ROOF EVALUATION REPORT

TWENTY-FIVE BUILDINGS
DIABLO VALLEY COLLEGE
321 GOLF CLUB ROAD
PLEASANT HILL, CALIFORNIA

4 November 2016

DRAFT

Prepared for:
Mr. Ray Pyle, Chief Facilities Planner
Contra Costa Community College District
500 Court Street
Martinez, California

Prepared by:
Steelhead Engineers, Inc.
2570 W. El Camino Real, Suite 320
Mountain View, California 94040
SEI JN: 16015
Mr. Ray Pyle, Chief Facilities Planner  
Contra Costa Community College District  
500 Court Street  
Martinez, California 94553  

RE: Roof Evaluation for Twenty-Five Buildings  
   Diablo Valley College, 321 Golf Club Road, Pleasant Hill, California  

Dear Mr. Pyle:  

As requested, Steelhead Engineers, Inc. (SEI) performed roof evaluation for twenty-five buildings at the Diablo Valley College campus in Pleasant Hill, California. This report summarizes our observations and presents our remedial recommendation.  

Sincerely,  

STEELHEAD ENGINEERS, INC.  

Mark G. Melamed  
Project Manager  

Alan E. Burnett, PE  
Principal
EXECUTIVE SUMMARY

Contra Costa Community College District (CCCCD) retained Steelhead Engineers, Inc. (SEI) to perform a roof evaluation for twenty-five building on the Diablo Valley College (DVC) campus. The buildings included in our evaluation are summarized below. For this report, we used the number and the building name listed on the DVC campus map.

<table>
<thead>
<tr>
<th>Building Name</th>
<th>Planetary Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – Advanced Technology Center</td>
<td>61 – Learning Center*</td>
</tr>
<tr>
<td>3 – Humanities</td>
<td>62 – Liberal Arts*</td>
</tr>
<tr>
<td>4 – Gymnasium*</td>
<td>63 – Faculty Office*</td>
</tr>
<tr>
<td>8 – Men’s Locker Room*</td>
<td>69 – Kinesiology Offices (PE Offices)*</td>
</tr>
<tr>
<td>9 – Music</td>
<td>70 – Art Building*</td>
</tr>
<tr>
<td>11 – Kinesiology (Physical Education)*</td>
<td>83 – Early Childhood Education North (Family Life Education)</td>
</tr>
<tr>
<td>12 – Life &amp; Health Science</td>
<td>84 – Warehouse</td>
</tr>
<tr>
<td>23 – Performing Arts</td>
<td>90 – Student Union</td>
</tr>
<tr>
<td>47 – Woman’s Locker Room*</td>
<td>91 – Math</td>
</tr>
<tr>
<td>57 – Library</td>
<td>92 – Physical Science</td>
</tr>
<tr>
<td>59 – Counseling*</td>
<td>94 – Business/Foreign Language</td>
</tr>
<tr>
<td>60 – Early Childhood Education South (Family Life Education)</td>
<td>97 – Book Center (Bookstore)</td>
</tr>
</tbody>
</table>

Asterisk (*) indicates building is included in proposed Bond E scope of work.

Measure E Bond Program

There are seven proposed phases for the bond program (Figure 1). The following phases contain buildings included in our evaluation:

- **Phase 1:** The Kinesiology and Woman’s Locker Room will be renovated and the Men’s Locker Room and Kinesiology Offices will be demolished, starting in 2019.

- **Phase 3:** The Art Building will be demolished, starting in 2021.

- **Phase 4:** The Learning Communities Annex (Learning Center) will be renovated, starting in 2024.

- **Phase 7:** The Liberal Arts, Faculty Office and Counseling Buildings will be demolished, starting in 2026

Note: The ET Building will be renovated starting in 2024 (Phase 6). This building was not in the scope of work, since the roof was replaced in 2016. The manufacturer roof warranty will be in effect at the time
of the renovation. If roof repairs/modifications result from the renovation, we recommend the roof manufacturer approve the repairs for warranty compliance, prior to the start of work.

**SEI ROOF EVALUATION**

Our roof evaluation consisted of interviewing representative of the building and grounds about reported leaks, observing the building roofs and accessible interior spaces with reported leaks. Exploratory, destructive probing was not performed.

**DVC Reported Leaks**

DVC representatives reported leakage in fourteen buildings as summarized below:

- 4 – Gymnasium: Leak in Coach’s office.
- 8 – Men’s Locker Room: Leaks at the west side. Roof repairs have been performed.
- 9 – Music: Leak in Room 102 due to a conduit.
- 11 – Kinesiology: Leaks.
- 12 – Life & Health Science: Leak in Rooms 204 and 215. Roof was installed in 2005 and is under warranty.
- 23 – Performing Arts: Leaks in audience area and arena control booth.
- 47 – Women’s Locker Room: Leaks.
- 61 – Learning Center: Leak near the southwest drain.
- 63 – Faculty Office: Leak in Rooms F229 and F250.
- 69 – Kinesiology Office: Leak in Room 105.
- 70 – Art: Leaks in Rooms 201 and 501.
- 90 – Student Union: Leak in Room 210. Some roof repairs have been performed.
- 92 – Physical Science: Leaks at both building ends and in central region.

**SEI Observations**

SEI observe the roofs in September and October 2016. We visually observed the roofs and did not perform exploratory probing to observe the roof assembly. For the twenty-five buildings, nineteen have built-up roof systems, one has a combination of built-up and single-ply roofs, one has a combination of built-up and shingle roofs, two have single-ply roofs and two have metal roofs. Each building is discussed individually in the report.

**Roof Evaluation**

Based on our observations, we evaluated the roofs and classified the roof as replace, repair, or perform periodic maintenance. In addition, we provided engineering cost estimates for the recommended remediation. Table 1 and Figure 2 summarize our evaluation recommendations.
DVC MEASURE E BUILDING PROJECTS: IMPLEMENTATION SEQUENCE & D-4012 SITE SCOPE

ALL DATES SUBJECT TO CHANGE. ALL PROJECT WORK LIMIT LINES ARE APPROXIMATE. LAST UPDATE: 8/2/2016 DGL
FIGURE 2

ROOF REMEDIATION RECOMMENDATIONS - CAMPUS PLAN
DIABLO VALLEY COLLEGE, PLEASANT HILL, CALIFORNIA

FIGURE 2

ROOF EVALUATION BUILDINGS

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>NAME</th>
<th>GRID</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>ATC  ADVANCED TECHNOLOGY CENTER</td>
<td>C1</td>
</tr>
<tr>
<td>3</td>
<td>H   HUMANITIES</td>
<td>B2</td>
</tr>
<tr>
<td>4</td>
<td>GYM  GYMNASIUM</td>
<td>C5</td>
</tr>
<tr>
<td>5</td>
<td>ML   MEN'S LOCKER ROOM</td>
<td>C5</td>
</tr>
<tr>
<td>9</td>
<td>M   MUSIC</td>
<td>CD4</td>
</tr>
<tr>
<td>11</td>
<td>KIN  KINESIOLOGY</td>
<td>B5</td>
</tr>
<tr>
<td>12</td>
<td>LHS  LIFE &amp; HEALTH SCIENCE</td>
<td>D1</td>
</tr>
<tr>
<td>23</td>
<td>PA   PERFORMING ARTS</td>
<td>B4</td>
</tr>
<tr>
<td>47</td>
<td>WL   WOMEN'S LOCKER ROOM</td>
<td>C5</td>
</tr>
<tr>
<td>57</td>
<td>L    LIBRARY</td>
<td>D2</td>
</tr>
<tr>
<td>59</td>
<td>LCA  LEARNING CENTER ANNEX</td>
<td>C2</td>
</tr>
<tr>
<td>60</td>
<td>ECS  EARLY CHILDHOOD EDUCATION SOUTH</td>
<td>B2</td>
</tr>
<tr>
<td>61</td>
<td>LC   LEARNING CENTER</td>
<td>C2</td>
</tr>
<tr>
<td>62</td>
<td>LA   LIBERAL ARTS</td>
<td>C2</td>
</tr>
<tr>
<td>63</td>
<td>FO   FACULTY OFFICE</td>
<td>C2</td>
</tr>
<tr>
<td>69</td>
<td>KINO  KINESIOLOGY OFFICE</td>
<td>C5</td>
</tr>
<tr>
<td>70</td>
<td>ART  ART BUILDING</td>
<td>B3</td>
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<tr>
<td>83</td>
<td>ECN  EARLY CHILDHOOD EDUCATION NORTH</td>
<td>B2</td>
</tr>
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<td>84</td>
<td>W    WAREHOUSE</td>
<td>B6</td>
</tr>
<tr>
<td>90</td>
<td>SU   STUDENT UNION</td>
<td>C4</td>
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<tr>
<td>91</td>
<td>MA   MATH BUILDING</td>
<td>C3</td>
</tr>
<tr>
<td>92</td>
<td>PS   PHYSICAL SCIENCE</td>
<td>D2</td>
</tr>
<tr>
<td>94</td>
<td>BFL  BUSINESS/FOREIGN LANGUAGE</td>
<td>B2</td>
</tr>
<tr>
<td>97</td>
<td>BC   BOOK CENTER</td>
<td>C3</td>
</tr>
<tr>
<td>-</td>
<td>PL   PLANETARIUM</td>
<td>D1</td>
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</tbody>
</table>

LEGEND

- REPLACE ROOF
- REPAIR EXISTING ROOF
- MAINTAIN EXISTING ROOF
- NOT IN SCOPE
- ROOF REPLACEMENT DURING RENOVATION

NOTE
1. ROOF REPLACED IN 2016
<table>
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<tr>
<th>Number</th>
<th>Name</th>
<th>Reported</th>
<th>Location</th>
<th>Status</th>
<th>Exp.</th>
<th>Comments</th>
<th>Bond Scope</th>
<th>Type</th>
<th>Recommendation</th>
<th>Bond</th>
<th>Non-Bond</th>
<th>Other</th>
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<td>-</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$10,000</td>
<td>Check if leak can be repaired under warranty</td>
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<td>-</td>
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<td>TBD</td>
<td>TBD</td>
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<td>BUR</td>
<td>Repair</td>
<td>$</td>
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<td></td>
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<td>Gymnasium</td>
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<td>Coach's Office</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>SPR</td>
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<td></td>
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<td>TBD</td>
<td>TBD</td>
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<td>BUR</td>
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<td>$</td>
<td>$5,000</td>
<td></td>
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<td>9</td>
<td>Music</td>
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<td>Room 102</td>
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<td>TBD</td>
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<td>Life &amp; Health Science</td>
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<td>Rooms 204 &amp; 215</td>
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<td>TBD</td>
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<td>TBD</td>
<td>NS</td>
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<td>No access</td>
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<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$50,000</td>
<td></td>
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<td>57</td>
<td>Library</td>
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<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>BUR/SPR</td>
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<td>$</td>
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<td>Counseling</td>
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<td>TBD</td>
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<td>Replace-2026</td>
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<td>Repair</td>
<td>$</td>
<td>$200,000</td>
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<tr>
<td>60</td>
<td>Early Childhood South</td>
<td>N</td>
<td>-</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$26,300</td>
<td></td>
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<tr>
<td>61</td>
<td>Learning Center</td>
<td>Yes</td>
<td>SW drain</td>
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<td>TBD</td>
<td>TBD</td>
<td>Renovate-2018</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$38,000</td>
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<td>62</td>
<td>Liberal Arts</td>
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<td>-</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>Replace-2018</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$25,000</td>
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</tr>
<tr>
<td>63</td>
<td>Faculty Office</td>
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<td>Room 229 north end</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>Replace-2018</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$50,000</td>
<td></td>
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<tr>
<td>69</td>
<td>Physical Education Office</td>
<td>Yes</td>
<td>Room 205</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>Replace-2018</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$5,000</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Art Building</td>
<td>Yes</td>
<td>Rooms 201 and 501</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>Replace-2021</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$80,000</td>
<td>Water-damaged siding; cracks in deck coating</td>
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<tr>
<td>83</td>
<td>Early Childhood North</td>
<td>N</td>
<td>-</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>BUR/Single</td>
<td>Repair</td>
<td>$</td>
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<td>84</td>
<td>Warehouse/Maintenance</td>
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<td>-</td>
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<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>Metal</td>
<td>Maintain Annual maintenance</td>
<td>$</td>
<td>$-</td>
<td>Impact damage to exterior walls</td>
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<tr>
<td>90</td>
<td>Student Union</td>
<td>Yes</td>
<td>Room 210</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$-</td>
<td>Impact damage to exterior walls</td>
</tr>
<tr>
<td>91</td>
<td>Math Building</td>
<td>N</td>
<td>-</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$35,000</td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>Physical Science</td>
<td>Yes</td>
<td>Building ends and middle</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$25,000</td>
<td></td>
</tr>
<tr>
<td>94</td>
<td>Business/Foreign Language</td>
<td>Yes</td>
<td>Wall related</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>BUR</td>
<td>Repair</td>
<td>$</td>
<td>$12,500</td>
<td>Check wall and mechanical ducts</td>
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<tr>
<td>87</td>
<td>Bookstore</td>
<td>N</td>
<td>Active</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>NS</td>
<td>SPR</td>
<td>Maintain Annual maintenance</td>
<td>$</td>
<td>$-</td>
<td>Asphault exiting metal from parapet panels</td>
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<tr>
<td>P</td>
<td>Planetarium</td>
<td>Yes</td>
<td>Dome related</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>NS</td>
<td>Metal</td>
<td>Replace Repair for short term</td>
<td>$</td>
<td>$100,000</td>
<td>Water enters under entry door at plaza</td>
</tr>
</tbody>
</table>

**Legend**
- BUR: Built-up roof
- NS: Not in scope
- SPR: Single-ply roof
- SW: Southwest

**Notes**
1. The estimated costs are in 2016 dollars, assume competitive, normal bidding climate. If performed later, some repair scope may change.

