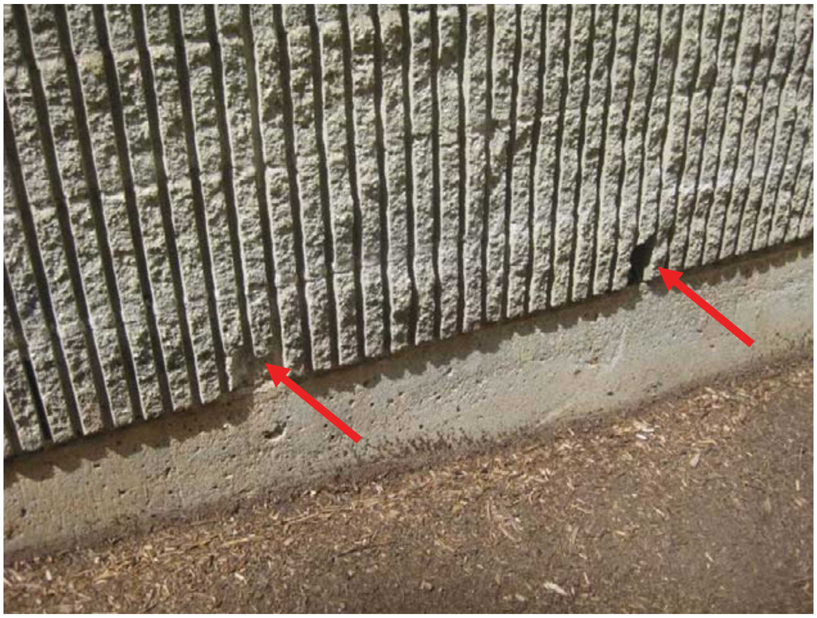


Photo 24

Displaced, cracked, and spalled ribbed concrete block on the east elevation.

Photo 25

Spalled ribbed-concrete-block below weep tube for interior mechanical equipment.

Photo 26

Open head joint at stone coping of north elevation retaining wall.

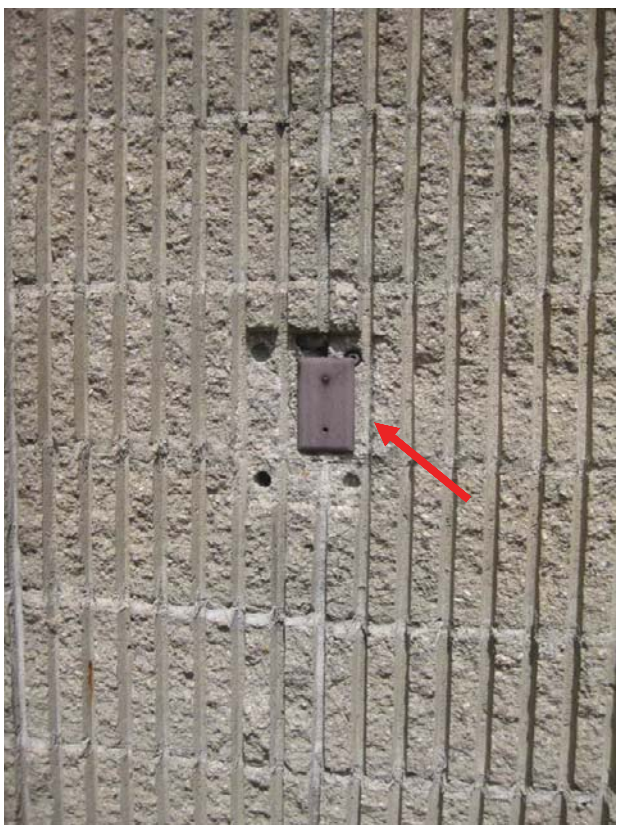


Photo 27

Abandoned light fixture on the south elevation.

Photo 28

Abandoned pipe fixtures on the south elevation.

Photo 29

Staining on the face of the ribbed-concrete-block surface below scuppers and weeps.

Photo 30

Staining at the base of west elevation masonry wall (right arrow) and on west elevation retaining wall (left arrow).

Photo 31

Hard, cracked, and missing sealant at masonry control joint.

Photo 32

Hard, cracked, and crazed sealant at ground-level louver perimeter on the west elevation.

Photo 33

Corroded louver at the east elevation second floor.

Photo 34

Damaged door on the south elevation.

Photo 35

Corroded door on the west elevation.

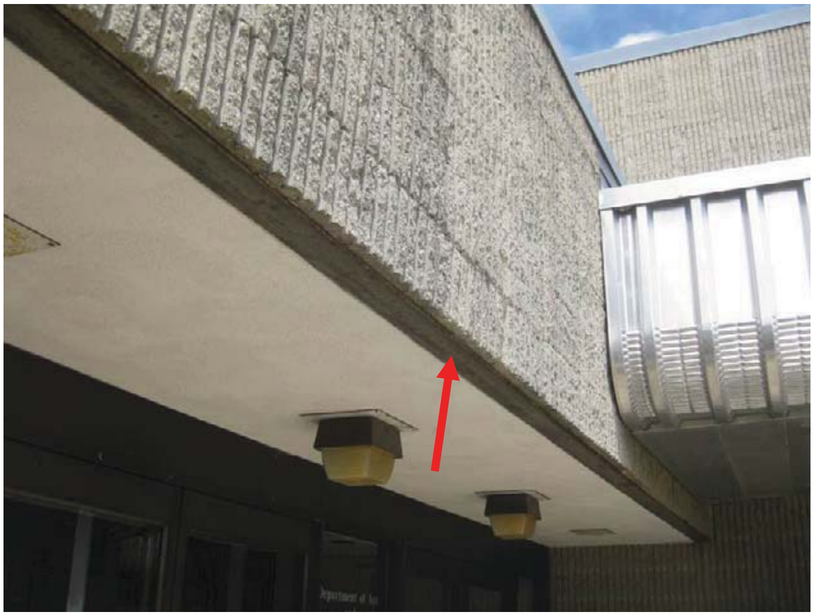


Photo 36

Surface corrosion on structural steel beam at the east elevation main entrance soffit.

Photo 37

Hard, cracked, and crazed sealant at window perimeter and frame joints.

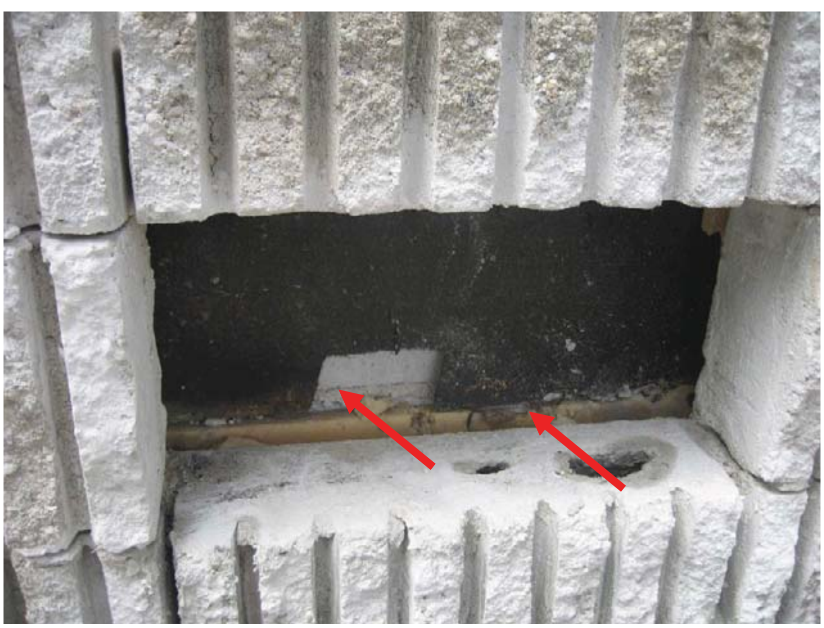


Photo 38

Masonry opening on the south elevation. Fabric flashing is brittle and does not bridge cavity (right arrow). Left arrow indicates location of flashing sample removed from the site.

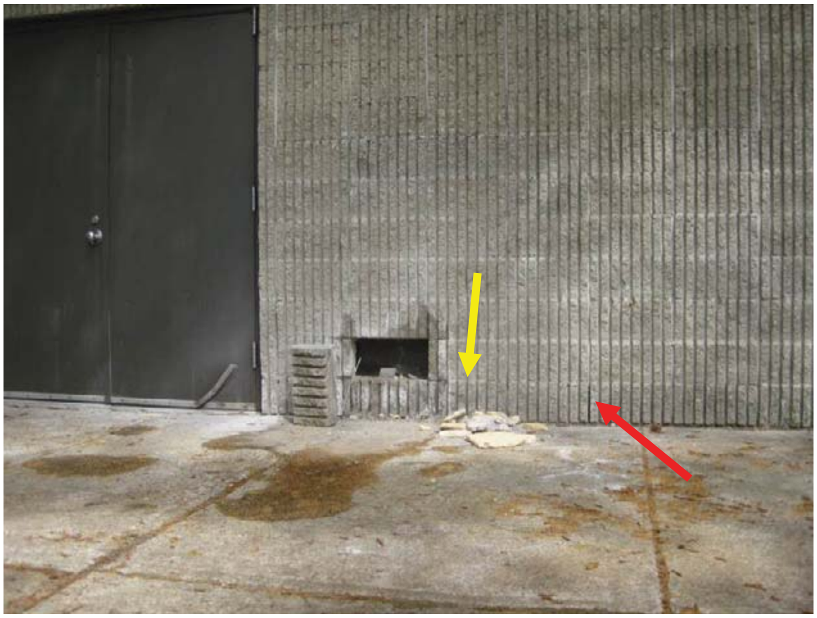


Photo 39

Location of weep (red arrow) below the level of the through-wall fabric flashing (yellow arrow).

Photo 40

Batten-seam metal panel roof on the west elevation.

Photo 41

Rake flashing at batten-seam metal panel roof.

Photo 42

Exploratory opening at batten-seam metal panel roof. Plywood is slightly damp below felt underlayment.

Photo 43

Corroded soffit vent on the south elevation.

Photo 44

Roof underlayment is discontinuous at roof eave and does not overlap metal eave flashing (arrow). Plywood is exposed.

Photo 45

Nonfunctional and damaged solar panel arrays on the south elevation.

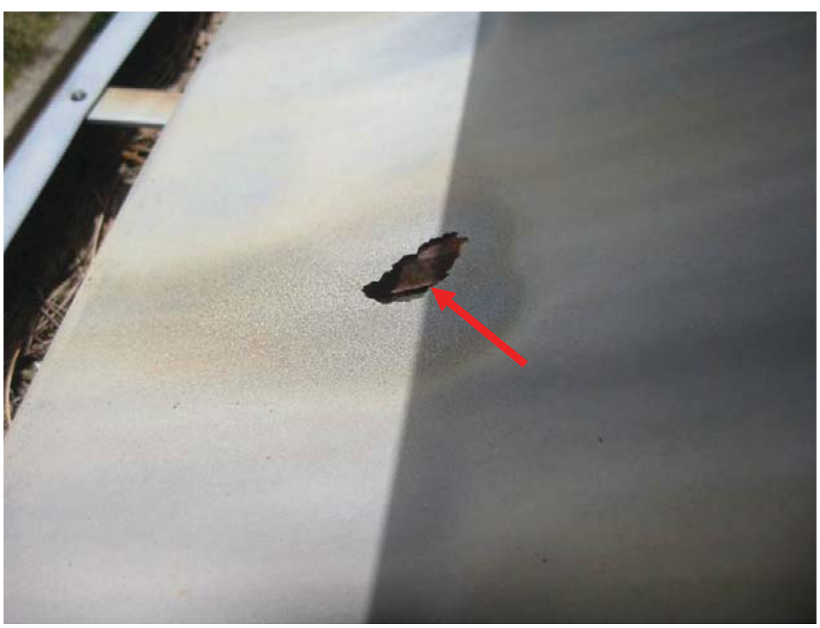


Photo 46

Hole in the batten-seam metal panel on the south elevation.

Photo 47

Stained batten-seam metal panels on the south elevation.

Photo 48

Corroded patch in metal roof just below transverse seam

Photo 49

Open voids in batten-seam metal panel transition on the west elevation.

Photo 50

Rake flashing termination is damaged and gapped, and sealant has failed.

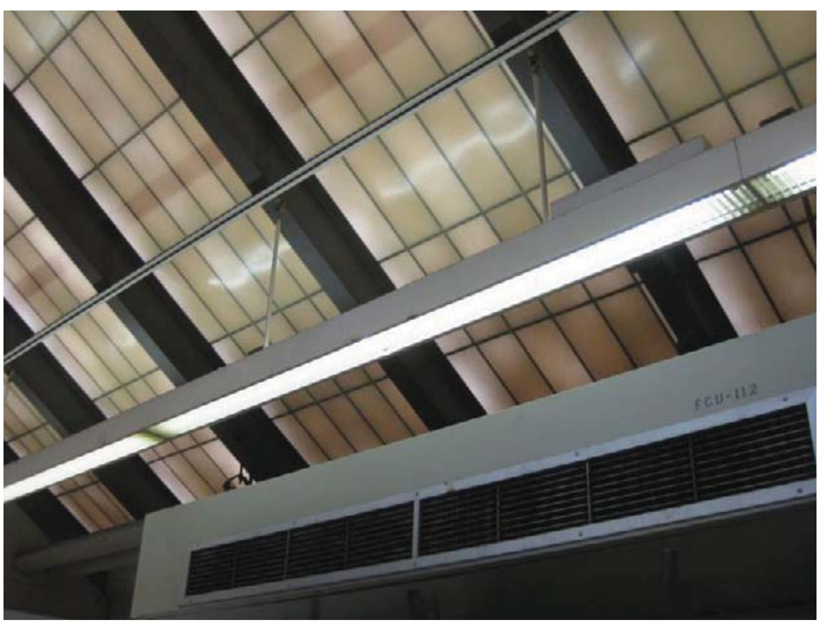


Photo 51

Underside of Kalwall panel installation on the north elevation.

Photo 52

Fiber reinforcement is exposed in worn areas of existing Kalwall panels.

Photo 53

Hard and cracked sealant at Kalwall panel perimeter.

Photo 54

Corroded metal gutter straps on the north elevation.

Photo 55

Open joint in south elevation gutter.

Photo 56

Collapsed gutters on the north elevation.

Photo 57

Missing gutters and down leaders on the west elevation.

Photo 58

Debris clogging the gutter on the south elevation.

Photo 59

Deformed down leader on the north elevation. Down leader termination is unclear.

Photo 60

Deformed down leader on the north elevation.

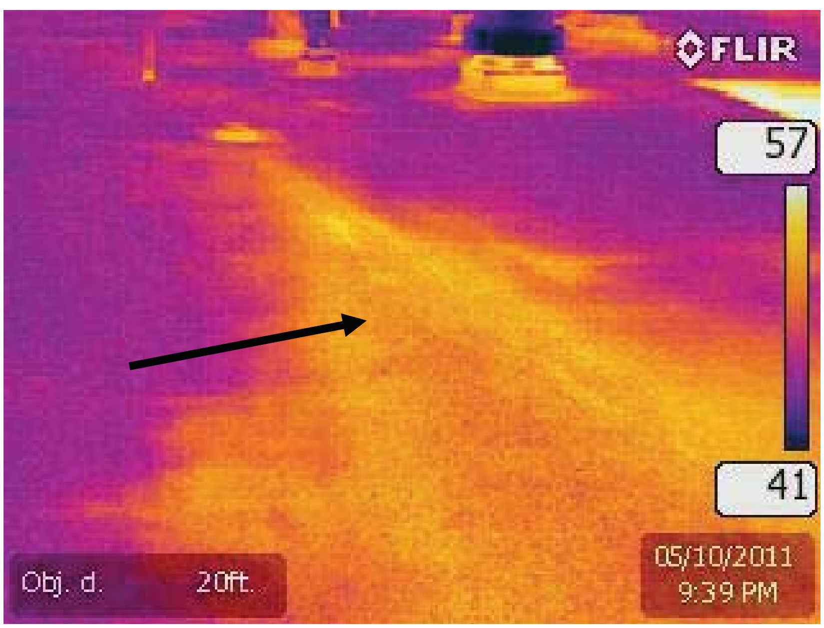


Photo 61

West-wing high roof.

Elevated surface temperatures aligned with tapered insulation valleys leading to roof drain.

Photo 62

West-wing high roof.

Digital image of Photo 61.

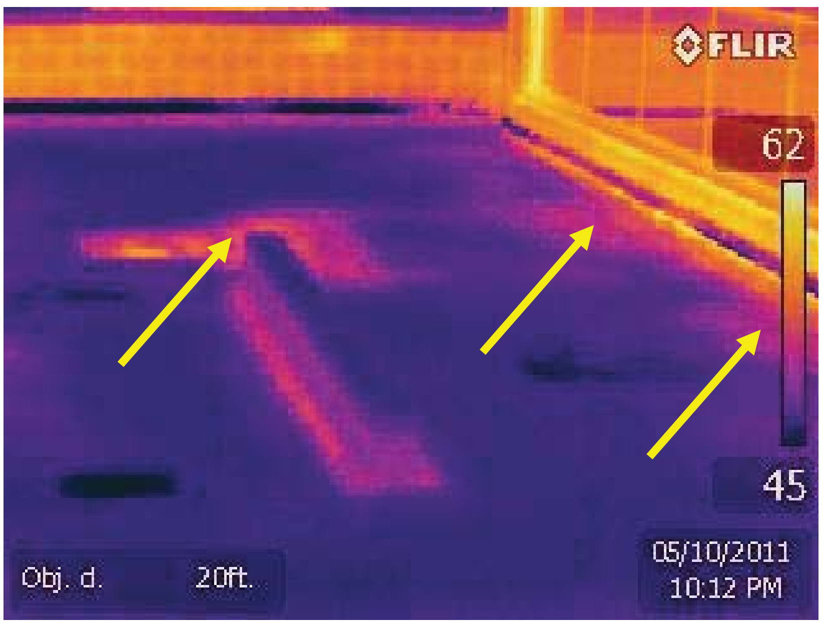


Photo 63

East-wing low roof.

Elevated surface temperatures adjacent to rising curtain wall and roof drain.

Photo 64

East-wing low roof.

Digital image of Photo 63.

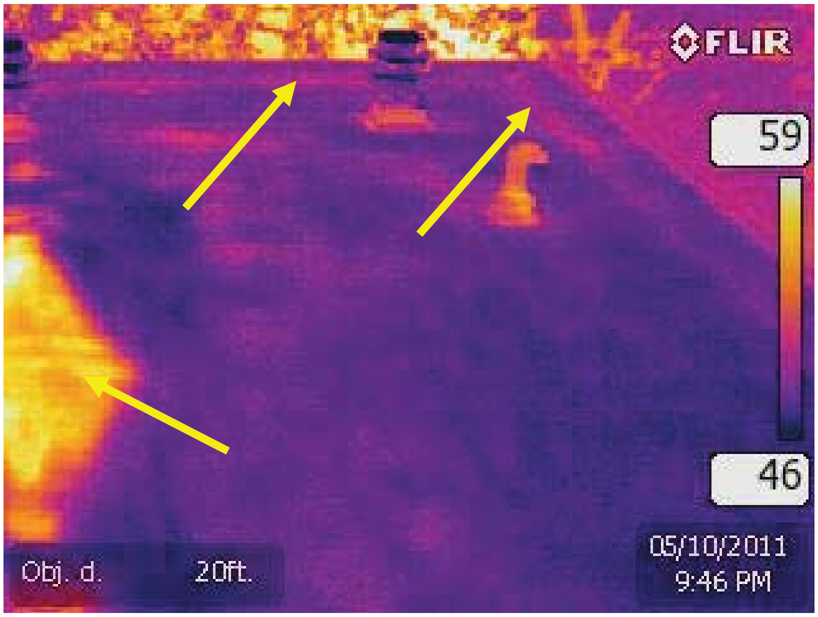


Photo 65

West-wing low roof.

