GLENDALE
ELEMENTARY SCHOOL DISTRICT

GLENDALE ELEMENTARY SCHOOL DISTRICT
SFB PROJECT RECAP

Prepared by:

SPS+ Architects, LLP
8681 E. Via De Negocio
Scottsdale, Arizona 85258

08.25.16 Issue Date
09.02.16 Reissued with updates

Glendale Elementary School District SFB Projects: Construction Cost Estimates

BRG:	Project:	Scope: Updated 9/1/16	Cost Estimate:
070440101-9999-003-BRG	Landmark Reseal		
	Phase 1	Sister wall: this is inclusive of footings, spoil removal, backfill, drilling, doweling, install and everything in the details and put back like we were never there.	$ 907,038.00
		Adjustments required for sister wall installation; extend electrical, downspouts, relocate irrigation boxes and other conflicts	$ 227,541.00
		Estimated Phase 1 Subtotal	**$ 1,134,579.00**
	Phase 2	Installation of masonry control joints/repair CMU	$ 40,000.00
		Weatherproof at new materials: Blockfill of new masonry and coating of Drylok extreme at exposed footing	$ 11,000.00
		Drainage corrections to remove turf and irrigation against building and replace with decomposed granite from face of wall to 5'-0" away from building	$ 46,765.00
		Estimated Phase 2 Subtotal	**$ 97,765.00**
		Estimated Total Repair:	**$ 1,232,344.00**

070440101-1001-009-BRG	Landmark Structural		
	Phase 2	Gervasio report regarding media center cracks	$ 150,000.00
		Gervasio report regarding gym cracks	$ 20,000.00
		Gervasio report regarding column cracks	$ 25,000.00
		Estimated Phase 2 Subtotal	**$ 195,000.00**
		Estimated Total Repair:	**$ 195,000.00**

070440111-9999-004-BRG	Challenger Reseal		
	Phase 1	Sister wall: this is inclusive of footings, spoil removal, backfill, drilling, doweling, install and everything in the details and put back like we were never there.	$ 870,756.00
		Adjustments required for sister wall installation; extend electrical, downspouts, relocate irrigation boxes and other conflicts	$ 225,296.00
		Estimated Phase 1 Subtotal	**$ 1,096,052.00**
	Phase 2	Installation of masonry control joints/repair CMU	$ 60,000.00
		Beam bearing cracks	$ 30,000.00
		Riddle blockfill of new masonry and coating of Drylok extreme at exposed footing	$ 11,000.00
		Estimated Phase 2 Subtotal	**$ 101,000.00**
		Estimated Total Repair:	**$ 1,197,052.00**

070440111-1003-002-BRG	Challenger Structural		
	Phase 2	Gervasio crack repair	$ 20,000.00
		Estimated Phase 2 Subtotal	**$ 20,000.00**
		Estimated Total Repair:	**$ 20,000.00**

Glendale Elementary School District SFB Projects: Construction Cost Estimates

BRG:	Project:	Scope: Updated 9/1/16	Cost Estimate:	
070440111-9999-005-BRG	Challenger Drainage			
	Phase2	Chasse Estimate	$	273,966.25
		Estimated Phase 2 Subtotal	**$**	**273,966.25**
		Estimated Total Repair:	**$**	**273,966.25**
070440106-9999-011-BRG	Mensendick Drainage			
	Phase2	Chasse Estimate	$	250,133.25
		Estimated Phase 2 Subtotal	**$**	**250,133.25**
		Estimated Total Repair:	**$**	**250,133.25**
070440106-9999-010-BRG	Mensendick Structural			
	Phase 1	Temporary bracing of non-structural CMU walls - 55 panels	$	192,500.00
		Estimated Phase 1 Subtotal	**$**	**192,500.00**
	Phase 2	Installation of masonry control joints/repair CMU	$	80,000.00
		Securing of decorative wythe of CMU	$	60,000.00
		Repair of CMU surround the stair stepped cracks	$	100,000.00
		Install helical piers	$	400,000.00
		Grout injection of slab	$	100,000.00
		Repair of the cracked CMU and rusted reinforcing	$	250,000.00
		Riddle blockfill of new masonry, reseal with 10 year weatherization warranty and coating of Drylok extreme at exposed footing	$	200,000.00
		Remove turf and irrigation against building and replace with decomposed granite from face of wall to 5'-0" away from building	$	52,000.00
		Estimated Phase 2 Subtotal	**$**	**1,242,000.00**
		Estimated Total Repair:	**$**	**1,434,500.00**
070440103-9999-013-BRG	Smith Structural and Drainage			
	Phase 2	Installation of masonry control joints/repair CMU	$	100,000.00
		Install helical piers	$	500,000.00
		Grout injection of slab	$	100,000.00
		Riddle blockfill of new masonry and coating of Drylok extreme at exposed footing	$	8,000.00
		Remove turf and irrigation against building and replace with decomposed granite from face of wall to 5'-0" away from building	$	40,000.00
		Chasse Drainage estimate	$	57,738.75
		Estimated Phase 2 Subtotal	**$**	**805,738.75**
		Estimated Total Repair:	**$**	**805,738.75**

