Steward Observatory Safety Committee
April 10th , 2018

Update on Indoor Air Quality Issues

Historic Review of IAQ Issues in Building 65

- History of sewer odors, chemical odors, reports of mold growth and occupants experiencing health problems in the building
- Steps taken to isolate and exhaust sewer odors and modify HVAC balance of mechanical rooms, and update HVAC exhaust in the machine shop
- IAQ Assessment by ATC Environmental Consultants
- Building Systems Assessment by GLHN
- FM Actions to Prevent Rainwater Intrusion
- HVAC Terminal Unit (Mixing Box) replacements
- Deep Cleaning and Analytical Testing in Targeted Areas – SWHC/WT
- Roof Repair, Cleaning, and Testing in the Annex – Bldg 64

Recent Actions

- Four quarterly environmental sampling events scheduled
- Testing performed by RMS, includes swabs and air samples, analysis by Quantitative Polymerase Chain Reaction (qPCR)
- Testing coupled with visual inspection to look for moisture problems
- Schedule intended to evaluate IAQ impacts from seasonal variations

  - Q1 – June 28, 2017
  - Q2 – October 12, 2017
  - Q3 – February 21, 2018
  - Q4 – July 2018

Interpreting Test Results

- qPCR analysis identifies individual mold species in samples
- Environmental Relative Moldiness Index (ERMI) – looks at a panel of 36 mold species which are typically found in mold-impacted buildings
- ERMI divides mold species into Groups I and II
  - Group I – 26 mold species commonly associated with water damage
  - Group 2 – 10 mold species common to indoor environments
- ERMI score is derived by comparing the logarithmic concentration difference in Group 1 and Group 2 mold species
- Scoring is only performed on surface swab samples, not air samples
- Score is being used as a screening tool to evaluate changes over time

ERMI Score	Level or Risk	Likelihood of Mold Problem
-10 to -4	Level 1	Lowest
-4 to 0	Level 2	Lower
0 to 5	Level 3	Moderate
5 to 20	Level 4	High

Q1 results

- Q1 – four species identified
  - Aureobasidium pollulans (Group 1)
  - Cladosporum sphareospermum (Group 1)
  - Aspergillus niger (Group 1)
  - Cladosporum cladosporiodes I (Group 2)
- ERMI scores for surface swabs were 3.1, 2.6, 3.4, 0.8 for areas tested. Scores of 0-5 are Level 3 or moderate likelihood of mold issue
- Air sample results were generally low values and unremarkable
- Visual inspection identified some water damaged ceiling tiles, which were scheduled for replacement

Q2 results

- Q2 – nine species identified
  - Group 1 - Aureobasidium pollulans, Cladosporum sphareospermum, Aspergillus niger, Aspergillus flavus, Eurotium amstelodami, Aspergillus ochraceus, and Penicillium spinulosum
  - Group 2 – Cladosporum cladosporoides I, Cladosporum cladosporoides II
- ERMI scores for surface swabs were 10.6, 1.5, 4.8, 1.2, 12.3, -1.0, 6.2 for indoor areas tested. Increases likely attributable to monsoon moisture and higher humidity
- Air sample results were again generally unremarkable
- Visual inspection verified replacement of previously identified water damaged ceiling tiles. No leaks or new water damage noted

Q3 results

- Q3 – 11 species identified
  - Group I organisms identified: Aureobasidium pollulans, Cladosporum sphareospermum, Aspergillus niger, Aspergillus fumigatus, Aspergillus versicolor and Aspergillus penicilloides.
  - Group 2 organisms identified: Cladosporum cladosporoides I, Cladosporum cladosporoides II, Alternaria Alternata, and Penicillium chrysogenum.
- ERMI scores for surface swabs were -2.0, 4.7, 0, -9.7, -0.9, 12.8, -10.3, 1.3, 2.3, -5.1, for indoor areas tested. Decreases in every area except for room 359 and 358 ceiling tile. The results for the outside swab was -7.5.
- Air sample results
  - Room N-134: Higher counts of Aureobasidium pollulans than outside.
- Visual inspection verified replacement of previously identified water damaged ceiling tiles. Some of them were not replaced, but they were immediately reported and action was taken.
- New leaks or missed stained ceiling tiles in rooms N-122,364, and 360. They were investigated, taken care of and replaced.

