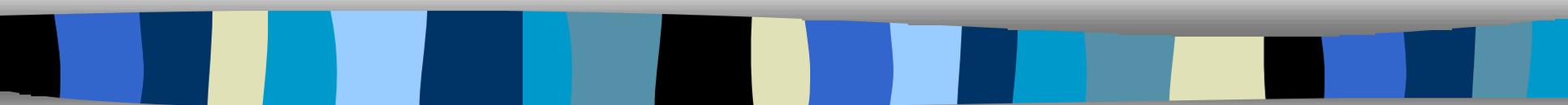
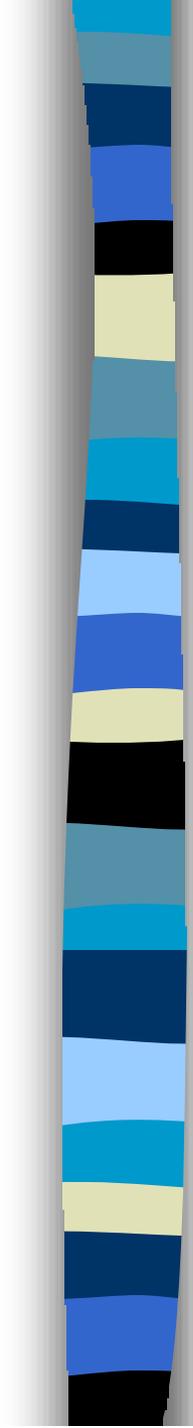


Mold Remediation In An Air Handling System



Rodney H. Lewis, PE, Fellow ASHRAE
Rodney H. Lewis Associates, Inc.
Consulting Engineers
Houston, Texas



The Building

8 STORY OFFICE BUILDING BUILT IN 1981

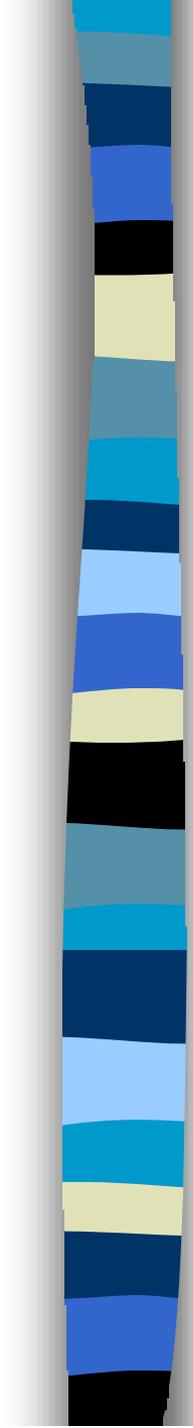
10 AIR HANDLING UNITS – 15,000 TO 25,000 CFM

