

Stillwater School District| Project Update

Conditions Assessment – Wall & Floor

Cracking Evaluation

March 24, 2025

Design.
Innovation.
Vision.



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Introduction of Assessment Team

Conditions Assessment

- Summary
- History of Cracking
- Architectural Assessment
- Civil Assessment
- Soil Assessment
- Conclusion
- Recommendations
- Schedule
- Proposed Funding Options

Conditions Assessment Review

ARCHITECTURE | INTERIOR DESIGN | ENGINEERING

ENV

Stillwater Township School

Stillwater, NJ

Wall and Floor Cracking Investigation & Report





NEW JERSEY

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Environetics Group Architects, PC

ENV Project No. 23147
April 16, 2024

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ENV

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Appendix 1- Existing Conditions Documentation (6 pages)
Appendix 2- Photographs (19 pages)
Appendix 3- Geotechnical Report (42 pages)
Appendix 4- Storm Line Inspection Report (3 pages)
Appendix 5- Historical Correspondence/Documentation (324 pages)

ENV

The purpose of our investigation was to understand the cause of various cracks in the walls and floors of the 1988 classroom and gymnasium addition. We documented the existing cracking, deterioration and deficiencies, performed geotechnical investigations, and reviewed available drawings specifications, reports and documents.

The classroom and gymnasium addition has approximately an 11,000sf footprint with approximately 4,700sf being a 2-story classroom section.

Stillwater Township Elementary School

- **1988 Addition – Project Team**
  - Designed by Charles Schaffer & Associates of Newton, NJ
  - MEP Engineering: Lloyd Engineering Co., Warren, NJ
  - Structural Engineering: Jorgenson Associates Consultant Eng.
  - Geotechnical Engineer: Melick-Tully & Associates Inc.
  - General Contractor was Vanas Construction Co., Bogota, NJ



- **Reviewed Existing Documentation**
  - Construction Drawings
  - Specs
  - Original Geotechnical Report

- **Existing Construction**
  - Masonry walls and pilaster with face brick, stucco and prefabricated wood roof trusses
  - Filled CMU and poured concrete foundations (Northend of Gym)
  - Continuous concrete wall footings (30” wide x 11” thick. Set 36”-28” below grade)
  - Concrete column/pilaster footings (5’x5’x11” thick. Set 44” below grade)
  - Steel floor joists and concrete deck, slab on grade on the lower level in the classroom section

Cracks in walls started to develop almost from the beginning…

In 1989, Heikki K. Elo Consulting Engineers P.C. of Easton, PA was retained to investigate cracking which was prevalent on the northside of the gym.

- **Findings**
  - Foundation had not settled and the expansion joints on the wall were not installed and/or were not installed properly
  - Recommended that 4 expansion joints to be installed

- **Outcome**
  - Architect developed the details and Vanas installed new expansion joints in 1989
  - Vanas also in 1989 returned to repair small hairline cracks that were observed and documented by the district. These cracks were primarily at wall intersections and were considered to be normal settlement cracks.



Since 1989, the cracking has been an ongoing issue leading to recent efforts

2016

- Large cracks were visible throughout the gym, Parette Somjen implemented a crack monitoring program with meters at 5 locations
- Over 3 years, of monitoring and observation, the cracks appeared to have “minor to no movement”

2020

- Cracks in the gymnasium were filled and repaired
- Since those repairs new cracks have appeared and some of the old ones have been reopened



Types of Wall Cracks Observed:

- *Mortar Joint Cracking*
  - These cracks follow mortar joints and can also appear/telegraph in a matching pattern on stucco surfaces.

- *Masonry Unit Cracking*
  - Vertical cracks through the body of the masonry units themselves.

- *Vertical Corner Cracking*
  - Cracks at the vertical intersection of walls, sometimes causing a gap or separation between the walls.

- *Harline Stucco Cracking / Telegraphing*
  - Cracks at the vertical intersection of walls, sometimes causing a gap or separation between the walls.

- All these types of cracks can be caused by a combination of issues:
  - Settlement or uneven settlement
  - Thermal expansion
  - Earth movement
  - Water infiltration



Mortar Joint Cracks



Masonry Unit Cracks



Vertical Corner Cracks

ENV

SERIOUS Cracks Observed:

- Horizontal cracking
- Masonry unit cracking
- Significant vertical corner cracking

These can indicate serious structural issues exist.