**Total Estimated Cost:** $1,005,000 $2,468,800
ADVANCED TECHNOLOGY CENTER

The Advanced Technology Center, built in 1960, is a two-story building. It has a built-up roof system with aggregate surfacing. The exterior walls are clad with cement plaster. This building is not included in the Measure E Bond scope.

Leakage Information

DVC personnel stated there was no leaks reported in this building.

SEI Observations

Tim Spotts of SEI observed the roof on 4 October 2016. Exploratory destructive roof probing was not performed. Our observations are summarized below.

Roof

- The built-up roof membrane has aggregate surfacing and a perimeter parapet. The base and wall flashing at the perimeter walls and equipment platforms is covered with a granulated cap sheet flashings (Photos 1 to 3).

- Open cap sheet laps occur at some perimeter wall and mechanical platform base flashings (Photos 4 and 5).

- The vent hoods are missing fasteners for connection to the supporting platforms. Holes are present in the hood flanges and in the platform behind the flange (Photo 6).

- Electrical conduit mounted on the east parapet wall is displaced. The fastener holes in the base flashing are exposed where the mounting hardware is displaced (Photo 7).

- Some pipe penetrations are not sealed (Photo 8).

- Some pipes that penetrate the roof are cut off above the pipe flashing leaving the cut end exposed to the weather. The sealant used to plug the cut end is deteriorated (Photo 9).

- Leaves and tree debris is accumulated at the south end of the roof (Photo 10).
Interior

Since there were no reported leaks, we did not observe the interior.

Discussion

This roof is in good condition and there are no reported leaks. The following observed defects need remediation. Some laps are not fully adhered at the parapet and platform base flashings. This can allow water to enter the base flashings and result in future leakage. Some pipes have unsealed cut ends that will provide openings that can result in leaks to the interior, if the ends are not capped. The roof is generally clean except for the tree debris at the south end. This is a maintenance item and we recommend periodic cleaning of the roof. Provided the recommended repairs and periodic repairs are performed, the remaining service life of the roof is 10 years.

SEI Recommendations

For the short-term, we recommend the following roof repairs:

- Reinstall the displaced conduit at the east side and seal the holes in the base flashing.
- Seal failed or poorly flashed pipe penetrations.
- Install a copper cap over the cut ends of the abandoned copper pipes.
- Install fasteners with neoprene-clad washers at vent hoods.
- Repair all cap flashing seams at the perimeter wall and equipment platforms. This will entail filling the unadhered lap and applying at patch over the lap.

The estimated cost for the above-mentioned repairs is $10,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

Photo 1: General view of the Advanced Technology Center.

Photo 2: General view of the Advanced Technology Center roof.
Photo 3: General view of the Advanced Technology Center roof.

Photo 4: Open base flashing lap.
Photo 5: Open base flashing lap.

Photo 6: Missing fastener at vent hood.
Photo 7: Fallen electrical conduit. Note fastener holes in base flashing.

Photo 8: Unsealed pipe penetration.
Photo 9: Sealant applied at abandoned pipe.

Photo 10: Leaf accumulation on roof.
3

HUMANITIES

The Humanities Building, built in 1964, is a single-story building. It has a built-up roofing system with aggregate surfacing. There is an entry awning with single-ply roofing. The exterior walls are concrete.

Leakage Information

DVC personnel reported no leaks in the building.

SEI Observations

Tim Spotts and Mark Melamed of SEI observed the building roof on 13 October 2016. No exploratory roof probing was performed. Our observations are summarized below.

Roof

- The roof consists of northern and southern wings and a narrow roof area connecting between the two wings. The narrow roof is at lower level than the wings. The built-up roof has aggregate surfacing with aggregate surfacing (Photos 1 to 3).

- The roof has raised perimeter edges with flashings covered with mineral-surfaced cap sheets (Photo 3). The cap sheet is crazed in some locations (Photos 4, 5 and 11). The cap sheet is delaminated from the edge metal (Photos 12 and 13).

- For the narrow roof area, a pair of scuppers provide drainage (Photos 6 and 7). For the wings, drains and overflow drains provide drainage (Photo 8).

- Each roof area has roof-mounted mechanical equipment. Two small HVAC units, enclosed with screen on three sides, occur at the north wing (Photo 10). One large mechanical unit, enclosed with screen on four sides occurs at the south wing (Photo 9). A small mechanical unit at the narrow roof area.

- The single ply roofed entry awning occurs at the south wall of south wing (Photo 14). It is sloped toward a scupper (Photo 15).
Interior

- Since there was no reported leakage, we did not observe the interior of the building.

Discussion

Roof appears of being about 15 years old. There are no reported leaks and it is in average condition. The following observed defects need remediation. The mineral surfaced cap sheet flashings are deteriorated as indicated by the observed crazing and delaminated flashing from the edge metal. This can allow water to enter the roof system at the delamination. At the south wing, there are some partially adhered base flashing laps. This can allow water to enter the base flashings.

Provided the recommended repairs and periodic repairs are performed, the remaining service life of the roof is 10 years.

SEI Recommendations

We recommend the following roof repairs:

- Apply white reflective coating over the cap sheet perimeter and base flashings.
- Seal open laps in cap sheet of base flashing at curbs and roof top equipment platforms in southern wing.

The estimated cost for the above-mentioned repairs is $7,500 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
PHOTOGRAPHS

Photo 1: General view of roof.

Photo 2: General view of roof.
Photo 3: General view of roof.

Photo 4: Crazed exposed cap sheet at roof perimeter edge strip flashing.
Photo 5: Crazed exposed cap sheet at roof perimeter edge strip flashing.

Photo 6: Scuppers draining “passage” area between two wings.
**Photo 7:** Close-up of scuppers draining “passage” area between two wings.

**Photo 8:** Roof drains by drain and overflow drains.
Photo 9: Large mechanical unit enclosed by screen on four sides.

Photo 10: Small two HVAC units enclosed by screen on three sides.
Photo 11: Crazed, exposed cap sheet at curbs base flashing.

Photo 12: Seal between roofing membrane and metal edge along roof perimeter is broken in many places.
**Photo 13:** Seal between roofing membrane and metal edge along roof perimeter is broken in many places.

**Photo 14:** Single-ply roof on awning at side entry door.
**Photo 15:** Scupper draining awning roof.

**Photo 16:** Base flashing laps unsealed at equipment supporting curb.
4 GYMNASIUM

The Gymnasium, built in 1955, is a single-story building. It consists of the main roof and a lower entry roof. Both roof areas have single-ply roof systems. There are two in-line canopies over the building entry on east side. The exterior walls are concrete. The adjacent canopies have built-up roofs with mineral-surfaced cap sheet.

Leakage Information

DVC personnel reported the following:

- Leak in the Coach’s Office.

SEI Observations

Mark Melamed of SEI observed the building roof on 6 October 2016. No exploratory, destructive roof probing was performed. Our observations are summarized below.

Roof

- The main roof is low-slope and has single-ply roofing that appears to be mechanically attached (Photos 1 to 3). There is no roof-top equipment.

- Drainage is provided by three drains on the northern and southern exterior perimeter walls (Photo 7); there is no overflow drains. Internal gutter collects water from the roof and distributes to drains (Photos 4, 5 and 6).

- Trees overhang the roof and leaves are in the gutters and there is standing water in the one gutter (Photo 8).

- There are four skylights covered with painted sheet metal roofs with standing seams (Photo 9). Most corners of these roofs are sealed; the sealant is deteriorated (Photo 10). The paint on these roofs is deteriorated (Photo 17).

- Both canopies on east side of the gymnasium have built-up roofing with mineral-surfaced cap sheets (Photos 11 to 13); the larger canopy have exposed drain pipes. Perimeter edges of this canopy are raised. Drainage occurs by rainfall falling into overflow down to the ground. The larger canopy has
one small roof top unit on elevated curb (Photo 14). The lower, smaller canopy drains into the gutter running along its east free edge.

Interior

The coach stated that water leaked from or near the wall-mounted electrical box near the ceiling (Photo 18). This location is under the gymnasium wall/entry roof junction.

Discussion

Gymnasium

The gymnasium single-ply roof appears about 10 years old. There are no reported leaks and it is in a good condition. There are roof drains, but no overflow drains. If roof drain is plugged, water will flow over roof perimeter. There are maintenance items that should be addressed. These include periodically cleaning the gutters and removing leaves. Replacing the deteriorated sealant at the metal roof-covered skylights and repainting the metal roofs.

We estimate the remaining roof service life is about 10 years.

Lower Entry Roof

The entry built-up roofs appear about 5 to 7 years old. It is in average condition, except for the leak. The roof/wall junction related to the Coach’s Office should be repaired. Its remaining life estimated at about 10 years.

The canopy roof has poor drainage due to absence of roof drains and as indicated by the observed ponding stains. During rainfall, water runoff can overflow the top of the base flashing before it can reach raised perimeter edges. This may cause or contribute to the leak Coach’s Office.

SEI Recommendations

We recommend the following roof repairs and maintenance measures:

Gymnasium Roof

- Trim the trees so no overhanging and clean gutters and drains periodically.
- Install sheet metal angular patches with pop rivets and soldered watertight at metal roof corners.
- Apply two coats of exterior grade paint the four metal roofs over the skylights.

Lower Entry Roof

- Add two properly sized drains corresponding to location of existing downspouts and provide overflow drains.
- Reseal the top of base flashing along the roof/wall junction (western edge of canopy roof).

The estimated cost for the above-mentioned repairs is $7,500 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
PHOTOGRAPHS

Photo 1: General view of roof.

Photo 2: General view of roof.
Photo 3: General view of roof.

Photo 4: Internal/built-in gutter along exterior roof edge.
Photo 5: Internal/built-in gutter along exterior roof edge.

Photo 6: Internal/built-in gutter along exterior roof edge.
Photo 7: Fallen leaves at roof drain.

Photo 8: Fallen leaves and standing water at roof gutter.
Photo 9: Eastward and westward draining metal roofs at former skylights.

Photo 10: Metal roof corners sealed with sealant.
Photo 11: Canopy general view.

Photo 12: Canopy general view.
Photo 13: Canopy general view.

Photo 14: Roof top unit at larger canopy.
Photo 15: Large trace of puddle at canopy.

Photo 16: Large trace of puddle at canopy.
Photo 17: Metal roof paint has deteriorated.

Photo 18: Leak in Coach’s office (interior picture).
MEN’S LOCKER

The Men’s Locker, built in 1961 and with an addition built in 1970, is a single-story building. It has a built-up roof system with gravel roofing. The exterior walls are clad with combination of brick and cement plaster. The building will be demolished, starting in 2018, as part of the Measure E Bond scope.

Leakage Information

DVC personnel reported a leak at the west walkway near the gas main pipeline.

SEI Observations

Tim Spotts of SEI observed the building roof on 6 October 2016. No exploratory, destructive roof probing was performed. Our observations are summarized below.

Roof

- The roof is one large area with a clerestory (Photos 1 and 2). The built-up roof has aggregate surfacing. An expansion joint separates the original portion of the roof and the addition.

- The expansion joint is deteriorated (Photos 4 and 5).

- The roof has eleven roof drains located along eaves (Photo 6). The clerestory roof area has four roof drains located along west and east exterior walls of clerestory. There are no overflow drains.

- There are equipment screens around the two HVAC unit systems (Photo 7). The equipment screens are wood framed with diagonal braces sitting directly on the roof (without curbs). The wood framing and flashing sealant at the equipment screen posts are deteriorated.

- There is a “spongy” area (upon application of foot pressure) at the roof area near west end of expansion joint.

- The base flashing at clerestory northern and southern walls is deteriorated.

- Some vent pipe and insulated pipe are unsealed (Photos 11 and 12).