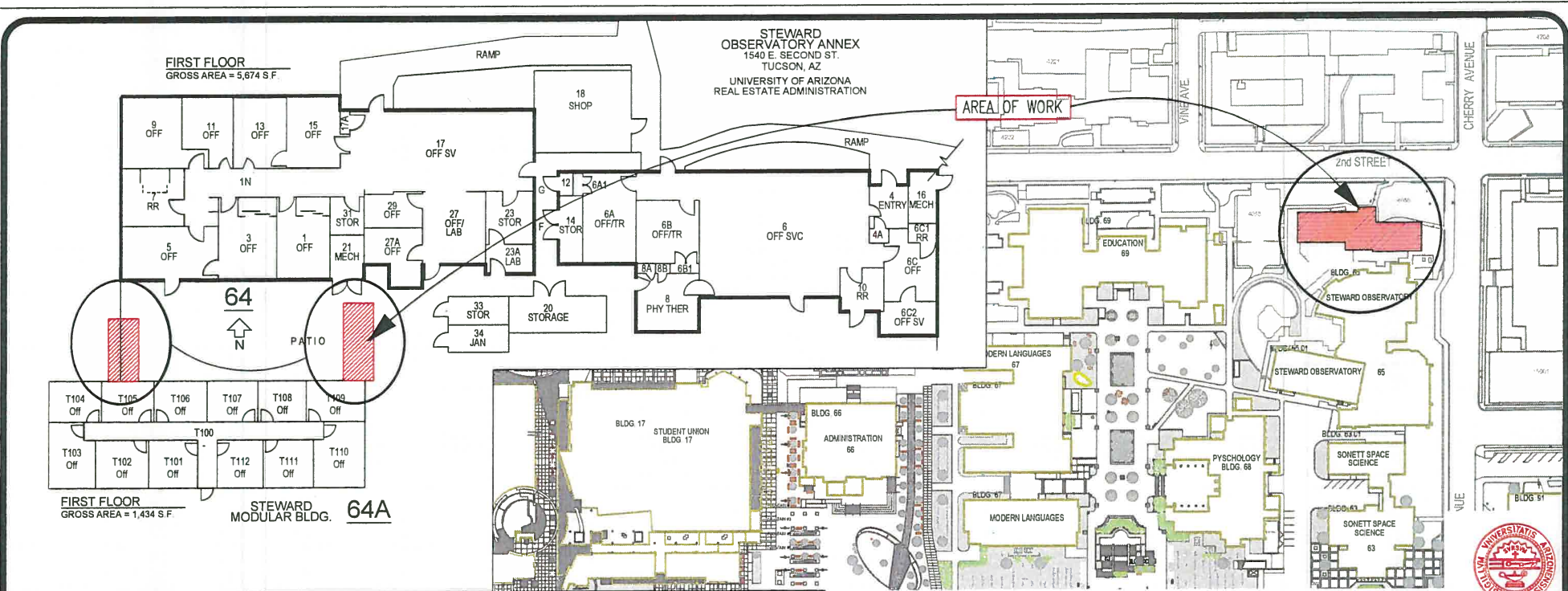| ERMI Score	Level or Risk		Likelihood of Mold Problem
-10 to -4	Level 1		Lowest
-4 to 0	Level 2		Lower
0 to 5	Level 3		Moderate
5 to 20	Level 4		High

Q3 results: Focus/Problematic Areas

- Room 358 fallen ceiling tile with visible black patch and room 359 results presented higher results than Q2 and than the outdoors.
    - No sign of water intrusion, smell or other stained ceiling tiles
- Room 466/468/470 (new target area)
    - Room 468 was thoroughly cleaned when first reported
    - Sampled again
    - Lower Result than outside mold swab and lower result than when sampled in 2017

Remediation Efforts

- Room 358, 359 and 360
  - Mixing Boxes, ductwork, ceiling tiles were removed
  - All 3 rooms were deeply cleaned.
  - Mixing Boxes, ductwork and ceiling tiles were replaced
  - Sampled again to see how conditions changed
    - Performed air and swab sample to confirm.

