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December 27, 2011

Mr. Scott Alfonse, Director  
City of New Bedford  
Department of Environmental Stewardship  
133 William Street  
New Bedford, Massachusetts 02740

**Subject: Winter 2011 Cap Inspection  
Keith Middle School  
New Bedford, Massachusetts**

Dear Mr. Alfonse:

At the request of the City of New Bedford (City), TRC performed the eleventh inspection of the protective cap installed at the Keith Middle School Site located at 225 Hathaway Boulevard in New Bedford, Massachusetts. The inspection was performed in accordance with the currently-approved Long-term Monitoring and Maintenance Implementation Plan (LTMMIP) dated October 20, 2006 prepared by the BETA Group, Incorporated (BETA). The LTMMIP requires three inspections per year in April, August, and November to confirm that the cap is being properly maintained to prevent exposure to the impacted fill beneath.

An inspection of repairs addressing issues pertaining to animal burrows was performed by a TRC engineer on November 22, 2011. Because the elevator vaults were inaccessible during the August inspection, the remainder of the cap inspection was postponed until December to coincide with the annual elevator inspection, during which the vaults could be observed. The elevator vaults were inspected on December 5, 2011, and the remainder of the cap inspection was performed on December 15, 2011.

### **SUMMARY OF RESULTS**

The following issues were noted in the previous inspection report and have been addressed:

- Animal burrows in the northern cap slope were confirmed to be vacated and then filled with clean soil.
- The crack in the walkway near the community room has been repaired.
- Soil loss due to erosion near the northern entrance from Hathaway Boulevard has been restored with clean soil.

- The subsurface vault near the western science rooms has been inspected and sealed with hydraulic cement.

The following issues were noted during the December 2011 inspection, and require repair by the next scheduled inspection:

- A significant concrete crack is located at the western-most entrance to the north of the school.
- Significant asphalt cracks are located in the parking lots to the north and south of the school.
- The gaps at the seams in the asphalt at the entrances to the driveway/parking areas are wide enough to require repair or filling.
- A loss of soil occurred during an apparent shrub removal at a western entrance to the school.
- New animal burrows were observed on the north, south, and southwest slopes.

Although not necessarily required by the LTMMIP at this time, TRC recommends addressing the following items to prevent potential cap issues in the future, or to otherwise maintain the integrity of school property:

- Vegetation on the western and northern cap slopes appeared overgrown. Cap slopes should be mowed at least twice per year.
- Minor cracking was observed at a few locations in the concrete walkway at the north of the school.
- Caulking between the building walls and exterior walkways is deteriorating.
- The cap slope is sloughing in an area adjacent to the wetland west of the school, and is undermining the concrete fence support. A significant crack was observed in the concrete fence support. The current cap slope in this area is likely steeper than the intended design slope.
- The vegetation on the southern cap slope is sparse, and may not protect surface soils from erosion.

## **DESCRIPTION OF INSPECTION**

The December 2011 cap inspection consisted of a walking traverse of the entire Site with visual observations of the cap, including the first floor concrete slab of the building, the courtyard within the building footprint, and the concrete, asphalt and landscaped surfaces outside the building. Access to most locked rooms within the building was provided by the facility engineer, Gary Gomes and/or a school custodian. The inspection was documented in a log book, and areas where important features were discovered are depicted in Figure 1. Copies of the log book pages are presented as Attachment 1. The findings of the inspection are documented on a site-specific Cap Inspection Form (Attachment 2) provided in the LMMIP. Photographs taken during the inspection are presented as Attachment 3.

The standing water that was observed in the sub-slab vault adjacent to the western science classroom during the previous two inspections was dry during this inspection, and there was no sign that standing water had occurred in recent months. Following the August 2011 inspection,



the vault was pumped out and inspected by the City of New Bedford. No evidence of cracks or leaks were observed and the joints were re-sealed with hydraulic cement.