Not as Serious Cracks Observed:

- Hairline Stucco Cracking
- Telegraphing hairline cracks in stucco
- Types of Floor Cracks Observed:
  - Perimeter cracking at joint between floor slab and walls and at door thresholds, generally caused by settlement
  - Diagonal cracking radiating from the exterior wall into the field of the concrete slab. Generally caused by settlement or soil conditions but more serious when there is a change in elevation on either side of the crack





Gym Area Cracks Observed

- *Exterior Walls*
  - Diagonal mortar joint including telegraphing through stucco

- *Primarily East Elevation*
  - SIGNIFICANT new vertical cracking near the mechanical room door

- *Interior Walls*
  - Hairline vertical cracks, including cracked CMU units
  - Vertical wall and corner cracking on East Side
    - ¼” cracking or more
- *Floors*
  - Perimeter floor cracking in the entire perimeter of the gym
  - Cracking along the east wall door thresholds
  - Significant diagonal cracking at north wall door thresholds





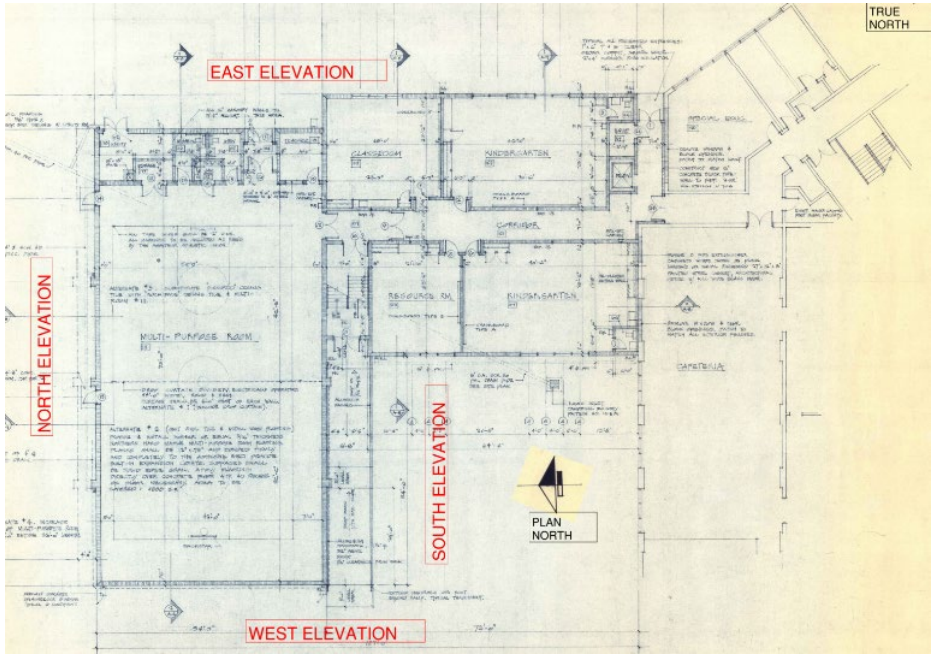


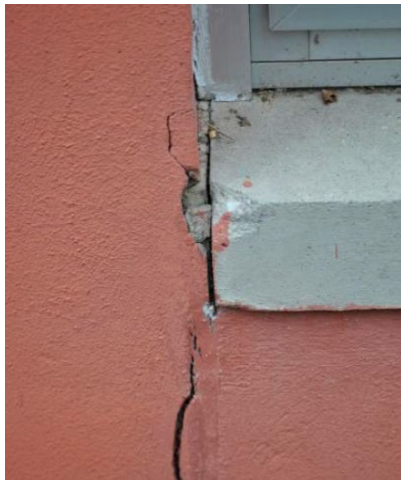
Two Story Classroom Addition

- *Exterior Walls*
  - Vertical cracking in the stucco from the windowsills to grade
  - Mortar joint cracking
  - Significant diagonal wall cracking by where classroom and gym meet
  - Eroded mortar joints