Phase 1 Total:	**$**	**2,423,131.00**
Phase 2 Total:	**$**	**2,965,603.25**
Total Estimated Construction Cost:	**$**	**5,388,734.25**

SPS+ ARCHITECTS
Robert L Pian, AIA
William R Pittenger, RA, CSI
Mark A Davenport, AIA, LEED AP
Herb W Schneider, FAIA
Howell Lewis Shay, AIA

September 2, 2016

RE: **GESD SFB Deficiency Corrections**
Landmark, Challenger, Mensendick and Smith

Please see below for a summary of work at each site:

Landmark (070440101-1001-009, 070440101-999-003): Constructed in 1987

- Structural: Our engineer agrees with the Gervasio reports for structural repairs at the gym, media and admin areas. This includes weatherization painting at areas of repair.
- Weatherization/Structural: please see below.
- Drainage corrections: This includes removal of turf and irrigation against buildings and replacement with decomposed granite from face of wall to 5'-0" away from building.

Challenger (070440111-1003-002, 070440111-999-004, 070440111-999-005): Constructed in 1987

- Structural: Our engineer agrees with the Gervasio reports for structural repairs. This includes weatherization painting at areas of repair.
- Weatherization/Structural: please see below.
- Civil: Construction documents are complete to make repairs at areas that get flooded.

Mensendick (070440106-9999-010, 070440106-9999-011): Constructed in 1966/1958

- Structural: Recommends to make repairs to cmu and interior slabs for functionality, weatherization and safety reasons. Weatherization/Structural: please see below. This includes weatherization painting at areas of repair.
- Civil: Construction documents are complete to make repairs at areas that get flooded.
- Drainage corrections: This includes removal of turf and irrigation against buildings and replacement with decomposed granite from face of wall to 5'-0" away from building.

Smith (070440103-999-013): Constructed in 1952

- Structural: Recommend making repairs to the masonry and interior slabs to increase functionality and weatherization. The estimate includes weatherization painting at areas of repair. Civil: Construction documents are complete to make repairs at areas that get flooded.
- Drainage corrections: This includes removal of turf and irrigation against buildings and replacement with decomposed granite from face of wall to 5'-0" away from building.

Weatherization project conditions: The structural assessments discovered a substantial amount of damage discovered in the horizontal (and in some cases the vertical) reinforcing steel at all campuses with the exception of Smith (which was unreinforced due to its age). This condition causes the engineer to be concerned about the integrity of the perimeter walls. As a result of moisture conditions, amount of cracking, and the test holes at reinforcing it is estimated that 33-75% of reinforcing along the length of the wall at grade is rusted, not the reinforcing in the entire wall. The result of cracks along grade, water infiltration and swelling of rusted reinforcing is that the CMU face shells are basically delaminating so that what originally calculated as an 8" wall is now functioning as a 4-6" wall, which obviously is not meeting the original code and is even further from compliance with current code. **Therefore, I concur with the engineer and recommend to move forward with these repairs as soon as possible and brace immediately.** Likely nothing happens, but from a calculations standpoint the engineer is unable to provide the appropriate safety assurances since we don't know the extent of the delamination and based on our investigation we know the conditions won't hold for much load at all. In addition to civil projects that may be happening at these sites, we recommend removing grass and irrigation within 5 feet of the buildings.

