



UNIVERSITY OF
ARKANSAS

Engineering Research Center (ENRC)

Roof Replacement Plan

May 7, 2019

SCM
ARCHITECTS PLLC

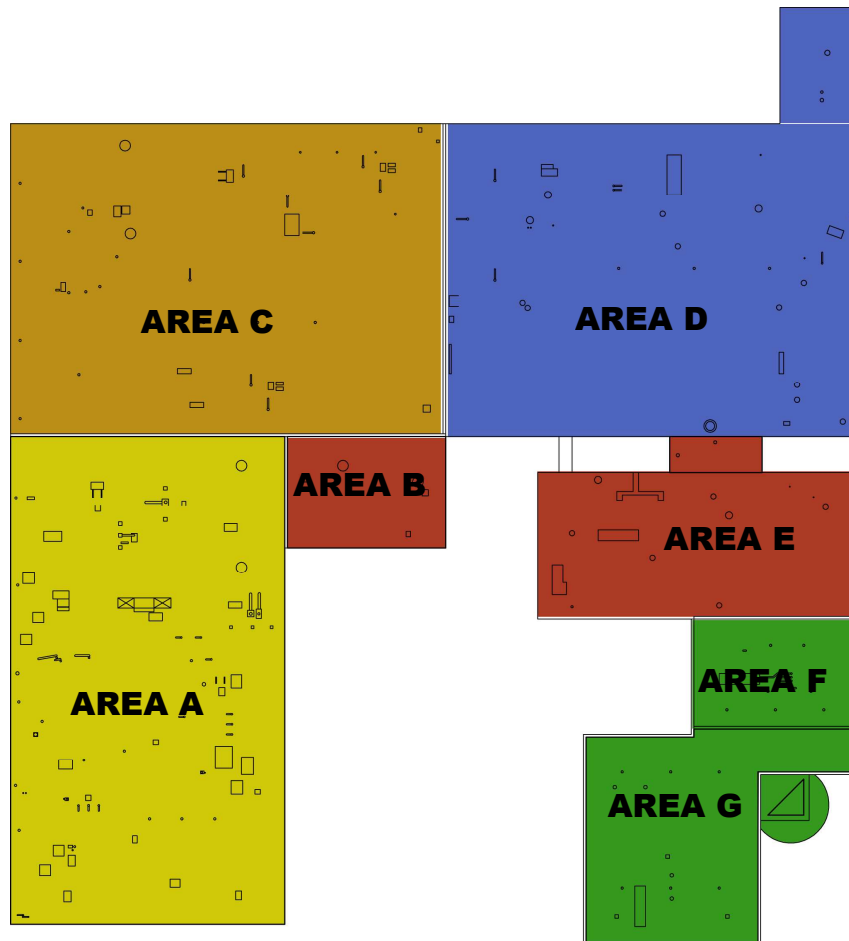
UNIVERSITY OF ARKANSAS ENGINEERING RESEARCH CENTER (ENRC) ROOF REPLACEMENT PLAN

Executive Summary

We have reviewed the roofs on the Engineering Research Center's (ENRC) various wings. The center consists of a metal roof deck with polyisocyanurate insulation (tapered), a modified bitumen roof membrane, a cover board and a second granulated surface modified roof membrane.







We have performed a thermal imaging analysis to identify various locations of potential water intrusion. Identified areas shown on the thermal images herein were cored to examine the actual roof condition. At several locations the roof presented water intrusion under the outer second roof but not under the original roof, at other locations water was found under both roof membranes (see attached for locations).

Roof appears to be at the end of its life and has been repaired several times in various areas. Re-coating the roof could extend some areas of the roof but due to water being present in various locations it is recommended to replace the roof in a phased approach, salvaging as much of the original roof and insulation as possible. Areas that need to be replaced immediately have been identified in Phase I.



Engineering Research Center (ENRC) Roof Plan
Not To Scale

NOT FOR CONSTRUCTION

PHASE LEGEND	
	Phase I
	Phase II
	Phase III
	Phase IV
	Phase V
	Area known or believed to include wet insulation

PHASE III: \$ 603,128
(Includes 10% Contingency and 9% JOC Fee)

Area C (Partial) - \$503,027

PHASE II: \$ 607,940
(Includes 10% Contingency and 9% JOC Fee)

Area A (Partial) - \$ 248,240
Area G - \$258,799

PHASE I: \$ 639,361
(Includes 10% Contingency and 9% JOC Fee)