Q4 Results

- Q4 – 8 species identified
  - Group I organisms identified: Aureobasidium pollulans, Cladosporum sphareospermum, Aspergillus niger, Wallemia sebi, Eurotium Amstelodami, Chaemotium globosum .
  - Group 2 organisms identified: Cladosporum cladosporoides I and Mucor racemosus.
  - ERMI scores for surface swabs were 4.9, 2.5, -1.9,-2.6, 3.6, 0.8, -2.7, 0, -1.8, 2.6, 5.3
  - Decreases in every area except for the 3rd floor hallway, and Room 470.
  - The results for the outside swab was 3.6 (higher than the 3rd round).
- Air sample results
  - We noticed a general decrease in the quantity of organisms found in this event when compared to the past events.
  - Aspergillus niger was found in air samples outside the building. Same species found in Room 470 in high quantities.
- Visual inspection verified replacement of previously identified water damaged ceiling tiles.
- Large amount of stained ceiling tiles in Room 168. Replaced

STEWARD
OBSERVATORY ANNEX
1540 E. SECOND ST.
TUCSON, AZ

UNIVERSITY OF ARIZONA
REAL ESTATE ADMINISTRATION

FIRST FLOOR
GROSS AREA = 5,674 S.F.

RAMP

AREA OF WORK

2nd STREET

First Floor Plan (Bldg. 64) labels:
9 OFF, 11 OFF, 13 OFF, 15 OFF, 18 SHOP, 17 OFF SV, 1N, RR, 31 STOR, 29 OFF, 27 OFF/LAB, 23 STOR, 12, 6A1, G, F, 14 STOR, 6A OFF/TR, 6B OFF/TR, 6 OFF SVC, 4 ENTRY MECH, 16, 6C1 RR, 4A, 5 OFF, 3 OFF, 1 OFF, 21 MECH, 27A OFF, 23A LAB, 6A 6B 6B1, 8 PHY THER, 10 RR, 6C OFF, 6C2 OFF SV, 33 STOR, 20 STORAGE, 34 JAN

64
N
PATIO

T104 Off, T105 Off, T106 Off, T107 Off, T108 Off, T109 Off
T100
T103 Off, T102 Off, T101 Off, T112 Off, T111 Off, T110 Off

FIRST FLOOR
GROSS AREA = 1,434 S.F.

STEWARD MODULAR BLDG. 64A

Campus site plan labels:
BLDG 69 EDUCATION 69, BLDG 65 STEWARD OBSERVATORY, STEWARD OBSERVATORY 65, MODERN LANGUAGES 67, BLDG 67, STUDENT UNION BLDG. 17, BLDG 66 ADMINISTRATION 66, PSYCHOLOGY BLDG. 68, SONETT SPACE SCIENCE, BLDG 67, MODERN LANGUAGES, SONETT SPACE SCIENCE 63, BLDG 51, CHERRY AVENUE, VINE AVE

DISABILITY RESOURCE CENTER—APPROVAL

PLANNING DESIGN & CONSTRUCTION—APPROVAL

UOFA RISK MANAGEMENT SERVICES
FIRE MARSHAL STAMP OF APPROVAL

GENERAL INFO & CODES

CODES:
"ALL WORK SHALL BE IN COMPLIANCE WITH THE FOLLOWING CODES AND STANDARDS:
2012 INTERNATIONAL FIRE CODE
2012 INTERNATIONAL BUILDING CODE
2012 INTERNATIONAL MECHANICAL CODE
2012 INTERNATIONAL PLUMBING CODE
2012 INTERNATIONAL FUEL GAS CODE
2011 NATIONAL ELECTRICAL CODE (NFPA 70)

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS 29 CFR
1910, 1919.146 CONFINED SPACES STANDARD 1926.

ACCESSIBILITY GUIDLINES—IN ADDITION TO ANY REQUIREMENTS IN THE ABOVE LISTED CODES:
GOVERNING REGULATION: DEPARTMENT OF JUSTICE'S TITLE 2 REGULATION 28 CFR
PART 35 AND TITLE 3 REGULATION 28 CFR PART 36.

AMERICAN WITH DISABILITIES ACT & ARCHITECTURAL BARRIERS ACT ACCESSIBILITY
GUIDELINES DATED JULY 23, 2004 BY THE UNITED STATES ACCESS BOARD.