- Some base flashing tops are unsealed (Photo 13 and 14).
Interior

Since access was not available during our site visit, we did not observe the building interior.

Discussion

The roof has reported leakage and has defects such as unsealed pipe flashings, deteriorated flashing sealant, deteriorated expansion joints and open tops of base flashings. It is nearing the end of its service life. Since the building will be demolished in 2018 as part of the bond program, we recommend repairs related to the reported leakage be performed to mitigate the leakage for the two years of remaining building service life.

SEI Recommendations

We recommend the following roof remediation measures:

Short Term: Repair the roof to address the reported leakage (Assume an allowance of $5,000).
PHOTOGRAPHS

**Photo 1:** General view of Men’s Locker roof.

**Photo 2:** General view of Men’s Locker roof.
Photo 3: General view of Men’s Locker roof end.

Photo 4: Deteriorated expansion joint cover.
Photo 5: Close-up of deteriorated expansion joint shown in Photo 4. Foot indicates “spongy” roof area.

Photo 6: Typical roof drain.
Photo 7: Equipment screen around HVAC unit.

Photo 8: Deteriorated wood framing of equipment screen.
Photo 9: Deteriorated flashing sealant at equipment screen post.

Photo 10: Equipment screen set directly on roof. Note bolts through roof.
Photo 11: Unsealed roof jack at vent pipe penetration.

Photo 12: Unsealed at insulated pipe penetration.
Photo 13: Unsealed base flashing at clerestory wall.

Photo 14: Unsealed base flashing at clerestory wall.
9

MUSIC

The Music Building, built in 1963, is a single-story, circular building with a saw tooth-profile lower roof and an upper roof areas. The building has built-up roofs with factory-coated mineral surfaced cap sheets. The exterior walls are clad with cement plaster. This building is not included in the Measure E Bond scope.

Leakage Information

DVC reported no current roof leaks in this building. One past leak related to a conduit was repaired and is inactive.

SEI Observations

Tim Spotts of SEI observed the building roof on 27 September 2016. Destructive, exploratory roof probing was not performed. Our observations are summarized below.

Roof

- The building has three low-slope areas with built-up roof systems with mineral surfaced cap sheets (Photos 1 to 5). There is an equipment screen wall around the area in the center of the building. There are raised perimeter curbs at the two other roof areas.

- Drainage is provided by multiple roof drains at each roof area.

- The cap sheet fibers are visible at many locations on the upper roof level where it is heavily worn (Photo 6). We did not observe worn cap sheet at the other levels.

- Much of the perimeter consists of short curbs not covered by a sheet metal cap. The membrane terminates over a metal flashing on top of these curbs. The cap sheet is often not well sealed or adhered to the underlying flashing. Poorly sealed and adhered areas were documented at the upper roof (Photo 7).

- At one location on the upper roof, there is a transition between different waterproofing materials on the perimeter curb. The cap sheet is placed over a sheet metal cap and is poorly adhered (Photo 8).

- The top of the perimeter curb on the upper roof is often cupped and retains water (Photo 9).
• There are multiple roof penetrations from pipes and conduits. Five penetrations are not sealed (Photo 10).

• The south side of the center roof portion has an expandable flashing to accommodate movement between the wall and the lower roof. The expandable flashing is Expand-O-Flash by Johns Manville. This flashing is installed in sections with flashing sheet adhered to the adjoining sections to form a seal between the two sections. One joint cover is not fully adhered (Photo 11).

• Leaves and pine needles are accumulated on the roof.

**Interior**

• Since there were no leakage and classes were in progress, SEI did not observe the interior.

**Miscellaneous**

• There is separation of a conduit joint at the upper roof level (Photo 12).

**Discussion**

The upper roof area is considerably more weathered than the lower roof areas, indicating the levels were installed at different times. Records show that the roof was installed in 2008 and the manufacturer roof warranty is still in force (Johns Manville).

There are conditions that should be repaired to prolong the roof service life.

The purpose of granules on the cap sheet is to provide protection from the sun and foot traffic. The installation of a coating can often prolong the life of the existing roof membrane when granules are displaced or loose. White-colored coatings will provide cool roof characteristics that enhance the energy efficiency of the building (i.e., higher reflectivity and emissivity). The coating on the upper roof level is deteriorated and should be recoated.

The roof edge detail present at much of the perimeter is very vulnerable to water intrusion because the adhesion of the membrane edge is lost over time. This interface should be resealed.

Trees drop their leaves and needles at different times. Sometimes multiple cleanings are required to prevent the drains from clogging.

**SEI Recommendations**

For the short term, we recommend the following:

• Seal the exposed membrane edge at the roof perimeter of the lower and upper areas.
- Install coating over the upper level roof. Build up areas on top of the perimeter curb as necessary to ensure water drains from the curb.

- Inspect all pipe and conduit penetrations and seal as necessary.

- Seal one joint cover on the Expand-O-Flash flashing south of the center roof area.

The estimated cost for the above-mentioned repairs is $18,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

Photo 1: General view of Music Building lower roof.

Photo 2: General view of Music Building lower roof.
Photo 3: General view of Music Building lower roof.

Photo 4: General view of Music Building upper roof.
Photo 5: Ponding stains at drain.

Photo 6: Deteriorated coating and cap sheet.
Photo 7: Deteriorated roof edge.

Photo 8: Adhesion failure of cap sheet to sheet metal.
Photo 9: Cupped roof edge.

Photo 10: Open conduit joint.
Photo 11: Partially adhered cover at expansion joint.

Photo 12: Separation of conduit joint.
11

KINESIOLOGY

The Kinesiology Building, built in 1967, is a two-story building. It has three levels of built-up roof systems. The exterior walls are concrete. This building is scheduled to be renovated, starting in 2018, as part of the Measure E Bond scope.

Leakage Information

DVC personnel reported leaks in the Dance Studio and the Weight Room. The roof area over the dance studio has blisters.

SEI Observations

Mark Melamed of SEI observed the building roof on 11 October 2016. No exploratory destructive roof probing was performed. Our observations are summarized below.

Roof

- There are three built-up roof areas. The highest roof area has aggregate surfacing; the lower two areas have mineral-surfaced cap sheets (Photos 1 to 5).

- Drainage is provided by roof drains for all three roof areas (Photos 6 and 7). There are no overflows, except at lowest roof, with two overflow scuppers.

- There are two large HVAC units set on curbs with duct work penetrating roof at numerous locations (Photos 8 and 9). There is a small roof-top mechanical equipment located near southeast corner of an eyebrow roof (the smallest of the three); it partially sits on concrete parapet wall and is corroded (Photo 10).

- The wall metal panel facing the eyebrow roof is corroded at the southern exterior wall of upper most roof (Photos 11 and 12). The eyebrow roof wall flashing at the top of parapet wall is sealed to the concrete wall with sealant and is missing metal coping (Photos 13 and 14).

Interior

- Since there was no access, we did not observe the interior of the building.
Discussion

The high roof appears to be about at least 15 years old and the two lower roofs about 5 to 7 years old. The three roofs in an average condition. The building will be renovated as part of the bond program starting in 2018. Since the renovation scope will probably include some roof work and the roof has about 10 years of remaining service life, we recommend the roof be replaced as part of the renovation. Since this would result in a remaining service life of two years, we recommend repairs related to the leaks be performed.

SEI Recommendations

For the short term (until renovation), we recommend the following roof repairs:

- Perform roof repairs related to the reported leaks. Since there was no information regarding the leak, we recommend budgeting a $5,000 allowance.

For the long term (during renovation), we recommend the following:

- Remove the existing roof to the roof deck. Abate as required.
- Perform renovation-related roof work (e.g., install new mechanical unit curbs).
- Install new Title 24-compliant roof system.

The estimated cost for the above-mentioned roof replacement is $520,000 (2016 dollars). The estimate assumes the project will be bid in a normal, competitive bidding climate.
PHOTOGRAPHS

Photo 1: General view of Kinesiology high roof.

Photo 2: General view of Kinesiology high roof.
Photo 3: General view of Kinesiology lower roof.

Photo 4: General view of Kinesiology lower roof.
**Photo 5:** General view of Kinesiology lower roof.

**Photo 6:** Roof drain on eyebrow roof.
Photo 7: Roof drain on high roof.

Photo 8: HVAC unit on high roof.
Photo 9: HVAC unit on lower roof.

Photo 10: Corrosion to mechanical equipment and sheet metal cap.
Photo 11: Corroded metal wall panel.

Photo 12: Corroded metal wall panel.
Photo 13: Parapet without sheet metal coping.

Photo 14: Parapet without sheet metal coping.
12

LIFE & HEALTH SCIENCE

The Life & Health Science Building, built in 1960, is a two-story building. It has a small roof at Level 2, a main roof and a penthouse roof. The exterior walls are clad with brick and cement plaster. The penthouse walls are clad with metal panels. This building is not included in the Measure E Bond scope.

Leakage Information

DVC personnel reported the following:

- Leaks occur in Rooms 102AB (Dental area) and Room 204.
- There have been other leaks that resulted in roof repairs. The roof has blisters.

SEI Observations

Mark Melamed and Tim Spotts of SEI observed the roof on 29 September 2016.

Roof

The three roof areas have built-up roofs with mineral-surfaced cap sheets. Our observations are categorized by roof area.

Main Roof

- There are numerous blisters throughout the roof; sizes vary from 1 foot to 3 feet long (Photos 5 to 7).
- There are numerous repairs to the roof (Photos 8 to 10).
- The mineral-surface of the cap sheet is eroded at some locations (Photo 11).
- Ponding stains are visible (Photos 12 and 13).
- Open pipe flashing (Photo 14).
- There is one location of impact damage (Photo 15) and fiberglass visible at another location (Photo 16).
There is a hole and an unsealed penetration in an insulated water line (Photos 17 and 18).

**Penthouse Roof**

- There are photovoltaic panels on the roof (Photos 19 and 20).

**Level 2 Roof**

- There is a repair in the central roof area (Photos 21 and 22).
- The granules are eroded from the cap sheet (Photo 23).
- Ponding stains are visible at the drain (Photo 23).
- Room 102AB (Dental Area): there are waterstains on the ceiling (Photos 24 and 25).
- Room 204: No waterstains are visible.

**Interior**

- Room 102AB (Dental): Waterstained ceiling tile are visible (Photos 24 and 25). Tis leak is over a repaired roof area.
- Room 204: There are no signs of leakage. The roof area above the room has roof repairs.

**Discussion**

The roof is in poor condition as indicated by the numerous blisters, erosion of cap sheet granules and numerous repairs. The roof has a history of leakage and has two active leaks. Due to high amount of blistering, roof replacement is a better long-term option than repairing leaks as they occur.

**SEI Recommendations**

We recommend the following:

- Remove the existing roof. Abate as required.
- Install a new Title 24-compliant single-ply or built-up roof system.
- Repair damage to insulated jacket of water pipe.

The estimated cost for the above-mentioned roof replacement is $605,000 (2016 dollars). The insulated jacket repairs are included in the estimated cost as an allowance. The estimate assumes the project will be bid in a normal, competitive bidding climate.
Photos

Photo 1: General view of main roof.

Photo 2: General view of main roof.
Photo 3: General view of main roof.

Photo 4: General view of main roof.
Photo 5: Blister on main roof.

Photo 6: Blister on main roof.
Photo 7: Blister on main roof.

Photo 8: Repair to main roof.
Photo 9: Repair to main roof.

Photo 10: Repair to main roof.
Photo 11: Eroded cap sheet granules.

Photo 12: Ponding stains at roof drains.
Photo 13: Ponding stains at roof valley.

Photo 14: Open pipe flashing.
Photo 15: Impact damage to roof.

Photo 16: Fiberglass visible at cap sheet.
Photo 17: Hole in insulated water line.
PERFORMING ARTS

The Performing Arts is a three-building complex containing the main theater and a connected arena and office buildings. All roof areas have built-up roof systems and the exterior walls are clad with cement plaster. This building is not included in the Measure E Bond Program scope.

Leakage Information

DVC reported the following:

-Leaks occur in the theater house (audience area) and two leaks in the control room for the arena.
-Leaves clog the roof drains.

SEI Observations

Tim Spotts and Alan Burnett of SEI observed the building interior and the roof on 12 and 13 October 2016. We did not perform exploratory, destructive probing. Our observations are summarized below and categorized by building.

Lobby

The lobby has a main roof with a clerestory and there are abutting classroom room roofs that are higher than the main lobby roof.