The source of the vault water observed in previous inspections is still unknown, but could be related to a plumbing issue. The vault space is traversed by drain lines from the science rooms.

Based on TRC's inspection, the concrete floor within the footprint of the building is currently acting to prevent exposure to the impacted fill beneath. Four minor cracks were previously noted in the boiler room floor and still do not present a significant issue at this time. Three very minor cracks were also observed in storage room 44, and also do not require repairs at this time.

The courtyard area within the building was acceptable. The concrete walkway leading to the western-most entrance at the north of the building exhibited a significant crack, and a piece of the concrete walkway had become dislodged. This crack will need to be repaired. The concrete walkways at the north of the school exhibited several other minor cracks that appeared less than 1/4-inch wide, and will be monitored in future inspections.

Cracks greater than 1/4-inch were also observed in the asphalt parking lots and should be scheduled for repair. The asphalt seams at the entrances to the school parking lots have become greater than 1/4-inch and should be repaired. Repair of the asphalt cracks and seams could be completed with an elastic asphalt filler/sealer or similar product.

The grass cover on the northern and western cap slopes appeared overgrown. The LTMMIP requires mowing of the cap slope a minimum of two times per year as a Best Management Practice.

In several areas around the exterior of the school building, a bead of caulking has been installed in the joint between the foot of the brick building walls and the concrete walkways. The caulking prevents weather elements (i.e., rain, snow, and ice) from entering the joint space. As noted in previous reports, the caulking appeared deteriorated in several areas, and was observed separating from the wall and walkway surfaces. Although conditions were not indicative of a potential for soil exposures, TRC recommends repair/replacement of the caulking. Continued infiltration of weather elements into the joint could eventually separate and deteriorate the walkway.

The landscaped areas around the exterior of the building were acceptable with the exception of the following:

- Several new small holes were observed along the northern and southern edge of the cap, which appear to have been burrowed by small animals.
- Sloughing riprap is undermining the concrete fence support at the top of the slope, and filling the outlet of the storm water drainage culvert on the west side of the Site. Areas of soil erosion were observed along the upper slope, as well as a crack in the concrete fence support. The area appears relatively stable at this time, but the condition is likely due to an increase in steepness beyond the cap design slope. The crack in the concrete fence support is not



identified as a cap integrity issue, but should be addressed to maintain the integrity of the fence.

- Evidence of shrub removal was observed near the western entrance , which has resulted in a loss of approximately six to twelve inches of soil. The soil at this location requires replacement in order to maintain the integrity of the cap.
- Vegetation is sparse along the southern edge of the cap. Significant rills in the surface soil were not visible at this time, but adding topsoil and perennial vegetation may prevent future erosion in this area.

## **CONCLUSIONS**

At this time the black separation fabric that demarcates the underlying contaminated fill from the clean imported fill is not visible, and exposures to the impacted fill beneath the cap are being prevented. However, the issues identified in this report should be addressed in order to prevent further cap damage or erosion that could eventually expose the separation fabric.

Please refer to the attached Cap Inspection Form and photographs for additional details concerning the conditions described above.

If you have any questions, please contact either of the undersigned at 978-970-5600.