On 8/25 we met with SFB, District, and engineering team to review the status of the projects as a result of the findings of the Structural Assessments. At that time is was recommended that calculations be completed and a shoring plan be reviewed and implemented immediately. Bixler was tasked with completing structural calculations and a sketch of a temporary shoring detail that would provide adequate reinforcing.

As requested we provided design fee proposals for each project. To ensure that Bixler's shoring solution was site adapted and the impacts to accessibility/safety were evaluated we scheduled a site visit. On 8/31 we walked the site with the District's pre-procured contractor Chasse, a masonry subcontractor, structural engineer and District representatives to review and discuss the best way to site adapt the Pre-Site Walk Shoring detail and still provide the least costly shoring alternatives based upon existing site conditions and the necessity to remain accessible and functional. **Shoring Alternative No. 1:** In this solution the calculations required a continuous metal angle and support members every 8' – 15' along the building perimeter. In each of these instances it was proposed that the end post would be driven 6'deep if the bracing was 8'on center; 8'deep if the bracing was 10' on center and 12' deep if the spacing was 15' on center. The mason stated that there was no physical way to drive the post in to that depth and that he would need to bore into the earth to create a footing and we had access issues that prohibited access to the larger equipment. A fence post digger could be used if the depth was to 4'-0" but the spacing on center would need to decrease to 4'-0" on center max. As we walked the site it became apparent to the mason that the expense for this shoring would be as much or more than an alternative solution. The mason estimated $2.5 million at Challenger excluding the additional mobilization costs required to actually replace the horizontal rebar along the base of the walls, which the mason said would be difficult to estimate. **Relocation in lieu of shoring:** We also discussed the feasibility of a portable campus in lieu of shoring and it was determined that we wouldn't be able to secure permits, modular or utilities in an expeditious manner. **Potential student relocation to alternate campuses:** It was determined that the District didn't have available space at other campus locations to relocate students during repairs. **Shoring Alternative No. 2:** The mason proposed a solution that would provide a structural retaining wall essentially a "sister wall". This would allow the rusted rebar to be grouted in place and encapsulated. The "sister wall" would have its own footing and structural members that would provide the adequate strength when calculated in conjunction with the existing wall would restore the structural integrity of the wall (to the requirements at the time it was constructed).

The widely accepted useful life expectancy of a building is approximately 30 – 40 years we provided recommendations that address immediate repair to address life safety needs identified. These were identified as Phase 1 and should be implemented immediately. Phase 2 pricing will make safe the structure and allow additional time to plan for the implementation of a replacement campus.

<u>Landmark</u> (070440101-1001-009, 070440101-999-003):

- Recommendation is to proceed with Shoring Alternative No. 2 as a temporary solution
    - Based upon the calculations for shoring requirements and the existing conditions it was determined that the cost for shoring with the structural retaining wall would be less expensive than the Shoring Alternative No. 1 ("sister wall" was estimated to save at least $1.8M over the initial shoring concept).
    - Estimated timeline to complete: 20 – 30 days.

Landmark (070440101-1001-009, 070440101-999-003): Continued

- Anticipated extension to useful life is 5 years. Contractor warranty would be 2 year.
- Minimizes amount of disruption at school because immediate shoring would remain in-situ and provides masonry repair at time of initial shoring.

Challenger (070440111-1003-002, 070440111-999-004, 070440111-999-005):

- Recommendation is to proceed with Shoring Alternative No. 2 as a temporary solution
  - Based upon the calculations for shoring requirements and the existing conditions it was determined that the cost for shoring with the structural retaining wall would be less expensive than the Shoring Alternative No. 1 ("sister wall" was estimated to save at least $1.5M over the initial shoring concept).
  - Estimated timeline to complete: 20 – 30 days.
  - Anticipated extension to useful life is 5 years. Contractor warranty would be 2 year.
  - Minimizes amount of disruption at school because immediate shoring would remain in-situ and provides masonry repair at time of initial shoring.

Mensendick (070440106-9999-010, 070440106-9999-011):

- Recommendation is to proceed with Shoring Alternative No. 3 as a temporary solution.
  - Based upon the calculations for shoring requirements and the existing conditions of the 1966/1958 buildings it was determined that the age/condition of the building made it a poor candidate for the "sister wall" temporary solution. An alternative bracing plan was created to provide horizontal reinforcing.
  - Estimated timeline to complete: 20 – 30 days.
  - Anticipated extension to useful life is approximately 1-2 years in area of work. Contractor warranty would be 2 years only related to the 55 panels that were in the worst condition.