- The lobby and clerestory have built-up roof systems with aggregate surfacing and the classrooms have built-up roofs with mineral-surfaced cap sheets (Photos 1 to 3). Roof drains and scuppers provide drainage.
- There are roof-mounted mechanical units on the lobby and classroom roofs (Photos 4 and 5). The sheet metal cover is corroded at the lobby roof (Photo 5).
- There are leaves accumulated on some of the lobby roofs (Photos 6 and 7). Some roof drains and scuppers are clogged with leaves (Photos 8 and 9).
- The mineral-surfaced cap sheet flashings at the lobby roof perimeter are crazed, have fasteners backing out and there are bare spots (Photos 10 to 13). The cap sheet has delaminated from the
edge metal at some locations (Photo 14). There are repairs to the perimeter flashing at some locations (Photo 15).

- There are open laps at base flashing corners of mechanical unit curbs at the classroom roofs (Photos 16 and 17).
- The cap sheet flashing is delaminated at some perimeter flashings of the classroom roofs (Photo 18).
- The unistrut support for insulated pipe has fallen from wood sleeper and one electrical box is open (Photos 19 and 20).

**Theater Roof**

There are three roof areas: House, stage and scenery workshop. There was no access to the stage roof, due to cable obstruction. The house and scenery workshop have built-up roofs with mineral-surfaced cap sheets (Photos 21 to 23 and 33).

- **House Roof:** There are extensive blisters throughout the roof area (Photos 24 to 26).
- **House Roof:** The cap sheet is worn throughout the field of the roof (Photos 27 and 28). The underlying fiberglass fibers are visible in some areas.
- **House Roof:** Ponding stains are visible (Photo 29).
- **House Roof:** There are holes in the lead flashings of vent pipes (Photos 30 and 31).
- **House Roof:** Sealant is split at parapet coping joints (Photo 32).
- **Scenery Workshop:** Blisters occur primarily along the stage wall and east parapet (Photos 34 and 35).
- **Scenery Workshop:** There is one open base flashing lap adjacent to a roof drain (Photos 36 and 37).
- **Scenery Workshop:** Open lead flashing occur at vent pipes (Photo 38).
- **Scenery Workshop:** There are exposed nails at parapet coping joints; the nails are backing out at some locations (Photo 39).

**Office Roofs**

The office has a main roof and small penthouse roofs (Photos 40 to 42). All roofs have built-up roofs with coated mineral-surfaced cap sheets.

- The coating is delaminated at numerous locations (Photos 43 and 44).
- Pine needles are accumulated on the roofs (Photo 45). There are ponding stains upslope of the accumulated pine needles. Some collector heads are filled with pine needles (Photo 46).
**ROOF ASSESSMENT - TWENTY-FIVE BUILDINGS**  
**DIABLO VALLEY COLLEGE, PLEASANT HILL, CALIFORNIA**  
**DRAFT – FOR CLIENT REVIEW**

**Arena**

- The arena and adjoining canopy have built-up roofs with mineral-surfaced cap sheets (Photo 47).
- There are blisters throughout the arena roof (Photo 48).
- Repairs are at a scupper and base flashing lap of the arena roof and to the drain at the canopy roof (Photo 49).

**Interior**

- Waterstains and delaminated tape are visible in the house ceiling (Photo 50 and

**Discussion**

The Performing Arts Building has roof systems of various ages. Each building will be discussed separately.

**Theater Roofs**

There are no reported leaks for the lobby and classroom roofs. The lobby roof is older and is in average condition. The observed deterioration, such as cap sheet crazing, backed out nails, is related to the perimeter. Repairs can be made to extend the roof service life. Since it is adjacent to the house roof that needs to be replaced and/or if the mechanical units are to be replaced, it may be more efficient to replace it during the house roof replacement. The classroom roofs appear newer and are in better condition. Minor repairs will extend the roofs service lives. For all the roof areas, there is leaf accumulations that will inhibit drainage and accelerate roof aging.

The house roof is in poor condition as indicated by the extensive blistering, worn cap sheets and open flashings. There is extensive waterstaining in the house ceiling. The roof has reached the end of its service life. The stage roof was not observed. For budgeting purposes, we recommend assuming it to be in the same condition as the house roof. The scenery workshop roof is in average condition. There is no reported leakage. The observed conditions, such as blisters, open flashings and coping joints, should be repaired to extend the roof service life. If these repairs are performed and periodic maintenance is performed, the roof should have 10 years remaining service life

**Office Roofs**

The office roofs are in average/good condition. These roofs appear newer than the theater roofs. They have coated cap sheets to provide cool roof characteristics. The coating is delaminating due to aging and ponding water. Pine needle accumulation inhibits drainage; ponded water will accelerate deterioration of the roof coating. Minor repair will prolong the roof service lives.
Arena Roof

There are two leaks in the control booth. One leak is related to a canopy roof drain. The other leak source is within the arena roof; possible sources include roof drain, roofing lap. Repairs have been made and the leakage persists. One leak occurs in a closet that houses expensive electrical equipment. We recommend roof replacement.

SEI Recommendations

Based on our observations, we recommend the following:

- **Repairs**: The estimated cost for the above-mentioned repairs is $25,000 to $50,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.

- **Roof Replacement**: For the House, Arena and Stage, the estimated cost for the above-mentioned replacement is $950,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate.
Photos

**Photo 1:** General view of lobby roof.

**Photo 2:** General view of lobby roof.
Photo 3: General view of lobby roof.

Photo 4: Roof-mounted mechanical unit on lobby roof.
Photo 5: Corroded sheet metal flashing.

Photo 6: Leaf accumulation on lobby roof.
Photo 7: Leaf accumulation on lobby roof.

Photo 8: Roof drain clogged with leaves.
Photo 9: Scupper clogged with leaves.

Photo 10: Scupper clogged with leaves.
Photo 11: Fastener backing out at lobby roof perimeter.

Photo 12: Fastener backing out at lobby roof perimeter.
Photo 13: Bare spot at lobby roof.

Photo 14: Cap sheet delamination at edge metal.
Photo 15: Repair to perimeter flashing at lobby roof.

Photo 16: General view of mechanical unit on classroom roof. Metal rod indicates hole.
Photo 17: Close-up of open base flashing corner.

Photo 18: Delaminated cap sheet from classroom roof edge metal.
Photo 19: Unistrut not connected to wood sleeper at lobby roof.

Photo 20: Open electrical box at lobby roof.
Photo 21: General view of house roof.

Photo 22: General view of house roof.
Photo 23: General view of house roof.

Photo 24: Blister in house roof.
Photo 25: Blister in house roof.

Photo 26: Blister in house roof.
Photo 27: General view of worn cap sheet at house roof.

Photo 28: Close-up of worn cap sheet at house roof.
Photo 29: Ponding stains at house roof.

Photo 30: Open lead flashing at house roof.
Photo 31: Open lead flashing at house roof.

Photo 32: Split sealant at coping joint.
Photo 33: General view of scenery workshop roof.

Photo 34: Blister at scenery workshop roof.
Photo 35: Blister at scenery workshop roof.

Photo 36: Open base flashing lap at scenery workshop roof.
Photo 37: Close-up of open base flashing lap shown in Photo 36.

Photo 38: Open lead flashing at vent pipe of scenery roof.
Photo 39: Backed out nails at parapet cap of scenery roof.

Photo 40: General view of office roofs.
Photo 41: General view of an upper office roof.

Photo 42: General view of main office roof.
Photo 43: Delaminated coating at office roof.

Photo 44: Delaminated coating at office roof.
Photo 45: Pine needle accumulation on office roof.

Photo 46: Pine needles in collector head of office roof.
Photo 47: General view of area roof.

Photo 48: Blister on area roof.
Photo 49: Repairs to scupper and base flashing.

Photo 50: General view of house.
Photo 51: Waterstains and delaminated tape at house ceiling.
WOMEN’S LOCKER

The Women’s Locker, built in 1962 with an addition in 1970, is a single-story building. It has a built-up with aggregate surfacing. The exterior walls are clad with combination of brick and cement plaster. The building will be renovated as part of the Measure E Bond Program scope.

Leakage Information

DVC personnel reported a leak, location is unspecified.

SEI Observations

Mark Melamed of SEI observed the building roof on 6 October 2016. No exploratory, destructive roof probing was performed. Our observations are summarized below.

Roof

- The building has a roof with a clerestory (Photos 1 and 2). The roof is a built-up roof membrane with aggregate surfacing; the slope exceeds \( \frac{\text{1}}{4} \) in. per foot (Photos 3 to 5).

- The main roof has roof drains along the eaves; if clogged, the water will flow over the raised eave. The clerestory roof area has no roof drains.

- Sheet metal caps and counterflashing at some roof top equipment at fans and at main roof base flashing have open corners.

- The base flashing is deteriorated at some locations and there are gaps to adjacent walls and curbs (Photos 6 to 8). There is impact damage to the cement plaster at one location (Photo 8).

- There is missing cover at one fan (Photo 9).

- There is one HVAC unit with the ducts. There are ponding stains adjacent to the unit. Ponding stains are visible near north wall of clerestory on the main roof (Photo 10).

- The downspouts are disconnected at roof scuppers (Photo 11).

- Sealant at counterflashing/brick wall joints is deteriorated at clerestory at brick walls (Photos 12 and 13).
Expansion joints separate the original roof and the addition (Photo 15).

**Interior**

There was no access and we did not observe the interior of the building.

**Discussion**

There are reported leaks in the building. Since there was no access to the interior, we could not correlate the leakage with the observed roof conditions. The roof is aged as indicated by deteriorated base flashings and gaps in base flashings, disconnected downspouts, open joints at sheet metal cap corners. The roof can be repaired to address the observed conditions and to repair the leakage to extend the roof service life. We understand the building will be renovated starting in 2018. We recommend the roof be replaced as part of the renovation, rather than repairing it and replacing it in the future (within five years). The current leaks can be addressed so that there will be no leakage in the remaining two years of service life.

**SEI Recommendations**

We recommend the following roof remediation measures:

- **Short Term**: Repair the roof to address the reported leakage (Assume an allowance of $5,000).

- **Renovation (Within Two Years)**: Remove and replace the roof as part of the building renovation. The engineering cost estimate is $600,000 for the roof replacement. This assumes that the project will be competitively bid in a normal bidding climate.
PHOTOGRAPHS

Photo 1: General view of Women’s Locker roof.

Photo 2: General view of Women’s Locker roof.
Photo 3: General view of clerestory roof.

Photo 4: General view of clerestory roof.
Photo 5: General view of clerestory roof.

Photo 6: Deteriorated base flashing at curb.
**Photo 7:** Base flashing with exposed nail at clerestory. Note gap at transition joint.

**Photo 8:** Damaged cement plaster and sheet metal counterflashing at clerestory corner.
Photo 9: Missing cover at fan.

Photo 10: Ponding stain on main roof near north wall of clerestory.
Photo 11: Disconnected downspouts at scuppers.

Photo 12: Deteriorated sealant at counterflash-to-brick wall termination.
Photo 13: Deteriorated sealant at brick wall/counterflashing joint. Note absence of end cap.

Photo 14: Open joint at sheet metal counterflashing corner joint.
Photo 15: General view of expansion joint.
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LIBRARY

The Library, built in 1970, is a three-story building. It has five separate roof areas and a combination of built-up and single-ply roofs. The walls are clad with cement plaster. This building is not included in the Measure E Bond Program scope.

Leakage Information

DVC reported the following:

- Leakage at the west side of the building.

SEI Observations

Alan Burnett and Tim Spotts of SEI observed the roof on 28 September 2016. Single-ply roofs are installed at the central lower and upper roofs, and the south stairwell roof. Built-up roofs with aggregate surfacing are installed at the south and southeast annexes. Our observations are summarized below.

Built-up Roofs

- The southeast roof area contains three light wells (Photo 3) and other mechanical hoods set on platforms. The sides of the platforms are covered with granulated cap sheet. SEI documented 21 locations where the cap sheet was beginning to fail at the platform corners. (Photo 4)

- The cap sheet surface on the platforms and perimeter curbs is cracking. (Photo 5)

- There are two unprotected vent pipes surrounded by lead jacks. The tops of the jacks are not protected. (Photo 6)

PVC Roofs

- We viewed the PVC roof over the south stairs from the nearby roof area. The roof looks like it is in good condition.

- The PVC membrane and wall flashing on the roof surrounding the center structure are in good condition. A label on the material indicates the membrane manufacturer is Sarnafil.
SEI inspected several drains. We were not able to determine exactly how the PVC membrane integrated into the drain body.

- There are many pipe and conduit penetrations on the roof. The flashings are in good condition.

**Interior**

- There are waterstained ceiling tile in the library stacks along the west wall (Photos 20 to 23).

**Discussion**

**Built-up Roofs**

The built-up membrane is in good condition. The roof surface has little tree debris.

Some maintenance is required to prevent premature failure and to prolong the useful life of the roof.

**PVC Roofs**

The PVC membrane is in good condition. The roof surface is fairly clean. We observed no pipe penetration flashings requiring immediate repair. The leaks in the library are below the single-ply roof and roof-mounted mechanical units. The leak could be related to the roof or a breech in the mechanical system. The status of the warranty should be determined prior to starting roof repairs. We observe mud accumulation at some drains. This will result in water ponding around the drains. Periodic maintenance is required to keep the roof drains unclogged or obstructed.