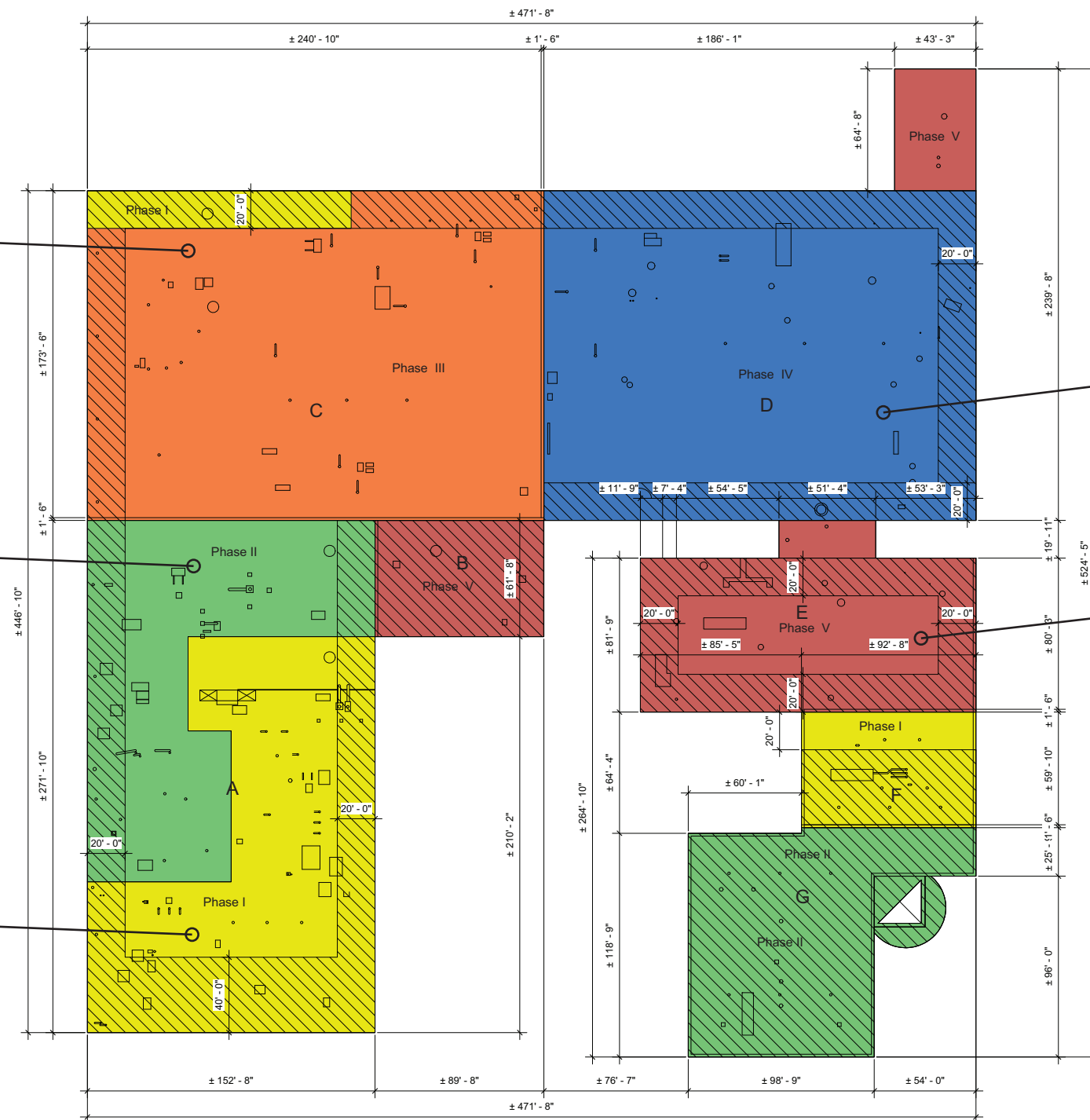
Area A (Partial) - \$348,727
Area C (Partial) - \$ 66,500
Area F - \$118,018

PHASE IV: \$ 699,881
(Includes 10% Contingency and 9% JOC Fee)

Area D (Partial) - \$583,721

PHASE V: \$ 588,888
(Includes 10% Contingency and 9% JOC Fee)

Area B - \$103,284
Area D (Partial) - \$ 53,143
Area E - \$334,722



TOTAL SQUARE FOOTAGE = 165,839 SF

5F ROOF REPLACEMENT - PHASING PLAN
1" = 40'-0"

**ENRC ROOF RENOVATION
UNIVERSITY OF ARKANSAS**

REVISIONS:

PROJECT NO.
19030
DATE:
APRIL, 19 2019

ROOF PLAN

A1.01

PROPOSED PHASED SCOPE OF WORK

PHASE I (SEE PLAN ON FOLLOWING PAGE)

AREA A (PARTIAL):

1. HATCHED AREA (10,309 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW TAPERED POLYISOCYANRATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **10,309 x \$19/SF = \$195,871**

2. SHADED AREA (11,838 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; CONSULT ARCHITECT WHERE FOUND. AREA ASSUMED TO BE DRY BASED ON ROOF CORE SAMPLING. **12,738 x \$12/SF = \$152,856**

PROVIDE NEW PROTECTION BOARD AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS.

AREA C (PARTIAL):

1. HATCHED AREA (3,500 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW TAPERED POLYISOCYANRATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **3,500 x \$19/SF = \$66,500**

AREA F:

1. HATCHED AREA (5,362 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW TAPERED POLYISOCYANRATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **5,362 x \$19/SF = \$101,878**

2. SHADED AREA (1,345 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; CONSULT ARCHITECT WHERE FOUND. AREA ASSUMED TO BE DRY BASED ON ROOF CORE SAMPLING. **1,345 x \$12/SF = \$16,140**

PROVIDE NEW PROTECTION BOARD AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS.

PHASE I Estimate: \$639,361 (Incl. JOC Fee and 10% Contingency)



Engineering Research Center (ENRC) Roof Plan
PHASE I
Not To Scale

PHASE II (SEE PLAN ON FOLLOWING PAGE)

AREA A (PARTIAL):

1. HATCHED AREA (3,836 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW TAPERED POLYISOCYANRATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **3,836 x \$19/SF = \$72,884**

2. SHADED AREA (15,513 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; CONSULT ARCHITECT WHERE FOUND. AREA ASSUMED TO BE DRY BASED ON ROOF CORE SAMPLING. **14,613 x \$12/SF = \$175,356**

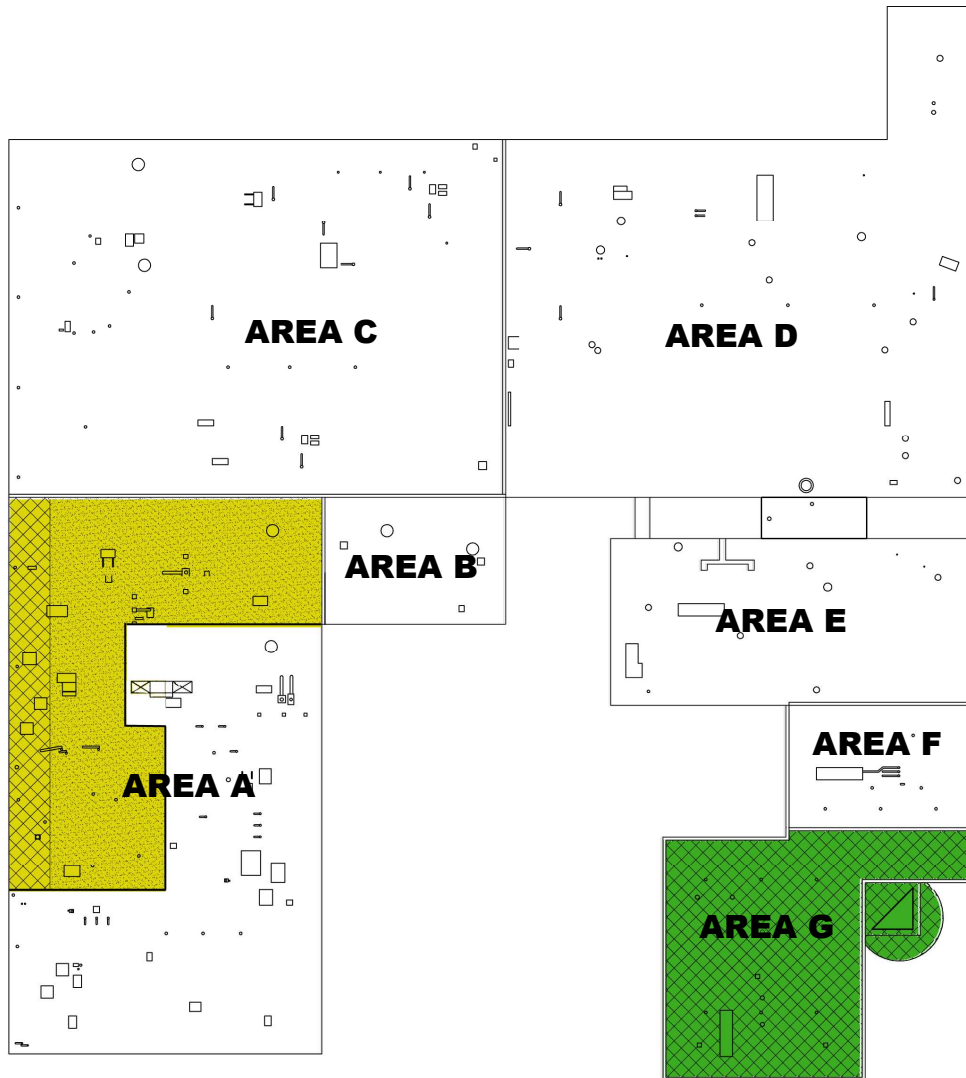
PROVIDE NEW PROTECTION BOARD AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS.