- *Interior Walls*
  - Vertical corner cracking

- *Floors*
  - Limited visible cracking, primarily along the east wall on the ground floor
  - Significant area of cracking and settlement at the south end corridor exit exterior concrete slab





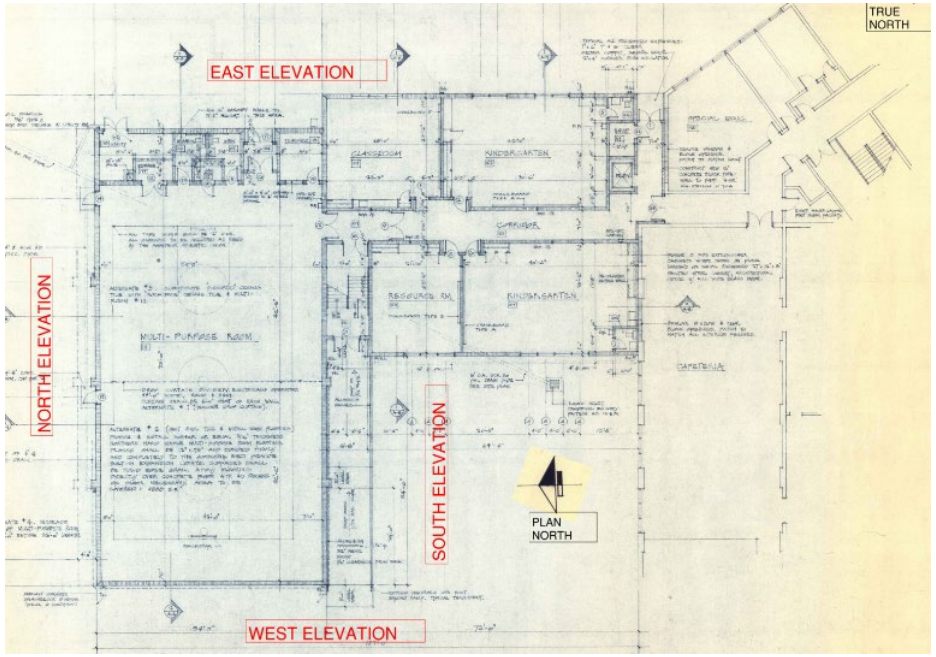


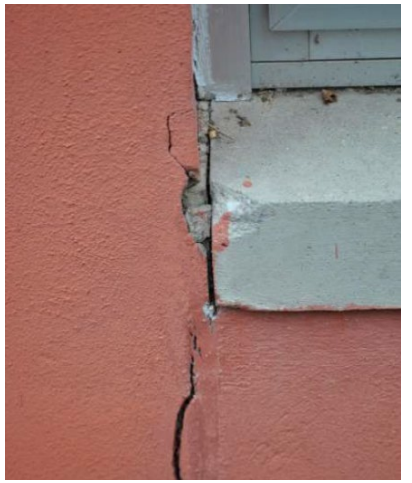
The types of floor and wall cracking observed are not unusual. They are typically caused by one or both of the following:

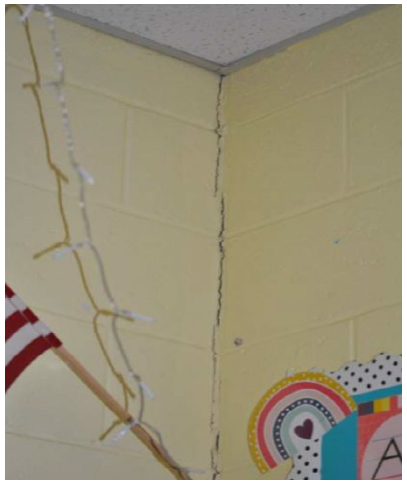
Settlement: Some small amount of settlement is to be expected over time and is typically hairline cracks. They can also appear after events that can impact subsurface soils, such as flooding.

Inadequate expansion & control joints: These type of joints are installed to allow for thermal movement of materials and control cracking by providing “planned cracks”

The quantity, size, and extended period of time that they have been occurring is unusual and concerning and points to a subsurface soil condition issue.