DOUBLE DUCT – VAV

DESIGN OUTSIDE AIR 12 CFM/PERSON

OUTSIDE AIR FAN ON ROOF DUCTED TO
RETURN PLENUM OF EACH UNIT

CHILLED WATER - DUCT MOUNTED ELECTRIC HEAT



The Air Handling Units

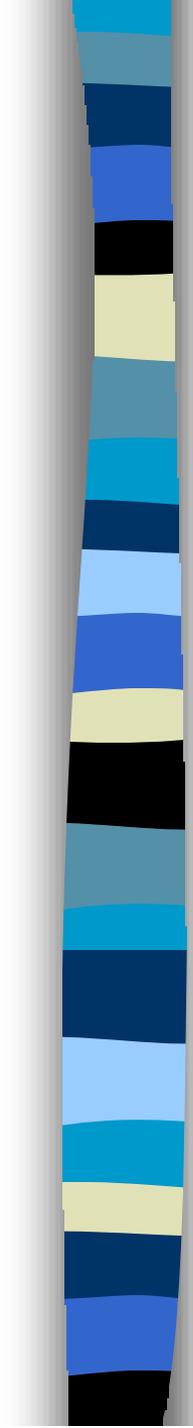
BLOW THRU DESIGN INTERNALLY INSULATED

36 SQUARE FOOT 6 ROW COOLING COIL

APPROXIMATELY 650 FEET PER MINUTE

INTERNALLY INSULATED UNIT CASING

NO ACCESS DOWNSTREAM OF COIL

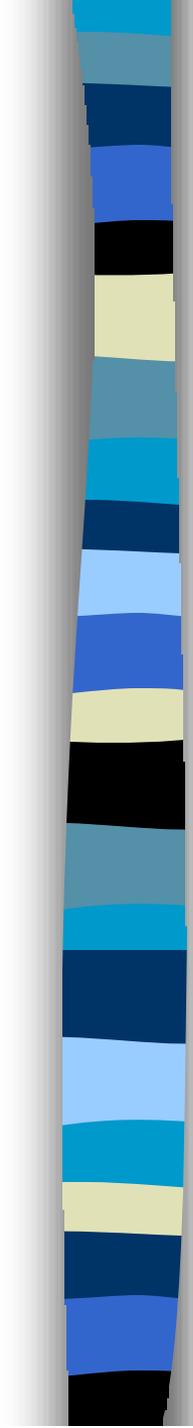


The Problem

SIGNIFICANT ODORS IN COLD DUCT

SIGNIFICANT MOLD IN DUCT LINER AND AIR
HANDLING UNIT INSULATION

MOLD ON COIL AND DRAIN PAN



Probable Causes

CHILLED WATER VALVE MALFUCTION

HIGH COIL FACE VELOCITY CAUSING CARRY-OVER

DUCT WORK LINER WETTED DURING CONSTRUCTION

POOR MAINTENANCE





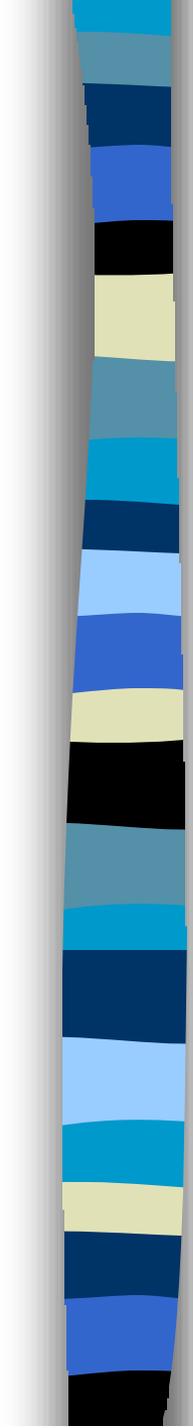