Sincerely,

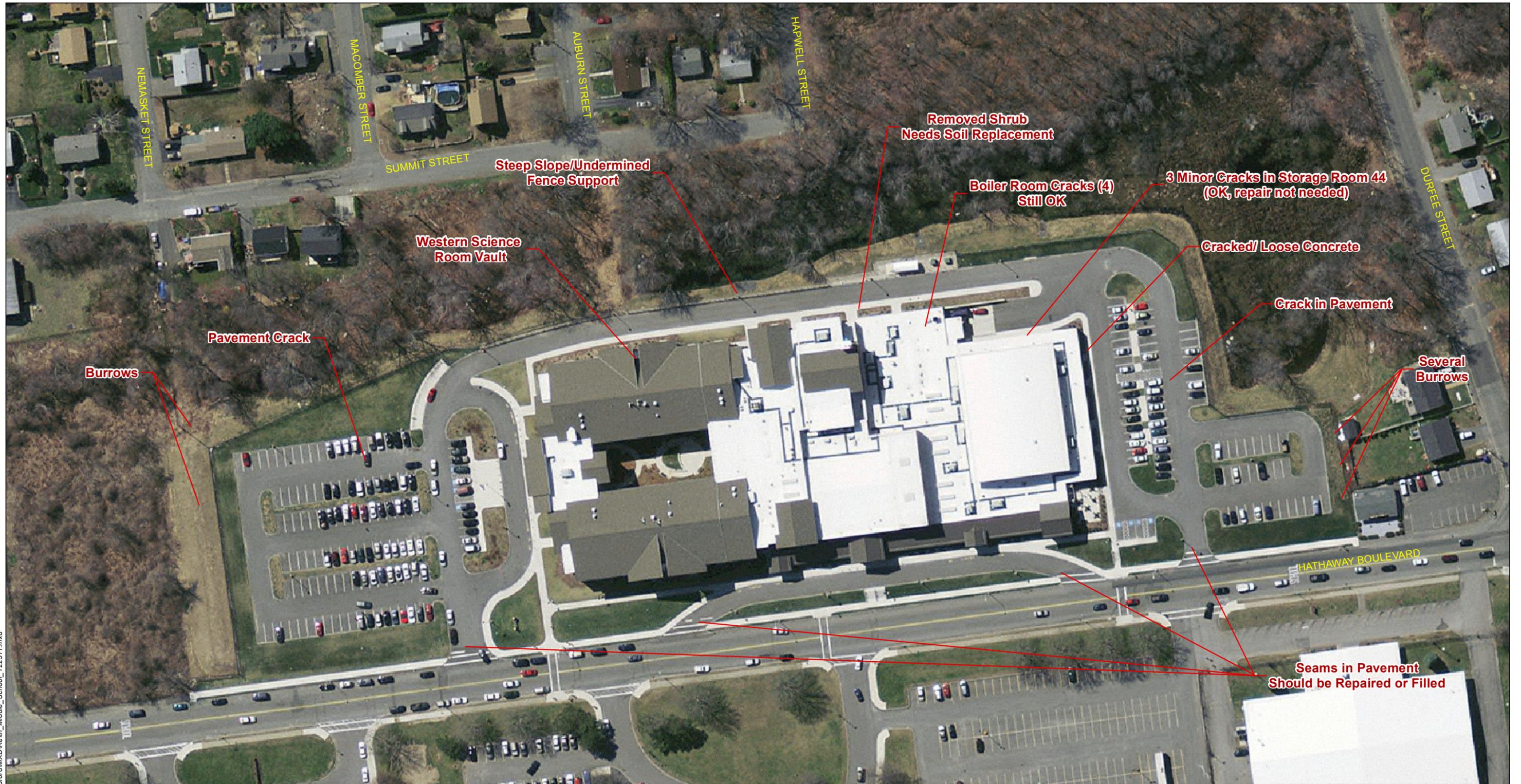


David M. Pettit  
Project Engineer



David M. Sullivan, LSP, CHMM  
Senior Project Manager

Attachments

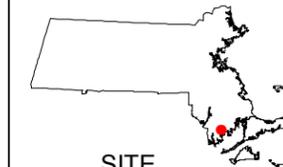


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Base map: 30 cm Imagery, MassGIS 2009