Elevated surface temperatures at roof perimeter tapered insulation crickets and at roof drain valleys.

Photo 66

West-wing low roof.

Digital image of Photo 65.

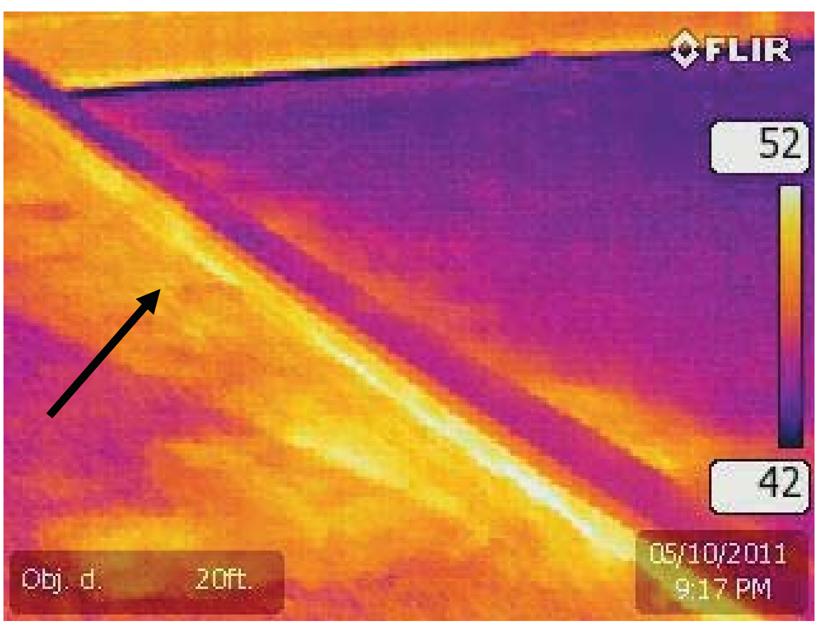


Photo 67

East-wing high roof – north-wing high roof.

Elevated surface temperatures adjacent to expansion joint.

Photo 68

East-wing high roof – north-wing high roof.

Digital image of Photo 67.

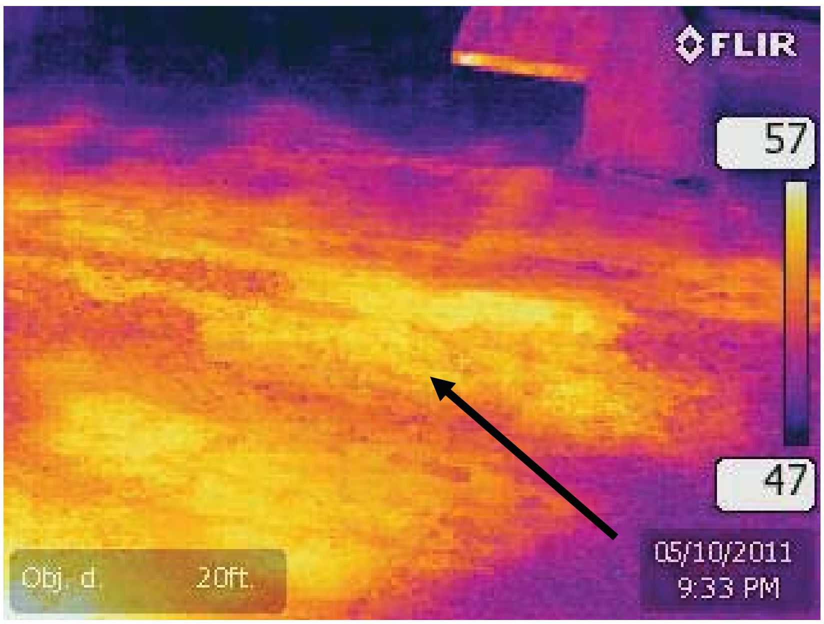


Photo 69

West-wing high roof.

Elevated surface temperatures adjacent to mechanical equipment.

Photo 70

West-wing high roof.

Digital image of Photo 69.

Photo 71

Split in built-up-roof membrane and water from below roof surface.

Photo 72

Built-up roof opening at spilt in membrane shown in Photo 71. From exterior to interior, BUR membrane, fiberboard, polyisocyanurate insulation, fiberboard, vapor retarder, metal deck.

Photo 73

Water saturated fiberboard and insulation from top layers of opening shown in Photo 72 (right arrow).

Mostly dry fiberboard from bottom layer of opening shown in Photo 72 (left arrow).

Photo 74

Cracked and crazed membrane at roof-fan BUR flashing.

Photo 75

Previous BUR perimeter flashing cut and repair.

Photo 76

Cracked metal skirt flashing at BUR rising masonry wall.

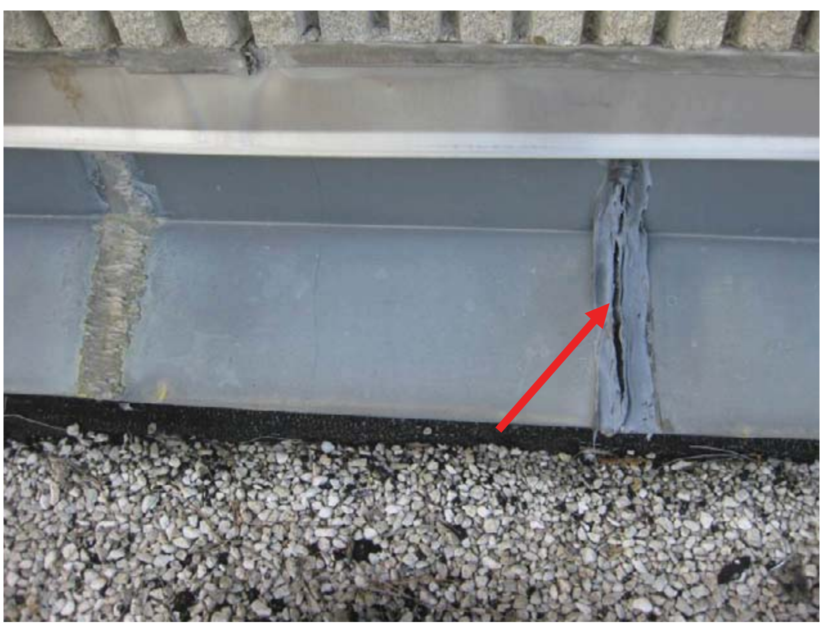


Photo 77

Cracked sealant at metal skirt flashing repair.

Photo 78

Slab settlement at north terrace.

Photo 79

Frost heaving at scupper locations in north terrace.

Photo 80

Surface wear and weathering at north terrace.

Photo 81

Staining on parapet wall at north terrace.

Photo 82

Minor settlement of west terrace

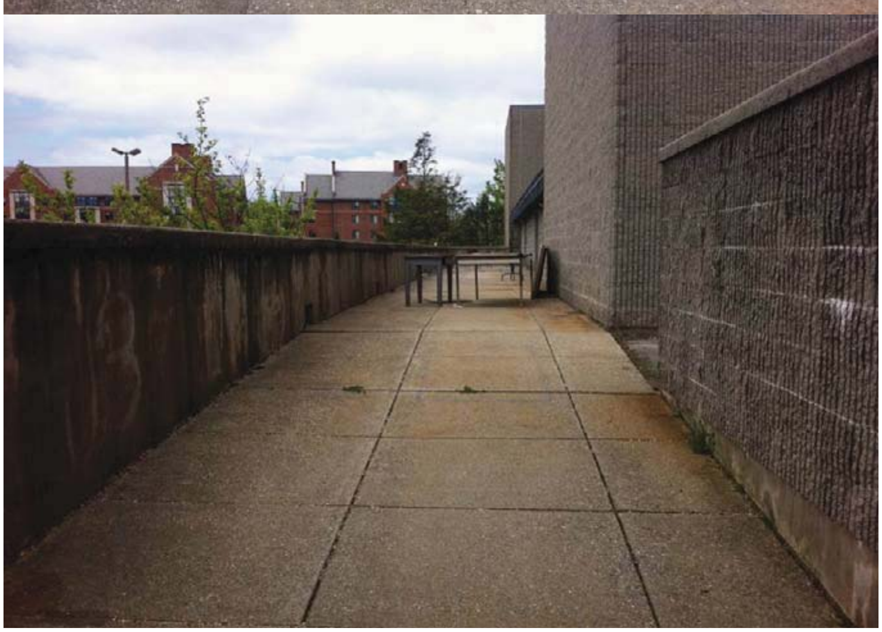


Photo 83
Surface wear and weathering at Terrace “B.”

Photo 84

Missing cover for ground-light casing at west terrace.

Photo 85

Settlement of concrete slab at Courtyard Area 1.

Photo 86

Settlement in northwest section of Courtyard Area 1.

Photo 87

Missing berm around landscaped island at Courtyard Area 1.

Photo 88

Staining at base of building at Courtyard Area 1.

Photo 89

Settlement at east building face, staining at building in Courtyard Area 2.

Photo 90

Berm missing around landscaped island at Courtyard Area 2.

Photo 91

Deteriorated curbing in easterly corner of parking lot, labeled as NP-C1 on the Key Plan.

Photo 92

Broken curb and exposed rebar at northeasterly parking area, labeled as NP-C2 on the Key Plan.

Photo 93

Curb running along north face of building, labeled as NP-C3 on the Key Plan.

Photo 94

Section of deteriorated curb around cul-de-sac center island.

Photo 95

Pavement patch in northerly parking lot.

Photo 96

Sidewalk and ramp deterioration and cracking, labeled as NB-S1 on the Key Plan.

Photo 97

Distress and cracking in sidewalk area at northwesterly building corner, labeled as NB-S2 on the Key Plan.

Photo 98

Multiple low-severity cracks at sidewalk along north building face, labeled as NB-S3 on the Key Plan.

Photo 99

Cracking and deterioration in concrete slab at loading dock by Coventry Road cul-de-sac.

Photo 100

Section of broken curb in west parking lot, labeled as WP-C1 on the Key Plan.

Photo 101

Minor chips in curbing in west parking lot, labeled as WP-C2.

Photo 102

Minor chips and cracks in west parking lot, labeled as WP-C3.

Photo 103

Low-severity bump and sagging in west parking lot, labeled as WP-P1 on the Key Plan.

Photo 104

Medium-severity crack at west parking lot, labeled as WP-P2 on the Key Plan.

Photo 105

Medium severity pothole at west parking entrance, labeled as WP-P3 on the Key Plan.

Photo 106

Medium-severity cracking in west parking lot, labeled as WP-P4 on the Key Plan.

Photo 107

Low-severity alligator scaling at entrance to the west parking lot.

Photo 108

Low-severity alligator scaling, vegetation growing through the pavement at paved dumpster location.

Photo 109

Trash and debris over catch basin inlet in paved dumpster area.

APPENDIX B

PLANS

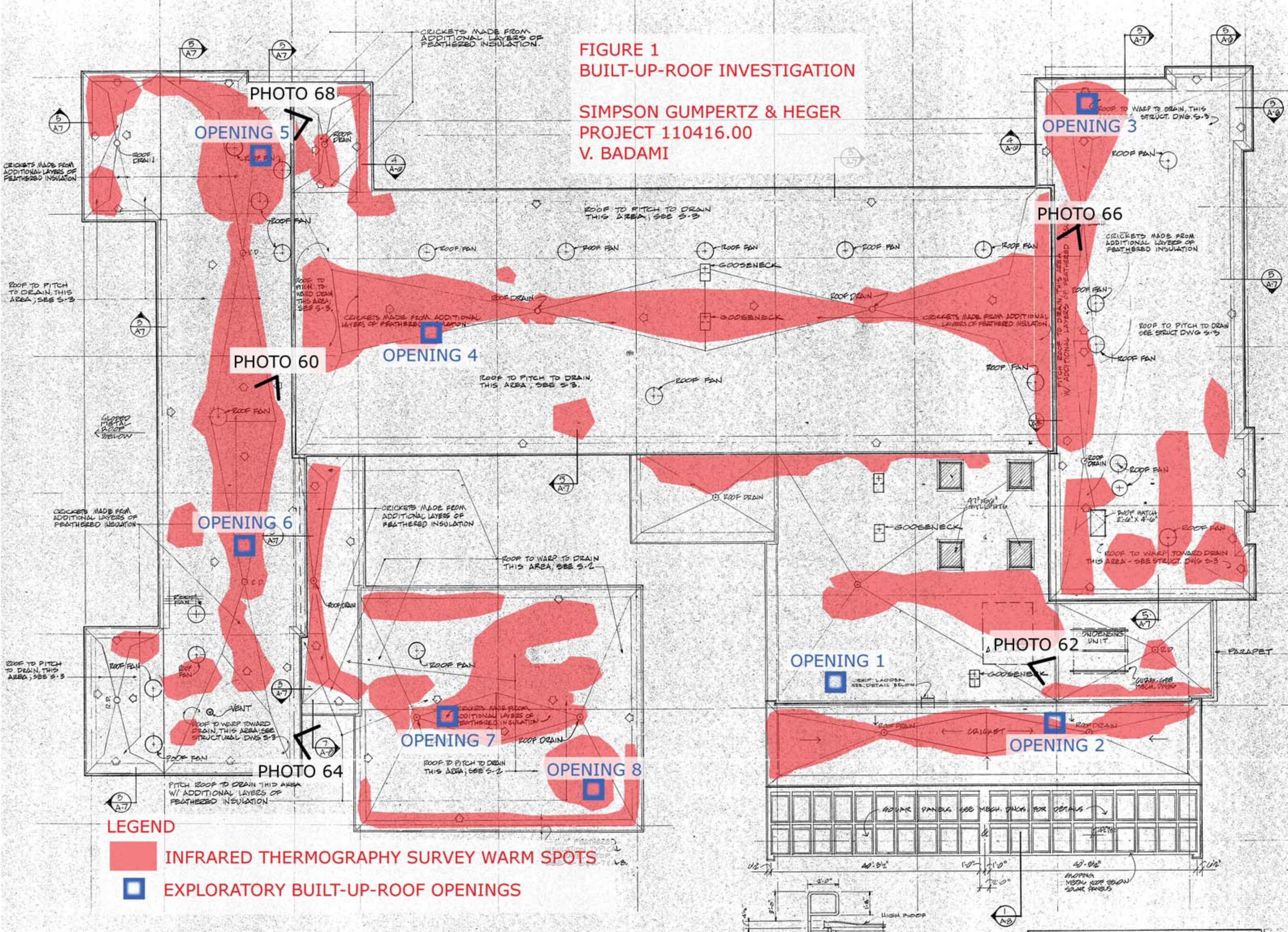
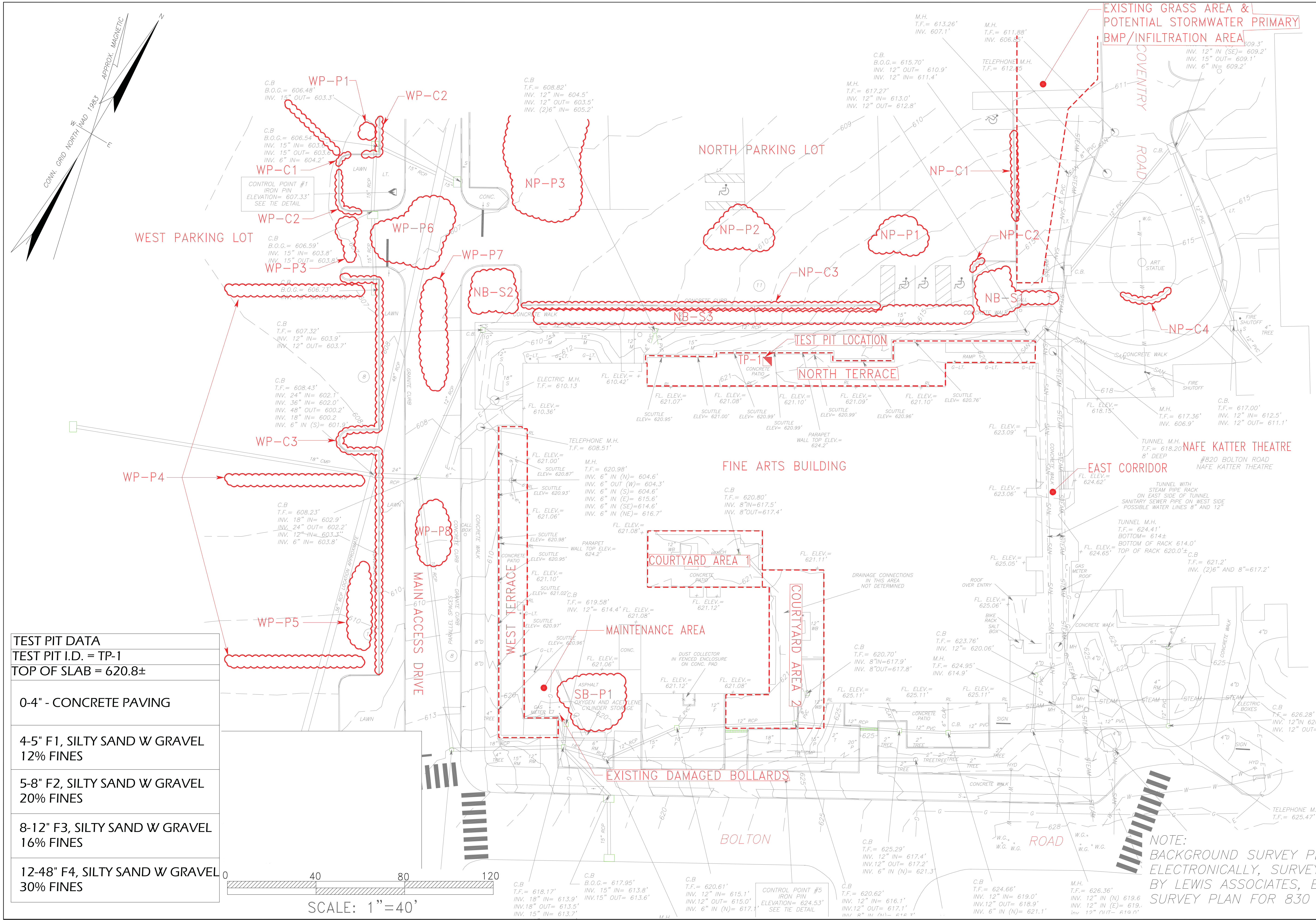


FIGURE 1
BUILT-UP-ROOF INVESTIGATION
SIMPSON GUMPERTZ & HEGER
PROJECT 110416.00
V. BADAMI
PHOTO 68
OPENING 5
OPENING 3
PHOTO 66
OPENING 4
PHOTO 60
OPENING 6
OPENING 1
PHOTO 62
OPENING 7
OPENING 2
OPENING 8
PHOTO 64
LEGEND
INFRARED THERMOGRAPHY SURVEY WARM SPOTS
EXPLORATORY BUILT-UP-ROOF OPENINGS



TEST PIT DATA
TEST PIT I.D. = TP-1
TOP OF SLAB = 620.8±
0-4" - CONCRETE PAVING
4-5" F1, SILTY SAND W GRAVEL 12% FINES
5-8" F2, SILTY SAND W GRAVEL 20% FINES
8-12" F3, SILTY SAND W GRAVEL 16% FINES
12-48" F4, SILTY SAND W GRAVEL 30% FINES

NOTE:
BACKGROUND SURVEY PLAN RECEIVED ELECTRONICALLY, SURVEY PLAN PREPARED BY LEWIS ASSOCIATES, ENTITLED SITE SURVEY PLAN FOR 830 BOLTON ROAD.