**SEI Recommendations**

We recommend the following:

**Built-up Roofs**

- Seal the corners of the light well and equipment platforms.
- Install a coating over the cap sheet covering the perimeter curbs and the platforms.
- Install lead caps at two pipe vents.

**PVC Roofs**

- Repair abrasions in single-ply membrane.
- Inspect the pipe penetration flashings at least once a year. Repair as required.
- Repair the roof/mechanical units, as required, at leak location.
- Remove soil/dirt from drain strainers.
The estimated cost for the above-mentioned repairs is $20,000 to 40,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

Photo 1: General view of south annex roof.

Photo 2: General view of southeast annex roof.
Photo 3: Typical roof and overflow drain.

Photo 4: Clerestory roofs and vents at southeast annex roof.
Photo 5: Cap sheet adhesion failure at curb corner.

Photo 6: Crazed cap sheet base flashing.
Photo 7: Open lead flashing at pipe.

Photo 8: General view of single-ply roof at central lower roof and stairwell.
Photo 9: General view of single-ply main roof.

Photo 10: General view of single-ply main roof.
Photo 11: General view of upper central roof. Note ponding stains.

Photo 12: Puncture in single-ply roof at upper central roof.
Photo 13: Fastener on upper central roof.

Photo 14: Absence of splash pan at downspout.
Photo 15: Mud encrusted around drain. Note absence of overflow.

Photo 16: Debris on roof.
Photo 17: Membrane covering most of drain bowl.

Photo 18: Sealant at conduit penetration.
Photo 19: Typical roof-mounted HVAC.

Photo 20: General view of library book stack with leaks.
Photo 21: Waterstained ceiling tile at Stack 26.

Photo 22: Waterstained ceiling tile at Stack 31.
Photo 23: Waterstained ceiling tile at Stack 32.
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LEARNING COMMUNITIES ANNEX

The Learning Communities Annex (formerly Counseling), built in 1972, is a single-story building. It has a built-up roof system with aggregate surfacing. The exterior walls are clad in wood siding. The building will be demolished, starting in 2026, as part of the Measure E Bond Program scope.

Leakage Information

DVC personnel did not report leakage in the building.

SEI Observations

Mark Melamed of SEI observed the building roof on 4 October 2016. No exploratory, destructive roof probing was performed. Our observations are summarized below.

Roof

- The building has terraced built-up roof systems with gravel surfacing (Photos 1 to 4).

- Upper roofs drain onto the lower roof with drains and downspouts; there are no splash pans at downspouts (Photo 6). The lower roof slopes (Photo 8) toward exterior perimeter wall drains connected to downspouts (Photo 8).

- Three large HVAC units are enclosed by metal equipment sheds.

- Ponding stains are visible at three locations: first near south-west corner of HVAC Unit 2 (Photo 7); second at north side of HVAC Unit 1 (Photo 4); and third at small elevated roof area at east end of the building.

- The GSM counterflashing is broken at the base flashing of curb supporting HVAC Unit 1 (Photo 11) and at main roof counterflashing at the base of walls (Photo 5).

- The roof flashing is delaminated at edge metal along most roof perimeter (Photos 12 and 13).

- The strip flashing is crazed at many locations at the perimeter and at base flashings (Photos 9 and 10).
Interior

- Waterstains are visible in Rooms 133, 147 and hallway ceilings.

Discussion

Roof appears of being about 20 years old and is in poor condition. There are leaks into the underlying interior. The building is scheduled for renovation starting in 2024 (eight years from date of report). Since the roof is nearing the end of its service life, we recommend replacing it during the renovation. Since it is eight years until the renovation will start, we recommend roof repairs to extend the roof service life. The repairs will need to address the following items:

- Deteriorated and delaminated perimeter flashing.
- Deteriorated base flashings.
- Leak repairs.

SEI Recommendations

Since the building will be demolished in eight years, we recommend the following roof repairs:

Roof Repairs

- Seal and coat the roof perimeter and base flashings.
- Repair sheet metal base counterflashing at HVAC Unit 1 with angular sheet metal patch that is mechanically fastened and soldered watertight to the existing counterflashing.
- Repair roof at leaks.

Roof Overlay

A more systemic repair would be to install a roof overlay. This system will provide a warranted roof for the remaining service life of the building. It entails removing the aggregate and installing a mechanically fastened cover board and fully-adhered single-ply roof membrane.

The estimated cost for the above-mentioned repairs is $25,000-40,000 (2016 dollars) and for the above-mentioned roof overlay is $200,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
PHOTOGRAPHS

**Photo 1:** General view of roof.

**Photo 2:** General view of roof.
Photo 3: General view of roof.

Photo 4: General view of roof. Trace of dried puddle – corresponds with leak at Room 133.
Photo 5: Break in main roof GSM counter flashing at wall base flashing corner.

Photo 6: Splash block (pan) at base of downspout is missing.
Photo 7: Trace of dried puddle adjacent to housed in metal shed HVAC unit 2.

Photo 8: Two roof drains at perimeter exterior walls – general view.
Photo 9: Deteriorated strip flashing at roof edge’s exposed cap sheet.

Photo 10: Deteriorated strip flashing at roof edge’s exposed cap sheet.
Photo 11: Deteriorated GSM counterflashing corner at curb supporting HVAC unit 1 housing/shed.

Photo 12: Deteriorated seal at perimeter roof edge and damage in a strip flashing in vicinity of leak observed in Room 133.
Photo 13: Deteriorated seal at perimeter roof edge and damage in a strip flashing in vicinity of leak observed in Room 133.
EARLY CHILDHOOD EDUCATION SOUTH

The Early Childhood Education South (formerly Family Life Education), built in 1972, is a two-story building. It has built-up roof systems with aggregate surfacing. The exterior walls are clad in wood siding. This building is not included in the Measure E Bond Program scope.

Leakage Information

DVC personnel did not report leaks.

SEI Observations

Mark Melamed of SEI observed the building roof on 13 October 2016. No exploratory destructive roof probing was performed. Our observations are summarized below.

Roof

- The building has a series of low-slope roof areas with built-up roof systems with aggregate surfacing (Photos 1 to 5).
- The upper roofs drain onto the lower roof via scuppers and downspouts. The lower roof has two roof drains (Photo 11).
- There is one large roof-mounted HVAC unit.
- There are broken and incomplete sheet metal counterflashing corners at walls at several locations (Photos 10 and 12).
- The seal between roofing membrane and edge metal along roof perimeter is deteriorated in most locations (Photos 9, 16 and 17).
- The sealant joint between metal canopy roof and exterior perimeter building wall is deteriorated (Photos 6 and 7).
- The downspout is loose high roof area (Photo 15); the scupper and downspout are damaged at another high roof area (Photos 13 and 14).
- The metal edge termination at wall and at base flashing is exposed and unsealed (Photo 18).
The sheet metal coping transition is open and unsealed at one high roof (Photo 8).

**Interior**

Since there are no reported leaks, we did not inspect interior of the building.

**Discussion**

Roof appears of being about 15 years old and is in average condition. There are no reported leaks. The estimated roofing remaining life is at least 5 years. There are conditions that should be repaired, including:

- Perimeter edge around roof either needs sealant between membrane and metal edge or it deteriorated. This condition may allow rain water to infiltrate between roofing membrane and deck and may cause deck deterioration and future leaks.

- The broken sheet metal counterflashing corners at walls and at curb expose base flashing termination and may cause future leaks.

- The deteriorated sealant joint between the metal canopy termination at exterior building wall may cause a future leak.

- Two loose downspouts and damaged scupper do not transport rain runoff from the elevated roof; the water will free fall to the roof area below.

- Open sheet metal coping transition at an elevated roof may cause future water infiltration into the wall cavity, damaging wall framing and finishes.

- Unsealed/open sheet metal roof edge termination at building exterior wall at main entrance may cause future leak.

**SEI Recommendations**

We recommend the following repair measures:

- Seal and coat the roof perimeter flashings.
- Repair sheet metal counterflashing at wall bases and curbs with angular sheet metal patch that is mechanically fastened and soldered watertight to the existing counterflashing. Paint patch to match existing color.
- Remove two damaged downspouts and one damaged scupper and replace with new scupper. Secure new downspouts at building walls.
- Provide sheet metal counterflashing at metal roof-to-exterior building wall transition. Cut wall siding and integrate with wall’s existing waterproofing, by using SASM.
• At main building entrance, install new sheet metal roof edge termination piece with integral flange attached to building wall. Integrate with base flashing at wall. Existing wall siding must be locally removed and SASM flashing shall be integrated with the existing wall waterproofing.
• At an elevated roof area, replace sheet metal coping at elevation change with single custom made transition piece, mechanically fasten and soldered watertight.

The estimated cost for the above-mentioned repairs is $25,300 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

Photo 1: General view of roof.

Photo 2: General view of roof.
Photo 3: General view of roof.

Photo 4: General view of roof.
Photo 5: General view of roof.

Photo 6: The sealant joint of metal roof to exterior building wall is deteriorated – opened up.
Photo 7: The sealant joint of metal roof to exterior building wall is deteriorated – opened up.

Photo 8: Area 2 roof – coping termination at elevation change is unsealed.
Photo 9: Seal between metal roof edge and roofing membrane is deteriorated.

Photo 10: Incomplete GSM corner of counterflash at wall base flashing.
Photo 11: Typical roof drain (one of two) on entire roof.

Photo 12: Broken GSM corner of counterflashing at wall base flashing and it’s exposed nailing. Nails do not have neoprene washers.
Photo 13: Loose downspout and damaged scupper at elevated roof Area 2.

Photo 14: Close-up of damaged scupper at same location.
Photo 15: Loose downspout at elevated roof Area 1.

Photo 16: Perimeter roof edge deteriorated seal between metal edge and roofing membrane.
Photo 17: Perimeter roof edge deteriorated seal between metal edge and roofing membrane.

Photo 18: Metal edge termination at roof base flashing termination over building’s main entrance.
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LEARNING CENTER

The Learning Center, built in 1993, is a two-story building with built-up roof system with aggregate surfacing. The exterior walls are cement plaster clad. The building will be renovated, starting in 2024, as part of the Measure E Bond Program scope.

Leakage Information

DVC personnel a leak near the southwest drain.

SEI Observations

Tim Spotts of SEI observed the roof on 28 September 2016. Exploratory destructive roof probing was not preformed. Our observations are summarized below.

Roof

- The roofing is a built-up membrane with aggregate surfacing (Photo 1).

- The raised roof perimeter consists of a short curb covered with a mineral-surfaced cap sheet. The cap sheet terminates over an edge metal flashing. The edge of the cap sheet is unprotected and is often not well sealed or adhered to the underlying flashing (Photo 2).

- On the west side of the building, the perimeter curb is interrupted by another roof area. The lead flashing used at this location has two holes (Photo 3).

- There are nine pipe penetrations that are poorly sealed (Photo 4).

- The roof-top equipment sits on elevated platforms. Cables are used to anchor the equipment to a bolt into the platform edge. Sealant is used at the bolt/platform curb joint. The selant is deteriorated at nine locations (Photo 5).

- The corner flashing on the equipment platforms is deteriorated (Photo 6).

- One condensate line is disconnected (Photo 7) and another one leaks at a conduit joint (Photo 8).

- There is an open flashing at a multiple-conduit penetration (Photo 9).
The cap sheet surface is beginning to degrade at some locations (Photo 10).

Overflow drain without a strainer at four locations (Photo 11).

**Interior**

- SEI did not observe the interior.

**Discussion**

The built-up membrane is in good condition. We recommend the roof be replaced as part of the future renovation. It has some conditions that should be repaired over the buildings remaining service life. These items are summarized in the recommendations section.

**SEI Recommendations**

We recommend the following:

- Seal the exposed cap sheet edge at the roof perimeter.
- Install a coating over the cap sheet covering the perimeter curbs.
- Inspect all pipe and conduit penetrations and seal as necessary.
- Seal one lead flashing detail on the west edge.
- Repair one location with damaged pipe insulation. Inspect all others and repair as necessary.
- Repair the base flashing corners at the equipment platforms.
- Repair holes around anchor bolts at the equipment platforms.
- Repair disconnected and leaking conduit lines.

The estimated cost for the above-mentioned repairs is $38,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

Photo 1: General view of Learning Center roof.

Photo 2: Unsealed cap sheet edge at roof perimeter.
Photo 3: Holes in lead flashing.

Photo 4: Hole in pitch pocket filler.
Photo 5: Hole and deteriorated sealant at cable connection.

Photo 6: Deteriorated corner flashing.
Photo 7: Disconnected condensate line.