AREA G:

1. HATCHED AREA (13,621 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW POLYISOCYANRATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **13,621 x \$19/SF = \$258,799**

PHASE II Estimate: \$607,940 (Incl. JOC Fee and 10% Contingency)



Engineering Research Center (ENRC) Roof Plan
PHASE II
Not To Scale

PHASE III (SEE PLAN BELOW)

AREA C (PARTIAL):

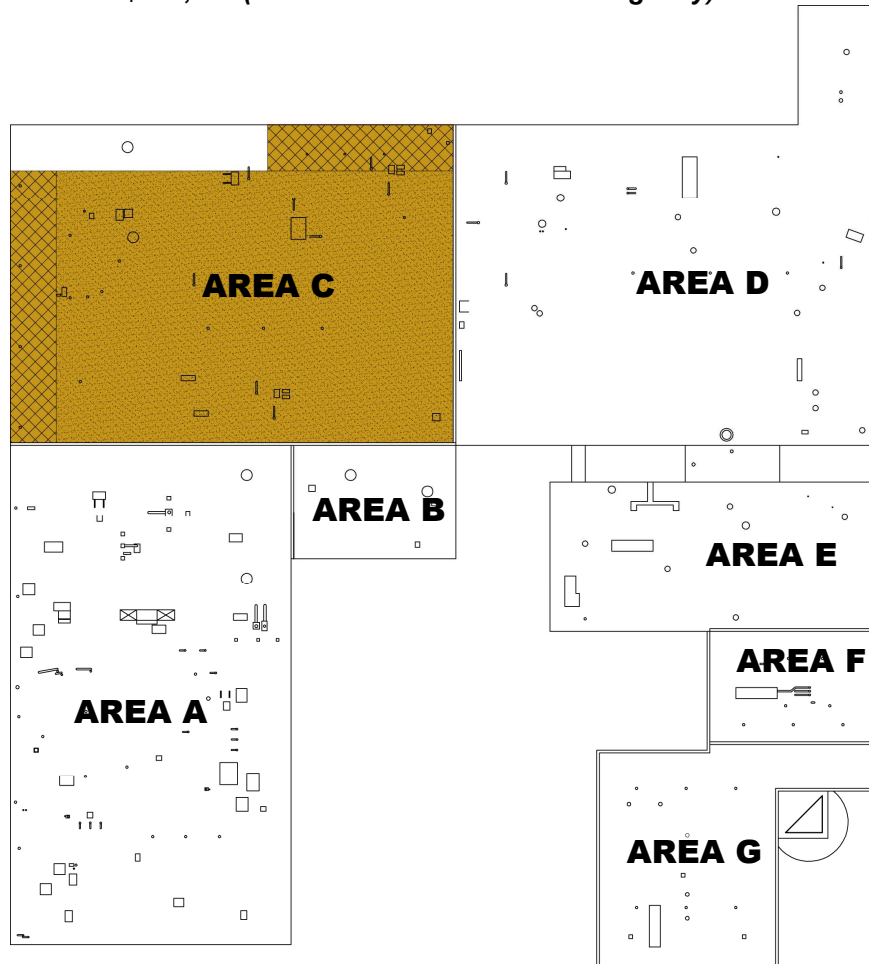
3. HATCHED AREA (6,233 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW TAPERED POLYISOCYANURATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **6,233 x \$19/SF = \$118,427**

4. SHADED AREA (32,050 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; CONSULT ARCHITECT WHERE FOUND. AREA ASSUMED TO BE DRY BASED ON ROOF CORE SAMPLING. **32,050 x \$12/SF = \$384,600**

PROVIDE NEW PROTECTION BOARD AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS.

PHASE III Estimate: \$603,128 (Incl. JOC Fee and 10% Contingency)



**Engineering Research Center (ENRC) Roof Plan
PHASE III
Not To Scale**

PHASE IV (SEE PLAN BELOW)

AREA D (PARTIAL):