Drawing No.: EX-1
Scale: 1"=40'

Project: UNIVERSITY OF CONNECTICUT, FINE ARTS BUILDING
Drawing Title: KEY PLAN
Date: 31 MAY 2011
Checked: AL
Drawn: PMA
Proj: 110416

SIMPSON GUMPERTZ & HEGER
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APPENDIX C

LANDSCAPE

University of Connecticut
Fine Arts Building

Landscape Findings and Recommendations

The existing landscape at the Fine Arts Building at the University of Connecticut is characterized by mature plantings that are in various stages of health and decline. We would initially recommend hiring an independent certified arborist for a minimum of three days to determine the health of the existing mature trees. Findings by the arborist will help determine if mature plantings are removed and/or replaced. It is also clear that there are significant drainage issues that are causing damage to existing plantings and hardscape. We would recommend that a comprehensive stormwater management plan be developed to address ongoing drainage issues.

Main Entrance:

The main entrance to the Fine Arts Building is currently underserved by the landscape planting. The two existing Goldenrain trees (*Koelreuteria paniculata)* are planted incorrectly. The tree closest to the road is planted too high and is showing advanced signs of distress. The second tree is planted too close to the building and will not thrive in such proximity. The other plantings are very underwhelming. We would recommend removing all of the existing planting at the entrance including the two Goldenrain trees, Holly shrubs and Azaleas and replacing them with additional trees, evergreen shrubs and ornamental grasses.

Bolton Road:

The planting along Bolton Road is very uneven. Closer to the main entrance the planting is essentially non-existent. Farther along Bolton Road, the planting consists of mature Pine (*Pinus nigra*), Hemlock (*Tsuga canadensis*) and Norway Maple (*Acer platanoides*). At the patio closest to the main entrance, the planting, Glossy Buckthorn (*Frangula alnus*) is either completely dead or dying. We would recommend removing all of the existing planting at this location and replacing it with trees, shrubs and grasses that would provide better screening for this potential outdoor classroom space. We would also recommend adding integrated seating at this location.

Near the entrance to the courtyard is a grouping of mature evergreen trees, Pine (*Pinus nigra*) and Hemlock (*Tsuga canadensis*). The pine trees appear to be in relatively good health but have been heavily limbed. The hemlock trees show signs of wooly adelgid infestation as well as other pests and need to be evaluated by an arborist. There is also a very loud and unattractive vent at this location that is not currently being screened by the existing planting. We would recommend adding additional planting to provide screening. If the hemlock trees are removed, we would recommend replacement with trees and evergreen shrubs to provide more substantial screening.

Farther down Bolton Road is a grouping of three mature Norway Maples (*Acer platanoides*) that provide welcome shade. These are mature trees that appear to be in good health but surface erosion and foot traffic is damaging their root systems. We would recommend that temporary landscape fencing be installed at this location to prevent further damage. We would also recommend that a permanent tree protection strategy be developed as part of an overall landscape design.

S. Lot:

The area along the facade facing the S. parking lot is currently very underserved by the landscape planting. At the corner closest to Bolton Road there are number of overgrown Viburnum shrubs that are in good health but to not provide any landscape benefits. We would recommend relocating the existing Viburnums and planting a row of 8-10 canopy trees to provide shade and screening for the south facing patio.

At the corner of S. Lot and parking Lot #1 there is a stand of Hemlocks (*Tsuga canadensis*) that are in poor condition. We would recommend evaluation by arborist and possible replacement with tree and shrub plantings that would better screen the adjacent vent.

SW Patio:

The SW Patio is in critical need of renovation. Drains and scuppers are no longer functioning due to settling and/or heaving. Current design also lacks integrated seating as well as sufficient screening and shading for this south facing patio.

Recommend reconstruction including the addition of integrated seating, lighting and additional landscape planting to provide shade and screening from parking lot. See Civil Engineer report for details.

Lot #1:

The planting along the Lot #1 facade is also uneven. At the end closest to S. Lot, there is a row of mature Norway Maples (*Acer platanoides*). These appear to be in reasonable health but need further evaluation by an arborist. If possible, it would be preferable to retain these trees as they provide shade and screening for the adjacent patio.

Farther along the planting becomes sparse, leaving a barren gap with no planting. We would recommend a continuous row of canopy trees along this facade, but would not recommend additional Norway Maples as they are invasive. The lack of proper stormwater management is especially evident along this facade as there is severe surface erosion.

The surface erosion is especially evident at the corner Lot #1 and the “Alley” separating the Fine Arts Building from the neighboring building. The runoff is being directed down the alley and the patio ramp and is causing significant damage to the planting bed and the adjacent concrete paths. The planting at this corner is also very underwhelming. We would recommend continuing the row of shade trees to the corner, coordinating with the stormwater drainage strategy that is developed for this location.

NW Patio:

Patio is in critical need of renovation. Drains and scuppers are no longer functioning due to settling and/or heaving. Current design also lacks integrated seating as well as sufficient shading and screening.

Recommend reconstruction including the addition of integrated seating, lighting and landscape planting to provide shade and screening from parking lot. See Civil Engineer report for details.

“Alley”:

The area between the Fine Arts Building and the neighboring building would benefit greatly from some landscape plantings. We would recommend replacing existing mulch beds with raised planters that incorporate small scale plantings as well as pedestrian level lighting.

Courtyard:

The most striking of all the planting on site are the four mature Birch trees (*Betula alba*) in the interior courtyard. These trees give identity and character to an otherwise uninviting space. These trees appear to be in good health but will need some careful pruning (by a certified arborist) to prevent damage to adjacent roof by overhanging branches.

In addition to the specimen Birch trees, there is also a large planting of Japanese Pieris (*Pieris japonica*). The majority of these plants are in excellent condition but need to be carefully trimmed back to create a lower massing, about 4-5’ tall. We would recommend adding 10-12 additional Pieris shrubs to this area to create a larger massing of a single species.

A number of locations in the courtyard show evidence of uplifted paving due to tree roots. Recommend regrade courtyards to resolve drainage issues. It is critical to protect trees/shrubs during construction. Also, expand planting beds around specimen trees to provide additional space for root systems.

The courtyard area is also lacking in sufficient seating and lighting. Recommend that reconstruction includes integrated seating and lighting in addition to a fully developed planting plan.

Summary:

The mature landscape plantings which characterize this landscape need to be evaluated by a certified arborist to determine health and do corrective pruning if needed.

The overall site plan lacks cohesion and does not provide character or identity for the Fine Arts Building. The landscape planting is also not providing adequate screening or shading for exterior patio areas. We recommend the development of an overall landscape plan to address concerns and revitalize the site.

Poor stormwater drainage is causing erosion and damage to existing plantings and hardscape. We recommend the development of a comprehensive stormwater management plan that addresses current problems and explores on-site infiltration to reduce load on existing storm sewers.

Existing Planting, Images 1-47

Images #1, 2

Koelreuteria paniculata
Goldenrain tree

Tree was planted incorrectly. Trunk flare should be at top of ground level, not top of mulch. Tree is showing advanced signs of stress and disease.

Recommend replacing.

Image #3

Koelreuteria paniculata
Goldenrain tree

Tree is planted too close to building and obscures current location of wall-mounted signage.

Recommend relocation and replacement with more substantial entrance planting.

Image #4

All street trees are missing.

Recommend replanting street trees along Bolton Street.

Existing Planting

Images #5,6,7

Frangula alnus
Glossy Buckthorn

Plants are dead or dying.

Recommend replacing all
with new plantings that provide screening for adjacent patio.

Image #8

2 Quercus sp
Oak

Possible volunteer planting.

Recommend removing smaller tree given space constraints.

Existing Planting

Images #9,10

3 Pinus nigra
Austrian Pine

Trees need to be carefully pruned by certified arborist.

Image #11

2 Tsuga canadensis
Canadian Hemlock

Trees are showing signs of stress and disease and are not providing sufficient screening for the loud vent nor the loading dock.

Recommend evaluation by arborist to determine level of disease. If removed, replace with sufficient planting/structure to provide better screening. If trees are not removed, additional planting/ structures are also needed to provide screening.

Image #12

Deceased Tsuga canadensis

Recommend removal.

Existing Planting

Images #13,14,15

3 Acer platanoides 'Crimson King'
Crimson King Maple

Mature trees are in relatively good health, but need evaluation by arborist. Root areas are being negatively impacted by surface erosion and foot traffic and need better protection.

Image #16

Viburnum sp.
Viburnum

This is the largest of the viburnums in this area and is in relatively good health. Surface drainage is eroding soil at base. Plants in this zone need better protection from erosion.

Existing Planting

Images #17,18,19

4 Viburnum sp.
Viburnum

Plants are in reasonable health but offer no shading or screening for the patio or sidewalk.

Recommend relocation and replacement with row of canopy trees to provide screening and shade.

Images #20,21

Malus sp.
Crabapple

Planted too close to wall

Recommend replacement with row of canopy trees
to screen patio from adjacent parking lot.

Existing Planting

Images #22,23

Tsuga canadensis
Canadian Hemlock

Trees are showing signs of stress and disease and are no longer screening the wall vent.

Recommend evaluation by arborist.
If removed, replace with planting that provides better screening.

Image #24

Deceased Tsuga canadensis

Recommend removal.

Images #25,26,27,28

5 Acer platanoides
Norway Maple

Trees are showing signs of stress.

Recommend evaluation by independent certified arborist.

If removed, replace with canopy trees to shade patio and provide screening from adjacent parking lot.

Existing Planting

Images #25,26,27,28 (continued)

Images #29,30

4 Viburnum sp.
Viburnum

Plants are in reasonable condition but are not providing needed shade nor screening for the patio.

Recommend relocation and replacement with row of canopy trees.

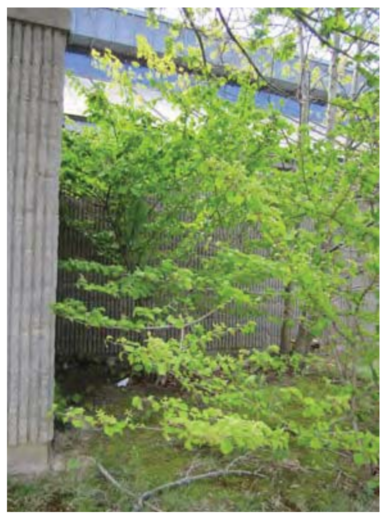


Image #31

Quercus sp.
Oak

Possible volunteer planting.
Located too close to patio wall.
Recommend replacement with canopy tree.

Existing Planting

Images #32,33

Acer platanoides
Norway Maple

Tree is showing signs of distress. Recommend evaluation by independent certified arborist.

If removed, replace with canopy tree.

Image #34

Juniperus sp.
Juniper

Euonymus sp.
Euonymus

Recommend replacement with more substantial planting along full length of building. Area is showing signs of surface erosion and needs to be better protected from runoff.

Image #35

Prunus sp.
Plum

Tree is in reasonable condition despite being planted too high.

Trunk wrap needs to be removed.

Existing Planting

Image #36

Juniperus sp.
Juniper

Not providing any landscape function.

Recommend removal.

Images #37,38

8 Pieris japonica
Japanese Andromeda

Very overgrown, need to be carefully trimmed back to create a lower massing.

Images #39,40,41

3 Betula alba
European Birch

Important specimen trees that should be retained.

Needs careful pruning by certified arborist to trim branches that are potentially impacting the roof.

Existing Planting

Images #39,40,41 (continued)

Image #42

Pyracantha coccinea 'Lalandi'
Laland Firethorn

Not providing any landscape benefit.

Recommend relocation and replacement with cohesive landscape planting.

Image #43

2 Pieris japonica
Japanese andromeda

Recommend relocation and replacement with cohesive landscape planting.

Existing Planting

Image #44, 45

Betula alba
European Birch

Important specimen tree that should be retained.

Needs careful pruning by
certified arborist to trim overhanging branches that are potentially impacting the roof.

Image #46

Interior view into courtyard garden

Image #47

Pachysandra terminalis

Established bed of healthy groundcover.

Protect during construction.

Existing Site Conditions, Images 48-92

Image #48

Surface erosion

Likely caused by pedestrian traffic.

Recommend minimizing lawn area by adding more substantial planting around entrance. More planting would encourage use of existing concrete path.

Image #49

Surface erosion

Likely caused by pedestrian traffic.

Recommend adding more substantial planting along sidewalk.

Image #50

Existing signage

Wall mounted entrance signage is obscured by planting. Recommend that new signage strategy is incorporated into new landscape planting design.

Existing Site Conditions

Image #51

Cracked concrete

Likely due to poor drainage.

Recommend regrading entire patio area to address site drainage. Trees and other plant material should be protected during regrading. See Civil Engineer report.

Image #52

Vent

Loud vent needs more screening. Recommend adding more substantial planting and a physical enclosure.

Images #53,54

Surface damage

Likely caused by pedestrian traffic.

Erosion is causing damage to root system and is negatively impacting mature tree planting.

Recommend immediate installation of temporary tree protection fencing to prevent further damage. Permanent tree protection measures should be incorporated into overall site design.

Existing Site Conditions

Images #55,56

Surface erosion
Caused by stormwater runoff and poor site drainage.

Runoff from sidewalks and adjacent patio is scouring planting bed at corner as well as planting strip at street edge. This is having a negative impact on the shade tree in this location.

Images #57,58,59,60,61,62

SW Patio
Patio is in critical need of renovation. Drains and scuppers are no longer functioning due to settling and/or heaving. Current design also lacks integrated seating as well as sufficient shading (south facing) and screening. Roof drains have been disconnected.

Recommend reconstruction including the addition of integrated seating and landscape planting to provide shade and screening from parking lot. See Civil Engineer report for details.

Existing Site Conditions

Images #57,58,59,60,61,62 (continued)





Images #63,64,65,66

Site erosion

Surface and root damage due to poor management of building runoff.


Existing Site Conditions

Images #63,64,65,66 (continued)

Images #67,68

Surface erosion

Due to pedestrian use and runoff.

Recommend comprehensive stormwater management strategy to address building and surface drainage.

.

Images #69,70,71,72,73,74,75,76,77

NW Patio

Patio is in critical need of renovation. Drains and scuppers are no longer functioning due to settling and/or heaving. Current design also lacks integrated seating as well as sufficient shading and screening.

Recommend reconstruction including the addition of integrated seating and landscape planting to provide shade and screening from parking lot. See Civil Engineer report for details.

Existing Site Conditions

Images #69,70,71,72,73,74,75,76,77 (continued)








Existing Site Conditions

Image #78

Surface erosion
Caused by poor runoff management and pedestrian traffic.

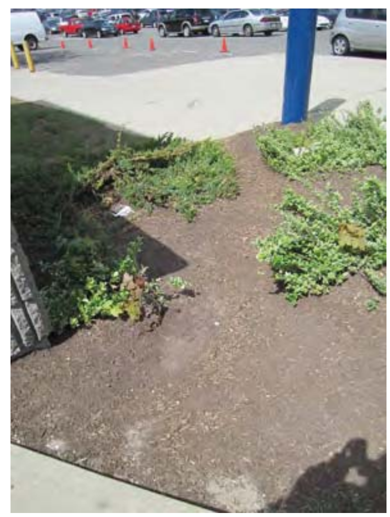
Recommend comprehensive site-wide stormwater management strategy.

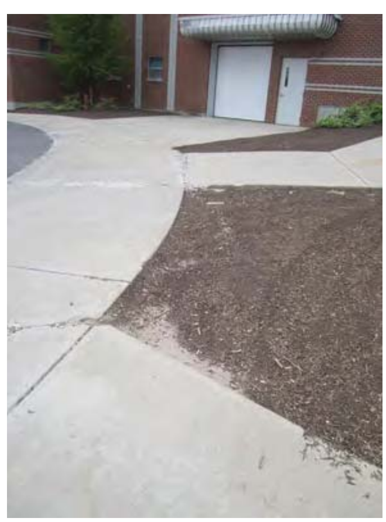
Images #79,80,81,82,83

Surface erosion
Caused by poor runoff management and pedestrian traffic.

Erosion is causing damage to planting area and adjacent concrete sidewalks and curbs.

Recommend development and adoption of comprehensive site-wide stormwater management strategy.





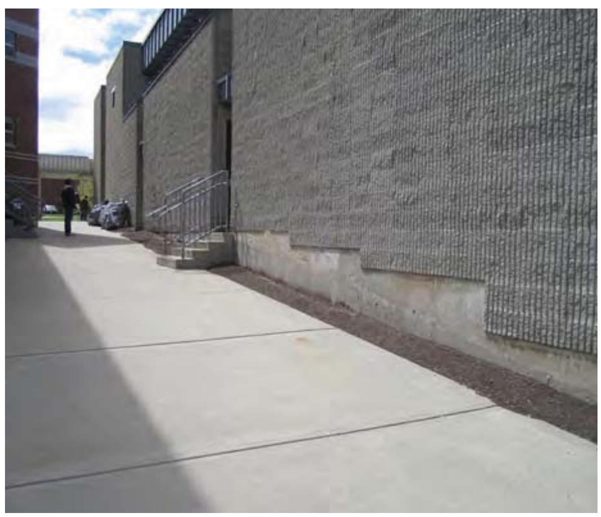
Images #84,85,86

Mulch erosion
Mulch beds provide no landscape benefit and are being washed away by poor site drainage causing a maintenance issue.

Recommend development and adoption of comprehensive site-wide stormwater management strategy.

Recommend adding raised planters at this location.

Images #84,85,86
(continued)



Images #87,88

Uplifted paving

Paving has been uplifted by roots of adjacent birch tree.

Recommend regrading of patio to correct drainage issues. Implement tree protection measures during construction.

Recommend increasing size of planting bed to accommodate mature specimen birch.

Existing Site Conditions

Images #87,88
(continued)

Image #89

Concrete pedestals
Display pedestals are in poor condition.

Survey faculty and staff to determine usefulness of pedestals and replace if needed.

Images #90,91

Uplifted paving
Paving has been uplifted by roots of adjacent birch tree.