Photo 8: Leak at condensate pipe joint.
Photo 9: Open flashing at multiple line penetration.

Photo 10: Deteriorated cap sheet.
Photo 11: Typical roof drain and overflow. Note no grate at overflow.
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LIBERAL ARTS

The Liberal Arts Building, built in 1972, is a two-story. It has a built-up roofing with cap sheet. The exterior walls are clad in a combination of wood siding and brick. It will be demolished, starting in 2026, as part of the Measure E Bond Program scope.

Leakage Information

DVC personnel did not report leaks.

SEI Observations

Mark Melamed of SEI observed the building roof on 29 September 2016. Exploratory, destructive roof probing was performed. Our observations are summarized below.

Roof

- The building has a main roof and smaller raised roof areas. All areas are low-sloped (1/4 in. per foot) and have built-up roof systems with mineral-surfaced cap sheets (Photos 1 to 5).
- Gutters and downspouts provide roof drainage.
- There are eleven unenclosed large roof-mounted HVAC units.
- Base flashing at equipment curbs is crazed in some areas.
- Blisters are visible in the central portion of the roof between west and east wings.
- Ponding stains are visible at the south-east corner of west wing, south-west corner of east wing, and south-eastern portion of central part of the building (Photos 6 and 7). Ponding stains and corrosion are visible at sheet metal caps (Photo 8).
- Expansion joints are located at narrow passage adjacent to north-eastern corner of west wing and at north-western corner of east wing.

Interior

- Since there is no reported leakage, we did not inspect interior of the building.
Discussion

There are no reported active leaks. The roof appears recently installed compared to the adjacent Faculty Office Building. Since it will be demolished in 2026, the remaining service life for the building is ten years. The remaining roof service life is similar with the building service life of ten years.

The roof is in average condition, except of the central portion, where the blisters occur. We recommend repairs be performed to maintain the roof to the end of the building service life. Repairs should address the observed defects such as blistering, deteriorated base flashings, roof perimeter.

SEI Recommendations

To maintain the roof for the remaining ten years of service, we recommend the following repair measures:

- Apply waterproofing coating at the base flashing.
- Repair the blisters in the central region of the roof.
- Seal the cap sheet edge at the roof perimeter.

The estimated cost for the above-mentioned repairs is $25,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

Photo 1: General view of Liberal Arts roof.

Photo 2: General view of Liberal Arts roof.
Photo 3: General view of Liberal Arts roof.

Photo 4: General view of Liberal Arts roof.
Photo 5: General view of Liberal Arts high roof area.

Photo 6: Ponding stain along roof perimeter.
Photo 7: Ponding stain along roof perimeter.

Photo 8: Ponding stains on GSM cap. Note corrosion.
FACULTY OFFICE

The Faculty Office, built in 1972, is a two-story building. It has built-up roof systems with gravel roofing. The exterior walls are clad with combination of wood siding. The building will be demolished, starting in 2026, as part of the Measure E Bond scope.

Leakage Information

DVC personnel reported the following:

- Leaks occur in Office F229 and in a room in the north part of the building.
- There was a leak from one exhaust fan being blown off the curb. This leak was repaired and is not active.

SEI Observations

Tim Spotts and Alan Burnett of SEI observed the building roof on 29 September 2016. No exploratory, destructive roof probing was performed. Our observations are summarized below.

Roof

- The roof consists of a main area, areas enclosed with walls and penthouse roofs. (Photos 1 to 3). All roof areas have built-up roof systems with aggregate surfacing.
- Scuppers connected to sheet metal downspouts provide drainage (Photo 4).
- Roofing cement repairs have been performed at conduit penetrations, roof edges, and base flashing corners (Photos 5 to 7).
- The edge metal does not have strip flashing. The fasteners are exposed and are backing out at some locations (Photo 8). Fascia is abutting the vertical leg of edge metal at some locations (Photo 9); roofing cement has been applied to the fascia/edge metal joints.
- There are open lead flashings at some vent pipes (Photo 10).
- Fasteners have been driven through the roof for utility sleepers (Photo 11).
- Some electrical conduit joints are broken (Photo 12).
- One exhaust fan has roofing cement repairs (Photo 13 – identified by DVC personnel as the fan that blew off curb).

- Delaminated paint is visible at some mechanical units (Photo 14).

**Interior**

We observed one of the two interior spaces reporting leakage.

- Office F224: Waterstains are visible in the ceiling (Photo 15). There is a mechanical directly over the office (Photo 16).

- North End of Building: There was no access to the interior space. The base flashing is damaged at the roof area above the space (Photos 17 and 18).

**Discussion**

There are two reported active leaks and the observed repairs indicate a history of leakage. The roof is aged as indicated by the observed open flashings and exposed edge metal. Since it will be demolished in 2026, the remaining service life for the building is ten years. The remaining service lives for the roofs is less than the building service life of ten years.

Since there is a short remaining service life for the building, three approaches to the roof are:

1. Option 1: Perform roof repairs as needed.
2. Option 2: Perform roof repairs and install single-ply overlay at the north end.
3. Option 3: Install a single-ply overlay for the entire building.

Option 3 provide a systemic approach to addressing the leakage and aged roof system. It is the most expensive, but it provides a warranted roof for the remaining service life of the building. Option 1 is a minimalist approach. Although it is the least costly now, it may result in extensive roof repairs over the remaining building service life.

**SEI Recommendations**

The estimated cost for the above-mentioned repairs is $30,000 to $50,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
PHOTOGRAPHS

Photo 1: General view of Faculty Office roof.

Photo 2: General view of Faculty Office roof.
Photo 3: General view of Faculty Office roof.

Photo 4: Typical scupper. Note roofing cement.
Photo 5: Roofing cement repairs at conduits.

Photo 6: Roofing cement repairs at roof edge.
Photo 7: Roofing cement repairs at base flashing corner.

Photo 8: Edge metal with exposed fasteners.
Photo 9: Fascia abutting edge metal vertical leg.

Photo 10: Open lead flashing at vent pipe.
Photo 11: Fastener through roof.

Photo 12: Unsealed at insulated pipe penetration.
Photo 13: Broken electrical conduit joint.

Photo 14: Mechanical unit with delaminated paint.
Photo 15: Waterstained ceiling in F229.

Photo 16: Mechanical unit above F229.
Photo 17: Roof area over office reporting leak.

Photo 18: Close-up of damaged base flashing.
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KINESIOLOGY OFFICES

The Kinesiology Offices, built in 1973, is a two-story building adjacent to the gymnasium. The building has terraced built-up roof systems and the exterior walls are clad with wood siding. It will be demolished, starting in 2018, as part of the Measure E Bond Program scope.

Leakage Information

DVC personnel reported the following:

- A leak occurs in Room 105 during rains. Water drips from the ceiling during rains.

SEI Observations

Alan Burnett of SEI observed the building interior and the roof on 11 October 2016. Exploratory, destructive roof probing of the roofs was not performed. Our observations are summarized below.

Roof

- The roofs are built-up roof systems with aggregate surfacing, except for two lower roofs which have mineral-surfaced cap sheets (Photos 1 to 6).

- Scuppers and downspouts provide drainage (Photo 7).

- There are two roof-mounted mechanical units (Photos 8 and 9). The insulated water line for one unit has deteriorated insulation jacket and penetrates a clerestory wall (Photos 10 and 11).

- There are bare spots at some raised perimeter edges (Photo 12).

- Sealant is split at sheet metal cone/conduit interfaces (Photo 13).

- There are sealant repairs at clerestory wall/sheet metal flashing interfaces (Photo 14).

- The wood is deteriorated and weathered at the south-facing clerestory window (Photos 15 and 16).
Interior

The occupant stated that water leaks from the light and she placed garbage baskets to catch the water (Photos 17 and 18). There is a roof area above this office (Photos 19 and 20). Sealant repairs have been made to the siding/parapet cap and siding/counterflashing joints.

Discussion

The roofs appear aged in average condition. The two roof areas with cap sheets appear to be recent replacements. The one reported leak (Room 105) appears related to the roof/wall or parapet cap/wall junctions. Since the building is scheduled for demolition in two years, we recommend performing roof repairs to address the leakage for the two years of remaining building service life.

SEI Recommendations

We recommend the following roof remediation measures:

Short Term: Repair the roof to address the Room 105 leakage (Assume an allowance of $5,000).
Photos

Photo 1: General view of Kinesiology Office roof.

Photo 2: General view of Kinesiology Office roof.
Photo 3: General view of Kinesiology Office roof.

Photo 4: General view of Kinesiology Office roof.
Photo 5: General view of Kinesiology Office roof.

Photo 6: General view of Kinesiology Office roof.
Photo 7: Typical scupper. Note leaf accumulation.

Photo 8: Roof-mounted mechanical unit.
Photo 9: Roof-mounted mechanical unit.

Photo 10: Deteriorated insulation jacket.
Photo 11: Pipes penetrating clerestory wall.

Photo 12: Bare spot at roof edge.
Photo 13: Split sealant at cone flashing for conduit.

Photo 14: Sealant repairs at flashing/siding interfaces.
Photo 15: General view of south-facing clerestory.

Photo 16: Deteriorated trim along clerestory window sill.
Photo 17: General view of Room 105.

Photo 18: Light fixture at leak location.
Photo 19: General view of exterior wall above Room 105.

Photo 20: roof area above Room 105. Note sealant repairs.
The Art Building, built in 1975, is a multi-building complex. It has a combination of built-up roof and metal roof systems. The exterior walls are clad with wood siding. Elevated walkways with traffic coatings connect the buildings. It is scheduled to be demolished in 2021, as part of the Measure E bond program.

Leakage Information

DVC personnel reported the following:

- Leaks in Rooms 201 and 501.
- Missing sheet metal flashing at wall/deck surface junctions.

SEI Observations

Tim Spotts of SEI observed the roof on 4 and 6 October 2016. Exploratory, destructive roof probing was not performed. Our observations are summarized below.

Roof

- The building has a combination of built-up roof membrane has aggregate surfacing or mineral-surfaced cap sheets and standing seam metal roofs. For built-up roofs, the base and wall flashing at the raised perimeter curbs and equipment platforms is covered with a granulated cap sheet (Photos 1 to 4).

- Scuppers and downspouts provide drainage (Photo 5). Some scuppers are filled with leaves (Photo 6).

- There are ponded water, blisters, and repairs at one roof area (Photos 7 to 9).

- There are bare spots and crazed asphalt at built-up roof perimeters (Photos 10 and 11).

- Roofing cement repairs have been performed at some penetrations (Photos 12 and 13).

- Ponding stains are visible on roofs with mineral-surfaced cap sheets (Photo 14).

- Some curb heights are less than 8 in. (Photo 15).
Siding is deteriorated at roof edge terminations and along the base of walls (Photos 16 and 17). Repairs have been made to wood framing (Photo 18).

Holes occur in pitch pocket filler (Photo 19).

Some sheet metal counterflashining is disconnected from the wall (Photo 20); some conduit has disconnected from the wall, resulting in holes in the siding (Photo 21).

A walk pad on edge has been used as a condensate line support (Photo 22). Some insulation jacketing at water lines is deteriorated (Photo 23).

**Interior**

Since classes were in progress at the time of our site visit, we did not observe the building interior.

**Miscellaneous**

An elevated walkway connects the buildings (Photo 24). It has a traffic coating for waterproofing (Photo 25). There are cracks in the waterproofing and ponded water (Photos 25 and 26).

**Discussion**

There are two reported leaks in the building. The observed roof repairs indicate that the building has a history of leakage for the built-up roofs. The building is scheduled for demolition in 2021. The required remaining service life is five years. The existing built-up roofs are nearing the end of their service lives. Repairs are required to prolong the service life until building demolition. For some roof areas, an overlay would be more effective that repairs. The metal roofs appear in good condition.

Since there is a short remaining service life for the building, three approaches to the roof are:

1. Option 1: Perform roof repairs as needed.
2. Option 2: Perform roof repairs and install single-ply overlay at the north end.
3. Option 3: Install a single-ply overlay for the entire building.

Option 3 provide a systemic approach to addressing the leakage and aged roof system. It is the most expensive, but it provides a warranted roof for the remaining service life of the building. Option 1 is a minimalist approach. Although it is the least costly now, it may result in extensive roof repairs over the remaining building service life.

**SEI Recommendations**

The estimated cost for the above-mentioned repairs is summarized below in 2016 dollars. The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Repair Allowance: $20,000 to $30,000.

Roof Overlay Allowance: $40,000 to $80,000.
**Photos**

**Photo 1:** General view of Art Building roof.

**Photo 2:** General view of the Art Building roof.
Photo 3: General view of the Art Building roof.

Photo 4: General view of the Art Building roof.
Photo 5: Typical scupper.

Photo 6: Scupper filled with pine needles.
**Photo 7:** General view of roof with ponding and repairs.

