Crawl Space Action Plan Outline
December 16, 2014

I. Time Line

Immediate Projects – This Year

1) Steam Tunnels – Hire temporary worker to seal up steam tunnels from animal incursion
2) GHI Engineer or Engineer consultant – Inventory entire community for broken and disconnected gutters and backed up downspouts, inventory discontinuous swales, etc starting this winter – Also get member feedback as go to each court
3) Hire engineering consultant experienced in crawl space remediation to write specifications for remediating, sealing, and semi-conditioning two frame rows.
4) Hire engineer to inspect crawl space work – could be same as 3.
5) Select pilot frame building crawl spaces and assess exterior/interior drainage issues in spring – challenging case(s) and non challenging case(s)
6) Remediate, Dry, and Seal selected pilot frame buildings in Fall/Winter 2015 to obtain cost and discover technical issues
7) Develop priority list of crawl spaces to be worked on.
8) Assess drainage issues for selected crawl spaces for remediation during spring for next year's work.

Medium Term Projects: 5-10 years all crawl spaces

Start with smaller number of buildings (e.g. 5%) and ramp up to larger number once process is established. Members might elect to change pace of work to distribute costs differently and/or priorities.

1) Each year remediate, dry, and seal previous years assessed crawl spaces
2) Each year assess during spring, next year's set of crawl spaces to be remediated, dried, and sealed

Long Term Projects: 10 - 15 years

Members might elect to change pace of work to distribute costs differently and/or priorities.

1) Drainage
   a. Court based drainage – i.e. repair or replace swales

b. Superblock or Large scale drainage issues

On Going: Perpetual

2) Educate member on the need for long-term maintenance of external drainage structures (swales, downspouts, gutters, storm drains, grade against foundation, etc.)
   a. Swales need to be continuous, not filled in for a garden
   b. Discussion on why members filling in swales – find other solutions.
   c. Members can ensure they have positive grading from house and not negative grade which traps water against foundation
   d. Educate members about issues for planting vegetation that requires a lot of water right within three feet of foundation

3) Educate members on the structural components of their particular unit at sale or upon request.
4) Inspections of crawl spaces

I. Staffing Needs:

1) Hire building science consultant with crawl space and drainage expertise to write specifications for remediating, sealing, semi-conditioning crawl spaces
   a. Duration TBD
   b. Inspect ongoing crawl space work
   c. Blower door test
2) Hire temp workers to seal steam tunnels to prevent animal incursion.
   a. Numbers TBD
   b. Duration TBD
3) Hire smart, hardworking Jr. Engineer(s) to assist technical services, liaise with maintenance, and monitor projects
   a. Number TBD
   b. Long Term
4) Civil Engineer with drainage expertise
   a. Staff or consultant
   b. Long term
5) Crawl space inspector(s)
   a. Staff and Outsourced
   b. Number TBD
   c. Long Term

II. Perimeter Sealed and Insulated Crawl Space:

a. 10-20 mil Vapor barrier covers floor and extends to appropriate height on all external walls and piers.
b. Perimeter walls are sealed and insulated.
c. Band joists properly sealed and insulated
d. Indoor/Outdoor carpet or plywood used to protect and facilitate access corridors over vapor barrier
e. Lighting such as LED Christmas lights used to provide lighting to facilitate work in crawl space.
f. Conduits for telecommunications
g. All units that require a sump pump have interior drainage leading to sump.
h. Sump Pumps
    a. Sumps are properly sealed and vented to proper exterior drainage system
    b. Suitable alarm system
    c. Backup sump pump for bulk water intrusion or deliberate drainage of water into crawl space might have problems when power outages occur during rain event or near major rain event.
        i. Battery backup
        ii. Water backup sump pump via municipal water supply
i. Mechanical Exhaust for frame units (1 CFM per 50 Square Feet) and ensure suitable make up air available from building above.
j. Crawl space dehumidifiers for all unit types where needed
k. Airtight access doors
l. Termite barrier strip or Termite reveal for inspections at top of rigid foam board on perimeter walls
m. Alarm system for excess moisture
    a. Hygrometer
    b. Water sensor
    c. LED alert
    d. Audio alert

III. Prep Crawl Spaces for future maintenance

a. Remove steam pipes (maybe long term project)
    i. Find average # pipes per building
    ii. Find average length of pipe
    iii. Find average diameter of pipe
    iv. Need to mark steam pipes – enables worker to know which pipe to cut.
    v. Cutting Time Estimate – 1 Minute per Inch of pipe diameter
        1. Estimate from former plumber and WSSC supervisor
        2. Cut in lengths 4 to 6 feet long
        3. Work time translates into labor cost
b. Investigate replacing horizontal components of waste system at this time
c. Make sure pipes that remain have adequate supports.
d. Modify shutoff for water system so GHI staff member does not need to crawl into crawl space to shut off water. Currently requires two staff members – one to make turn off water; second person is doing the repair.
e. Clean out debris

IV. Inspection

a. Critical to long-term success
b. Rotate between independent inspector and in house staffing
c. Financially sustainable
d. Determine what training is required
e. Establish basic inspection sheet

V. Technology – leverage for staff work production

a. Remotely operated vehicles – inspect spaces that are difficult for humans to reach in a time efficient manner.
    i. Inspect joists
    ii. Inspect foundation
b. Water Sensors + alarms
c. Humidity Sensors + alarm
d. Long term – develop network to link sensors back to administration

VI. People – Engage GHI members

a. Leverage better members eyes on structures
    i. Allow members to upload images/videos of structural and drainage issues.
    ii. Online status of structural, drainage, and other complex projects.
b. State of the union: Building Structures and Land