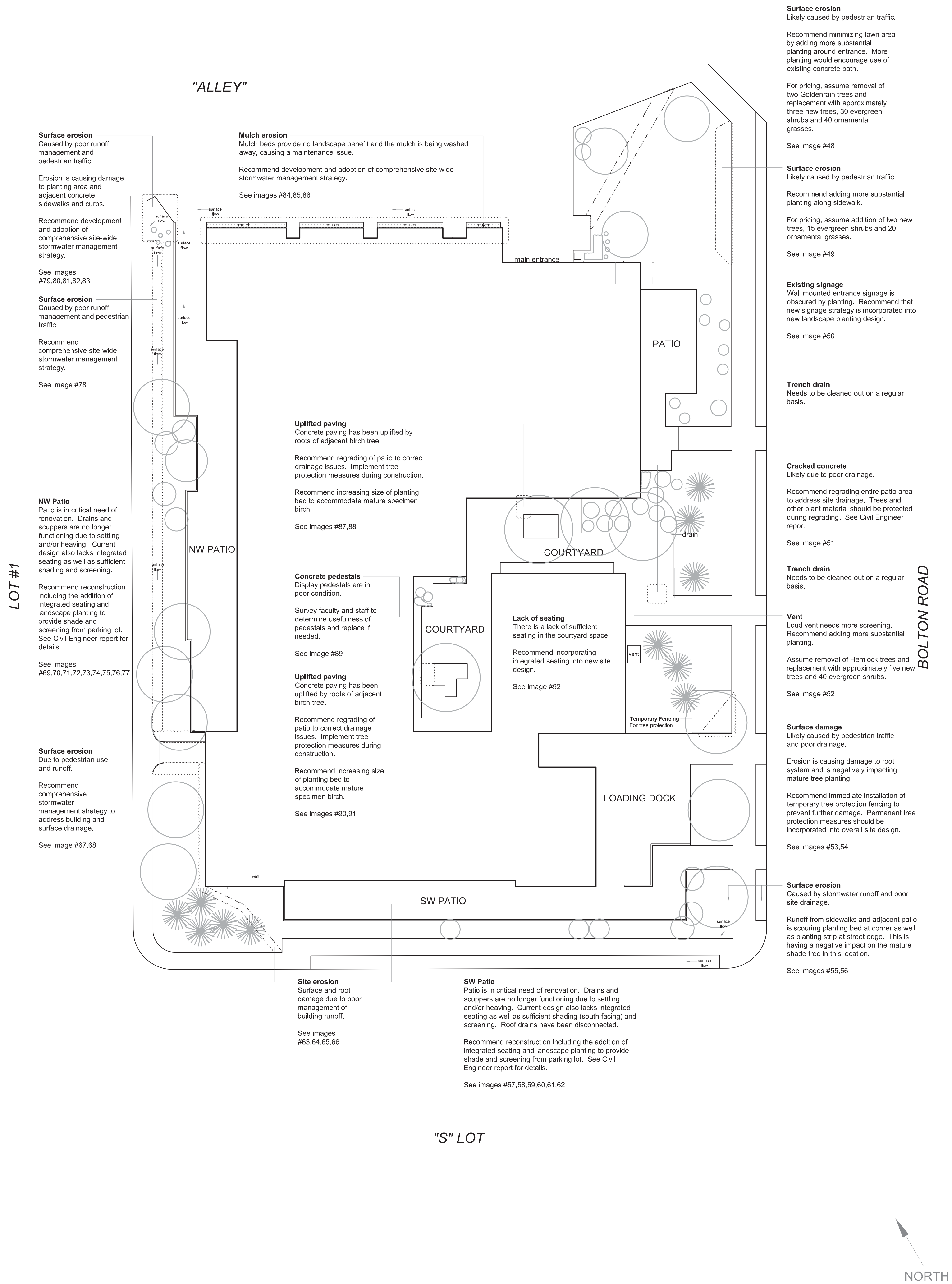
Recommend regrading of patio to correct drainage issues. Implement tree protection measures during construction.

Recommend increasing size of planting bed to accommodate mature specimen birch.

Image #92

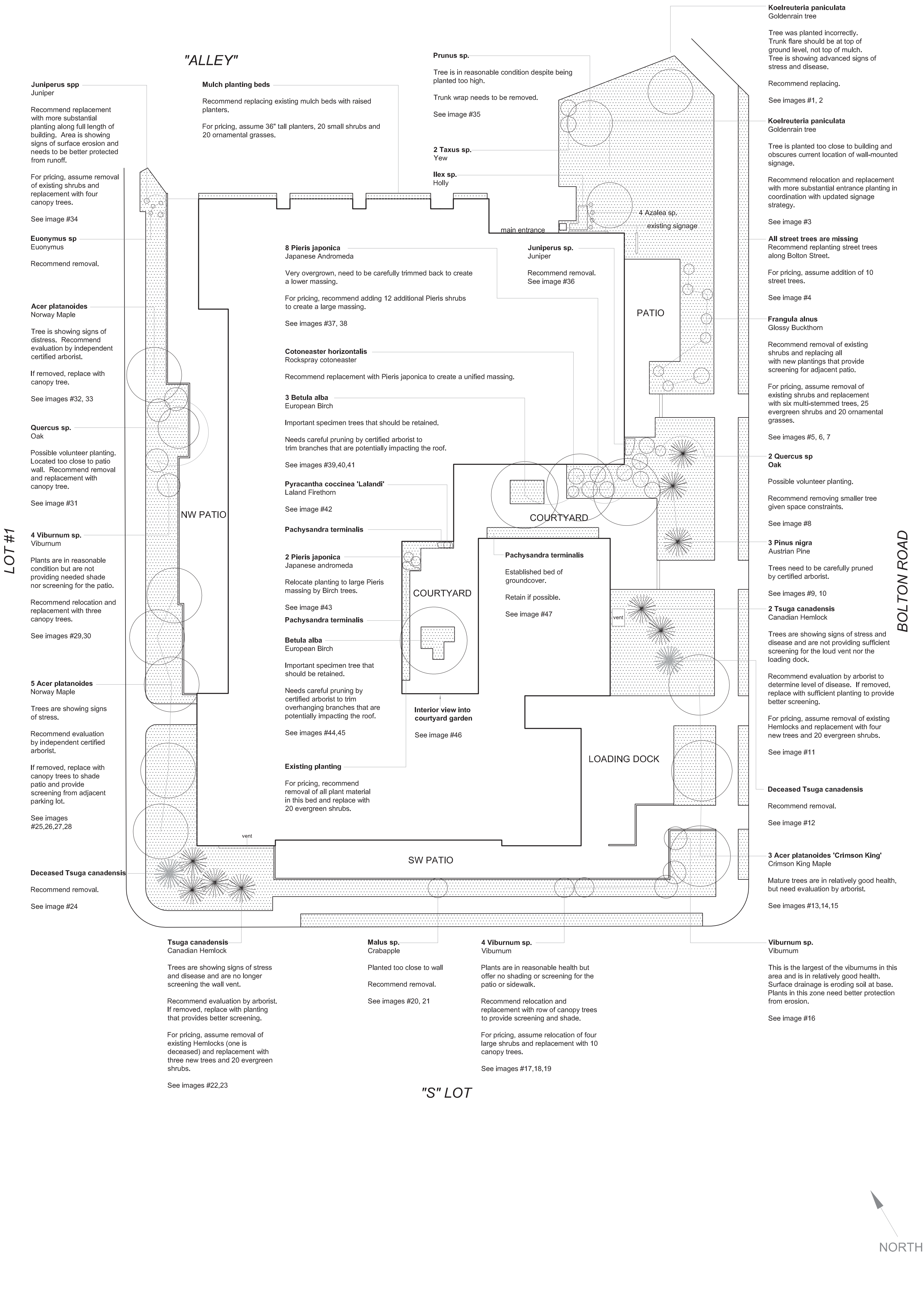
Lack of seating
There is a clear lack of sufficient seating in the courtyard space.

Recommend incorporating integrated seating into new site design.



University of Connecticut
Fine Arts Building

Existing Landscape Conditions
LWSI 1"=32'-0"



University of Connecticut
Fine Arts Building

Existing Landscape Planting
LWSI 1"=32'-0"

APPENDIX D

COST ESTIMATE

University of Connecticut
Fine Arts Building Repairs
Storrs, CT

Schematic Estimate

June 13, 2011

Engineer: Simpson Gumpertz & Heger

VJ ASSOCIATES
A CONSTRUCTION CONSULTING FIRM

60 Dedham Avenue, Needham, MA 02492

University of Connecticut
Fine Arts Building Repairs
Storrs, CT
Schematic Estimate

June 13, 2011

No.	SUMMARY OF COSTS	Est. Cost	Total Cost incl. all Mark-ups
	Direct Costs -		
1	Roof Repairs	1,255,002	1,801,179
2	Masonry Repairs	162,783	233,626
3	Drainage Repairs		
3A	Drainage Repairs	95,510	137,076
3B	Site Work	182,523	261,957
3C	Landscape Work	150,275	215,675
	Sub-Total Drainage Repairs (3A+3B+3C)	428,308	614,708
	Sub-Total Direct cost of all work…. ….. (1+2+3)	**$1,846,093**	$2,649,513
	Markups:		
	Design Development Allowance 15%	276,914	
	Construction Contingency 5%	92,305	
	Sub-Total	2,215,312	
	General Contractor's OH&P, General Conditions 15%	332,297	
	Material sales tax, assumed project is exempted	0	
	Escalation at 4% for approximately one year	101,904	
	Total Project Costs …	**$2,649,513**	
	USE	**$2,650,000**	
	Total Markups, multiplier to Direct Costs	*1.44*	
	Alternate 1 -	249,600	
	with mark ups, USE	… … … … …	**$358,226**

Notes:

1 All Owner's costs are excluded.
2 All A/E and other soft costs are excluded.
3 Estimate is based on using union labor.
4 The estimated costs are in present day cost, escalation is included at 4% to Aug. 2012
5 For the asbestos abatement from roofing material, it is assumed that it is in non-friable condition, tests should be conducted for verification prior to bidding out the work.
6 It is assumed that the work will be competitively bid by qualified, experienced contractors in this class of work.
7 The estimate is based on schematic documents prepared by SGH. Drawings noted with basic work items noted and outline specifications received on May 20, 2011.

University of Connecticut
Schematic Estimate

Engineer: Simpson Gumpertz & Heger
June 13, 2011

Roof Repairs

S.O.W. Item		Description of Work	Qty	Unit	Unit Cost	Total
		Roofing removal work -				
		Asbestos abatement from built up roofing material -				
		It is assumed that asbestos in the roofing material is in non-friable condition; like mastic or sealant and does not require containment dome while working to remove the same. Personnel protection and other material handling, disposal related guidelines will be followed				
		Remove "obstacles" and prepare roof surface (wet) for roofing removal	25,750	SF	0.50	12,875
		Removal of roofing material	25,750	SF	5.00	128,750
		Fill bags, with vacuum device	2,150	EA	12.00	25,800
		Disposal incl hauling	240	CY	240.00	57,600
		Allowance for sampling, testing, Technician	1	LS	5000.00	5,000
		Removal of insulation, etc down to metal deck	25,750	SF	1.00	25,750
		Removal of flashing etc	1	LS	3000	3,000
		Material hoist, installation and removal	1	LS	10000	10,000
		Debri, waste chute allowance	1	LS	2500	2,500
		Disconnect mech units, raise to remove built-up- roof under. Raise to install new roofing. Temp. supports, units to be operational.	2.00	EA	7500	15,000
		Disassemble Counter Flashing At Roof Fans/Goosenecks to Remove Built-up-roof	40	EA	300.00	12,000
		Disconnect fans, reconnect after new roofing installation	2	EA	1500.00	3,000
		Mech/Electr labor for equipt disconnect, reconnect; inspect and keep it operational	1	LS	6000	6,000
						0
		Remove Kalwall Panel System	1750	SF	4.00	7,000
		Remove Batten-Seam Metal Panel, sheathing, felt	3550	SF	2.50	8,875
		Remove Deteriorated Metal Skirt Flashing Above Terrace Roof Canopy	230	LF	3.50	805
		Remove and replace skylights, flashing, curb, complete.	4	EA	1800	7,200
		Check system and Disconnect piping	1	LS	400.00	400
		Glycol disposal	1	LS	500.00	500
		Remove And Dispose Solar Panels, piping, repair, patch supports, penetrations.	1110	SF	7.00	7,770
						0

ASSOCIATES
A CONSTRUCTION CONSULTING FIRM

University of Connecticut
Schematic Estimate

Engineer: Simpson Gumpertz & Heger
June 13, 2011

Roof Repairs

S.O.W. Item		Description of Work	Qty	Unit	Unit Cost	Total
		New work -				0
						0
		New EPDM roofing, rigid board, tapered insulation	25723	SF	15.75	405,137
		Flashing at parapet all around; incl. base flashing, plywood sheathing, hook strip.	1200	LF	40.00	48,000
		New Base Flashing, Metal Skirt Flashing & Metal Cap Flashing	370	LF	25.00	9,250
		New Elevated Curbs for mechanical units	80.00	LF	15.00	1,200
		Install new translucent glazing System, new framing	1750	SF	150.00	262,500
		Install new standing Seam Metal Panel with underlayment, sheathing, insulation	3550	SF	43.00	152,650
		Metal flashing at Termination of Metal Roof Rake Flashing	186	LF	25.00	4,650
		Install New Soldered Kick Out Flashing at Gable End Intersection With Masonry Wall	10	EA	200.00	2,000
		Replace Guy Wires At Mechanical Stack, repair anchors	1	EA	2500.00	2,500
		Replace Deteriorated Metal Skirt Flashing Above Terrace Roof Canopy	230	LF	20.00	4,600
		Remove, Store, Prepare, Refinish And Reinstall Existing Ladder	1.00	EA	1200.00	1,200
		Repair Metal Panel Roof Flashing. Install Kick out	82.00	LF	20.00	1,640
		New Expansion joints flashing, bellows,metal cap	155	LF	28.00	4,340
		Remove, store and reinstall existing lightning protection system - air terminals and roof cable; And Recertify	1	LS	4460.00	4,460
		Treated wood allowance for misc. use	1	LS	1000.00	1,000
		Mech/electrical check out at the end of work	1	LS	1200.00	1,200
		Snow guards to standing seam metal roof	1	LS	8850.00	8,850

		SUBTOTAL:				$1,255,002

University of Connecticut
Schematic Estimate

Engineer: Simpson Gumpertz & Heger
June 13, 2011

Masonry Repairs

S.O.W. Item		Description of Work	Qty	Unit	Unit Cost	Total
		Remove & Replace All Sealant at Curtain Wall frames and Perimeter.	929	LF	8.00	7,432
		Remove and Dispose of and Replace Gutters & Downleader	362	LF	13.50	4,887
		Replace Door Threshold	118	LF	20.00	2,360
		New gaskets and sealants at doors perimeter	600	LF	13.50	8,100
		Remove Abandoned Pipe Penetrations From Envelope Wall & Infill with New Masonry to Match Existing	3	EA	600.00	1,800
		Clean Efflorescence From Masonry	134	SF	5.50	737
		Repair Cracking Mortar Joint	15	LF	20.00	300
		Remove & Replace Displaced Lintel Above Louver, 9 ft long. Including temporary support, 1 location	1	LS	2200.00	2,200
		Remove & Replace Sealant at Louvers and Repaint all louvers	1	LS	4140.00	4,140
		Allowance 1 - Repoint 5% of masonry area	530	SF	30.00	15,900
		Allowance 2 - Replace Split Ribbed Concrete Block	778	SF	18.50	14,393
		Allowance 2 - Temporary supports for above CMU replacement	1	LS	10,000	10,000
		Replace Corroded Beam 22 ft long, Supporting Entrance Soffit. Includes temp support for installation of new beam	1.00	LS	12,500	12,500
		Clean Corrosion And Graffiti on Doors. Prepare & Repaint	12	EA	300.00	3,600
		Replace Sealant & Backer Rod at control joints (masonry area 10560 SF)	650	LF	16.00	10,400
		Repoint Crack & Separation Between Retaining Wall and Envelope Wall	45	SF	20.00	900
		Repair Holes Between Masonry Veneer Wall & Back up Masonry at weeps(30) & Scuppers(15) -	1	LS	12125.00	12,125
		Clean Masonry Along Length of Base of Wall on Terrace	150	LF	4.00	600
		Repair Crack In Terrace Side of Retaining Wall	66	LF	16.00	1,056
		Clean Heavy Staining & Efflorescence From Masonry Wall. Clean Entire Retaining Wall on Both Sides to Ensure Uniform Masonry Color	3378	SF	6.50	21,957
		Remove coping on retaining wall, install metal cap flashing, reinstall coping	300	LF	30.00	9,000
						0
						0

University of Connecticut
Schematic Estimate

Engineer: Simpson Gumpertz & Heger
June 13, 2011

Masonry Repairs

S.O.W. Item		Description of Work	Qty	Unit	Unit Cost	Total
		Repoint Crack in Retaining Wall & Deteriorated Mortar Joints	81	SF	16.00	1,296
		Remove and replace corroded soffit vents above doors	60	LF	35.00	2,100
		Scaffolding allowance	1	LS	15000.00	15,000

		SUBTOTAL:				$162,783
		Alternate 1 - Repair masonry wall thru wall flashing, remove bottom block at base, install new thru wall flashing	960	LF	260.00	249,600

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University of Connecticut
Schematic Estimate

Engineer: Simpson Gumpertz & Heger
June 13, 2011

Drainage Repairs / Site Work

S.O.W. Item		Description of Work	Qty	Unit	Unit Cost	Total
	Fig 4	**Site Work -**				
		Terrace "A" and "B" - 4" Concrete slab removal	4400	SF	7.00	30,800
		Regrade area, excavate, remove and replace base 4 ft thick; compact in 6" lifts (small area, some hand tools use)	652	CY	30.00	19,556
		New C.I.P. reinforced concrete slab	4400	SF	7.50	33,000
						0
		Remove existing curb	250	LF	7.25	1,813
		Install new concrete curb, control joints and epoxy comp	250	LF	12.00	3,000
		Fill cracks in concrete curbs	100	LF	8.50	850
						0
		Remove existing courtyard slab 4" thk	3400	SF	7.00	23,800
		Regrade area, excavate, remove and replace base 4 ft thick; compact in 6" lifts (small area, some hand tools use)	504	CY	30.00	15,111
		New C.I.P. reinforced concrete slab	3400	SF	7.50	25,500
						0
		Remove exist pavement and 6" sub-base	1500	SF	1.35	2,025
		Regrade, compact base	56	CY	25.00	1,389
		Install new bituminous concrete pavement	1500	SF	6.00	9,000
						0
		6" thk Concrete pad for dumpster incl gravel base	200	SF	12.00	2,400
		Concrete filled pipe bollards	2	EA	750.00	1,500
						0
	IIIa	Repair cracks in concrete slab, 1/2" wide	250	LF	5.00	1,250
		Demo and remove sections of slab (30)	480	SF	8.50	4,080
		Remove and replace 6" gravel below, 30 separate sections	10	CY	25.00	250
		Replace concrete slab in sections (30)	480	SF	15.00	7,200
						0

		Sub-total Site Work				**$182,523**

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University of Connecticut
Schematic Estimate

Engineer: Simpson Gumpertz & Heger
June 13, 2011

Drainage Repairs / Site Work

S.O.W. Item		Description of Work	Qty	Unit	Unit Cost	Total
		Drainage repair work -				0
		New drainage man hole	4	EA	5000.00	20,000
		New 8" drain lines to connect to roof leaders	180	LF	32.00	5,760
		New 12" dia corrugated polyethylene pipe (CPP)	250	LF	38.00	9,500
		Proposed underground infiltration system - Storm Tech SC-740 system, 10 qty.	1	LS	6000.00	6,000
		Replace grates on exist CBs with Dome grates	4	EA	500.00	2,000
		Clean exist CBs and TDs	1	LS	2500.00	2,500
						0
		Terrace, courtyard area CBs, 4 ft dia.	5	EA	4000.00	20,000
		Discharge pipe and 4 ft deep sump	5	EA	3000.00	15,000
		Hood over discharge pipe	5	EA	750.00	3,750
						0
		Construction period erosion control plan - 16 CBs, 16 inlets; incl. weekly inspection, monitoring - 13 weeks	1	LS	8500.00	8,500
		Site clean up	1	LS	2500.00	2,500
						0
						0
						0
						0
						0
						0
						0

		Sub-total Drainage Repair				**$95,510**

University of Connecticut
Schematic Estimate

Engineer: Simpson Gumpertz & Heger
June 13, 2011

Landscape Work

S.O.W. Item		Description of Work	Qty	Unit	Unit Cost	Total
		Dwg titled Existing Landscape Conditions -				
		Most of the reconstruction work noted, e.g. patio, courtyard, etc is included with Site work				
		Most of the area drainage repair work noted, is included with Drainage repair work				
		Integrated (concrete bench) seating and landscape planting "box" in patio and courtyard areas, approx total length for both ~ 450 ft	1	LS	56250.00	56,250
		Tree protection, 2 areas	1	LS	1400.00	1,400
		Replace pedestals	1	LS	1000.00	1,000
		Increase size of planting beds	1	LS	2000.00	2,000
		Removal of trees	1	LS	1900.00	1,900
		New trees - 10; new evergreen shrubs - 45; new ornamental grass - 100	1	LS	17500.00	17,500
		Tree maintenance to expose signage	1	LS	800.00	800
		Tree protection fencing	1	LS	1800.00	1,800
						0
						0
		Dwg titled Existing Landscape Planting -				0
		Independent certified arborist	3	DAY	1200.00	3,600
		Remove shrubs, 3 areas	1	LS	500.00	500
		Remove trees (3 small)	1	LS	900.00	900
		Remove trees (medium to large, approx. 10)	1	LS	4000.00	4,000
		Relocate large shrubs, small trees, several areas	1	LS	6000.00	6,000
						0
		New trees, approximately 47	1	LS	35250.00	35,250
		New evergreen shrubs, approx. 65 and ornamental grass	1	LS	12375.00	12,375
		Erosion control at a tree	1	LS	500.00	500
		Tree maintenance	1	LS	3500.00	3,500
		Clean up after completion of work	1	LS	1000.00	1,000
						0
						0
						0
						0
						0
						0