UNIVERSITY OF ARIZONA DESIGN & SPECIFICATIONS STANDARDS

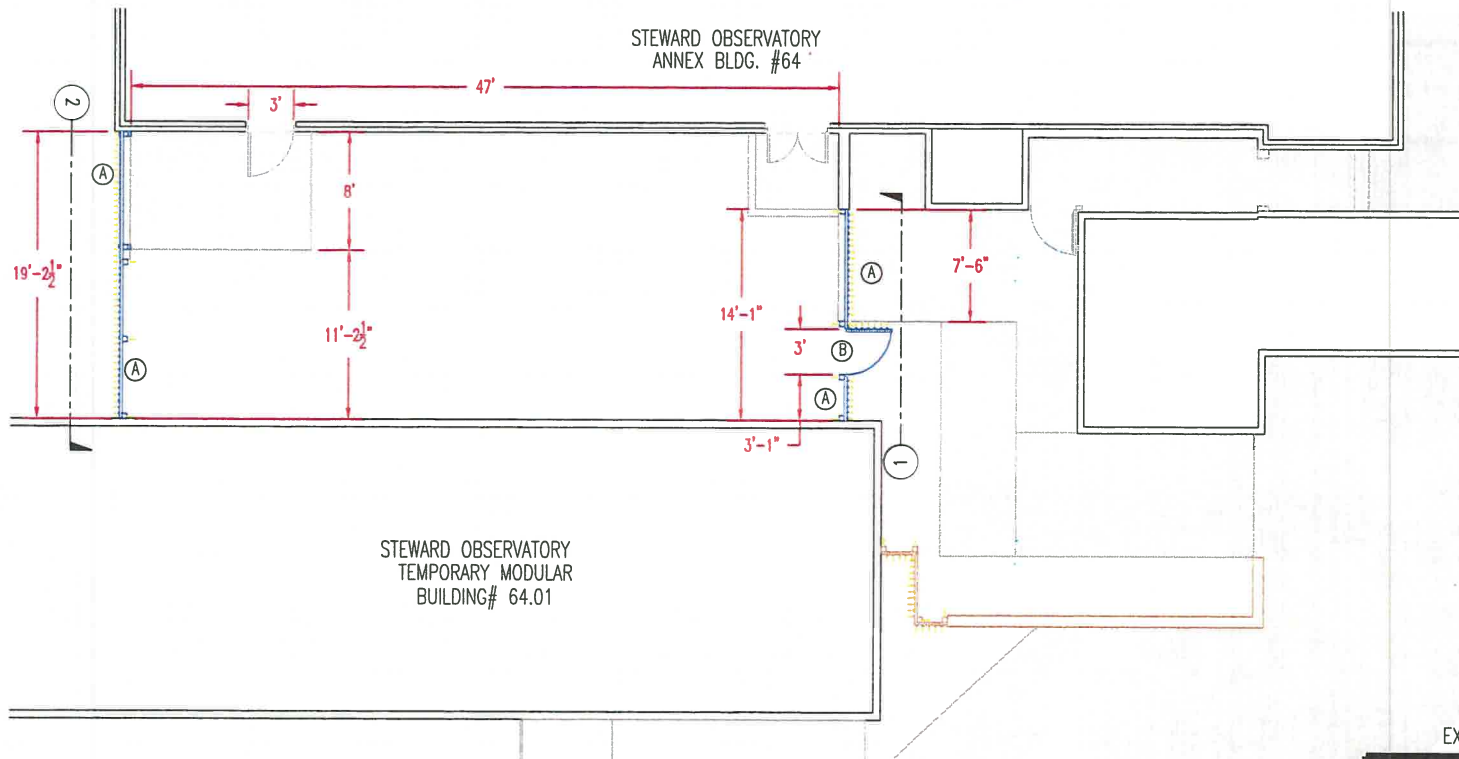AND WORK SHALL NOT BE IN VIOLATION OF ANY FEDERAL OR STATE LAW OR STATUTE."