**Photo 8:** Close-up of ponding shown in Photo 7.
Photo 9: Blister in built-up roof.

Photo 10: Bare spot at roof perimeter.
Photo 11: Crazed perimeter flashing.

Photo 12: Roof cement repairs at vent pipe.
Photo 13: Roof cement repairs at scupper.

Photo 14: Ponding stains.
Photo 13: Roof cement repairs at scupper.

Photo 14: Ponding stains.
Photo 15: Curb height less than 8 in.

Photo 16: Deteriorated siding at roof edge termination.
Photo 17: Deteriorated siding at wall base.

Photo 18: Repair to wood beam end.
**Photo 19:** Hole in pitch pocket filler.

**Photo 20:** Disconnected sheet metal counterflashing.
Photo 21: Conduit disconnected from wall. Note hole.

Photo 22: Walk pad on edge used as sleeper.
Photo 23: Deteriorated insulated water line.

Photo 24: General view of elevated walkway.
Photo 25: Ponded water on elevated walkway.

Photo 26: Close-up of ponded water. Note cracking.
EARLY CHILDHOOD EDUCATION NORTH

The Early Childhood Educations North is two buildings. This report addresses the northern building. The building has six low-slope built-up roofs with granulated cap sheet and 2 sloped roofs with composition shingles. The exterior walls are clad with plywood siding.

Leakage Information

DVC reported no leaks.

SEI Observations

Tim Spotts of SEI observed the building interior and the roof on 13 October 2016.

Built-up Roofs

- The granulated cap sheet is in good condition throughout most of the roof.

- The cap sheet turns up walls to form a base flashing. At these locations we noted cracked cap sheet (Photo 1) and open base flashing ends (Photo 2).

- The perimeter edges terminate on a sheet metal flashing. The cap sheet edge is not well sealed. The preformed metal edge rises above the level of the cap sheet creating a short dam at the point where the surface water is intended to flow off the roof. There are locations of stained cap sheet indicating the water ponds near the edges. There are locations where the membrane edge has been patched. (Photo 3, 4 and Photo 5)

- We documented one open pipe penetration on the east side of the upper roof. (Photo 6)

- There is a rain water leader near the southeast corner of the upper roof. There is no splash pan under the leader end. (Photo 7)

- The roof supports horizontal pipes at three locations. The pipes are mounted to blocks set in a bed of roofing cement. There are no protection pads under the blocks. We documented 15 blocks without pads. (Photo 8)

- SEI documented four blisters in the cap sheet.
Composition Shingle Roofs

- The composition shingle roofs are in good condition.

Interior

- SEI did not inspect the interior.

Miscellaneous

- A PVC pipe penetrates the siding near the southeast corner of the upper roof. The pipe is cut flush with the siding and the end is not capped or plugged. (Photo 9)

- There are two locations where the plywood siding is decayed. (Photo 10)

Discussion

The main areas of the roofs are in good condition. The perimeters of the built-up roofs require repair to prevent leaks and prolong the useful life of the roofs.

The edges of built-up roofs are very vulnerable to wear and water infiltration. The raised profile of the preformed edge metal requires the surface water to build up depth before it can flow over the top of the metal. This type of profile is often found on built-up roofs with gravel. The raised profile helps retain the gravel surface. The best solution to the present condition is to replace the metal edge. Replacing the edge is likely not feasible until the roof membrane is replaced. The membrane edge will require regular inspection and sealing unless it is replaced.

Long pipes expand and contract with temperature changes. It is a common practice to place protection pads under the pipe supports to protect the roof from localized wear. The pipes on these roofs are not very long. We documented no signs of wear at the pipe supports.

SEI Recommendations

Short Term: We recommend the following:

- Seal the failed pipe flashing.

- Remove the blisters and patch the areas.

- Inspect all base flashing for open seams and cracks and repair as needed.
• Add a splash pan under the rain water leader.

• Add protection pads under the blocks supporting pipes.

• Replace the metal edge or reseal all perimeter membrane edges of the built-up roofs. The repair option will require annual inspection and repair.

The estimated cost for the above-mentioned repairs is $20,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

Photo 1: Cracked base flashing.

Photo 2: Open base flashing.
Photo 3: Split at perimeter flashing.

Photo 4: Ponding stains and repairs along roof edge.
Photo 5: Repairs along roof edge.

Photo 6: Open pipe flashing.
Photo 7: Absence of splash pan under downspout.

Photo 8: Minimal sleepers for conduit.
Photo 9: Water damaged wood siding.

Photo 10: Cut off conduit at wall.
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WAREHOUSE

The Warehouse, built in 1980, is an engineered metal building by Soule Building Systems. It consists of warehouse and office parts. The walls and exterior walls have corrugated panels with exposed fasteners. It is not part of the Measure E Bond Program scope.

Leakage Information

DVC reported no leakage. Campus personnel stated that the gutter tend to fill with leaves.

SEI Observations

Alan Burnett of SEI observed the building interior and the roof on 12 October 2016. We did not access the roof, since there were no tie-off anchors. Our observations are summarized below.

Roof

- The corrugated roof panels are anchored to the steel frame with exposed screws with neoprene-clad washers (Photos 1 to 4).
- Some roof vents occur at the ridge.
- Sheet metal gutters with gutters mounted to the eaves provide drainage. Ponding stains and leaves are visible in the gutters (Photo 5). Downspouts empty onto the hardscape.
- There is impact damage to some roof panels (Photo 6).
- Surface corrosion is visible on some roof panel fasteners (Photo 7).

Exterior Walls

- Impact damage is visible to the base of the exterior wall panels and at some door jambs (Photos 8 to 11).
- Metal patches are applied to the wall at some locations (Photo 12).
Discussion

There is no reported leakage and the roof is in good condition. There is surface corrosion in the gutters indicating the presence of ponded water.

There is impact damage to the building walls and door jambs, from vehicles.

SEI Recommendations

Based on our observations, we recommend the following:

- **Short Term**: No roof repairs are recommended. We recommend performing periodic maintenance to the roof (e.g., gutter cleaning). For the exterior walls, the District should consider installing bollards and installing sheet angles at doors where vehicles enter the building, as protection form impacts.

- **Long Term**: None.
Photos

Photo 1: General view of warehouse.

Photo 2: General view of roof.
Photo 3: General view of roof.

Photo 4: General view of roof.
Photo 5: Gutter with leaves and ponding stains.

Photo 6: Deformed roof panel.
Photo 7: Surface corrosion to roof panel fastener.

Photo 8: Office portion of warehouse. Note impact damage to exterior wall.
Photo 9: Close-up of impact damage shown in Photo 8.

Photo 10: Impact damage to door jamb.
Photo 11: Impact damage to exterior wall panel.

Photo 12: Metal patches to exterior wall panel.
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STUDENT UNION

The Margaret Lesher Student Union, built in 1997, is a two-story building built on sloped terrain. It has built-up roof systems and exterior walls clad with exterior insulated finish system (EIFS). It is not part of the Measure E Bond Program scope.

Leakage Information

DVC personnel reported the following:

- There was a leak in Room 210, the work room. It has been repaired and it no longer active.

SEI Observations

Alan Burnett of SEI observed the building interior and the roof on 29 September 2016. The building has three roof areas, the middle roof area is higher than the adjoining two areas and contains most of the roof-mounted equipment. Our observations are summarized below.

Roof

- The three roof areas have built-up roof systems with aggregate surfacing and mineral-surfaced cap sheet flashing at base, perimeter, and drain flashings (Photos 1 to 4).

- Roof and overflow drains in sumps provide drainage for the lower roofs (Photo 5). Scuppers and downspouts provide drainage for the upper roof (Photo 6).

- Blisters and ridges occur in the perimeter flashing of the lower roofs (Photos 7 to 10).

- The cap sheet of the lower roof perimeter flashing is crazed (Photo 11).

- Open pipe flashing (Photo 12).

- Leaf accumulation on lower small roof (Photo 13).

- Absence of counterflashing at base flashing of wall (Photo 14).

- Corroded downspout/scupper (Photo 15).
- Corroded mechanical unit, ducts and steel frame over Room 210 (Photos 16 to 20).
- Abandoned conduit are sealed with roofing cement (Photo 21).
- Penetrations through the EIFS wall have sealant joints (Photo 22).

**Interior**

- The ceiling tiles are waterstained in Room 210 (Photos 23 and 24). This is over a roof-mounted mechanical unit that has corrosion to the unit and some duct joints (Photos 16 to 20).

**Discussion**

The building is nineteen years old and the roof appears to be original. The one reported leak appears related to the mechanical unit penetration or deterioration of the mechanical system (e.g., corrode duct joints and corroded unit). The roof shows signs of deterioration as indicated by blisters and crazed cap sheet. We estimate the roof has about 5 years of remaining service life, provided repairs are performed.

If the District is planning to replace the roof-mounted mechanical systems in the near future, we recommend the roof be replaced in conjunction. If no mechanical work in the near future, the District should plan to replace the roofs in 5 years.

**SEI Recommendations**

Based on our observations, we recommend the following:

- **Short Term**: Repair blisters, apply coating to perimeter flashings and base flashings, repair pipe flashings.

- **Long Term**: Evaluate the roof performance in five years. If not adequate, replace the roof in 5 years. If the existing mechanical system will be repaired, replace the roof simultaneously.

The estimated cost for the above-mentioned repairs is $35,000 (2016 dollars) and the roof replacement is $240,000. The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

Photo 1: General view of Student Union roof.

Photo 2: General view of Student Union roof.
Photo 3: General view of Student Union roof.

Photo 4: General view of Student Union upper roof.
Photo 5: Typical roof and overflow drains for lower roofs.

Photo 6: Scupper and downspout of upper roof.
Photo 7: Blister in perimeter flashing.

Photo 8: Blister in perimeter flashing.
Photo 9: Ridge in perimeter flashing of lower roof.

Photo 10: Ridge in perimeter flashing of lower roof.
**Photo 11:** Crazed cap sheet of perimeter flashing.

**Photo 12:** Open pipe flashing.
Photo 13: Leaves on lower small roof.

Photo 14: Absence of counterflashing at wall.
Photo 15: Corroded downspout/scupper.

Photo 16: General view of HVAC system above Room 210.
Photo 17: Corroded mechanical unit above Room 210.

Photo 18: Close-up of corroded mechanical unit.
Photo 19: Corroded ducts over Room 210.

Photo 20: Corroded steel frame over Room 210.
Photo 21: Abandoned conduit sealed with roofing cement.

Photo 22: Sealed penetrations through EIFS.
Photo 23: General view of Room 210.

Photo 24: Waterstained ceiling tile in Room 210.
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MATH

The Math Building, built in 1998, is a two-story building with built-up roof systems. The walls are clad with a combination of wood siding and cement plaster. It is not part of the Measure E Bond Program scope.

Leakage Information

DVC reported no leakage. In the past, one roof-mounted fan was blown off its curb resulting in a leak. This was repaired.

SEI Observations

Tim Spotts and Alan Burnett of SEI observed the building interior and the roof on 26 September 2016. Our observations are summarized below.

Roof

- The built-up roof has aggregate surfacing and mineral-surfaced cap sheet flashing at base and drain flashings (Photos 1 to 3).
- Roof and overflow drains in sumps provide drainage (Photos 4 to 6).
- There are roof-mounted HVAC units set on prefabricated curbs and smaller HVAC units set on curbs (Photos 7 and 8).
- Parapets with set metal caps occur at the roof perimeter.
- Blisters and partially open base flashing laps are visible (Photos 9 to 12).
- Cap sheet flashings are crazed at most locations (Photos 14 and 15).
- One open pipe flashing (Photo 16).
- Deteriorated insulation jacketing (Photos 17 and 18).
ROOF ASSESSMENT - TWENTY-FIVE BUILDINGS
DIABLO VALLEY COLLEGE, PLEASANT HILL, CALIFORNIA
DRAFT – FOR CLIENT REVIEW

- Curbs without equipment and abandoned conduit (Photos 19 and 20).
- Some corrosion of sheet metal of HVAC units (Photos 21).

Discussion

The building is eighteen years old and the roof appears to be original. There are no reported leaks, except for one related to a vent cap being blown off. The roof has about 5 years of remaining service life, provided repairs are performed.

If the District is planning to replace the roof-mounted mechanical systems, we recommend the roof be replaced in conjunction. If not mechanical work in the near future, the District should plan to replace the roofs in 5 years.

SEI Recommendations

Based on our observations, we recommend the following:

- **Short Term:**
  - Repair blisters and dry laps in base flashings.
  - Apply reflective coating on base flashings and parapet walls.
  - Repair open pipe flashings.
  - Repair deteriorated insulation jacketing at water pipes.

  The estimated cost for the above-mentioned repairs is $25,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.