		Sub total Landscaping				$150,275

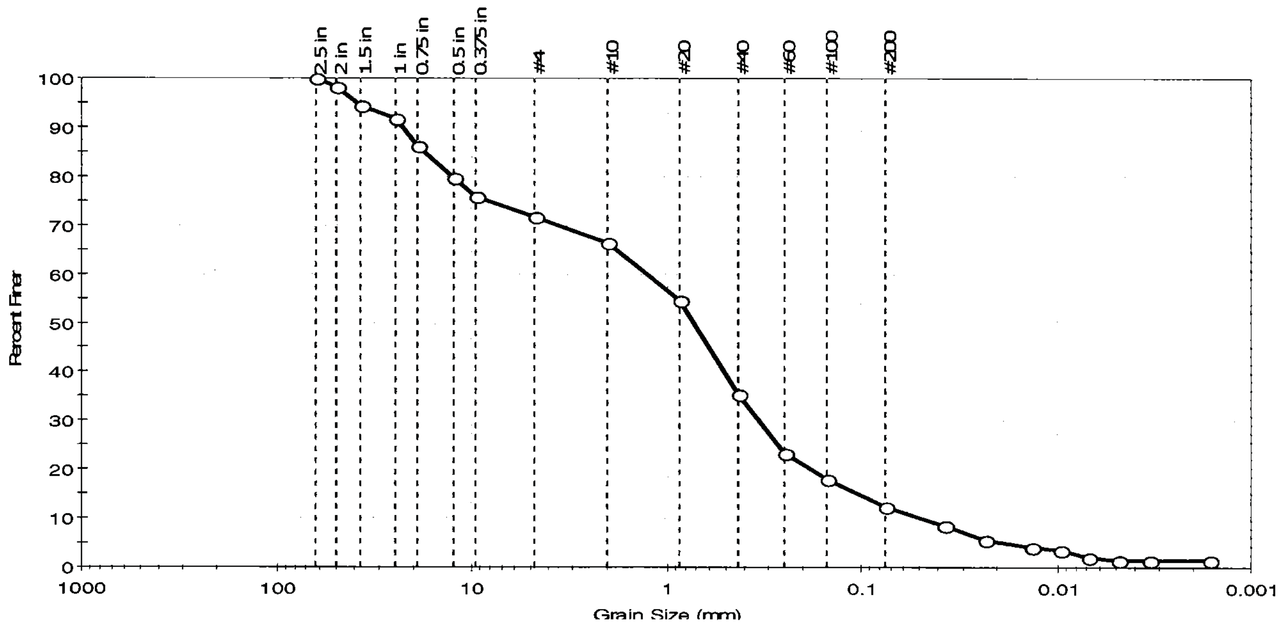
APPENDIX E

GRADATION TESTING RESULTS

GeoTesting EXPRESS

Client:	Simpson Gumpertz & Heger, Inc.				
Project:	Fine BLD, UConn				
Location:	Storrs, CT			Project No:	GTX-10790
Boring ID: ---		Sample Type:	bucket	Tested By:	jbr
Sample ID:F1		Test Date:	05/12/11	Checked By:	jdt
Depth : ---		Test Id:	207937		
Test Comment:	---				
Sample Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	28.2	59.5	12.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2.5 in	63.00	100		
2 in	50.00	98		
1.5 in	37.50	94		
1 in	25.00	92		
0.75 in	19.00	86		
0.5 in	12.50	80		
0.375 in	9.50	76		
#4	4.75	72		
#10	2.00	67		
#20	0.85	55		
#40	0.42	35		
#60	0.25	23		
#100	0.15	18		
#200	0.075	12		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0380	9		
---	0.0234	6		
---	0.0136	4		
---	0.0096	4		
---	0.0068	2		
---	0.0048	1		
---	0.0034	1		
---	0.0016	1		

Coefficients

D_{85} = 17.7664 mm
D_{30} = 0.3368 mm
D_{60} = 1.2488 mm
D_{15} = 0.1035 mm
D_{50} = 0.7191 mm
D_{10} = 0.0494 mm
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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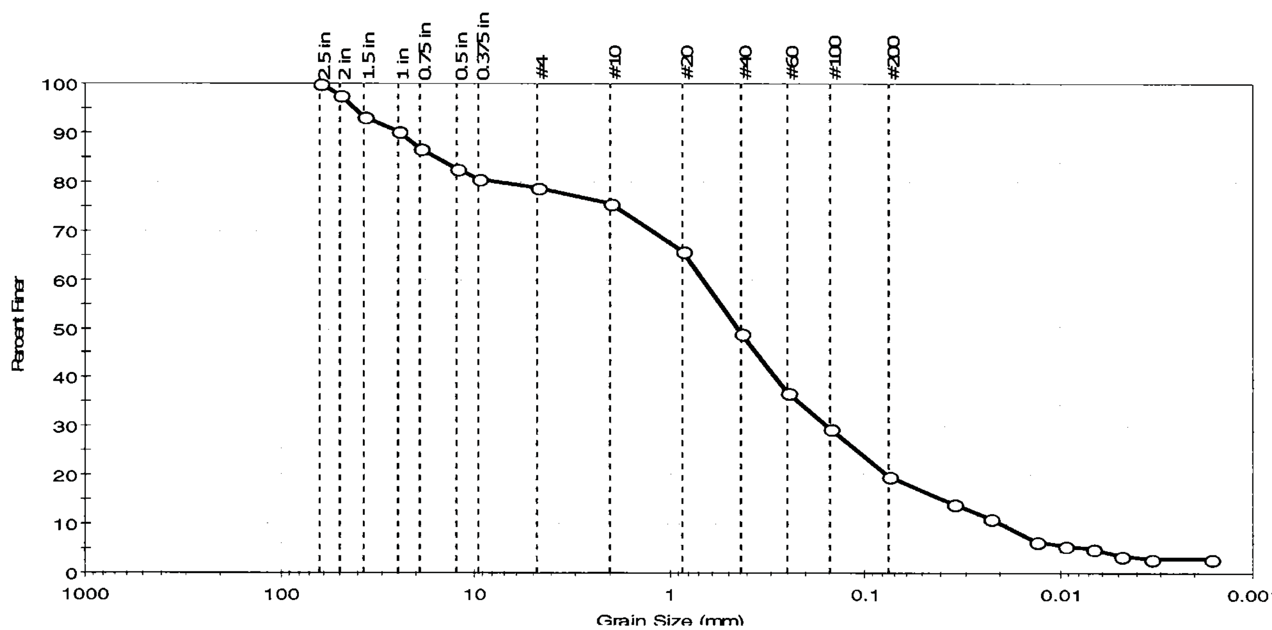
GeoTesting EXPRESS

Client: Simpson Gumpertz & Heger, Inc.	
Project: Fine BLD, UConn	
Location: Storrs, CT	Project No: GTX-10790
Boring ID: ---	Sample Type: bucket	Tested By: jbr
Sample ID:F2	Test Date: 05/12/11	Checked By: jdt
Depth : ---	Test Id: 207938	
Test Comment: ---	
Sample Description: Moist, brown silty sand with gravel	
Sample Comment: ---	

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	21.4	58.9	19.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2.5 in	63.00	100		
2 in	50.00	98		
1.5 in	37.50	93		
1 in	25.00	90		
0.75 in	19.00	87		
0.5 in	12.50	83		
0.375 in	9.50	81		
#4	4.75	79		
#10	2.00	75		
#20	0.85	66		
#40	0.42	49		
#60	0.25	37		
#100	0.15	30		
#200	0.075	20		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0352	14		
---	0.0230	11		
---	0.0132	6		
---	0.0095	6		
---	0.0067	5		
---	0.0048	4		
---	0.0034	3		
---	0.0016	3		

Coefficients

D_{85} =15.7827 mm D_{30} =0.1547 mm

D_{60} =0.6697 mm D_{15} =0.0395 mm

D_{50} =0.4430 mm D_{10} =0.0198 mm

C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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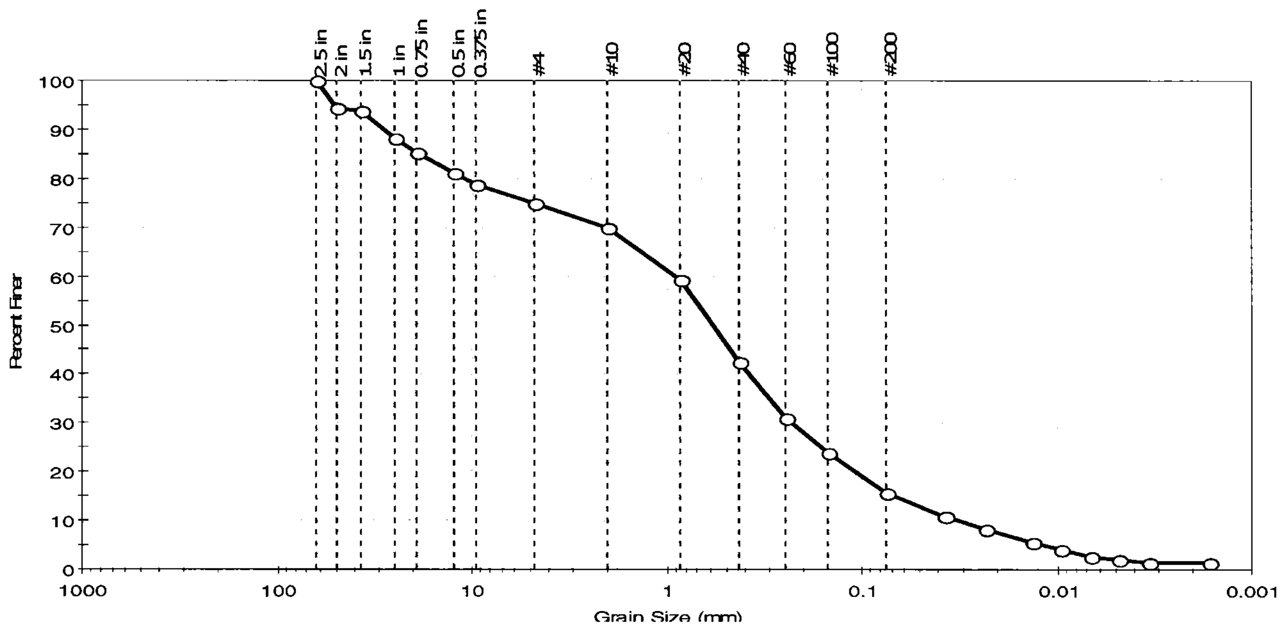
GeoTesting EXPRESS

Client:	Simpson Gumpertz & Heger, Inc.				
Project:	Fine BLD, UConn				
Location:	Storrs, CT			Project No:	GTX-10790
Boring ID: ---		Sample Type:	bucket	Tested By:	jbr
Sample ID:F3		Test Date:	05/13/11	Checked By:	jdt
Depth : ---		Test Id:	207939		
Test Comment:	---				
Sample Description:	Moist, yellowish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	25.1	59.1	15.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2.5 in	63.00	100		
2 in	50.00	94		
1.5 in	37.50	94		
1 in	25.00	88		
0.75 in	19.00	85		
0.5 in	12.50	81		
0.375 in	9.50	79		
#4	4.75	75		
#10	2.00	70		
#20	0.85	59		
#40	0.42	42		
#60	0.25	31		
#100	0.15	24		
#200	0.075	16		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0373	11		
---	0.0233	8		
---	0.0135	5		
---	0.0096	4		
---	0.0068	3		
---	0.0048	2		
---	0.0034	1		
---	0.0016	1		

Coefficients

D_{85} =18.3016 mm D_{30} =0.2324 mm

D_{60} =0.8976 mm D_{15} =0.0671 mm

D_{50} =0.5790 mm D_{10} =0.0319 mm

C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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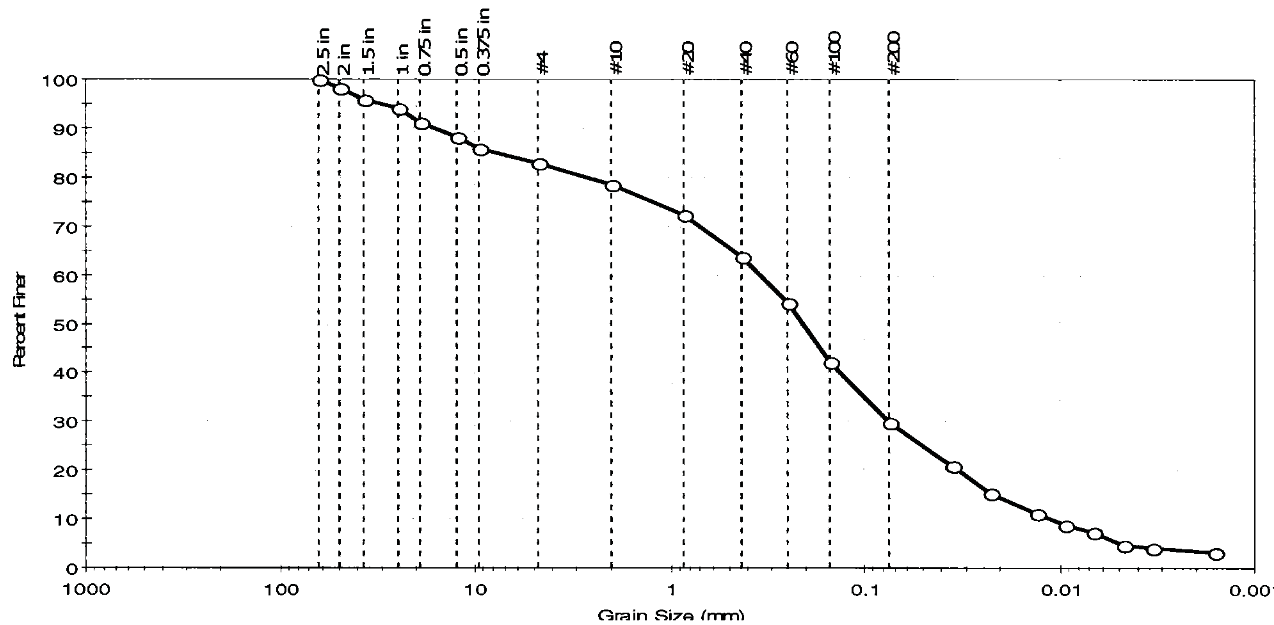
GeoTesting EXPRESS

Client: Simpson Gumpertz & Heger, Inc.			
Project: Fine BLD, UConn			
Location: Storrs, CT		Project No:	GTX-10790
Boring ID: ---	Sample Type: bucket	Tested By:	jbr
Sample ID:F4	Test Date: 05/12/11	Checked By:	jdt
Depth : ---	Test Id: 207940		

Test Comment: ---
Sample Description: Moist, brown silty sand with gravel
Sample Comment: ---

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	17.1	53.0	29.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2.5 in	63.00	100		
2 in	50.00	98		
1.5 in	37.50	96		
1 in	25.00	94		
0.75 in	19.00	91		
0.5 in	12.50	88		
0.375 in	9.50	86		
#4	4.75	83		
#10	2.00	79		
#20	0.85	72		
#40	0.42	64		
#60	0.25	54		
#100	0.15	42		
#200	0.075	30		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0360	21		
---	0.0226	15		
---	0.0132	11		
---	0.0094	9		
---	0.0067	7		
---	0.0048	5		
---	0.0034	4		
---	0.0016	3		

Coefficients

D_{85} =7.9183 mm — D_{30} =0.0754 mm
D_{60} =0.3467 mm — D_{15} =0.0216 mm
D_{50} =0.2097 mm — D_{10} =0.0110 mm
C_u =N/A — C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED
Sand/Gravel Hardness : HARD

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APPENDIX F

Scope of Work Submitted to VJ Associates

SECTION 011000

UCONN FINE ARTS BUILDING REPAIR OUTLINE SCOPE OF WORK – FACADE, ROOF, AND SOLAR PANELS

PART 1 – GENERAL

1.01 SUMMARY

A. The work of this Section includes all labor, materials, equipment, and service necessary to perform repairs as specified, including but not limited to the following:

1. Provide access to the building areas as required to perform the Work, including aerial lifts, scaffolding, etc. If scaffolding is to be used, provide a staging and work plan, stamped by a licensed professional engineer in the State of Connecticut, to the Engineer. Coordinate location of cranes and other lifting or hoisting equipment with the Owner.

2. Provide appropriate dumpsters for temporary debris storage during construction activity.

B. Remove and dispose of all materials within existing built-up-roof system down to the existing metal roof deck, including all existing base, penetration, and other miscellaneous flashing and blocking. The extent of built-up-roof replacement is shown on Figures 1 and 2.

1. The asbestos-abatement work shall include the removal of asbestos-containing materials. Assume that the existing built-up roofing and flashing contain asbestos.

a. The Contractor shall supply all labor, materials, equipment, services, insurance (with specific coverage for work on asbestos), and incidentals that are necessary or required to perform the work in accordance with applicable governmental regulations and these specifications.

2. Remove and store existing lightning protection system to allow roofing, flashing and metal flashing installation

3. Verify working condition of HVAC roof-mounted equipment in mechanical area. All equipment shall remain fully operational during roof reconstruction. At HVAC units (2 locations total) where shown on the drawings, temporarily remove equipment from existing supports to allow removal of existing roofing materials and installation of new roofing. Temporarily support units during roof reconstruction and do not overload roof.

a. Provide the services of a licensed electrician to extend the electrical power service to the existing rooftop equipment as necessary for raising the height of the units. Also provide the services of a licensed mechanical contractor as necessary to extend any control wiring, ductwork, conduit, plumbing, etc. to allow units to be placed on new elevated curbs.

4. Temporarily remove or lift rooftop piping and conduit to allow roofing installation; reinstall piping and conduit on prefabricated, adjustable pipe supports.

   a. Disassemble and reinstall counter-flashing on up to 40 roof fans and goosenecks to remove existing built-up-roof and install new EPDM roof and flashing.

   b. Remove and dispose of 4 existing translucent unit skylights to remove existing built-up-roof. Reinstall 4 new skylights; basis of design is Model CS1/CSP1 Curb-Mounted Thermalized Skydome by Wasco Skylight Products, Inc.

5. Remove and dispose of existing base and metal skirt flashing at intersection of built-up-roof and masonry walls (See existing Detail 2/A-3). Existing through-wall flashing to remain.

6. Remove and dispose of all existing metal roof edge perimeter flashing and blocking.

7. Remove and dispose of metal cap flashing and membrane flashing at expansion joints between adjacent built-up-roof areas (See existing Detail 1/A-3). Refer to the Drawings for expansion joint locations.

C. Install new EPDM roof system to replace existing built-up-roof system; all components of the roofing and insulation system shall be manufactured by Carlisle-Syntec.

1. New EPDM roof system shall consist of the following components in addition to all necessary flashing, insulation, and roofing accessories required or recommended by the manufacturer to receive a 30-year warranty (components listed from exterior to interior):

   a. Roof Membrane: 0.090 in. thick non-reinforced EPDM fire-retardant sheet membrane.

   b. 1/2 in. thick glass-faced gypsum sheathing board.

   c. (2) layers of 2 in. thick polyisocyanurate insulation.

   d. 6-mil polyethylene sheet vapor retarder. Seal the vapor retarder at all terminations and penetrations.

   e. Existing metal roof deck.