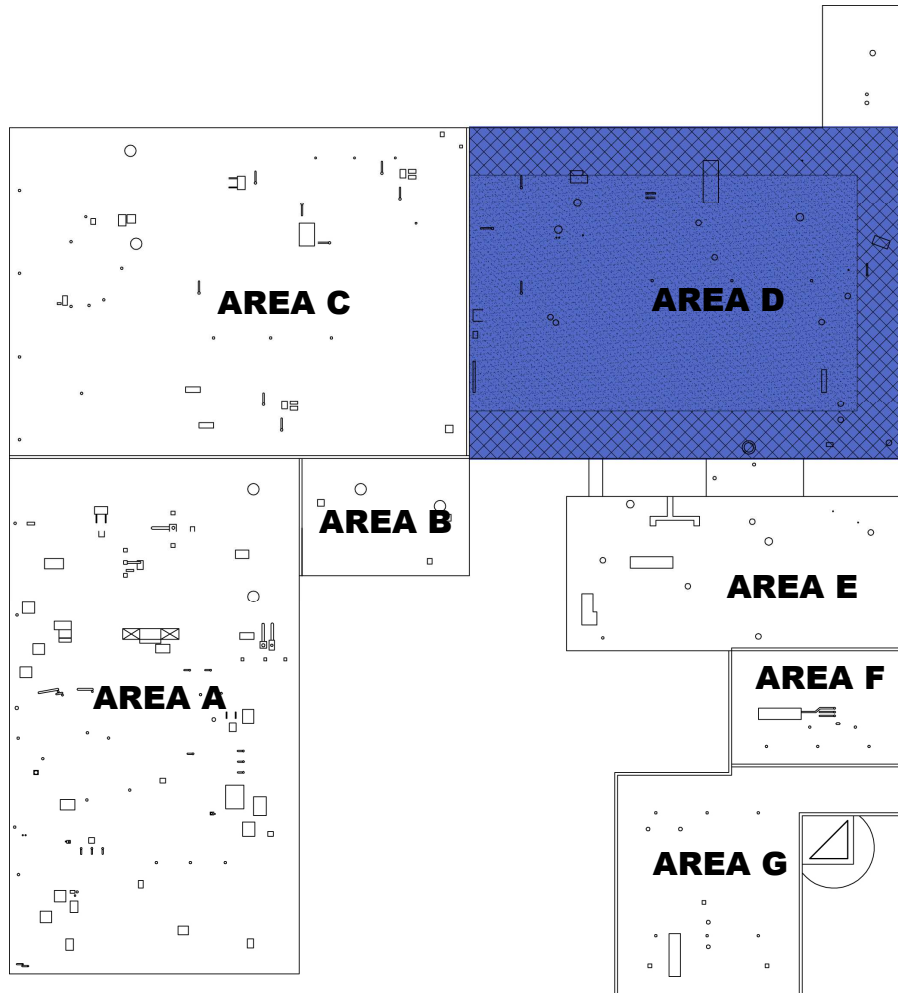
5. HATCHED AREA (14,591 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW TAPERED POLYISOCYANURATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **14,591 x \$19/SF = \$277,229**

6. SHADED AREA (25,541 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; CONSULT ARCHITECT WHERE FOUND. AREA ASSUMED TO BE DRY BASED ON ROOF CORE SAMPLING. **25,541 x \$12/SF = \$306,492**

PROVIDE NEW PROTECTION BOARD AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS.

PHASE IV Estimate: \$699,881 (Incl. JOC Fee and 10% Contingency)



PHASE V (SEE PLAN ON FOLLOWING PAGE)

AREA B:

1. HATCHED AREA (5,436 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW POLYISOCYANURATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **5,436 x \$19/SF = \$103,284**

AREA D (PARTIAL):

2. HATCHED AREA (2,797 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW TAPERED POLYISOCYANURATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **2,797 x \$19/SF = \$53,143**

AREA E:

1. HATCHED AREA (15,198 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; WHERE FOUND REMOVE EXISTING INNER (1ST) MODIFIED BITUMEN ROOF AND POLYISOCYANURATE INSULATION DOWN TO METAL DECK. AREA ASSUMED TO HAVE WATER INTRUSION BASED ON ROOF CORE SAMPLING.

PROVIDE NEW POLYISOCYANURATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **15,198 x \$19/SF = \$288,762**

2. SHADED AREA (3,830 SF): REMOVE EXISTING OUTER (2ND ROOF) MODIFIED BITUMEN ROOF MEMBRANE AND FIBER PROTECTION BOARD AND INSPECT FOR WATER INTRUSION; CONSULT ARCHITECT WHERE FOUND. AREA ASSUMED TO BE DRY BASED ON ROOF CORE SAMPLING.

PROVIDE NEW POLYISOCYANURATE ROOF INSULATION AND FLEECEBACK TPO ROOF MEMBRANE. MEMBRANE TO MEET VERY SEVERE HAIL (VSH) FM GLOBAL APPROVALS. **3,830 x \$12/SF = \$45,960**

PHASE V Estimate: \$588,888 (Incl. JOC Fee and 10% Contingency)



Engineering Research Center (ENRC) Roof Plan
PHASE V
Not To Scale

● ROOF CORE LOCATIONS

AREA A
SOUTH END AERIAL IMAGERY

AREA A



● DRY
(COVER BOARD
CRUMBLED BUT NOT
WET PRESENTLY)

● WET
(WET BELOW TOP
MEMBRANE, DRY BELOW
1ST ROOF LAYER)

● WET
(WET BELOW TOP
MEMBRANE, WET BELOW
1ST ROOF LAYER)

● WET
(WET BELOW TOP
MEMBRANE, DRY BELOW
1ST ROOF LAYER)

● WET
(WET BELOW TOP
MEMBRANE, DRY BELOW
1ST ROOF LAYER)

● DRY
(COVER BOARD
CRUMBLED BUT NOT
WET PRESENTLY)

40'

ARROWS SHOW POTENTIAL
WET LOCATIONS

AREA A
SOUTH END THERMAL IMAGERY

AREA A



PHASE I



● ROOF CORE LOCATIONS

AREA C
WEST END AERIAL IMAGERY

WET
(WET BELOW TOP MEMBRANE, DRY BELOW 1ST ROOF LAYER)

AREA C

PHASE I

ARROWS SHOW POTENTIAL
WET LOCATIONS

AREA C
WEST SIDE THERMAL IMAGERY



AREA C

PHASE I

● ROOF CORE LOCATIONS

AREA F
WEST END AERIAL IMAGERY

(WET BELOW TOP
MEMBRANE, WET BELOW
1ST ROOF LAYER)