Civil Engineering Assessment

Civil (Storm Water Drain Lines)

- PVC storm drain line runs from a lawn inlet in the courtyard area under the gym building and out to the east side
  - On 12/11/2023 a video inspection of this drain line was completed the inspection indicated that the PVC pipe was clear and appeared intact
  - The pipe was “misaligned”, but the pipe was clean of debris
  - There may be a debris blockage or possibly a break in the pipe outside of the building and near the pipe outlet. This drainpipe does not seem to be a factor in subsurface conditions under the Addition.



Soil Assessment

1986 Geotechnical Report

- Original geotechnical prepared by Melick-Tully & Associates Inc. and a copy was available for review.
  - Documented Subsurface Condition
    - Depth of the fill ranged 10’-24’ (depending on location)
    - Fill was considered ***medium dense to dense*** and the natural soil was ***medium dense***
    - Groundwater was below 19’



Melick-Tully concluded that the addition could be safely supported on conventional shallow foundations with some recommendations including:

- Adding drainage systems at below grade walls
- Compaction of subgrade soil to a firm and unyielding consistency
- Compaction of backfill to 95% density
- Modifications to the steep slope at the southeast corner to minimize erosion after construction
- Foundation design included estimated post construction settlement of 1/2” or less

Soil Assessment

Current Day Assessment

Sor Consulting Engineers performed **7 borings** up to a depth of 44’ and excavated **2 test pits** along the North wall of the Gym to a depth of 4’

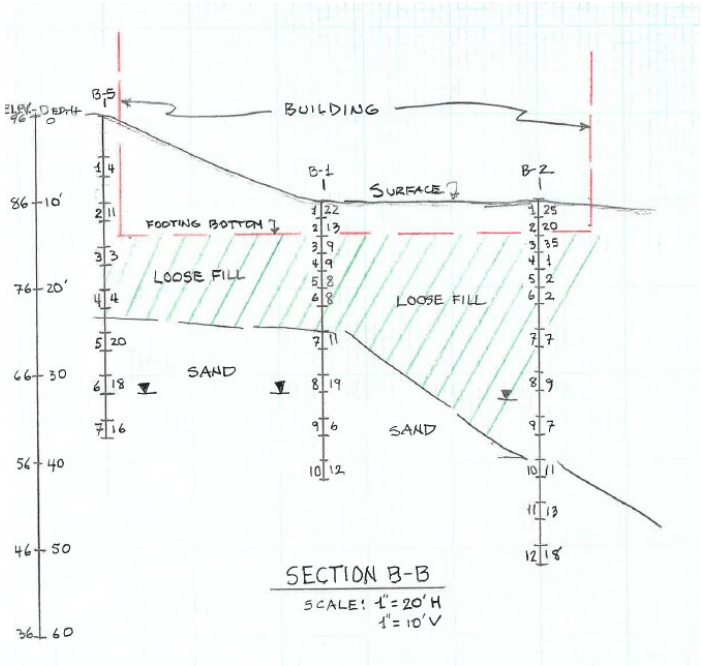
Current Subsurface Condition:

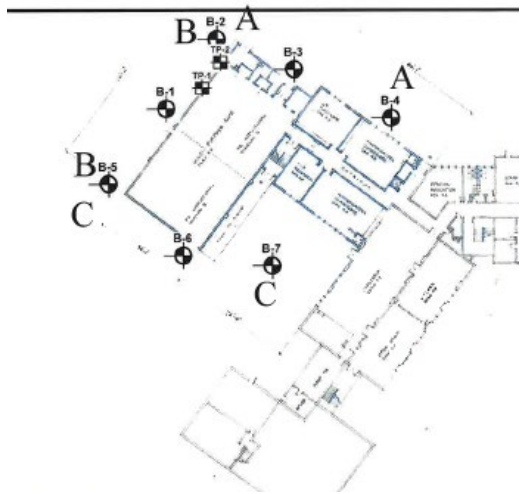
- Currently consists of 4”-6” of topsoil
- Fill material to depths of 8’-30’ and natural soil that was ***silty sand***
- Fill material to 4’-6’ was *medium compact to* ***loose*** condition
- Groundwater was encountered at depths of 22’-32’ below grade.

Loose *to* ***very loose*** below 4’-6’. The silty sand natural soil is in a ***medium dense*** condition.

The test pits revealed that the Addition is supported on continuous wall footing at a depth of 38” below grade with column footings at 44” below grade.