2. Provide tapered insulation as shown in the existing drawings to facilitate drainage to the existing roof drains. Existing structural metal roof deck slopes

1/8 in. per foot. Tapered insulation shall be installed to achieve a minimum of 1/4 in. per foot slope throughout the field of the new high EPDM roofs. For clearance at existing masonry wall skirt flashings, tapered insulation shall be installed to achieve a minimum of 1/8 in. per foot throughout the field of the new low EPDM roofs.

3. Install new base membrane flashing and metal skirt flashing with cleats at masonry walls as noted on the Drawings and integrate with existing metal through wall flashing (see existing Detail 2/A-3).

4. Provide treated wood blocking and plywood at roof penetrations, roof edges, door sills, mechanical curbs, as shown on the drawings. Taper wood blocking as necessary to maintain roof slope.

5. Install new sheet metal roof edge perimeter flashing, curbs, door sills, and perimeters of mechanical equipment.

6. At existing expansion joints, install new expansion joint bellows and metal cap flashing. Basis of design is Schuller (Johns-Manville), Expand-O-Flash, EJ-8 with stainless steel flanges. Provide factory-fabricated pieces at all corners, intersections, and transitions.

7. Integrate EPDM roof system with existing counterflashing on goosenecks, roof fans, and other miscellaneous mechanical equipment.

8. Replace guy wires at mechanical stack located at the southwest corner of the roof.

9. Reinstall existing lightning protection system.

10. Remove, store, prepare and paint existing steel ladder. Reinstall ladder.

D. The demolition contractor shall remove and properly dispose of the four solar hot water heating arrays and associated structural supports from the south elevation batten-seam metal panel roof. Each array consists of 10 panels, total of 40 panels. The demolition contractor shall engage the services of a plumbing contractor to perform the following tasks.

1. Verify if there is glycol in the piping. If, so the plumbing contractor shall drain the system.

2. Close all valves.

3. Properly cap all supply and return piping for each array at the valve in the classrooms directly below the array. Typical for eight locations.

4. Remove and properly dispose of the piping and associated insulation and pipe supports from each valve to the array. Typical for eight pipes.

E. Remove and dispose of all materials within existing batten-seam metal panel roof systems down to the existing metal roof deck, including batten-seam metal panels, insulation, plywood, felt, and metal rake skirt flashings. Masonry through-wall flashing to remain. The extent of metal panel roof replacement is shown on Figures 1 and 2.

1. Remove and dispose of batten-seam metal panel wall and soffit panels as shown on the Drawings (See existing Drawing Sheets A-6, A-7, and A-9 for wall and soffit panel profile on north, south, east, and west elevations). For pricing, also include removal and replacement of concealed wall and soffit panels on the backside of the south elevation batten-seam metal panel roof (Photo 1 at end of scope of work) and at returns on the north and south elevations (Photos 2 and 3 at end of scope of work). See Figure 1 for photo locations.

F. Install new standing-seam metal roof panels to replace existing batten-seam roof, wall, and soffit panels.

1. Standing-seam metal panel roof system shall consist of the following components, from exterior to interior:

    a. Standing-seam zinc-tin coated copper panels, 16 oz. Nailing cleats shall be of 20 oz. zinc-tin coated copper.

    b. Rosin paper and felt underlayment; Rosin-sized paper shall be smooth, unsaturated building paper weighing approximately 5 to 6 lbs per 100 sq. ft. Felt underlayment shall be #15 fiberglass-reinforced felt, “Shingle-Mate” manufactured by GAF Materials Corporation. Install high-temperature resistant self-adhering membrane underlayment at roof eave; basis of design is Grace Ultra by Grace Construction Products Inc. Extend self-adhering membrane underlayment min. 3 ft. upslope of the plane of the exterior wall.

    c. 3/4 in. thick plywood sheathing.

    d. 1-1/2 in. vented airspace.

    e. (2) layers of polyisocyanurate insulation.

    f. Self-adhering rubberized asphalt membrane air barrier/vapor retarder.

    g. 1/2 in. glass-faced gypsum sheathing.

    h. Existing metal roof deck.

2. Integrate standing-seam metal panels with new EPDM roof perimeter flashing, existing curtain wall sill flashing, and masonry rake flashing where applicable.

3. Install new soldered kick-out zinc-tin coated copper flashing at all gable end intersections with masonry walls.

4. Install snow guards on new standing-seam metal panel roofs on the south, east, and west elevations. Snow fences shall clamp directly to the standing-seams of the metal panels and extend continuously across the width of the sloped roof. Spacing of snow guards shall not exceed recommended horizontal and vertical spacing of the snow guard manufacturer, with a minimum of 3 rows of snow guards on the west and south elevations.

   a. Snow guards shall be pipe style snow guards for standing-seam metal roofs to match color and material of standing-seam roof panels, manufactured by Alpine SnowGuards, or equal.

G. At south elevation free-standing masonry partition wall, remove and store existing stone coping. Install new continuous metal cap flashing and dowels. Provide soldered thimbles over dowels. Reinstall existing stone coping over dowels and plastic shims. Install sealant and backer rod between metal cap flashing and stone coping and at head joints in the stone coping. See Figure 3.

   1. Clean all staining, graffiti, and efflorescence from the existing masonry.

H. At the top of retaining walls on the north, south, and west elevations, remove and store existing stone coping. Install new continuous metal cap flashing and dowels. Provide soldered thimbles over dowels. Reinstall existing stone coping over dowels and plastic shims. Install sealant and backer rod between metal cap flashing and stone coping and at head joints in the stone coping. See Figure 3.

   1. Clean all staining, graffiti, and efflorescence from the existing masonry. At retaining walls, clean entire exposed surface on both sides of retaining wall to ensure uniformity of masonry color.

   2. Repair broken and cracked split-rib concrete block on the retaining walls as noted in the Drawings.

   3. Repair deteriorated concrete on terrace side of retaining wall on the west elevation as noted in the Drawings. Use polymer-modified concrete for patching, “Renderroc HB2” or “Renderoc HBA” by Fosroc Inc. or approved equal.

I. Repair broken and cracked split-rib concrete block on the building envelope walls as noted in the Drawings. Replace damaged areas with new split-rib concrete block as required.

J. Repoint separation between north elevation retaining wall and main building wall at the northwest corner of the terrace as noted on the Drawings.

K. On all exterior doors, prepare and paint doors.

   1. Replace metal reinforcement at the bottom of exterior doors as noted on the Drawings.

2. Remove and dispose of all existing door thresholds. Install new door thresholds with integral gaskets to prevent water infiltration as noted on the Drawings.

3. Replace all perimeter door gaskets and sweeps.

L. Clean masonry on all main building and retaining walls as noted on the Drawings. Locations of heavy staining are noted on the drawings.

M. Remove and dispose of all existing sealant and install new sealant at the following locations as noted on the Drawings:

1. All curtain wall frame-to-IGU joints and frame perimeters.

2. All louver perimeters.

N. At existing louvers, prepare and paint all louvers.

1. At large louver located on the second floor of the east elevation, remove louver and replace corroded steel lintel as noted on the Drawings.

O. Remove and dispose of all existing sealant and backer rod at all masonry control joints. Install new sealant and backer rod at all masonry control joints.

P. Remove and dispose of all existing sealant at all door frame perimeters. Install new sealant and backer rod and door frame perimeters.

Q. On the south elevation, remove abandoned 1 in diameter pipe penetrations through the main building wall and infill with new split-rib concrete block as noted on the Drawings.

R. Replace all Kalwall panels on the north and south elevations, including frame, as shown on the Drawings. New panel system to include integral drainage channels. Basis of design shall be the “Sloped” skylight manufactured by LINEL, or similar, with translucent glazing to match existing.

1. Install new soldered kick-out flashing at gable end intersection with masonry walls.

S. Remove and dispose of existing gutters on the north and south elevations below the existing batten-seam metal panel roofs and Kalwall panel roofs as noted on the Drawings.

1. Install new hung metal gutters on the north, south, and west elevations below the sloped roofs with revised structural attachment including hangers and brackets.

T. Remove and replace damaged downleaders as noted in the Drawings and integrate with new drainage system (refer to Civil Scope of Work).

U. Remove and replace corroded soffit vents (11 vents) below batten-seam roof eaves.

V. Replace corroded steel beam in masonry above the east elevation door entrance as noted on the Drawings.

W. At retaining wall weeps (up to 30 weeps) and scuppers (up to 15 scuppers) on the north and west elevations, in-fill gaps between split-rib concrete block and back-up wall to prevent water from entering the wall cavity.

1. At scuppers, install reglet set zinc-tin coated scupper liner soldered watertight.

2. Excavate on the heel side of the wall at each existing weep hole and installing a stainless steel screen across the opening. Install crushed stone in the zone of the weep.

X. Provide the following work as Allowances as specified below:

1. Allowance No. 1 – Pointing – Provide an allowance for miscellaneous pointing of 5% of the exterior split-rib concrete wall area.

2. Allowance No. 2 – Unit Masonry – Provide an allowance for removing and replacing 10 split–ribbed concrete block.

Y. Provide the following work as Alternate as specified below:

1. Alternate No. 1 – Repair Masonry Wall Through-Wall Flashing – Remove bottom course of split-rib concrete block at bases of wall (leg-and-leg method). Remove existing fabric through wall flashing and install new L-shaped zinc-tin coated copper through-wall flashing (Refer to existing detail 3/A-8 dated 17 September 1974 for section view). Integrate new metal through-wall flashing with existing wall back-up waterproofing using self-adhered sheet membrane, termination bar, and liquid membrane. Provide weeps in every third head joint in the split-rib concrete block directly above the through-wall flashing to drain water from the wall cavity.

1.02 SUBMITTALS

A. Submit the following items for the Engineer in time to prevent delay of the project and to allow adequate time for the Engineer’s review and for resubmittals, if needed. Do not order materials or start work before receiving the Engineer’s written approval. Refer to the Agreement and Division 1 – General Requirements for submittal procedures.

1. Deviations: Materials, methods, or details where the Contractor proposes to deviate from those specified herein, if any.

2. Existing Condition Shop Drawings: Shop drawings that accurately document all existing conditions, including measurements and geometry.

3. Demolition/Protection/Operations and Safety Plan: Provide a detailed description of the demolition process, equipment to be used, and any materials required to complete the work, for approval. Include procedures

and detail drawings for protection of exterior and interior building surfaces, hardscape; and landscaping below, and proposed overhead protection measures and locations.

4. Temporary Weather Protection Plan: Submit proposed temporary weather protection procedures for all demolition work that affects the integrity of the building envelope.

1.03 QUALITY REQUIREMENTS

A. Regulatory requirements:

1. Comply with all applicable local, city, state, and federal government environmental requirements regarding demolition and disposal of the materials scheduled for removal.

B. Quality Assurance:

1. Provide full-time supervision of the progression of the work to ensure that all items are constructed in accordance with the Drawings, Specifications, and all referenced standards. Replace deficient or rejected work at no cost to the Owner and in a manner so as to prevent delay to the project.

2. Attend a preconstruction conference to be held with a representative of the Owner, Architect, Engineer, the Contractor's field superintendent, site foreman, and the foremen of all participatory trades to discuss practices applicable to this project and coordination within the project.

3. Attend job meetings during the course of the work as required by the Owner

C. Quality Control: Conduct a quality control program that includes, but is not limited to, the following:

1. Establishment of procedures for executing the work.

2. Inspection of work in progress and completed work to assure work is being done in accordance with established procedures, and specific Engineer, Architect, or Owner instructions, if given. Correct all defective work at no cost to the Owner.

1.04 PROJECT CONDITIONS

A. Avoid disturbing the building owner and occupants with fumes, odors, dust, or noise generated by the work to the extent possible. Notify the owner a minimum 48 hours prior to performing work that could disturb the occupants.

B. Verify dimensions by field measurement.

END OF SECTION

Photo 1

Remove and replace batten seam metal panels on backside of south elevation batten-seam metal panel roof (arrow).

Photo 2

Remove and replace batten seam metal panels at return on north elevation (arrow) (opposite side of roof is similar).

Photo 3

Remove and replace batten seam metal panels at return on south elevation (arrow).