SHEET INDEX:
SH. 1 — GENERAL INFO/CODES
SH. 2 — EXISTING/NEW SITE PLAN
SH. 3 — ELEVATION/DETAILS

TOTAL BLDG. SQUARE FOOTAGE: 5,674 SF
TOTAL FLOOR AREA SQUARE FOOTAGE: 5,674 SF
TOTAL WORK CONSTRUCTION AREA SQUARE FOOTAGE: 100 SF

OWNER:
THE UNIVERSITY OF ARIZONA
ARIZONA BOARD OF REGENTS
2020 N. CENTRAL AVENUE
PHOENIX, AZ. 85004-4593
PHONE 602-229-2500

THE UNIVERSITY OF ARIZONA–TUCSON, AZ.
STEWARD OBSERVATORY ANNEX BLDG. 64
1540 E 2ND STREET. INSTALL 3 NEW
MAN GATES WITHIN BLDG. HALL COMPLEX
ONE ON THE NORTH, ONE SOUTH, AND
ONE SOUTHWEST.

UOFA FACILITIES MGMT. RENOVATION SVCS.
1610 N. VINE AVENUE TUCSON, AZ.
(520)626-3002(OFFICE), 621-2912(FAX)
DRAWN BY R.G.

JOB# 29679

DATE: 06/26/2018

SCALE: NOT TO SCALE

1

1 OF 3

UNIVERSITATIS ARIZONENSIS
SIGILLUM
1885

STEWARD OBSERVATORY
ANNEX BLDG. #64

47'

3'

19'-2½"

8'

11'-2½"

14'-1"

7'-6"

3'

3'-1"

Ⓐ

Ⓑ

①

②

STEWARD OBSERVATORY
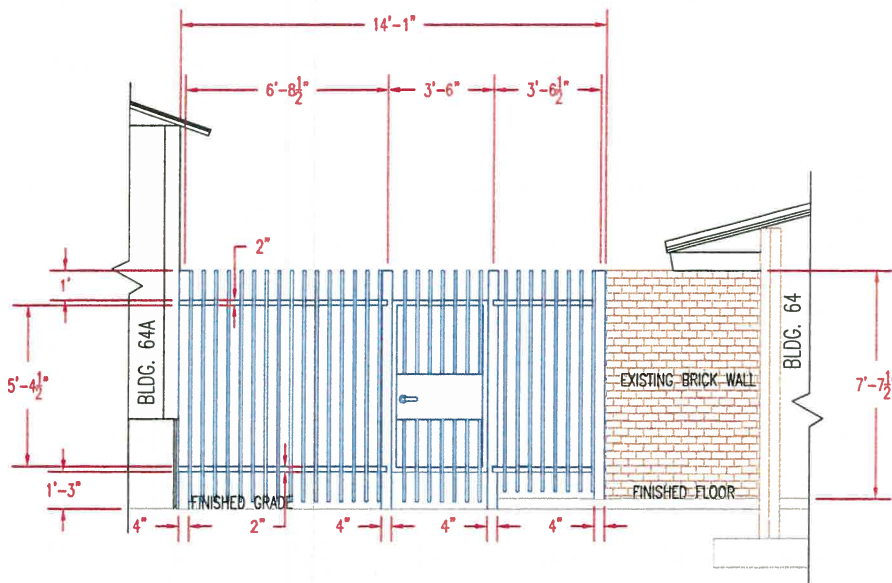TEMPORARY MODULAR
BUILDING# 64.01

EXISTING/NEW SITE PLAN

DEMOLITION NOTES:

Ⓐ INSTALL NEW WROUGHT IRON FENCING HERE, FENCING TO BE:
  – 4"X4" STEEL POSTS(HEIGHT WILL VARY, SEE ELEVATIONS)...
  – 2"X2" STEEL HORIZONTAL SPANS...
  – 1"X1" STEEL PICKETS SET @5"O.C...

Ⓑ INSTALL NEW WROUGHT IRON DOOR HERE, DOOR TO BE:
  – 2"X2" STEEL FRAMING...
  – 1"X1" STEEL PICKETS SET @5"O.C...
  – ADD HANDLE LEVER LOCKSET TO DOOR...
  – ADD WIRE MESH BLOCK AROUND DOOR HANDLE...
  – DOOR WILL BE 3'-0" WIDE...