WET

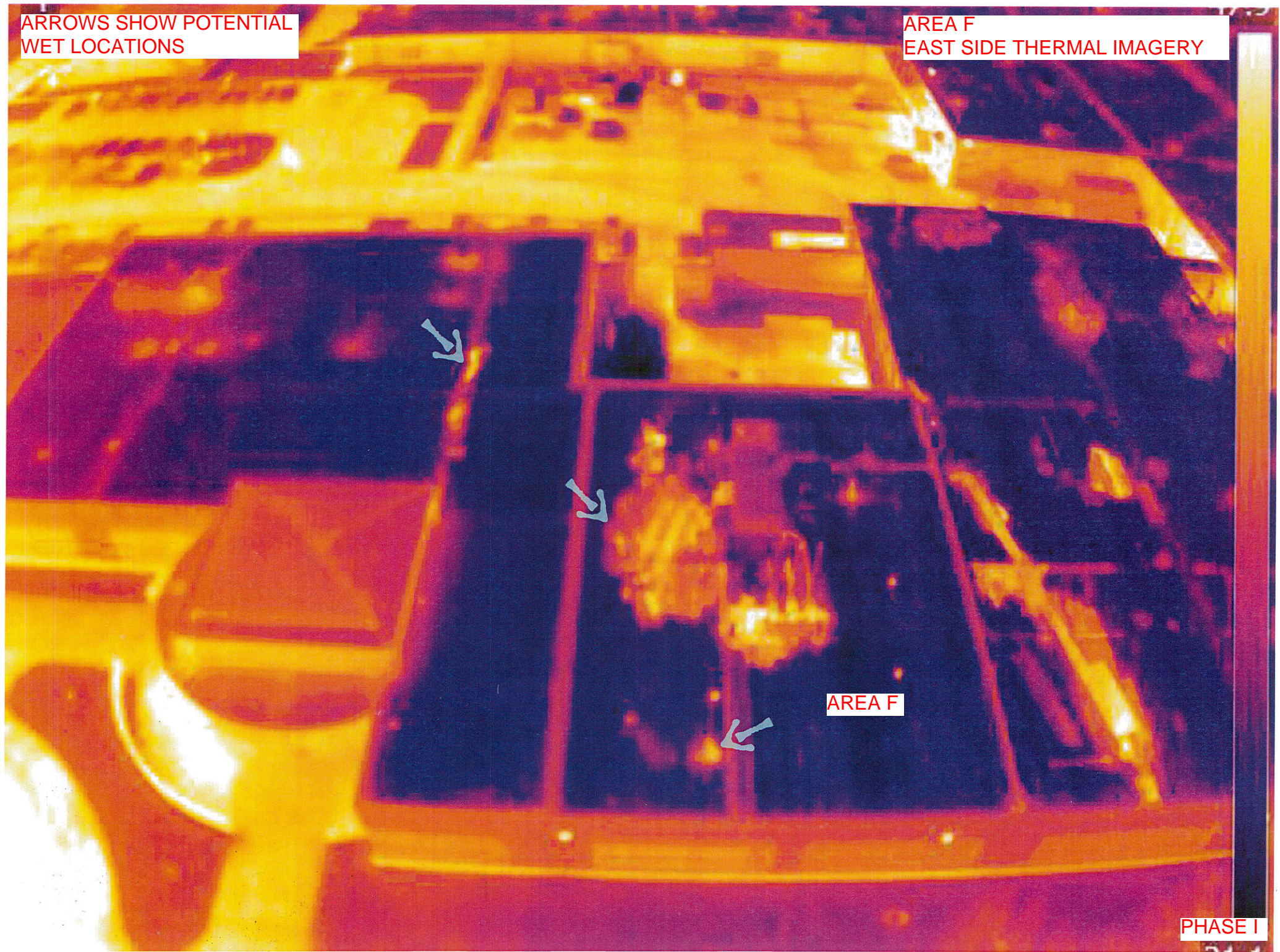
AREA F



PHASE I

ARROWS SHOW POTENTIAL
WET LOCATIONS

AREA F
EAST SIDE THERMAL IMAGERY



AREA F

PHASE I

● ROOF CORE LOCATIONS

AREA A
SOUTH END AERIAL IMAGERY



(COVER BOARD
CRUMBLD BUT NOT
WET PRESENTLY)

● DRY

(WET BELOW TOP MEMBRANE,
DRY BELOW 1ST ROOF LAYER)