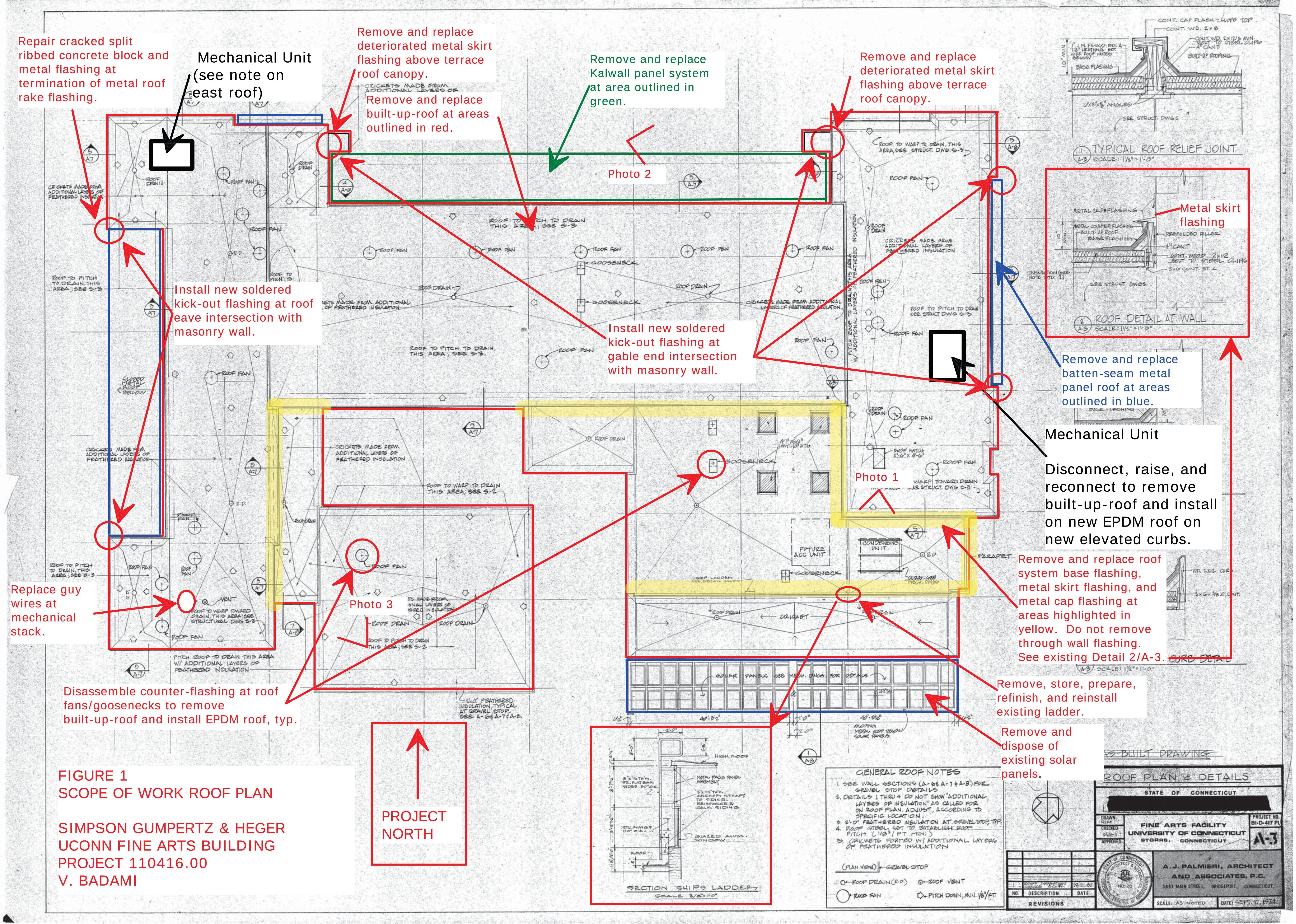

FIGURE 1
SCOPE OF WORK ROOF PLAN

SIMPSON GUMPERTZ & HEGER
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PROJECT 110416.00
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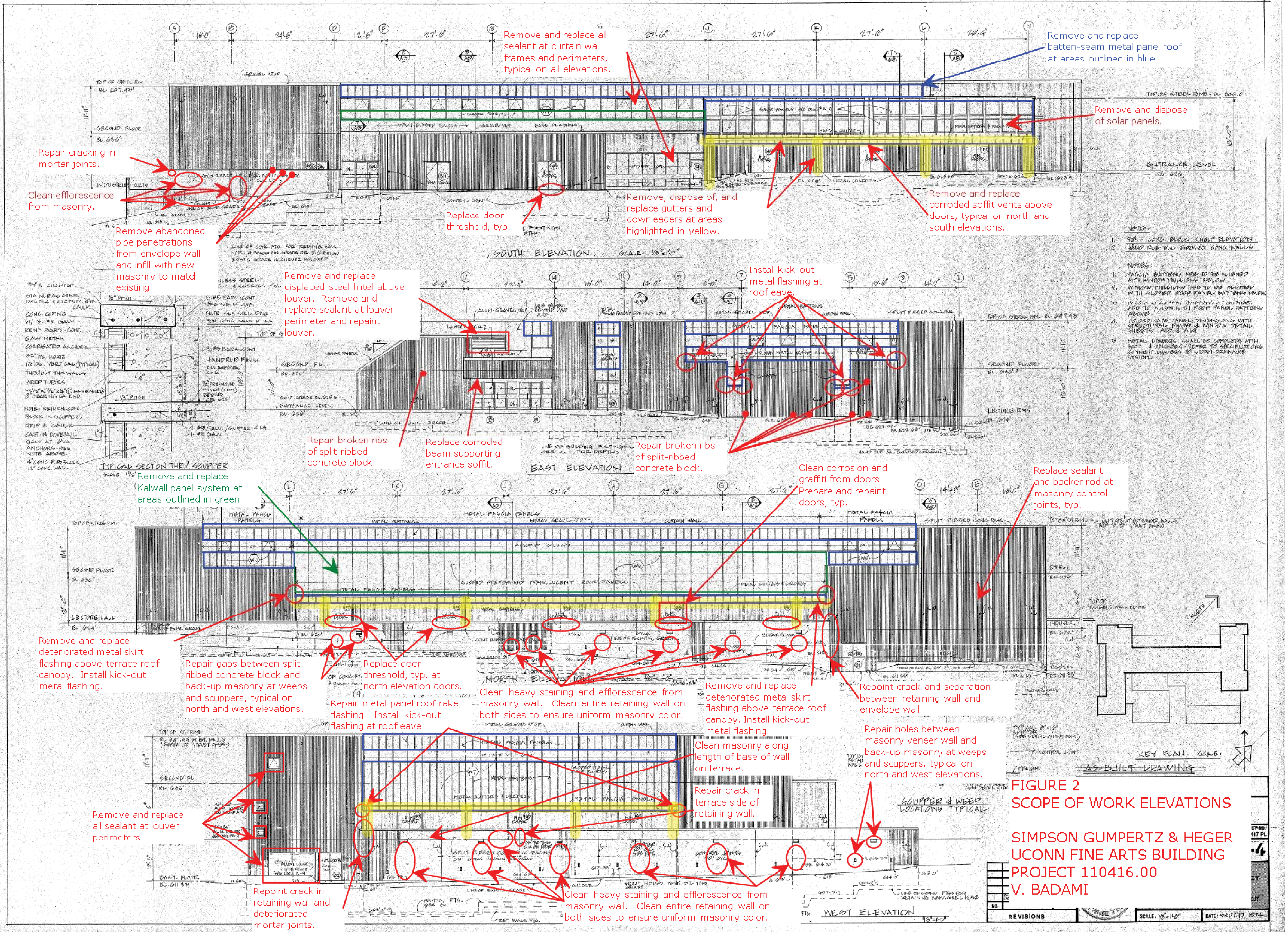
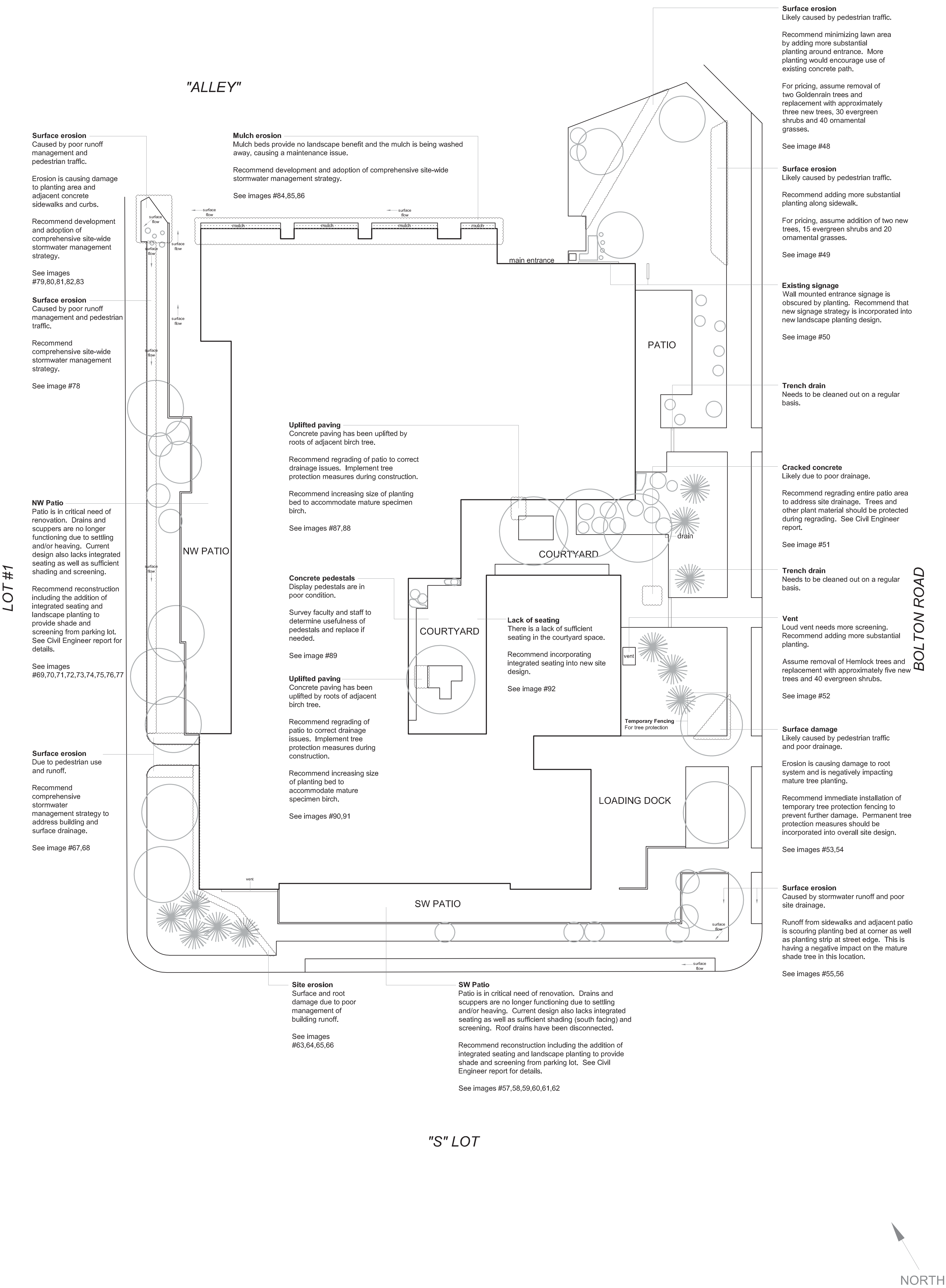


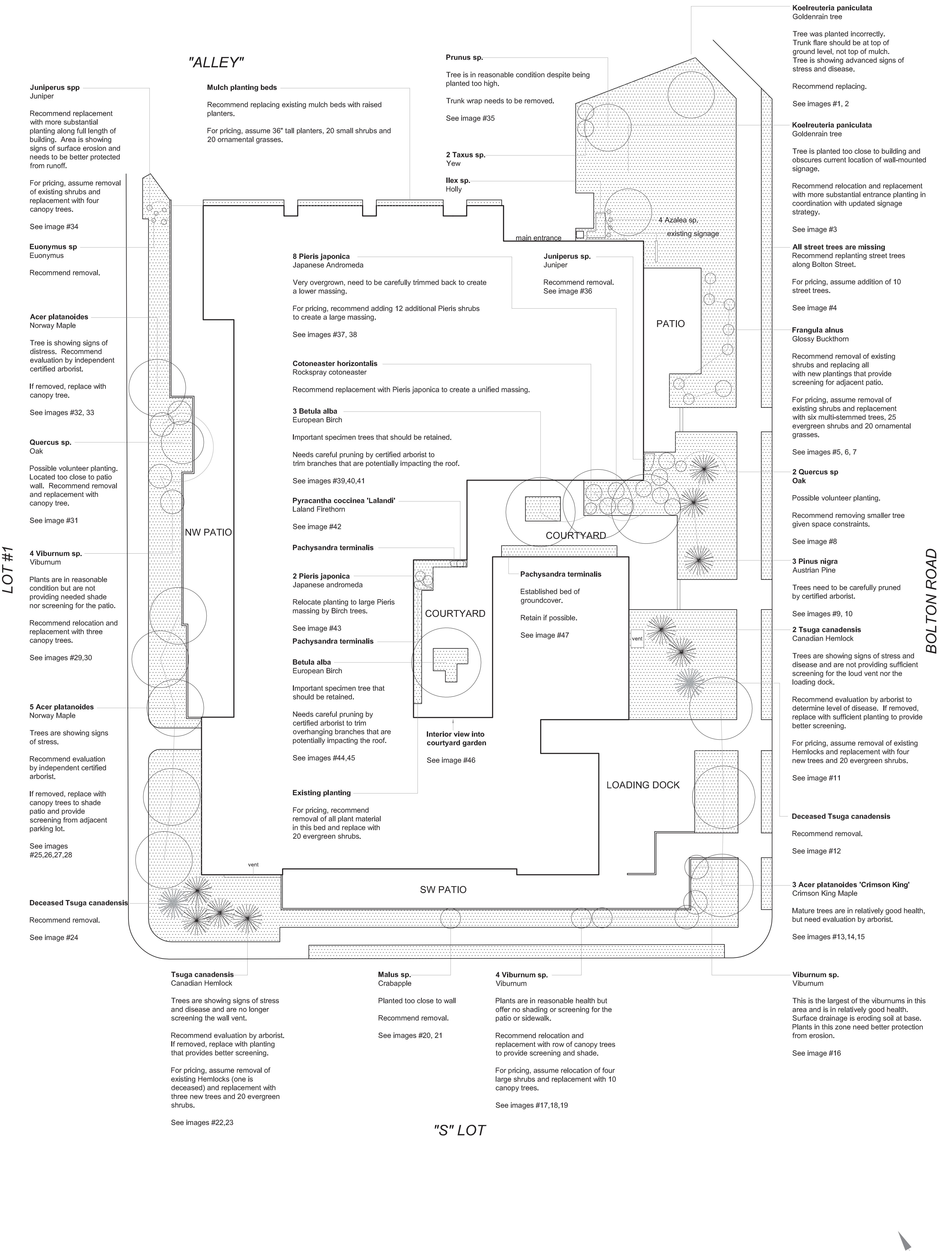
FIGURE 2
SCOPE OF WORK ELEVATIONS

SIMPSON GUMPERTZ & HEGER
UCONN FINE ARTS BUILDING
PROJECT 110416.00
V. BADAMI



University of Connecticut
Fine Arts Building

Existing Landscape Conditions
LWSI 1"=32'-0"



University of Connecticut
Fine Arts Building

Existing Landscape Planting
LWSI 1"=32'-0"

Existing Planting, Images 1-47

Images #1, 2

Koelreuteria paniculata
Goldenrain tree

Tree was planted incorrectly. Trunk flare should be at top of ground level, not top of mulch. Tree is showing advanced signs of stress and disease.

Recommend replacing.

Image #3

Koelreuteria paniculata
Goldenrain tree

Tree is planted too close to building and obscures current location of wall-mounted signage.

Recommend relocation and replacement with more substantial entrance planting.

Image #4

All street trees are missing.

Recommend replanting street trees along Bolton Street.

Existing Planting

Images #5,6,7

Frangula alnus
Glossy Buckthorn

Plants are dead or dying.

Recommend replacing all
with new plantings that provide screening for
adjacent patio.

Image #8

2 Quercus sp
Oak

Possible volunteer planting.

Recommend removing smaller tree given
space constraints.

Existing Planting

Images #9,10

3 Pinus nigra
Austrian Pine

Trees need to be carefully pruned by certified arborist.

Image #11

2 Tsuga canadensis
Canadian Hemlock

Trees are showing signs of stress and disease and are not providing sufficient screening for the loud vent nor the loading dock.

Recommend evaluation by arborist to determine level of disease. If removed, replace with sufficient planting/structure to provide better screening. If trees are not removed, additional planting/structures are also needed to provide screening.

Image #12

Deceased Tsuga canadensis

Recommend removal.

Existing Planting

Images #13,14,15

3 Acer platanoides 'Crimson King'
Crimson King Maple

Mature trees are in relatively good health, but need evaluation by arborist. Root areas are being negatively impacted by surface erosion and foot traffic and need better protection.

Image #16

Viburnum sp.
Viburnum

This is the largest of the viburnums in this area and is in relatively good health. Surface drainage is eroding soil at base. Plants in this zone need better protection from erosion.

Existing Planting

Images #17,18,19

4 Viburnum sp.
Viburnum

Plants are in reasonable health but offer no shading or screening for the patio or sidewalk.

Recommend relocation and replacement with row of canopy trees to provide screening and shade.

Images #20,21

Malus sp.
Crabapple

Planted too close to wall

Recommend replacement with row of canopy trees
to screen patio from adjacent parking lot.

Existing Planting

Images #22,23

Tsuga canadensis
Canadian Hemlock

Trees are showing signs of stress and disease and are no longer screening the wall vent.

Recommend evaluation by arborist.
If removed, replace with planting that provides better screening.

Image #24

Deceased Tsuga canadensis

Recommend removal.

Images #25,26,27,28

5 Acer platanoides
Norway Maple

Trees are showing signs of stress.

Recommend evaluation by independent certified arborist.

If removed, replace with canopy trees to shade patio and provide screening from adjacent parking lot.

Existing Planting

Images #25,26,27,28 (continued)

Images #29,30

4 Viburnum sp.
Viburnum

Plants are in reasonable condition but are not providing needed shade nor screening for the patio.

Recommend relocation and replacement with row of canopy trees.

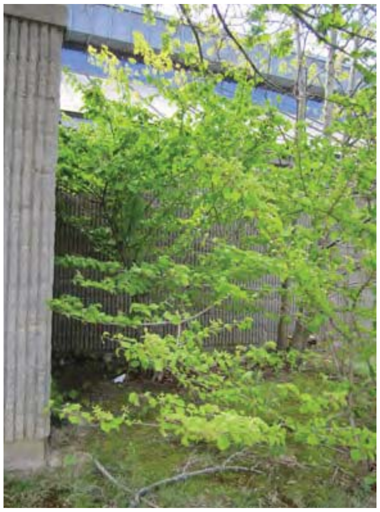


Image #31

Quercus sp.
Oak

Possible volunteer planting.
Located too close to patio wall.
Recommend replacement with canopy tree.

Existing Planting

Images #32,33

Acer platanoides
Norway Maple

Tree is showing signs of distress. Recommend evaluation by independent certified arborist.

If removed, replace with canopy tree.

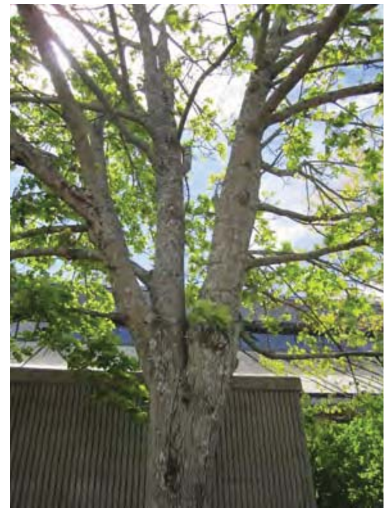


Image #34

Juniperus sp.
Juniper

Euonymus sp.
Euonymus

Recommend replacement with more substantial planting along full length of building. Area is showing signs of surface erosion and needs to be better protected from runoff.

Image #35

Prunus sp.
Plum

Tree is in reasonable condition despite being planted too high.

Trunk wrap needs to be removed.

Existing Planting

Image #36

Juniperus sp.
Juniper

Not providing any landscape function.

Recommend removal.

Images #37,38

8 Pieris japonica
Japanese Andromeda

Very overgrown, need to be carefully trimmed back to create a lower massing.

Images #39,40,41

3 Betula alba
European Birch

Important specimen trees that should be retained.

Needs careful pruning by certified arborist to trim branches that are potentially impacting the roof.

Existing Planting

Images #39,40,41 (continued)

Image #42

Pyracantha coccinea 'Lalandi'
Laland Firethorn

Not providing any landscape benefit.

Recommend relocation and replacement with cohesive landscape planting.

Image #43

2 Pieris japonica
Japanese andromeda

Recommend relocation and replacement with cohesive landscape planting.

Existing Planting

Image #44, 45

Betula alba
European Birch

Important specimen tree that should be retained.

Needs careful pruning by
certified arborist to trim overhanging branches that are potentially impacting the roof.

Image #46

Interior view into courtyard garden

Image #47

Pachysandra terminalis

Established bed of healthy groundcover.

Protect during construction.

Existing Site Conditions, Images 48-92

Image #48

Surface erosion

Likely caused by pedestrian traffic.

Recommend minimizing lawn area by adding more substantial planting around entrance. More planting would encourage use of existing concrete path.

Image #49

Surface erosion

Likely caused by pedestrian traffic.

Recommend adding more substantial planting along sidewalk.

Image #50

Existing signage

Wall mounted entrance signage is obscured by planting. Recommend that new signage strategy is incorporated into new landscape planting design.

Existing Site Conditions

Image #51

Cracked concrete

Likely due to poor drainage.

Recommend regrading entire patio area to address site drainage. Trees and other plant material should be protected during regrading. See Civil Engineer report.

Image #52

Vent

Loud vent needs more screening. Recommend adding more substantial planting and a physical enclosure.

Images #53,54

Surface damage

Likely caused by pedestrian traffic.

Erosion is causing damage to root system and is negatively impacting mature tree planting.

Recommend immediate installation of temporary tree protection fencing to prevent further damage. Permanent tree protection measures should be incorporated into overall site design.

Existing Site Conditions

Images #55,56

Surface erosion
Caused by stormwater runoff and poor site drainage.

Runoff from sidewalks and adjacent patio is scouring planting bed at corner as well as planting strip at street edge. This is having a negative impact on the shade tree in this location.

Images #57,58,59,60,61,62

SW Patio
Patio is in critical need of renovation. Drains and scuppers are no longer functioning due to settling and/or heaving. Current design also lacks integrated seating as well as sufficient shading (south facing) and screening. Roof drains have been disconnected.

Recommend reconstruction including the addition of integrated seating and landscape planting to provide shade and screening from parking lot. See Civil Engineer report for details.

Existing Site Conditions

Images #57,58,59,60,61,62 (continued)

Images #63,64,65,66

Site erosion

Surface and root damage due to poor management of building runoff.

Existing Site Conditions

Images #63,64,65,66 (continued)

Images #67,68

Surface erosion

Due to pedestrian use and runoff.

Recommend comprehensive stormwater management strategy to address building and surface drainage.

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Images #69,70,71,72,73,74,75,76,77

NW Patio

Patio is in critical need of renovation. Drains and scuppers are no longer functioning due to settling and/or heaving. Current design also lacks integrated seating as well as sufficient shading and screening.

Recommend reconstruction including the addition of integrated seating and landscape planting to provide shade and screening from parking lot. See Civil Engineer report for details.

Existing Site Conditions

Images #69,70,71,72,73,74,75,76,77
(continued)

Existing Site Conditions

Image #78

Surface erosion
Caused by poor runoff management and pedestrian traffic.

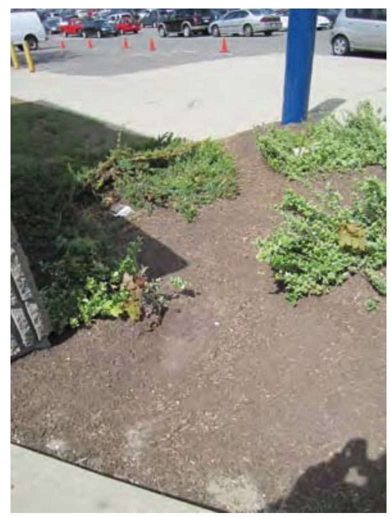
Recommend comprehensive site-wide stormwater management strategy.

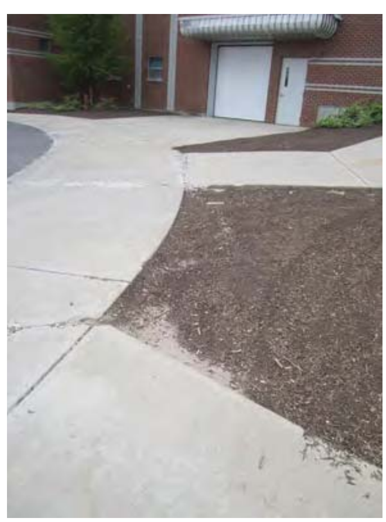
Images #79,80,81,82,83

Surface erosion
Caused by poor runoff management and pedestrian traffic.

Erosion is causing damage to planting area and adjacent concrete sidewalks and curbs.

Recommend development and adoption of comprehensive site-wide stormwater management strategy.





Images #84,85,86

Mulch erosion
Mulch beds provide no landscape benefit and are being washed away by poor site drainage causing a maintenance issue.

Recommend development and adoption of comprehensive site-wide stormwater management strategy.

Recommend adding raised planters at this location.

Images #84,85,86
(continued)

Images #87,88

Uplifted paving

Paving has been uplifted by roots of adjacent birch tree.

Recommend regrading of patio to correct drainage issues. Implement tree protection measures during construction.

Recommend increasing size of planting bed to accommodate mature specimen birch.

Existing Site Conditions

Images #87,88
(continued)

Image #89

Concrete pedestals
Display pedestals are in poor condition.

Survey faculty and staff to determine usefulness of pedestals and replace if needed.

Images #90,91

Uplifted paving
Paving has been uplifted by roots of adjacent birch tree.

Recommend regrading of patio to correct drainage issues. Implement tree protection measures during construction.

Recommend increasing size of planting bed to accommodate mature specimen birch.

Image #92

Lack of seating
There is a clear lack of sufficient seating in the courtyard space.

Recommend incorporating integrated seating into new site design.