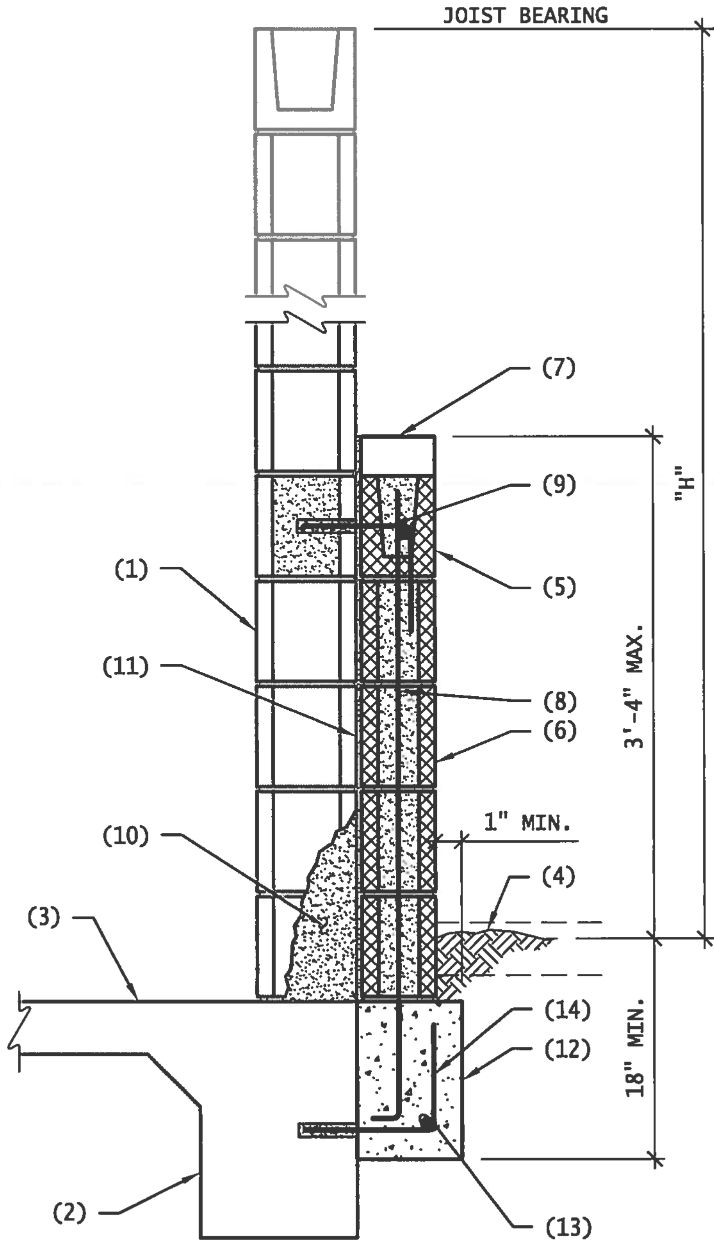
Smith (070440103-999-013):

- This building is unreinforced as that was not necessary at the time it was constructed in 1952, however deterioration is present and conditions are worsening.
  - No immediate need for temporary shoring needed at this site.

Sincerely,

SPS+ ARCHITECTS, LLP

Mark Davenport, AIA, LEED AP BD&C
Partner



NOTES:
1. EXISTING MASONRY WALL.
2. EXISTING CONCRETE FOOTING.
3. EXISTING CONCRETE SLAB.
4. CONCRETE SLAB OR FINISHED GRADE AS OCCURS.
5. CONTINUOUS FULLY GROUTED BOND BEAM REINFORCED W/1-#4 CONTINUOUS.
6. 6" CONCRETE MASONRY WALL.
7. CAP BLOCK PER ARCHITECTURAL DRAWINGS.
8. WHERE "H" IS 12'-0" OR LESS, REINFORCE W/#4 VERTICALS @ 32"O.C. WHERE "H" IS GREATER THAN 12'-0", REINFORCE W/#4 VERTICALS @ 16"O.C.
9. #4 DOWELS WITH STD. 90° HOOK @ 48"O.C. MAX. DRILL AND EPOXY INTO EXISTING FULLY GROUTED CELL W/4" MIN. EMBED.
10. REMOVE DELAMINATED & CRACKED CMU & GROUT SOLID.
11. MORTAR COLLAR JOINT SOLID.
12. CONCRETE FOOTING.
13. 1-#4 CONTINUOUS.
14. #4 DOWELS WITH STD. 90° HOOK @ 18"O.C. MAX. DRILL AND EPOXY INTO EXISTING FOOTING W/4" MIN. EMBED.

