

W E T H E R H O L T   A N D   A S S O C I A T E S ,   P . S .

**ROOF EVALUATION**

**FIRE STATION #6**  
**101 23<sup>rd</sup> Avenue South**  
**Seattle, Washington**

for

City of Seattle  
Executive Services Department  
618 Second Avenue, Suite 1400  
Seattle, WA 98104

Attn: Martha Turnbull

*Project No. 0002-06G*  
*July 24, 2000*

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July 24, 2000  
0002-06G

City of Seattle  
Executive Services Department  
618 Second Avenue, Suite 1400  
Seattle, WA 98104

phone # 206-386-1367  
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Attn: Martha Turnbull

Ref: Roof Evaluation  
Fire Station #6  
101 23<sup>rd</sup> Avenue South  
Seattle, Washington

Greetings,

At the request of Martha Turnbull, this writer met with Ms. Turnbull and Josh Mullen, Wetherholt and Associates, on June 23, 2000 to evaluate the condition of the roof on the building and determine if the roof could be repaired, or required replacement.

### **Observations**

The roof on the building consists of structural concrete roof deck covered by a hot asphalt vapor barrier, two layers of 2 inch thick phenolic foam, a fiberglass basesheet mopped to the perlite, and a smooth surface APP modified bitumen torchdown. The torchdown has been surfaced with an aluminum coating.

The roof has received extensive patching of the torchdown seams, and the APP surface has severe craze cracking similar to that observed with ARC Premium, a product no longer made, as the manufacturer went out of business.

The roof has almost no slope for drainage. It appears the drains present were newly installed with the torchdown roofing. The roof drain lines appear to be small for the amount of roof area drained.

Leakage occurs into a food storage closet, that is directly below where conduit penetrate the roof.

The perimeter baseflashing is counterflashed by sheet metal flashing inserted into a cut-in reglet or covered by a surfacemount counterflashing pinned to the concrete. The windows on the apparatus bay limit the height and thickness of insulation and roofing.

## Discussion

The roof on Fire Station #6 is due for replacement immediately.

Because it may be a historic building, it may be necessary to review the perimeter flashing details, or consider other roof flashing options. One option (after removal of the existing roofing and insulation) is to install a lightweight concrete insulation system (Siplast NVS) to provide slope for drainage, provide additional drains and overflow drains, install a Siplast roof system consisting of an SBS basesheet, Paradiene 20 in adhesive, and a Paradiene 30TG torched in place. This is a relatively durable system when properly installed by approved contractors. A comparable system is made by Soprema.

It will not be possible to match the advertised R value for the phenolic foam insulation, as the product is no longer made. Other insulations have an R value ranging from R-5 to R-6.5 per inch of thickness.

It may be necessary to wrap the top of the parapet walls with a product such as Kemperol B165, a polyester reinforced fluid applied coating, that can wrap over the surface mount flashing, and waterproof the top of the wall.

The paint coating on the top of the wall will need to be evaluated for lead content, and dealt with appropriately, if required.

After removal of the existing roofing and insulation, the least expensive option is to install new flat isocyanurate insulation in hot asphalt,  $\frac{3}{4}$  inch perlite in hot asphalt, and a fiberglass basesheet covered by 4 plies of Type IV fiberglass plysheet with gravel surface in hot asphalt flood coat. Gravel surfaced roofs have good durability, and are probably most resistant to ponding water.

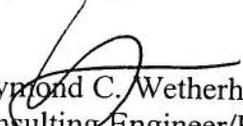
Replacement cost for the roof may be between \$16 and \$20/sf due to location and details required. Please note that our estimate is based on our experience with similar projects, and is not a "hard bid" as we are not contractors. In other words, the estimate is just that, an estimate.

In summary, the existing insulation and roof has to be removed and replaced with a new roof system. We have suggested two reroofing options, both of which are maintainable by non-roofing specialists.

Enclosed are photographs, photo log, and a roof plan from our site visit for your review with this report.