MASSACHUSETTS



SITE LOCATION



Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
978-970-5600

**SITE MAP**

**KEITH MIDDLE SCHOOL**

**NEW BEDFORD, MA**

FIGURE 1

DECEMBER 2011

# **Attachment 1**

## **Log Book**

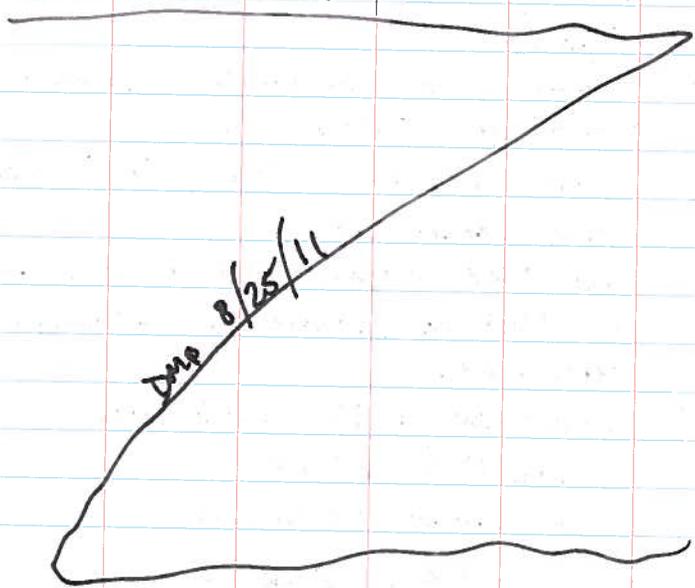
8/25/11 KMS Cap Inspection DMP

0745 Concrete curb is still undermined above a western outfall. Slope is too steep here.

0950 slope repair (previous) looks good. (Western portion of cap. south of land bridge)

10:00 Southwestern edge is poorly visible due to knotweed. Southern edge of cap looks very prone to erosion, but no serious rills now. This area should have topsoil, as vegetation is very sparse. (soil is too sandy)

10:15 Return keys to custodian  
DMP OFFSITE



12/15/11 KMS Cap Inspection DMP

0630 DMP ONSITE 450 light rain  
Start boring school in boiler room

0650 Meet Cheryl Henkin

0700 Cracked tile in West boys room floor - not significant

0710 Western science room vault is dry, hydraulic cement was used around cracks

0750 Observe 3 minor cracks extending East/West across storage room 4A, adjacent to gymnasium.

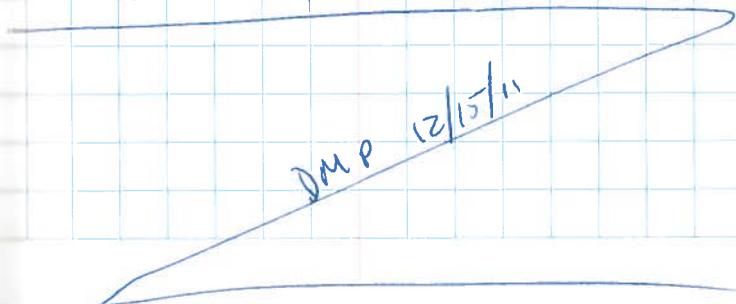
0810 cracked concrete at western-most entrance at North of school.

0815 crack in pavement in northern parking lot

0820 Several burrow entrances on northern parking lot slope, on KMS side of fence  
0840 burrows at south end - 1 in knotweed at SW corner, 1 in slope on southern limit.

0850 Need to replace soil from shrub removal at western entrance near LPG tank

0910 DMP OFFSITE



**Attachment 2**  
**Cap Inspection Form**

## CAP INSPECTION FORM KEITH MIDDLE SCHOOL

Use this inspection form to document cap inspections. If unacceptable conditions are observed, complete an additional form immediately after repairs are completed.

Inspection Dates: November 22, 2011 (Northern Cap Slopes), December 5, 2011 (Elevator Vaults), and December 15, 2011 (Remaining Areas)

Inspection by: David Pettit, TRC, and Cheryl Henlin, City of New Bedford

A. ASPHALT AND CONCRET PAVING – observe asphalt and concrete paving for cracking, holes, asphalt removed during construction, other damage.

Cracking of the concrete sidewalks was observed, some cracks require repair and others will be monitored during future inspections.