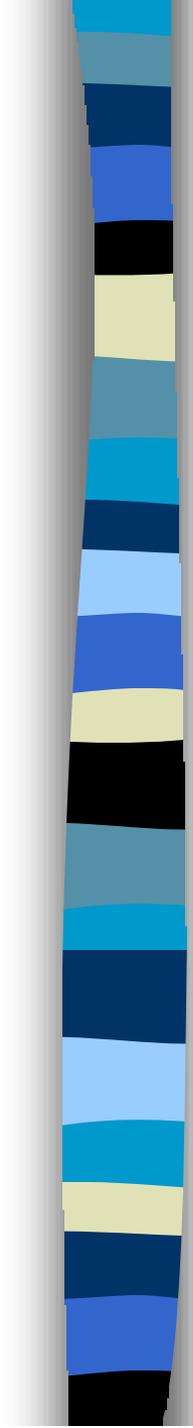


Remediation

TIME FRAME

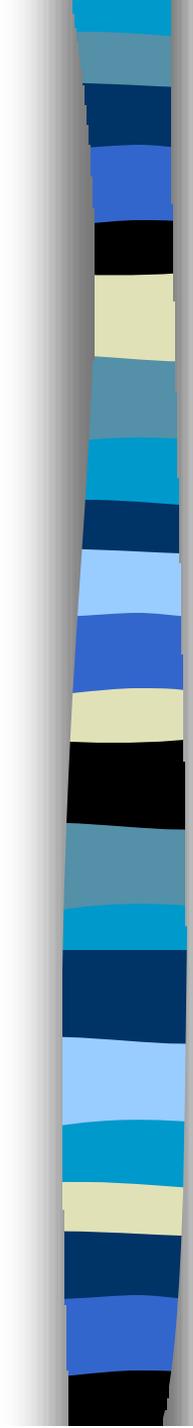
BEGAN THURSDAY 6PM

FINISHED TUESDAY 4AM



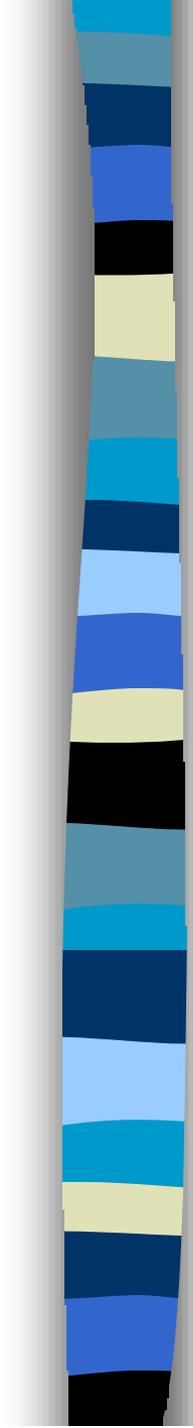
Remediation Steps

- MONITOR WITH PARTICAL COUNTER OUTSIDE CONTAINMENT THROUGHOUT PROCESS
- CUT ACCESS DOORS INTO UNIT
- MOVE ALL FURNITURE OUTSIDE OF REMEDIATION AREA
- HEPA VACUUM MECHANICAL ROOM
- REMOVE CEILING TILES AND GRID WHERE NECESSARY
- CREATE CONTAINMENT AREA WITH POLY SHEETS, FLOOR TO STRUCTURE INCLUDING COVERING CARPET



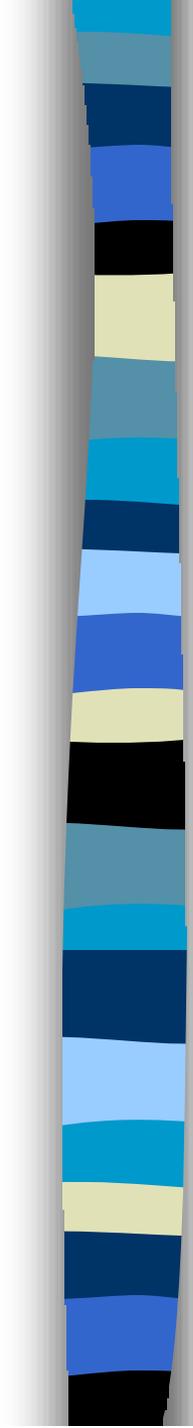
Remediation Steps (Cont.)

- REMOVE AND BAG DUCTWORK AND UNIT INSULATION
- HEPA VACUUM INSIDE UNIT AND ENTIRE CONTAINMENT AREA
- APPLY DISINFECTANT TO ALL SURFACES
- REMOVE CONTAINMENT