1 SECTION

N.T.S.

DAVID BIXLER & ASSOCIATES

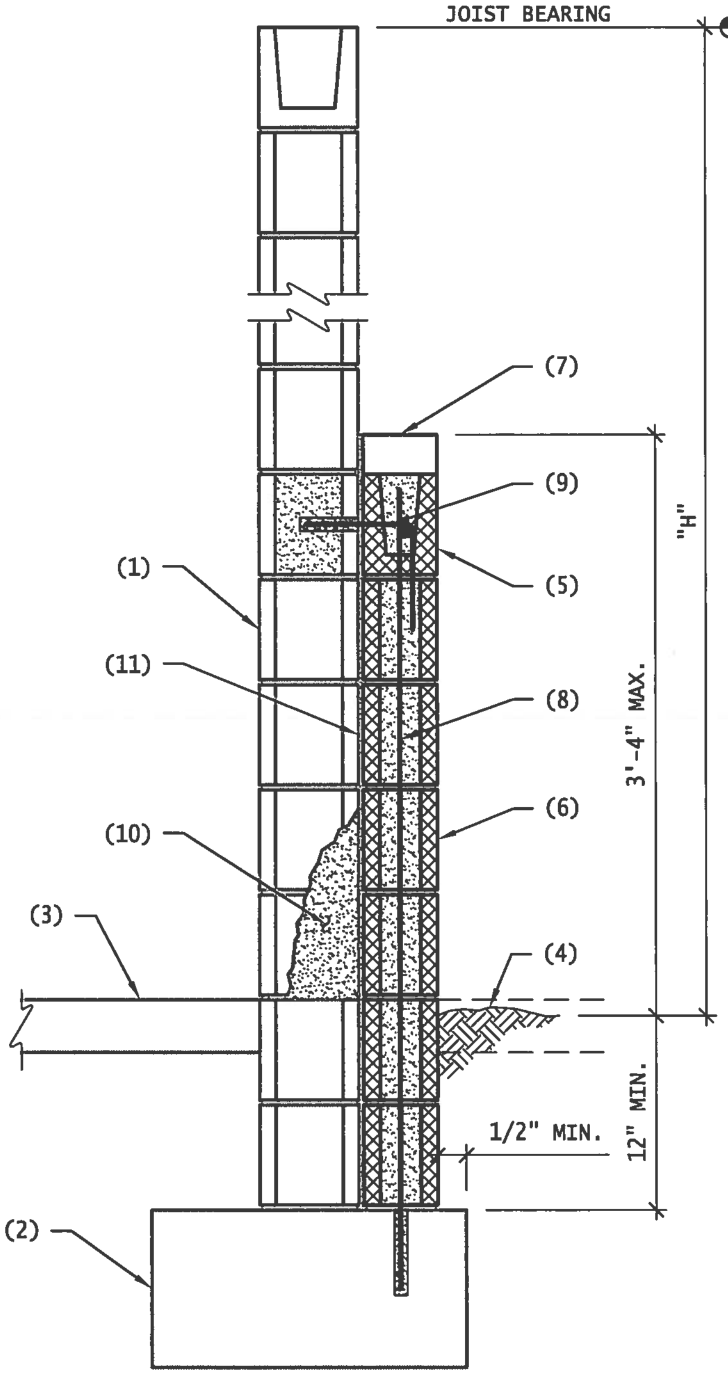
David Bixler & Associates
Stuctural Engineering
8360 East Raintree Drive, Suite 110
Scottsdale, Arizona 85260
Office: (480) 219-2886 Fax: (480) 588-8584
www.dbaaeng.com

LANDMARK SCHOOL
5730 WEST MYRTLE AVENUE
GLENDALE, AZ

Registered Professional Engineer (Structural)
CERTIFICATE NO. 46644
W. DAVID BIXLER
DATE SIGNED 8/31/16
ARIZONA, U.S.A.
Expires 6/30/19

DRAWN BY:	ERB
CHECKED BY:	WDB
JOB NO:	16.097
PRINTED:	08.31.2016

SSK1



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10. REMOVE DELAMINATED & CRACKED CMU & GROUT SOLID.
11. MORTAR COLLAR JOINT SOLID.