The soil below the foundations is ***loose to very loose*** fill





Conclusion

Based on their findings, Sor Consulting Engineers has concluded that:

- The addition foundations and floor slabs are supported on fill material that is in a *loose* condition
- The existing fill does not appear to have been placed and compacted in a controlled manner and has settled unevenly, causing distress to the addition which is appearing as cracks in the walls and floors
- Sor has concluded that the fill in its current condition **is not capable of providing adequate support for the addition** and that the walls and slab will continue to be in distress due to differential settlement

The condition of the subsurface soil and the Addition itself indicates that the settlement is still occurring and will continue to occur for the foreseeable future and at some point, compromise structural elements.

- Foundation walls and exterior walls will be under increasing stress that may lead to structural cracking and displacement, compromising the structural integrity of the structure and requiring costly reconstruction
- Below grade and in-wall utility pipes and conduits can become stressed and break, compromising building infrastructure and requiring more costly repairs.

The stress and future deterioration will most likely be uneven and unpredictable
We recommend within the next 12-24 months that this be repaired to lessen the risk of comprising the structure

Recommendations

1. Building Foundation Stabilization

Foundation Support: HELICAL PILE

- Re-supporting the foundations by installing helical piles that extend through the unsuitable soil and at least 7’ into natural soils
- Attach piles to the existing concrete foundation by steel brackets
- Anticipate that piles will need to be approximately 5-10’ apart on all or part of each side of the addition
- Inspect and repair sub-surface utility pipes, conduits and structures adjacent to the building area
- Restore the site and landscaping around the 1988 addition

Concrete Floor Slab Support: IN-PLACE SOIL STABILIZATION BY COMPACTION GROUTING

- Small diameter holes are drilled in the concrete slab, 5’-7’ apart and extending down into the suitable soil
- Portland cement-based grout is then pressure injected into the soil in stages to fill any voids allowing the fill to densify
- Patch and relevel concrete floor slab and apply new finish

As an alternative to patching the concrete slab, after the grouting work is completed:

- Remove entire slab and replace it with a new reinforced concrete slab supported on grouted soil and crushed stone
- This will provide a stable and level surface for new synthetic or wood sports flooring

Recommendations

2. After Stabilization

- Exterior masonry repairs and pointing
- Expansion joint caulking
- Window and door perimeter caulking
- Stucco repairs
- Interior floor cracking repairs
- Interior wall crack repairs at wall and corners
- Gym area bathroom renovations to replace floor and wall tile





Final Summary

Due to the extent and nature of the work and the time required, the district should consider a full renovation of the gym at the same time as all the equipment is 35 years old and new materials can improve energy efficiency.

Renovation could include:

- New HVAC controls
- LED lighting and finished ceiling
- Athletic flooring system
- Window replacement
- Gym equipment
- Painting, new doors and frames

Phase: Stabilization and Floor Finishes	
Preparation of Construction Drawings	12 Weeks
Bidding	5 Weeks
Construction	20 Weeks
For Optional Gym Renovation Work Add the Following to Above Schedule	
Preparation of Construction Drawings	4 Weeks
Bidding	No Change
Construction	10 Weeks
Phase: Exterior Crack Repairs	
Preparation of Construction Drawings	8 Weeks
Bidding	5 Weeks
Construction	8 Weeks
Phase: Interior Crack Repairs & Bathroom Renovation	
Preparation of Construction Drawings	10 Weeks
Bidding	5 Weeks
Construction	10 Weeks

Stabilization & Floor Finishes

Construction Cost:	$1,616,110
Soft Costs:	$657,833
Total Project Cost:	**$2,273,943**

Exterior Crack Repairs

Construction Cost:	$426,584
Soft Costs:	$138,975
Total Project Cost:	**$565,559**

Interior Crack Repairs & Bathroom Renovations

Construction Cost:	$1,706,980
Soft Costs:	$518,094
Total Project Cost:	**$2,225,074**

Funding Option

- Capital Reserve
- Lease Purchase
- Referendum

Funding through Referendum

Local Share 60% of Project Costs	$3,102,046
State Share 40% of Project Costs	$2,068,030
Total Project Cost	**$5,170,076**

Thank You