All Asphalt and concrete paving acceptable?  YES  NO

If no, attach photograph

If no, describe unacceptable condition:

Location:

- 1) Walkway leading to the northwest entrance of the school.
- 2) Several areas, including service way entry, and the patio at the northeastern portion of the building.
- 3) At the entrances to the KMS parking lot from Hathaway Boulevard and parking lots north and south of the school.
- 4) Several locations along the concrete walkways.

Condition:

- 1) Significant crack and loose piece of concrete walkway, see Photograph #6. This section of the concrete walkway should be replaced or repaired.
- 2) Caulking in joints between brick walls and concrete walkways is deteriorating.
- 3) Separation of the seams of the asphalt parking lot entrances and cracks greater than ¼-inch in parking lots, see Photographs #13 and #14.
- 4) Minor cracks were observed at several locations along the concrete walkways, see Photographs #7 and #8. These cracks appear ok at the present time, but may require repair in the near future.

Describe any repairs to asphalt and/or concrete paving conducted since previous inspection:

A significant crack in the concrete walkway was successfully repaired, see Photograph #9.

All repairs adequate  YES  NO      Photograph of repair attached

B. INTERIOR CONCRETE FLOORS – observe concrete for cracking, holes, concrete removed during construction, other damage.

Four cracks in the boiler room floor are less than ¼-inch wide, see Photograph #3. Pipe penetrations appeared intact, see Photograph #4. Three minor cracks in storage room 44 are also less than ¼-inch wide, see Photograph #5. The majority of interior concrete floors are covered with tiles or other type of flooring material. Based on visual inspection and conversations with current employees, there are no breaches or other significant damage or deterioration of the interior surficial flooring materials or, where visible, concrete floors. No construction was occurring within the building at the time of the inspection.

All interior concrete floors acceptable?  YES  NO

**If no, attach photograph**

If no, describe unacceptable condition:

Location:

Condition:

Describe any repairs to interior concrete floors conducted since previous inspection:

Standing water was pumped out of the sub-slab concrete vault located adjacent to the western science classrooms. Evidence of a breach was reportedly not observed by City personnel during the pump-out event, but the joints were re-sealed with hydraulic cement. No standing water has been observed in recent months; see Photographs #1 and #2.

All repairs adequate  YES  NO      Photograph of repair attached

C. LANDSCAPING – observe landscaping for erosion animal holes, excavation, erosion control vegetation health.

**All landscaped areas acceptable?**  YES  NO

**If no, attach photograph**

If no, describe unacceptable condition:

Location:

- 1) The steep slope just above the wetland, to the west of the southern parking lot and school
- 2) The landscaped area near the western entrance to the school.
- 3) The slopes to the north and south of the school.

Condition:

1) The structural integrity of the fence may be compromised if the sloughing and erosion continues, see Photograph #15. A crack in the concrete fence support was also observed, see Photograph #16. The cap soils beneath the riprap may also become exposed and susceptible to erosion. The area appears stable at the moment, but the condition is likely due to an increase in steepness beyond the cap design slope. The extent of erosion seems similar to the conditions observed during several previous inspections. See inspection report letters dated August 31, 2011 and May 4, 2011.

2) A shrub was removed causing a loss of soil in the landscaped area near the western entrance to the school, see Photograph #10. This location needs to be filled with soil in order to maintain the integrity of the cap at this location.

3) New animal burrow holes were observed on the slopes to the north, south, and southwest of the school, see Photograph #17.

Describe any repairs to landscaping since previous inspection:

Landscaped areas adjacent to the concrete walkway entering the school building at the northern entrance from Hathaway Boulevard were repaired with soil to prevent erosion, see Photographs #11 and #12. Animal burrows identified during previous inspections appeared to be vacated and were backfilled with clean soil. See Photograph #19.