NORTH

EXISTING/NEW SITE PLAN
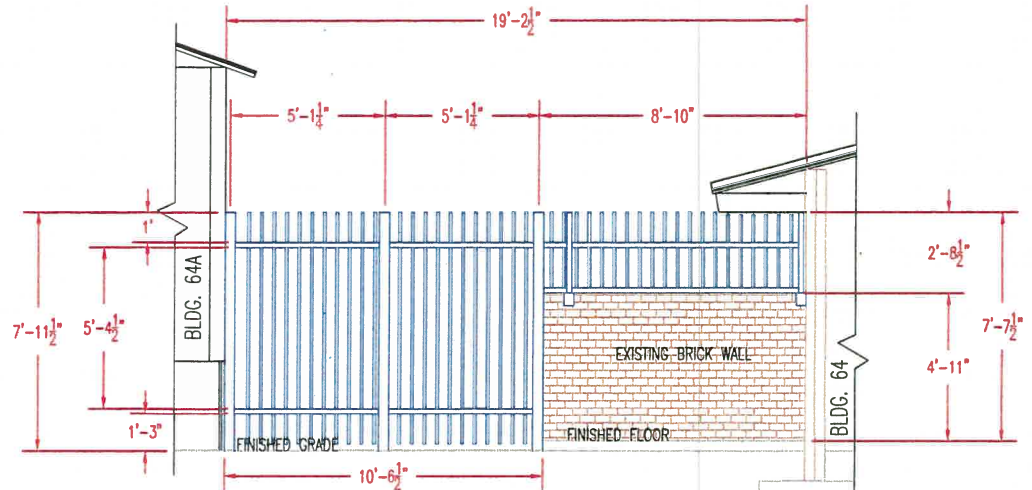SCALE: 1/8" = 1'

EXISTING/NEW SITE PLAN

THE UNIVERSITY OF ARIZONA-TUCSON, AZ.
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SCALE: 1/8" = 1'

2

2 OF 3

ELEVATION LOOKING WEST — Detail 2

19'-2½"

5'-1¼"   5'-1¼"   8'-10"

1"

BLDG. 64A

7'-11½"   5'-4½"

1'-3"

EXISTING BRICK WALL

2'-8½"

7'-7½"

4'-11"

BLDG. 64

FINISHED GRADE   FINISHED FLOOR

10'-6½"

(2) ELEVATION LOOKING WEST
SCALE: 1/4" = 1'

ELEVATION LOOKING WEST — Detail 1

14'-1"

6'-8½"   3'-6"   3'-6½"

2"

1'

BLDG. 64A

5'-4½"

1'-3"

EXISTING BRICK WALL

BLDG. 64

7'-7½"

FINISHED GRADE   FINISHED FLOOR

4"   2"   4"   4"   4"

(1) ELEVATION LOOKING WEST
SCALE: 1/4" = 1'

Section Detail

4"

1"X1" STEEL TUB PICKETS (TYP)

4"X4" STEEL TUBE POSTS (TYP)

1"

?

2"X2" STEEL TUBE HORIZONTALS (TYP)

2"

3'

2'

1'

FOOTING SIZE? (TYP)

1'-4"

ELEVATIONS/DETAILS

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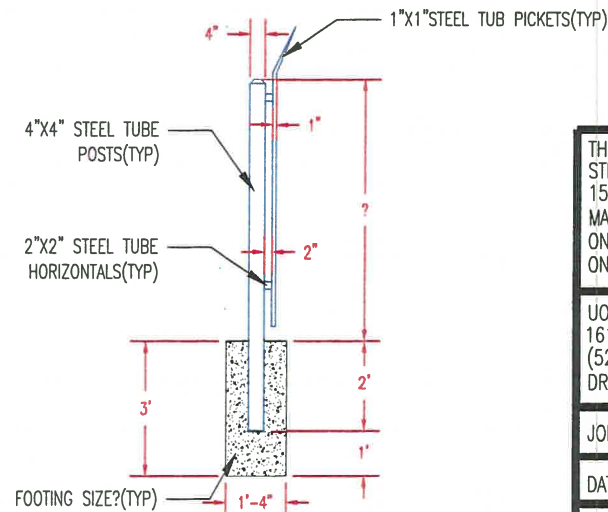(520)626-3002(OFFICE), 621-2912(FAX)
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SCALE: VARIES SEE PLAN

3

3 OF 3