Build Back

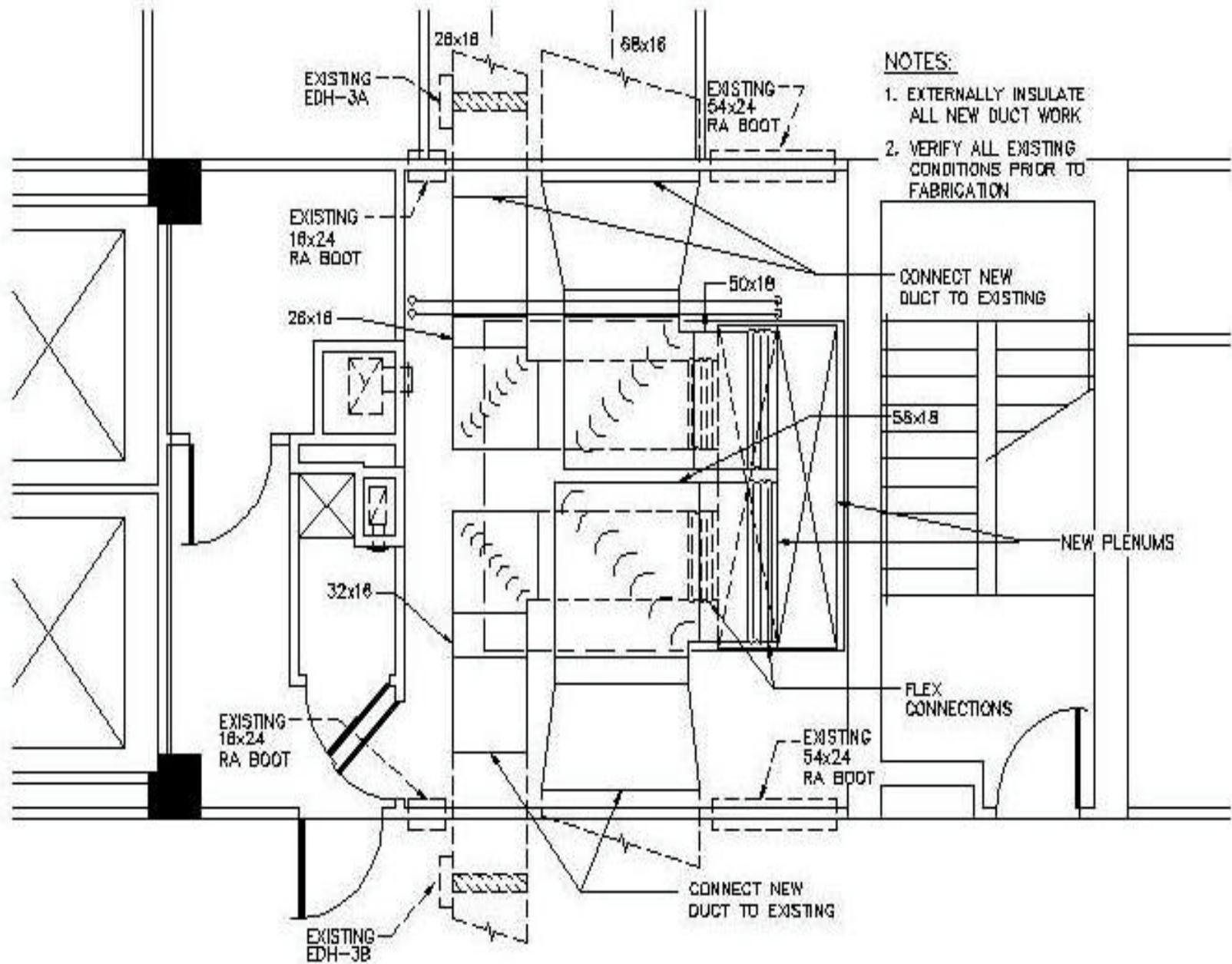
- UNIT INSULATION – DUCTBOARD WITH FOIL FACING TO AIR STREAM
- NEW DUCTWORK FOR BOTH HOT & COLD DUCTS
- ALL DUCT JOINTS SEALED
- EXTERNAL DUCT INSULATION
- SLOW FAN TO 550 FEET PER MINUTE COIL FACE VELOCITY



Costs

APPROXIMATELY \$85,000

WHICH EQUATES TO \$4.25 PER SQUARE FOOT
OF AREA SERVED



NOTES:

1. EXTERNALLY INSULATE ALL NEW DUCT WORK
2. VERIFY ALL EXISTING CONDITIONS PRIOR TO FABRICATION