All repairs adequate  YES  NO      Photograph of repair attached

D. Areas Not Inspected:

1) All rooms were inspected. The elevator vaults were inspected during a routine elevator inspection on December 5, 2011.

Reason:

Additional Notes:

1. Some minor erosion had occurred in the past on the southern slope of the cap, as noted in the prior inspection report (dated August 31, 2011). Vegetation is present, although sparse in some areas, see Photograph #18. It is recommended that additional topsoil and shallow-rooted vegetation be added to limit future erosion.

## **Attachment 3**

### **Site Inspection Photographs**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**



**1) Dry science room vault.**



**2) Dry science room vault.**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**



**3) Minor crack in boiler room floor.**



**4) Pipe penetrations in the boiler room.**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**



**5) Minor crack in storage room 44 floor.**



**6) Significant crack and loose piece of concrete in walkway leading to western-most entrance at north end of school.**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**



**7) Minor crack in concrete walkway.**



**8) Minor crack in concrete walkway.**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**

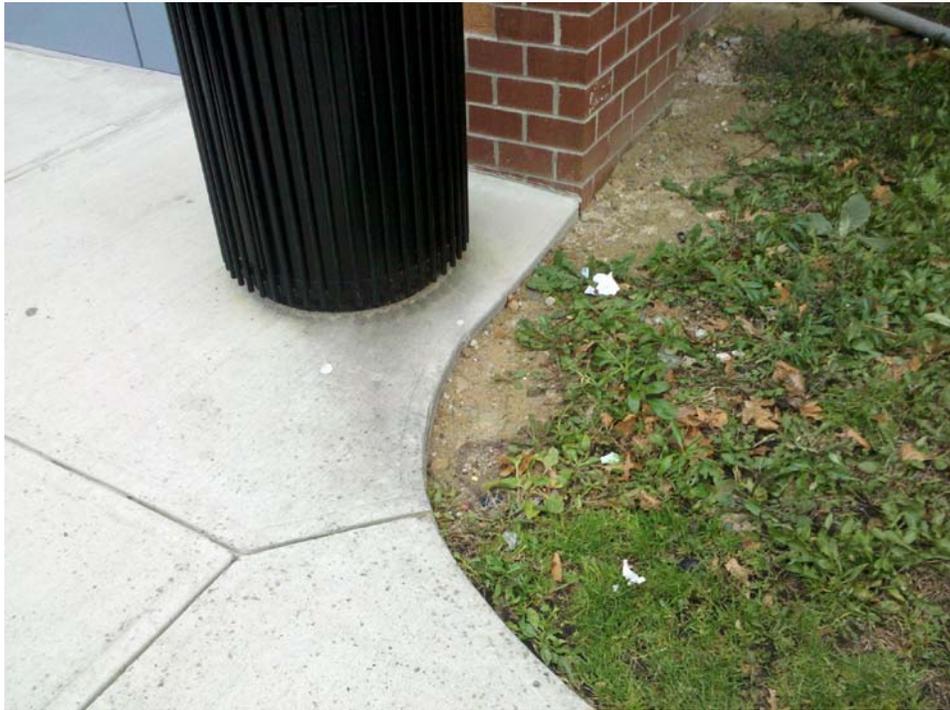


**9) Significant crack repair in walkway leading to community room area.**



**10) Soil loss due to shrub removal.**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**



**11) Repair to prevent undermining of concrete walkway.**



**12) Repair to prevent undermining of concrete walkway.**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**



**13) Crack in asphalt parking lot north of school.**



**14) Seam in asphalt pavement at school entrance.**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**



**15) Undermining of concrete structure for fence west of school.**



**16) Crack in concrete fence support.**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**



**17) Animal burrow south of school.**



**18) Sparse vegetation on portion of cap south of school.**

**SITE PHOTOGRAPHS**  
**December 2011 Cap Inspection**  
**Keith Middle School**  
**New Bedford, Massachusetts**



**19) Repaired animal burrow on slope north of school.**