We trust the above discussion has been of assistance. If you have any questions, or if we may be of further service, please do not hesitate to call.

Respectfully,

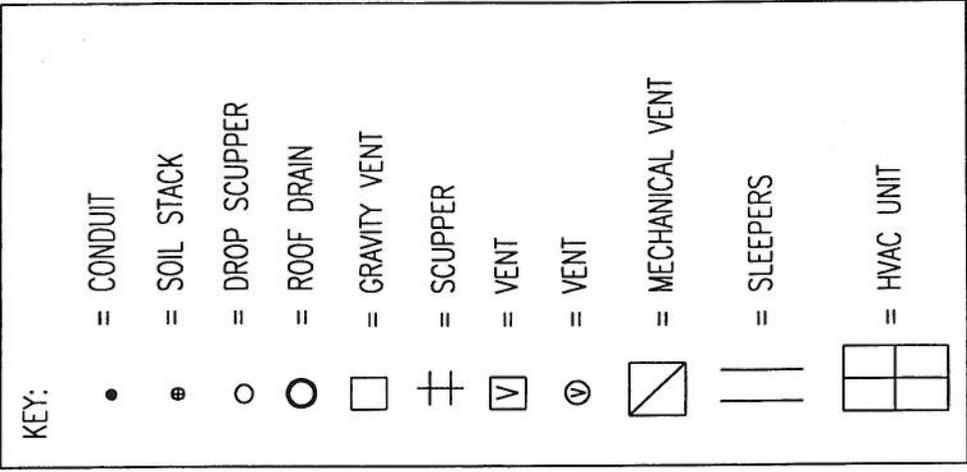
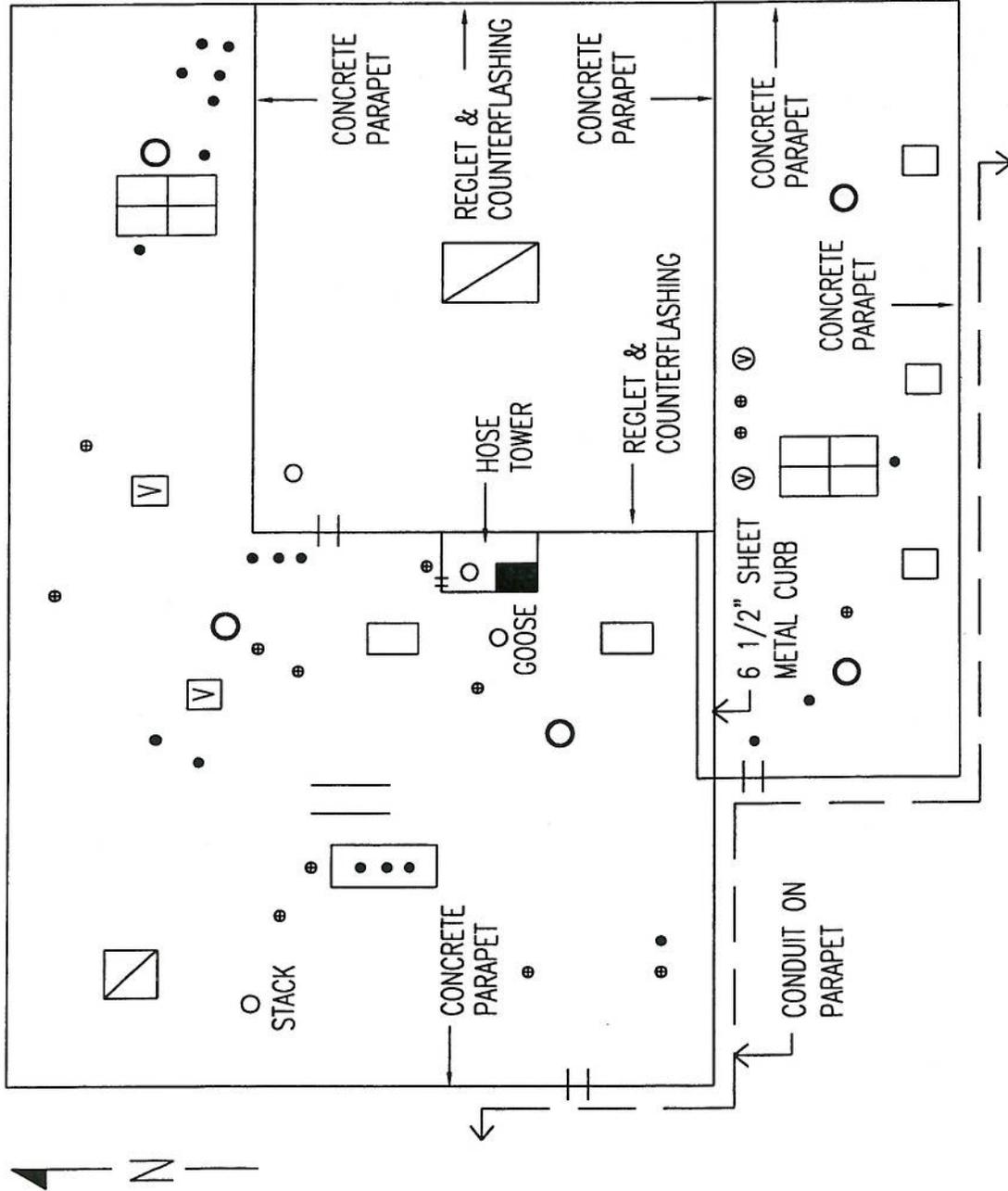
  