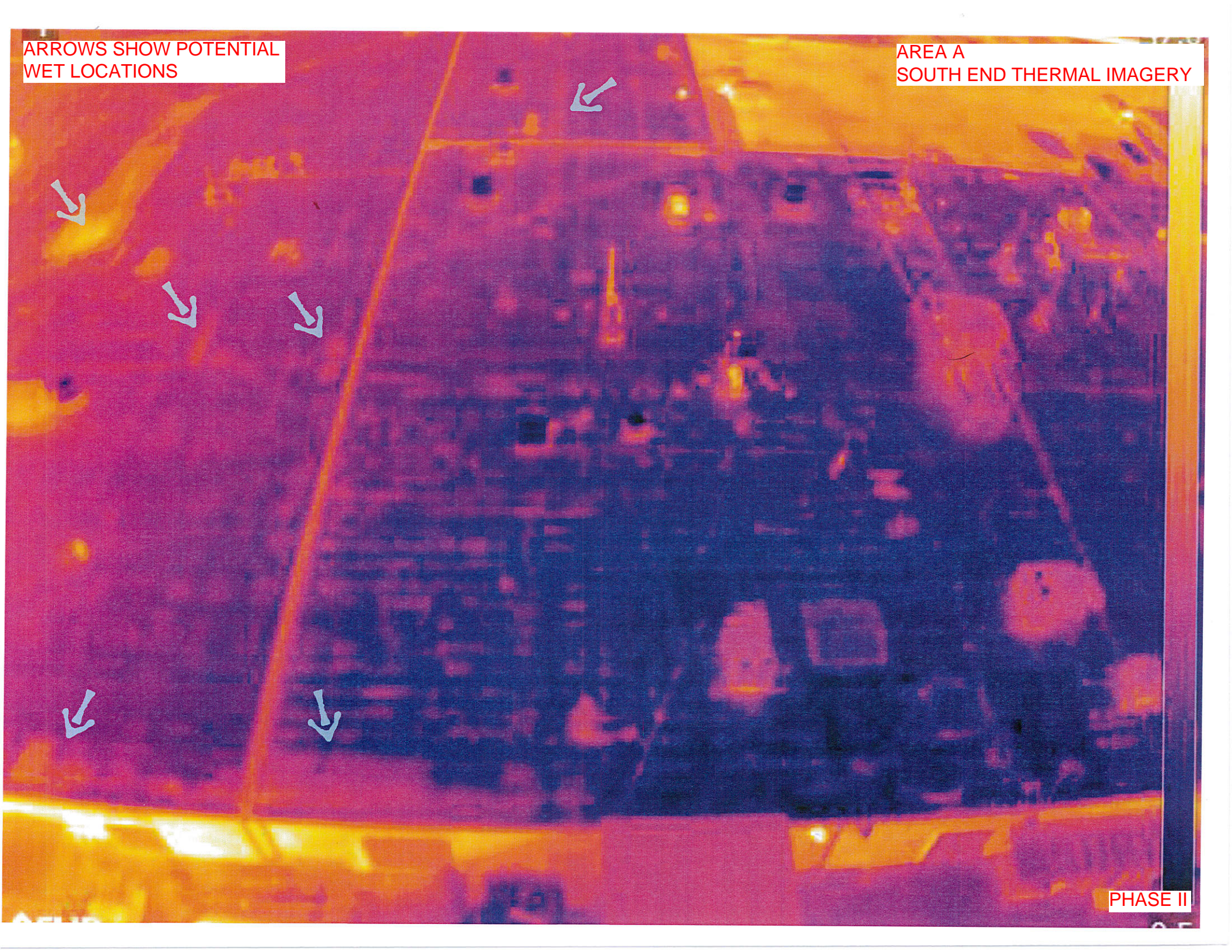
● WET

● DRY

(COVER BOARD
CRUMBLD BUT NOT
WET PRESENTLY)

ARROWS SHOW POTENTIAL
WET LOCATIONS

AREA A
SOUTH END THERMAL IMAGERY



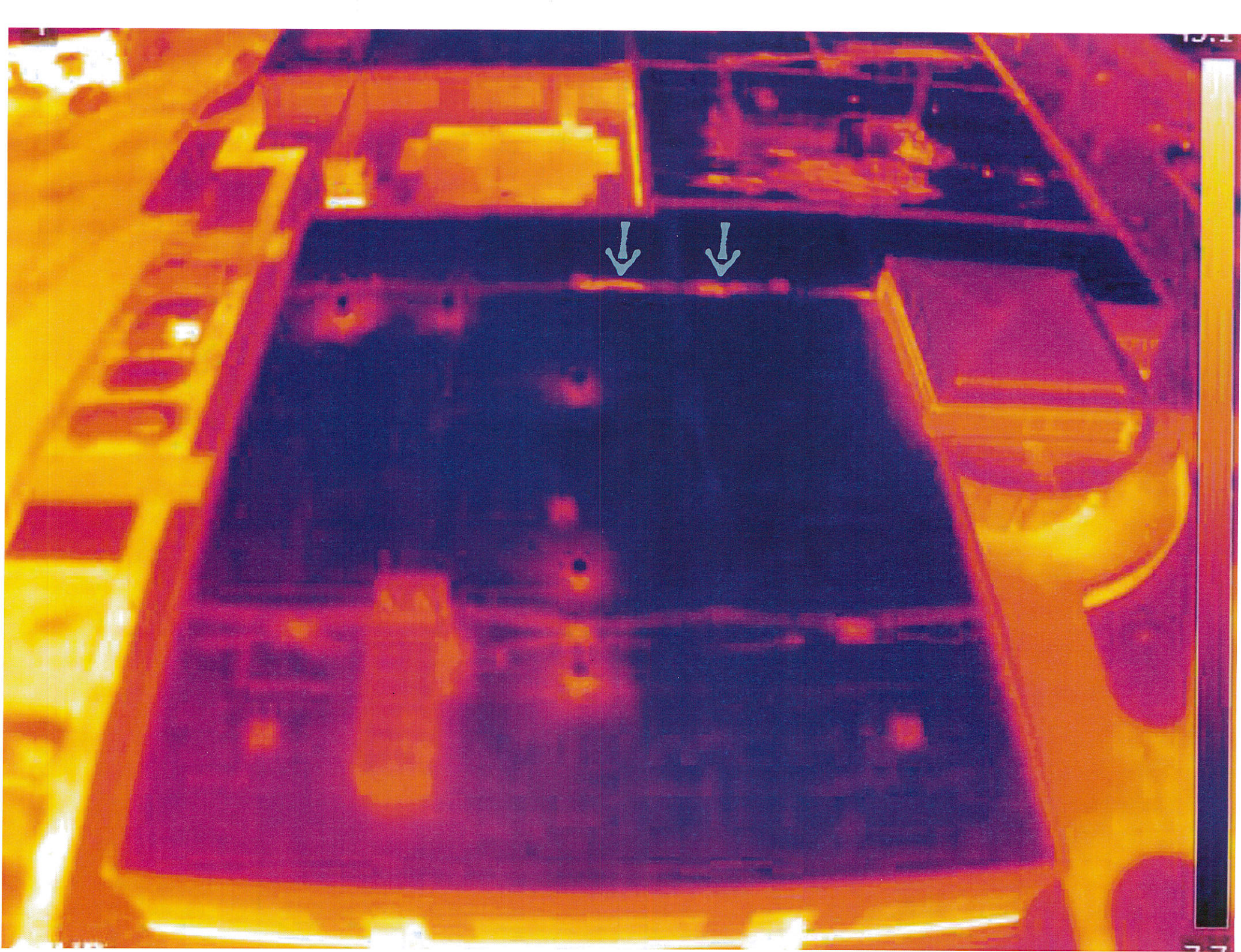
PHASE II

AREA G
SOUTH END AERIAL IMAGERY



AREA OF
SUSPECTED WATER
INFILTRATION

PHASE II



● ROOF CORE LOCATIONS

AREA C
WEST END AERIAL IMAGERY

AREA D

(AREA RECENTLY
RECOVERED BUT THERMAL
SHOWS WET BELOW)