- **Long Term:** Evaluate the roof performance in five years. If not adequate, replace the roof in 5 years. Assuming the following scope of work: Remove the existing built-up roofs (abate as required), repair roof deck as required, install new built-up of single-ply roof system.
Photos

Photo 1: General view of Math Building roof.
Photo 2: General view of Math Building roof.
**Photo 3:** General view of Math Building roof.

**Photo 4:** Typical roof and overflow drain.
Photo 5: Roof area without overflow drain.

Photo 6: Condensate drain.
Photo 7: Typical large HVAC unit.

Photo 8: Typical small HVAC unit on curbs.
Photo 9: Blisters in base flashing.

Photo 10: Blisters in base flashing.
Photo 11: Open base flashing.

Photo 12: Open base flashing.
Photo 13: Roofing cement repairs to base flashing.

Photo 14: Crazed base flashing and open lap.
Photo 15: Crazed base flashing.

Photo 16: Open conduit flashing.
Photo 17: Deteriorated insulation jacketing.

Photo 18: Deteriorated insulation jacketing.
Photo 19: Curbs without unit.

Photo 20: Abandoned penetrations.
Photo 21: Corrosion to GSM flashing at HVAC unit.

Photo 22: Delaminated paint on top of large HVAC unit.
The Physical Science, South Building, built in 2000, is a two-story plus basement. The building roof is spread on two levels: main/upper and lower. A built-up roofing with gravel is on both levels. The exterior walls are clad with wood siding. The building is not included in the Measure E Bond Program scope.

### Leakage Information

DVC personnel reported the following:

- Leaks at ends and at midsection of the building.

### SEI Observations

Mark Melamed of SEI observed the building roof on 11 October 2016. No exploratory, destructive roof probing was performed. Our observations are summarized below.

#### Roof

- The building has three roof areas: two upper and lower. Both roof areas have low-sloped built-up roof systems with gravel (Photos 1 to 6).

- Gutters emptying into three downspouts provide drainage for both roofs (Photo 12).

- There are one large HVAC unit on platform (Photo 1) and small mechanical unit on curbs. A wood-clad equipment screen is installed around the unit. Ducts penetrate the roof.

- There is a gap between the screen wall and the sheet metal counterflashing termination at the southwest corner (Photos 8 and 9).

- There is crazing of the mineral-surfaced cap sheet base flashings at the equipment platform and curbs (Photos 16 to 19).

- There is a narrow gap (about 3 feet wide) between the two upper roof areas (Photo 14). A temporary stair connects the two upper roofs (Photo 13).

- There is a small turret-like structure with a built-up roof (Photo 15).
Interior

- Since there was no access to the interiors due to classes, we did not observe interior.

Discussion

There are reported roof leaks. We could not access the interiors to correlate the leaks to the observed conditions. Roof appears original, making it 16 years old. The roof is in average condition. Conditions that should be repaired include crazed base flashing and gaps between the screen wall counterflashing and roofing. Crazed base flashing is a sign of deterioration from solar exposure. The observed gaps may be the cause of the leakage at the west end of the building.

The estimated roofing remaining life is about 5 to 7 years.

SEI Recommendations

We recommend the following repair measures:

**Main – Upper Roof**

Apply waterproofing coating on the base flashing of all roof top supporting platforms and curbs. Add a new GSM termination piece at main roof termination at screen wall with its proper integration with the existing wall waterproofing, using SASM and liquid Bituthene membrane. As a precaution, apply sealant at the north-western corner of turret’s wall/roof transition at existing base counter flashing piece to seal any potential water entry (Photo 7).

**Lower roof.**

As a precaution, apply waterproofing coating on the base flashing, along the length of turret’s wall/roof transition.

The estimated cost for the above-mentioned repairs is $25,000 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

*Photo 1:* General view of main roof.

*Photo 2:* General view of main roof.
Photo 3: General view of main roof.

Photo 4: General view of lower roof.
Photo 5: General view of lower roof and view of turret’s south elevation. Main roof is to the left of red colored wall.

Photo 6: General view of lower roof.
Photo 7: Turret: Gap between termination of counter flashing at base of wall corner.

Photo 8: Screen wall – west face.
Photo 9: Close-up screen wall – west face at roof edge, showing gap at counterflashing termination.

Photo 10: General view on large HVAC unit.
Photo 11: Large HVAC unit and small mechanical unit next to it with ducts penetrating roof.

Photo 12: Gutter along northern edge of main roof.
Photo 13: Temporary looking stair between roofs on north and south physical science building.

Photo 14: Narrow gap between roofs of north and south physical science building.
Photo 15: Small eyebrow roof with no roofing on north side of turret.

Photo 16: Crazed and patched base flashing at fan supporting curb.
Photo 17: Crazed and patched base flashing at curb supporting pipe penetration.

Photo 18: Crazed base flashing at roof hatch curb.
Photo 19: Crazed base flashing at platform supporting large HVAC unit.
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BUSINESS & FOREIGN LANGUAGE

The Business and Foreign Language Building, built in 2002, is a two-story building with a detached single-story Community Conference Center. Both buildings have built-up roof systems with aggregate surfacing. The exterior walls are clad with a stone veneer. There is no scope in the Measure E Bond Program.

Leakage Information

DVC personnel reported the following:

- There are no roof leaks.
- There have been leaks related to the west-facing exterior walls. The District had a study of the wall leakage performed (copy not available for our review).

SEI Observations

Tim Spotts of SEI observed the roof on 28 September 2016. Our observations are summarized below.

Roof

- Both buildings have built-up roof systems with aggregate surfacing (Photos 1 to 4). The measured roof slope is 1-1/2 in. per foot.

- The raised perimeter curbs are covered with a granulated cap sheet flashings (Photo 5). The cap sheet terminates over the edge metal flashing. The cap sheet is not well sealed and is crazed (Photo 5 and 6).

- There are localized bare spots on the roof (Photo 7).

- The roof has pipe penetrations that are poorly sealed. (Photo 8). The insulation jackets are deteriorated at some insulated water lines (Photos 8 and 9).

Interior

- Since there were no reported roof leaks, we did not observe the interior.

Miscellaneous
Some duct joint seals are deteriorated and others are corroded (Photos 10 and 11)

The exterior electrical outlet of a mechanical unit does not have a cover. (Photo 12).

Discussion

The roofs appear to be original and are in good condition. Since the building is fourteen-years old, the roof warranty may still be in force. There are some age-related conditions that should be repaired as preventative maintenance. These items include the perimeter flashing and roof penetration seals. This will mitigate premature failure and to prolong the roof service life.

The ducts are showing signs of deterioration as indicated by the deteriorated seal at joints and corrosion. We understand the exterior outlet cover will be replaced by the time this report is submitted.

SEI Recommendations

Short Term: We recommend the following roof repairs:

- Seal the exposed cap sheet edge at the roof perimeter.
- Install a coating over the cap sheet covering the perimeter curbs.
- Inspect all pipe and conduit penetrations and seal, as necessary.
- Repair bare spot in roof.

Non-Roof Related Items

- Repair duct seals and treat corrosion.

The estimated cost for the above-mentioned repairs is $12,500 (2016 dollars). The estimate assumes the project will be bid in a normal bidding climate. If the repairs are performed later, further aging of the roof may expand the repair scope.
Photos

**Photo 1:** General view of Business/Foreign Language roof.

**Photo 2:** General view of Business/Foreign Language roof.
Photo 3: General view of Business/Foreign Language roof.

Photo 4: General view of Community Conference Center roof.
Photo 5: Typical raised perimeter curb. Note crazing.

Photo 6: Close-up of crazing.
Photo 7: Bare spot on roof.

Photo 8: Inadequate sealant at conduits and pipes. Note deteriorated insulation.
Photo 9: Deteriorated insulation jacket.

Photo 10: Deteriorated duct seal.
Photo 11: Corrosion of roof-mounted ducts.

Photo 12: Electrical outlet without cover.
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BOOKSTORE

The bookstore, built in 2006, is a two-story building with a single-ply roof. The exterior walls are clad with a combination of brick veneer and cement plaster. The building is not part of the Measure E Bond Program scope.

Leakage Information

DVC reported no leakage.

SEI Observations

Alan Burnett of SEI observed the building interior and the roof on 4 October 2016. Our observations are summarized below.

Roof

- The roof system is a polyvinyl chloride (PVC) by Sarnafil (Photos 1 to 3).
- Roof drains and overflow drains provide drainage (Photo 4). There are ponding stains at some roof drains.
- There is metal sided parapet around the roof perimeter (Photo 6). There is asphalt residue along the base of the metal siding at numerous locations (Photos 7 to 9).

Interior

- No leakage observed.

Discussion

The roof is original and is ten years old. It is probably under warranty and is in good condition. The observed ponding stains and ponded water is probably due to drain collar height. It does not affect the warranty.

The roof sides of the parapets are clad with metal siding. There is a weather resistant barrier behind the siding. Asphalt residue is visible at the base of the siding at numerous locations. This could be from a
modified asphalt-based self-adhering sheet flashing melting. Sheet metal will get hot on warm and hot
days. If the underlying membrane is high temperature resistant, it will melt and run down the wall and
exit at the base of the metal cladding. This will result in a degraded weather resistant barrier and the
residue can block parapet wall drainage.

SEI Recommendations

We recommend that periodic maintenance be performed.

For the parapet walls, recommend removing a section of metal cladding to observe the underlying
construction. Once observed, a repair concept can be developed.
Photos

Photo 1: General view of single-ply roof.
Photo 2: General view of single-ply roof.
Photo 3: General view of single-ply roof.

Photo 4: Typical roof and overflow drains. Note ponding stains.
Photo 5: Typical roof and overflow drains. Note ponding stains.

Photo 6: Typical parapet.
Photo 7: Typical parapet. Note asphalt residue.

Photo 8: Close-up of asphalt residue shown in Photo 7.
Photo 9: Asphalt residue at parapet.
PLANETARIUM

The Planetarium, built in 1958, consists of a dome set on top of a single-story building. The building has a combination of 16-ounce copper and single-ply roofs. The exterior walls are clad with cement plaster. The surrounding podium roof around the Planetarium is a traffic coating over a concrete deck. The building is not part of the Measure E Bond Program scope.

Leakage Information

DVC reported the following:

-Leaks occur on the projection screen directly under the copper-clad dome during rains.
-Water on the concrete podium runs under one of the entry doors. DVC personnel thought the podium drains are too small. Leaks also occur in Room PL-101 under this area.

SEI Observations

Alan Burnett of SEI observed the building interior and the roof on 20 and 29 September 2016. We did not access the roof, since there were no tie-off anchors. Our observations are summarized below.

Roof

- The roof consists of a copper dome and single-ply membrane at the low-slope portion of the roof (Photos 1 to 4). There is a parapet curb cap. Drainage is provided by one roof drain that is connected to the storm sewer (Photo 5).

- The copper roof has locked seams (Photo 4). There are roofing cement repairs to the copper joints at the top of the dome (Photo 2).

Interior

- Waterstains are visible on the projection screen directly under the dome (Photos 6 to 9).

Miscellaneous

- Entry doors have metal thresholds (Photos 10 to 12).

Discussion
The reported leakage is directly above the copper-clad dome. The original drawings show that the top four joints of the dome are to be soldered. Over time, the soldered joint will degrade due to thermal movement. There is minimal roof slope at the top of the dome, water can build up at joints and enter water to enter through compromised joints. Roofing cement repairs performed on these joints indicate a history of leakage.

The traffic coating is in good condition. Typically, traffic coatings require recoating every 3 to 7 years, depending upon exposure and foot traffic. There is flooding problems at the south-facing entry door that appears related to water run-off and inadequate slope in front of the door.

SEI Recommendations

We recommend the following:

- **Short Term**: Perform repairs to the top of the dome to prevent leakage through the copper joints. Neoprene strips can be used to seal these joints. The existing roofing cement repairs need to be removed and the substrate cleaned. This would be a short-term repair and will require maintenance/recoating. The cost estimate for the repair is $_________ (Source: Graham Prewitt Proposal of ___ November 2016).

- **Long Term**: If the short-term repair maintenance is not practical, remove and replace the dome roof. The new roof can be either standing seam metal or a single-ply roof that mimics copper roof. The engineering cost estimate for roof replacement is $100,000 (single-ply option).
Photos

Photo 1: General view of planetarium.

Photo 2: Copper dome of planetarium. Note repairs at top of dome.
Photo 3: Planetarium copper and single-ply roofs.

Photo 4: Close-up of planetarium copper roof.
Photo 5: Planetarium roof drain pipe connected to sewer.

Photo 6: General view of planetarium projection screen.
Photo 7: Waterstains on projection screen.

Photo 8: Waterstains on projection screen.
Photo 9: Underside of planetarium dome.

Photo 10: Entry door with report leakage at threshold.
Photo 11: Close-up of door threshold shown in Photo 10.

Photo 12: Close-up of door threshold shown in Photo 10.