Raymond C. Wetherholt P.E./CPRC/CPWC  
Consulting Engineer/Roofing Consultant  
President, Wetherholt and Associates P.S.

Enclosures: photographs, photo log, roof plan

Please note that this inspection is provided at the request of Martha Turnbull, who represents the City of Seattle. No liability, warranty of merchantability, or guarantee of roof service life is accepted or implied. Wetherholt and Associates, P.S. is a neutral consulting engineering/roofing consulting firm specializing in resolving building and roof related problems.

**Photograph Log**  
**Fire Station #6**  
**June 23, 2000**

- Photograph 32-36: east then south across the roof from the northwest corner
- Photograph 1-4a: east across the south portion of the roof over the sleeping rooms and training area
- Photograph 5a: craze cracking of the torchdown surface directly through the aluminum coating
- Photograph 6a: window and roof-to-wall detail on the south side roof
- Photograph 7a: one of the spinner vent curbs. It appears that the torchdown was run up the outside of the curb without any counterflashing.
- Photograph 8a: exhaust fan system for the apparatus bay
- Photograph 9&10a: termination bar used on the roof on the north side and around to the hose tower
- Photograph 11a: conduit that entered the roof over the kitchen and office side. These will require field-soldered flashings. Leakage occurs directly below this location in the food area. Most likely due to leakage someplace else in the assembly.
- Photograph 12a: air conditioning unit on the north side, low roof area with skirtflashing installed and a diverter on the air intake – note the newer roof drain bowl
- Photograph 13-14a: single roof drain on the top of the apparatus bay roof, panorama of the roof
- Photograph 15a: roof drain with screen and overflow pipe above, on hose tower
- Photograph 16: roof drain for the apparatus bay roof, 2.5 inches diameter
- Photograph 17-20: south then west across the apparatus bay roof from the northeast corner. We need to verify that roof drains are adequately sized for this roof area.
- Photograph 21: northwest across the main roof
- Photograph 22: typical cracking of the roof surface, and mastic/webbing patching at seams
- Photograph 23: test cut showing phenolic foam and torchdown, on craze cracked surface
- Photograph 24: Fire Station from the front



N.T.S.

FIRESTATION #6  
ROOF PLAN

WETHERHOLT & ASSOCIATES, P.S.  
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DATE: 07/00

(NSP) G/ADDENDUMS/FORMS/RESPONSES/ROOMS/446