AREA C

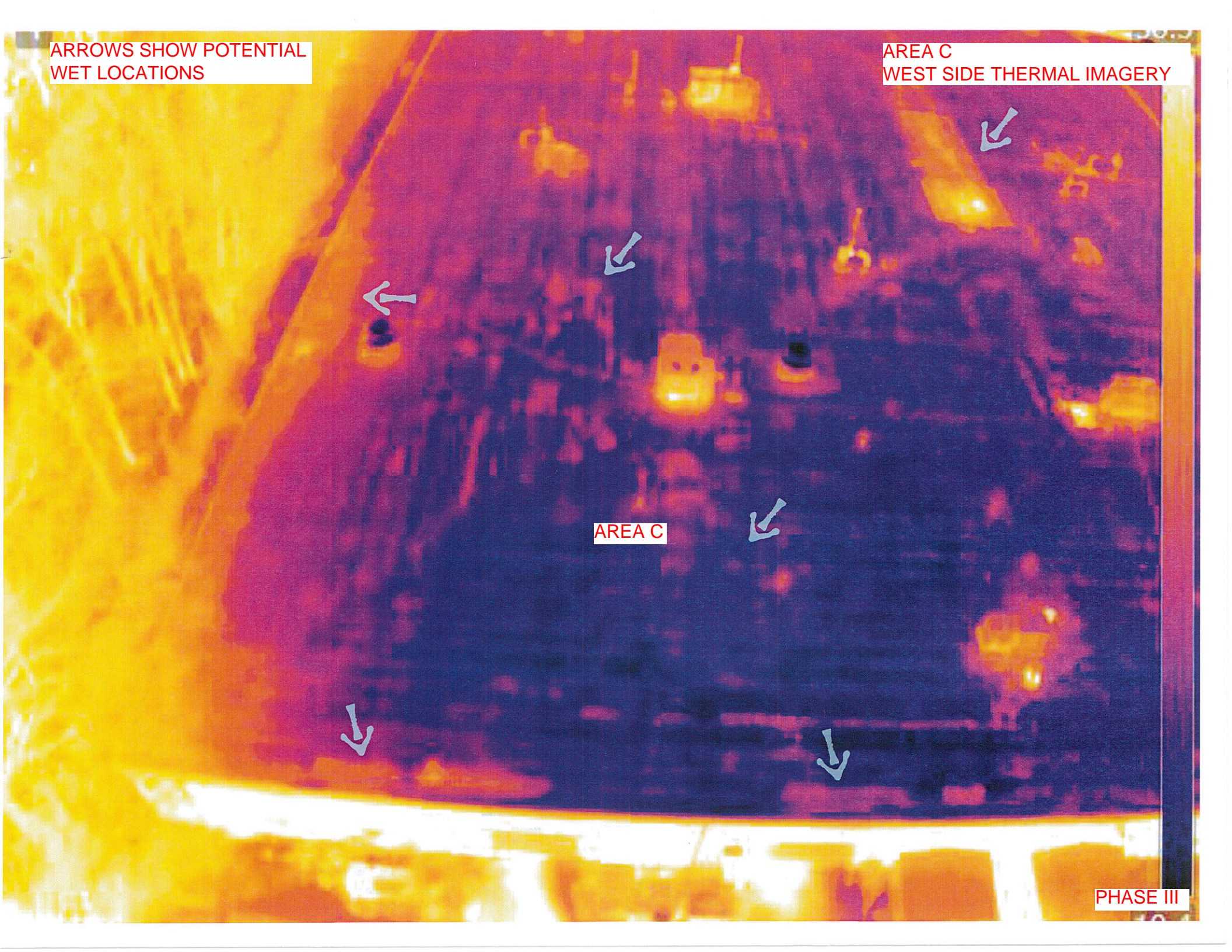
(THERMAL SHOWS WET
BELOW WHICH MATCHES
ADJACENT ROOF CORE
SHOWN ON PHASE I)

PHASE III



ARROWS SHOW POTENTIAL
WET LOCATIONS

AREA C
WEST SIDE THERMAL IMAGERY



AREA C

PHASE III

ARROWS SHOW POTENTIAL
WET LOCATIONS

AREA D
WEST SIDE THERMAL IMAGERY

Suspect Standing Water

AREA D

PHASE III



**AREA D
WEST END AERIAL IMAGERY**

AREA C

AREA D

(AREA RECENTLY
RECOVERED BUT THERMAL
SHOWS WET BELOW)

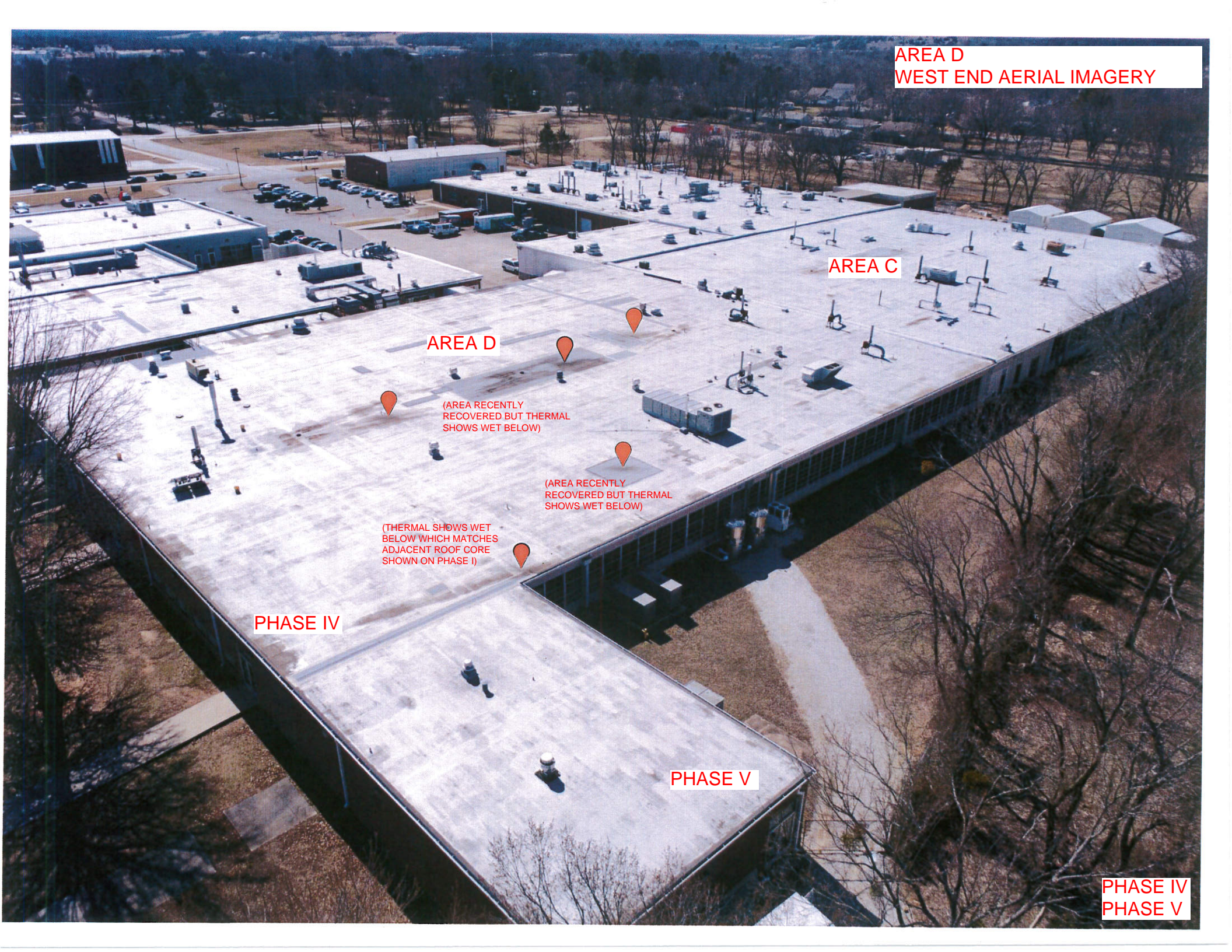
(AREA RECENTLY
RECOVERED BUT THERMAL
SHOWS WET BELOW)