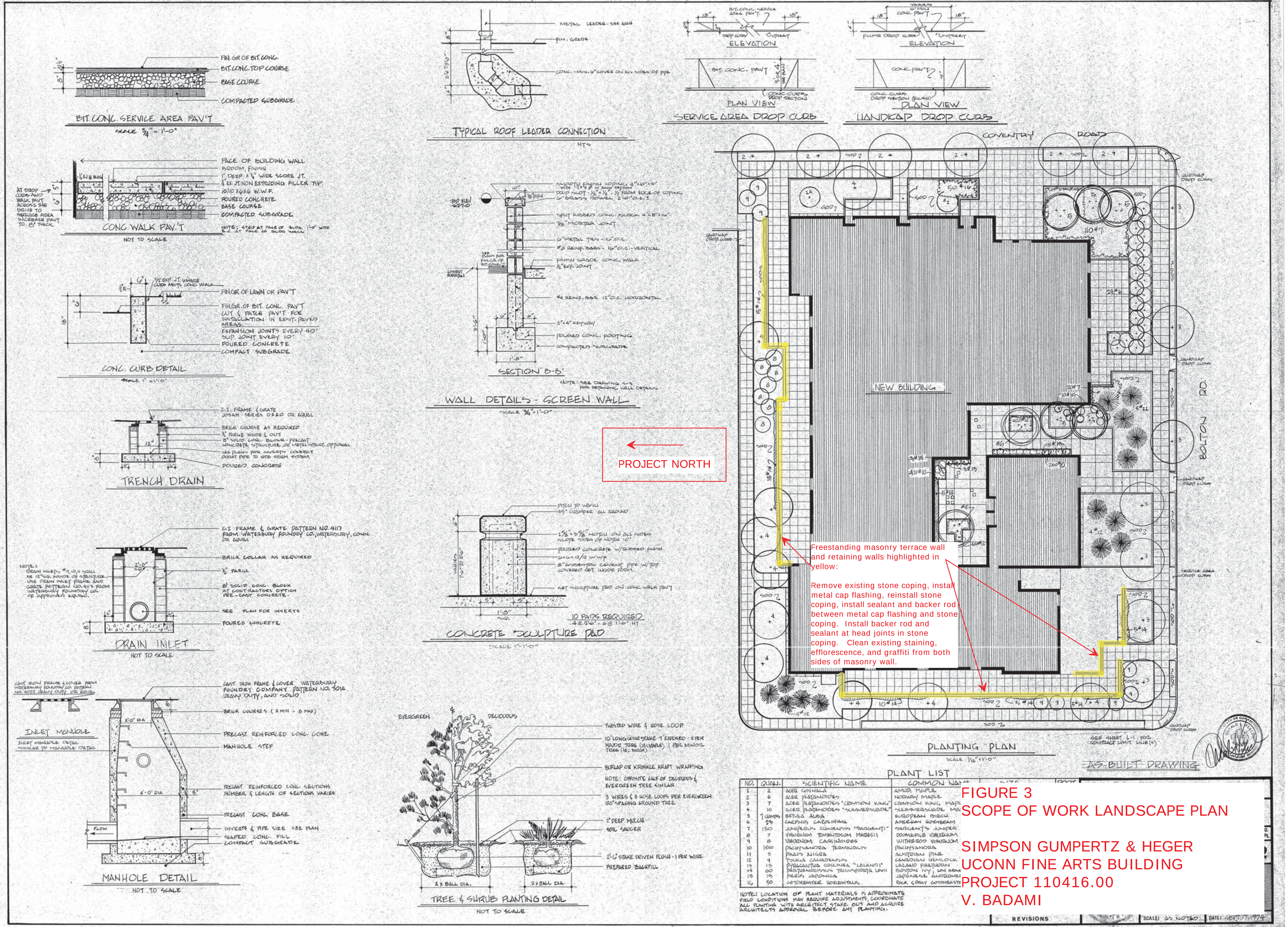


FIGURE 3
SCOPE OF WORK LANDSCAPE PLAN

SIMPSON GUMPERTZ & HEGER
UCONN FINE ARTS BUILDING
PROJECT 110416.00
V. BADAMI

CONCEPTUAL SITE/CIVIL SCOPE OF WORK (SEE FIGURE 4):

I. Terraces

The work outlined in this section includes all the labor, materials, tools, equipment, transportation, supervision and related work necessary to complete the repair of the existing cast-in-place concrete terraces. This work includes the following:

a. Demolish existing 4 in. cast-in-place concrete patio slab at Terraces A and B.

b. Remove and dispose of existing 4 in. concrete slab and sub-base up to a depth of 4 ft.

c. Backfill excavated area with suitable fill materials

   i. Provide materials meeting MHD M2.01.3.

   ii. Compact in 6 in. max. lifts with three passes of 150 lb. min. walk behind compactor.

   iii. Compact to 95% maximum dry density based on modified proctor.

d. Re-grade fill areas to drain which will readily shed water. Grade the surface to prevent ponding of surface runoff water. Final surface grade of each terrace shall slope away from the building, to the proposed drain inlets (catch basins) at a slope no less than 1.5% and no greater than 2.0% (refer to section VI - Drain system/Stormwater Management for drain system component breakdown)

e. Excavation for catch basins and/or manholes shall leave at least 12" clear between their outer surface and the side wall of excavation. Depths of excavation shall be sufficient to install a compacted crushed stone base for each structure.

f. New surface treatment: Replace with new cast-in-place concrete plaza slab with broom finish. Provide price alternative for a decorative stamped concrete finish.

II. Courtyard

The work specified in this section includes all the labor, materials, tools, equipment, transportation, supervision and related work necessary to complete the repair of the existing concrete courtyard located on the southerly side of the Fine Arts Building. This work includes the following:

a. Demolish existing cast-in-place concrete patio slab.

b. Remove and dispose of existing 4 in. concrete slab and sub-base up to a depth of 4 ft.

c. Backfill excavated area with suitable fill materials

   i. Provide materials meeting MHD M2.01.3.

ii. Compact in 6 in. max. lifts with three passes of 150 lb. min. walk behind compactor.
iii. Compact to 95% maximum dry density based on modified proctor.

d. Re-grade fill areas to drain which will readily shed water. Grade the surface to prevent ponding of surface runoff water. Final surface grade of the courtyard shall slope away from the building, to the proposed and existing drain inlets (catch basins) at a slope no less than 1.5% and no greater than 2.0%.

III. Concrete Sidewalks

The work specified in this section includes all the labor, materials, tools, equipment, transportation, supervision and related work necessary to complete the repair of the existing concrete sidewalks. This work includes the following:

a. Repair cracking in concrete sidewalk along northern face of the building. Panels with low-severity cracks less than ½ in. wide shall be cleaned to remove all dust, loose concrete and oil/grease prior to repair. Repair with non-shrink grout. All crack repairs shall be based on a unit price basis. The contractor shall carry an allowance of 250 lf. for bidding purposes.

b. Sidewalk panels with moderate to severe cracks greater than or equal to ½ in. shall be replaced. Demolish existing panel, excavate 6 in. of existing material and replace with suitable fill materials. All sidewalk panel replacement shall be based on a unit price basis. The contractor shall carry an allowance of 30, 4 ft x 4 ft panels for bidding purposes.

IV. Curbing

The work specified in this section includes all the labor, materials, tools, equipment, transportation, supervision and related work necessary to complete the repair of the existing concrete curbing. This work includes the following:

a. All “medium to high severity” cracked, deteriorated and spalled sections of concrete curbing in the northerly and westerly parking lots shall be removed and replaced with reinforced extruded concrete curbs, or precast concrete curbing where shown on Figure 4. All curb replacement shall be based on a unit price basis. The contractor shall carry an allowance of 200 l.f. for bidding purposes.

- Curbing shall be bonded to the pavement by using an approved concrete to asphalt adhesive or a two-component epoxy.

- Install a control joint every 9 ft.

b. All “low severity” cracks (</= to 0.5 in.) in the existing curbing shall be cleaned to remove all dust, loose concrete, and grease/oil prior to repair. Cracks shall be filled with cement grout or patched with concrete as necessary. All low severity cracks shall be repaired based on a unit price basis. The contractor shall carry an allowance of 100 lf for bidding purposes.

V. Bituminous Concrete Paving, Concrete Pad for Trash Area, and Bollards

The work specified in this section includes all the labor, materials, tools, equipment, transportation, supervision and related work necessary to replace the existing bituminous concrete (asphalt) in the maintenance area, provide a concrete pad for the trash area, and install bollards to protect the existing gas line. This work includes the following:

a. Remove and dispose of the existing bituminous asphalt in the existing maintenance area in accordance with all local, state, and federal policies. Remove 6 in. of the existing granular sub-base and replace with suitable compacted material. Install 2 in. bituminous base course and 1 in. bituminous wearing surface.

b. Install 10 ft wide by 20 ft long by 6 in. thick concrete pad for dumpster.

c. Install two new bollards at gas line entrance. Bollards shall be concrete filled steel pipe, 4 in. diameter with a rounded top, reveal shall be 4 ft above grade, and set to a depth of 4 ft below grade.

VI. Drain system/Stormwater Management

The work specified in this section includes all the labor, materials, tools, equipment, transportation, supervision and related work necessary to implement a new stormwater management system for Terrace Area A, Terrace Area B, the existing courtyard and roof discharge locations. This work includes the following:

a. Install two (2) 4 ft dia. precast concrete drain inlets (catch basins) with frame and grate, in each terrace area (See Figure 4). Install a hood over the discharge pipe and a 4 ft deep sump.

b. Install one (1) 4 ft dia. precast concrete drain inlet (catch basin) with frame and grate in approximate location shown on Figure 4. Install approximately 30 L.F. of new 12 in. dia. drain pipe between new catch basin and existing site drainage system. Install a hood over the discharge pipe and a 4 ft deep sump.

c. Install approximately 180 l.f. of 8 in. drain pipe for connections to roof leaders, under each terrace/patio. Connect gutter down spouts (collecting roof drainage) to catch basin drain inlets, refer to Figure 4.

d. Proposed catch basins and drain manholes shall be precast concrete structures with an inside diameter of 48 in. Wall thickness shall not be less than 5 in. Manholes and catch basins shall be equipped with heavy duty, cast-iron frames, grates and/or covers.

e. All new catch basins shall be outfitted with hoods covering the outlet pipe. Hoods shall be constructed of high density polyethylene. The bottom of the hood shall extend downward a distance equal to ½ the outlet pipe dia and a minimum of 6 in.

f. Proposed 12 in. dia drain pipes shown on Figure 4 shall be Corrugated Polyethylene Pipe (CPP), unless otherwise noted, and conform to AASHTO Designations for High Density Polyethylene Pipe (smooth interior). Install approximately 250 l.f. of 12 in. CPP.

g. Install an underground infiltration system located to the north side of the building to collect water from Terrace A and roof drain leaders. Infiltration system shall consist of ten (10) Stormtech SC-740 Infiltrator chambers or equal (each chamber is 7.1' long x 3.7 ft wide x 2.7 ft deep with 0.5 ft of ¾ in. stone above and below. The estimated storage capacity is approximately 800 CF.

h. The existing frame and grates of approximately four (4) existing catch basins, which are located in landscape/lawn areas, shall be replaced with low profile "bee-hive" dome cast iron grates to prevent trash, debris, and mulch, from clogging the drainage system.

VII. Construction Period Pollution Prevention/Erosion & Sedimentation Control Plan

The work of this section includes all the labor, materials, tools, equipment, transportation, supervision and related work necessary to implement the required erosion and siltation controls to minimize erosion and siltation during the construction phase of the project. The work includes the following:

a. Straw Wattle Barriers: Straw wattle barriers shall be installed at the toe of existing slopes around the perimeter of the limit of work and at all storm drain inlets in the vicinity of the site work, as identified on Figure 4 (Assume 16 storm drain inlets). Wattles shall be inspected after any relevant rain event (greater than 0.5-inches of rainfall within a 24 hour period), and bi-weekly during construction activities. Wattles shall be inspected for tears, accumulated sediment and debris, and repaired/cleaned accordingly.

b. Catch basin filter bags: Catch basin filter bags shall be installed in existing basins (approximately 16 existing catch basins) and proposed catch basins (2 proposed catch basins) as identified on Figure 4.

c. Concrete Washout Areas – A concrete washout area shall be provided if concrete is to be poured in-place on the site. The following shall apply to all concrete washout areas proposed:

   i. Concrete washouts shall be at least 10 ft wide and sized to contain all liquid and solid waste expected to be generated between cleanout periods.
   ii. Concrete washouts can be prefabricated containers delivered to the site or self-installed using an impermeable liner and perimeter control.
   iii. Concrete washout areas shall be sited at least 50 ft from any storm drain inlet, if possible.
   iv. Concrete washout areas shall be inspected daily for leaks, damages, tears, and adequate free board (more than 6" from top of berm or approximately 75% of the holding capacity) and repaired/maintained accordingly.
   v. Once the washout areas holding capacity has been reached, the concrete wastes will be allowed to harden and concrete will be broken up, and hauled off-site for proper disposal.

VIII. Operation and Maintenance

To assure the ongoing and proper functioning of the on-site stormwater management/BMP facilities, this Operations and Maintenance Plan has been developed.
The work of this section includes all the labor, materials, tools, equipment, transportation, supervision and related work necessary to implement operation and maintenance of the proposed stormwater management system during and after the construction phase of the project. This includes the following:

a. Deep Sump Catch Basins:

Stormwater runoff from Terrace A and B, and the courtyard is directed to proposed catch basins via curbing and site grading. To ensure proper functioning of the catch basin, it shall be inspected and maintained as follows:

Inspection: Semi-annually and after major storm events (3.2 inches or more in a 24 hour period). Structural damage and other malfunctions to be noted and reported.

Maintenance: Cleaned annually or when the sump is half full by a licensed contractor. Sediment and hydrocarbons will be properly handled and legally disposed of off-site in accordance with local, state, and federal guidelines and regulations. Any structural damage to catch basins and/or castings will be repaired upon discovery.

b. Sweeping and Site Clean-Up

Routine sweeping of paved areas is an effective method to provide important nonpoint source pollution control and, when available, performed by mechanical sweepers. Most stormwater pollutants travel with the suspended solids contained in the stormwater runoff and regular sweeping will help reduce a portion of this load. Sweeping, especially during the period immediately following winter snowmelt (March/April) when road sand and other debris has accumulated on the pavement, will capture a peak sediment load before spring rains wash residual sand from winter applications into nearby resource areas.

Inspection: Paved areas shall be inspected for litter on a bi-weekly basis and picked up and properly disposed of immediately.

Maintenance: All parking areas, sidewalks, driveways and other impervious surfaces (except roofs) shall be swept clean of sand, litter, trash, etc. on a semi-annual basis. Separate cleanup services will be conducted at least twice a year, once between November 14 and December 15 (after leaf fall) and once during the month of May (after snow melt). Additional cleanup services will be conducted as necessary.

c. Underground Infiltration System:

Infiltration systems are impoundments designed to temporarily store runoff, allowing all or a portion of the water to infiltrate into the ground. An infiltration basin is designed to completely drain between storm events. An infiltration basin is designed specifically to retain and infiltrate the entire Water Quality Volume (first flush of runoff, typically equal to 1” over the impervious area draining to the system). Underground infiltration basins will be inspected and maintained as follows:

Inspection: Systems should be inspected at least annually, at a drywell/observation port locations and following any rainfall event exceeding 3.2 inches in a 24 hour period, with maintenance or rehabilitation conducted as warranted by such inspection.

Maintenance: Includes the removal of debris from inlet and outlet structures & removal of accumulated sediment. All drywells should be inspected, if an infiltration system does not drain within 72-hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore infiltration function, including but not limited to removal of accumulated sediments.

d. Existing catch basins and trench drains:

All existing catch basin sumps and trench drains in the vicinity of the site work (approximately 16 existing catch basins and 2 existing trench drains), shall be cleaned and the accumulated sediment, trash and debris shall be disposed of in accordance with all local, state and federal policies.

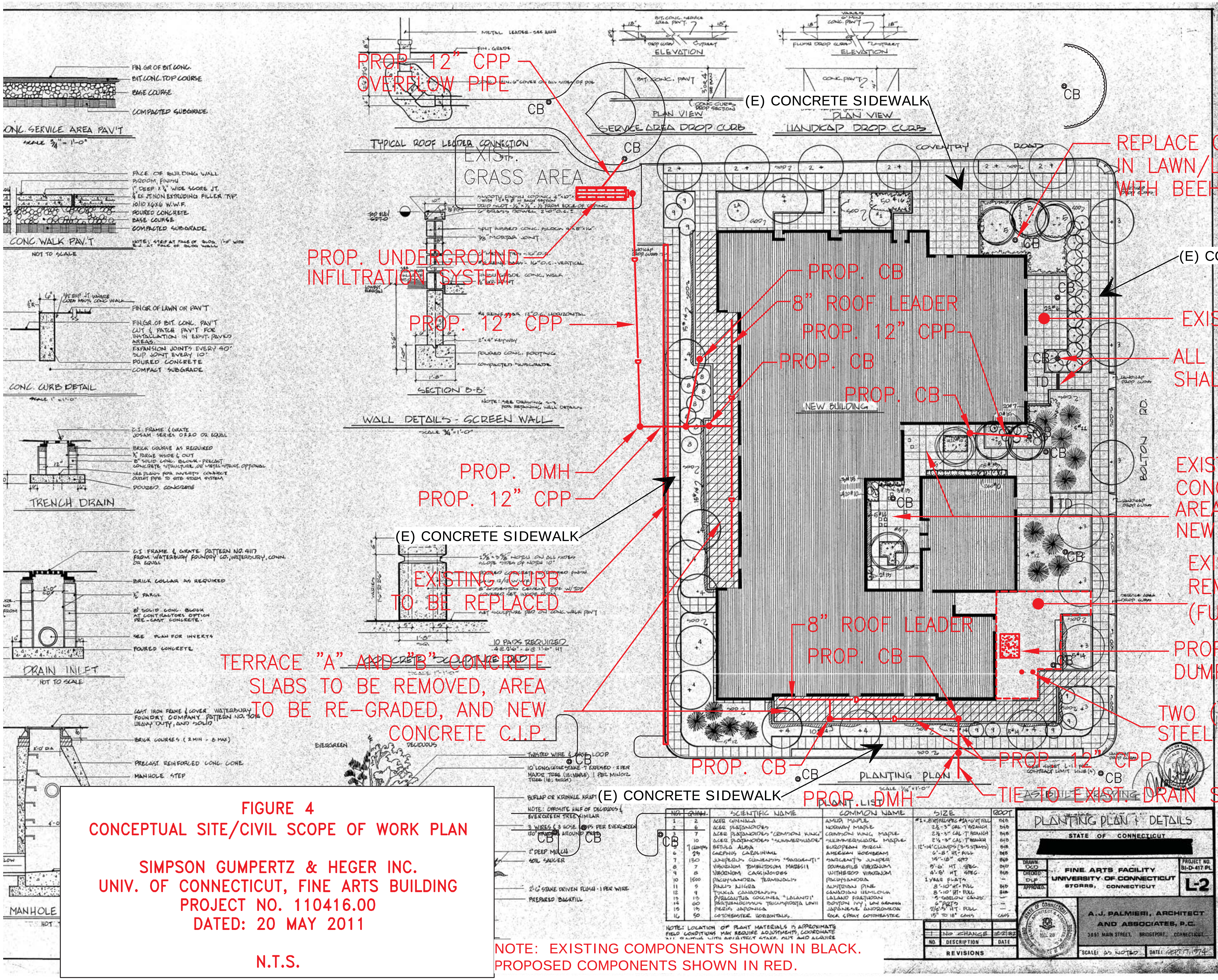


FIGURE 4
CONCEPTUAL SITE/CIVIL SCOPE OF WORK PLAN

SIMPSON GUMPERTZ & HEGER INC.
UNIV. OF CONNECTICUT, FINE ARTS BUILDING
PROJECT NO. 110416.00
DATED: 20 MAY 2011

N.T.S.

NOTE: EXISTING COMPONENTS SHOWN IN BLACK.
PROPOSED COMPONENTS SHOWN IN RED.