(THERMAL SHOWS WET
BELOW WHICH MATCHES
ADJACENT ROOF CORE
SHOWN ON PHASE I)

PHASE IV

PHASE V

**PHASE IV
PHASE V**



AREA B & E
EAST SIDE AERIAL IMAGERY

AREA B

(AREA RECENTLY
RECOVERED BUT THERMAL
SHOWS WET BELOW)

(AREA RECENTLY
RECOVERED BUT THERMAL
SHOWS WET BELOW)

(AREA RECENTLY
RECOVERED BUT THERMAL
SHOWS WET BELOW)

AREA E

THERMAL SHOWS
SUSPECTED WET BELOW)

PHASE V



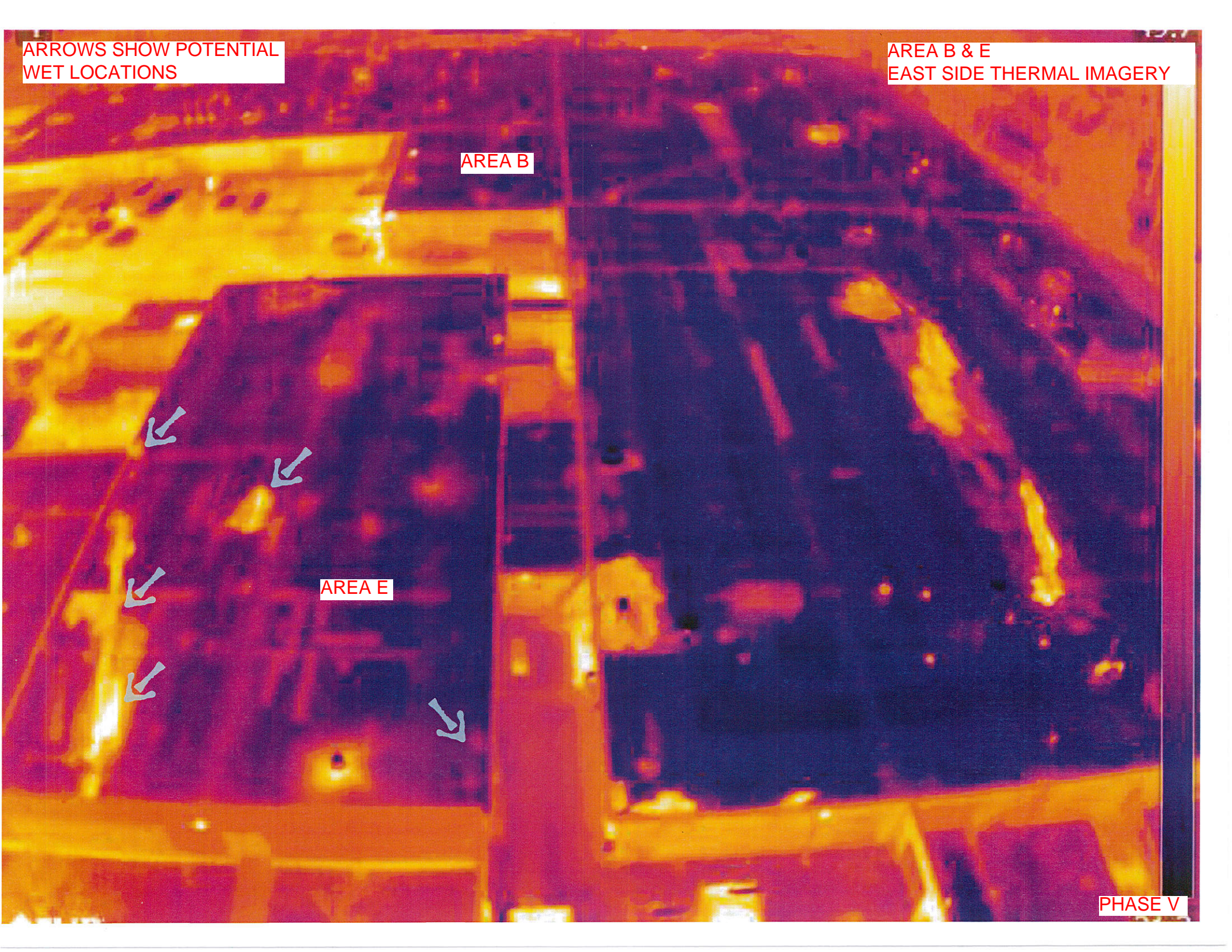
ARROWS SHOW POTENTIAL
WET LOCATIONS

AREA B & E
EAST SIDE THERMAL IMAGERY

AREA B

AREA E

PHASE V



AREA B
SOUTH SIDE AERIAL IMAGERY



AREA B

THERMAL SHOWS
SUSPECTED WET BELOW)

THERMAL SHOWS
SUSPECTED WET BELOW)

THERMAL SHOWS
SUSPECTED WET BELOW)

PHASE V

ARROWS SHOW POTENTIAL
WET LOCATIONS

AREA B
EAST SIDE THERMAL IMAGERY

AREA A

AREA C

AREA B



PHASE V