2 SECTION

N.T.S.

DAVID BIXLER & ASSOCIATES

David Bixler & Associates
Stuctural Engineering
8360 East Raintree Drive, Suite 110
Scottsdale, Arizona 85260
Office: (480) 219-2886 Fax: (480) 588-8584
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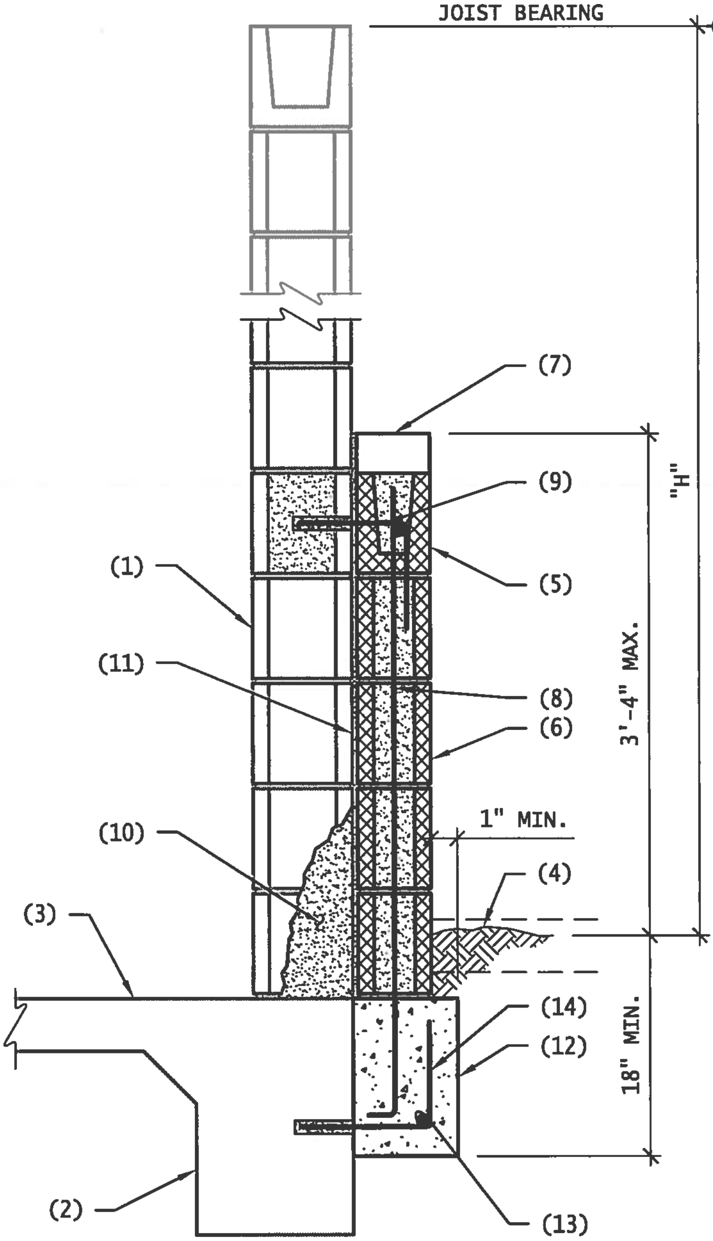
SSK2



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Stuctural Engineering
8360 East Raintree Drive, Suite 110
Scottsdale, Arizona 85260
Office: (480) 219-2886 Fax: (480) 588-8584
www.dbaaeng.com

CHALLENGER SCHOOL
6095 WEST MARYLAND AVENUE
GLENDALE, AZ 85303

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID BIXLER
DATE SIGNED 8/31/16
ARIZONA, U.S.A.
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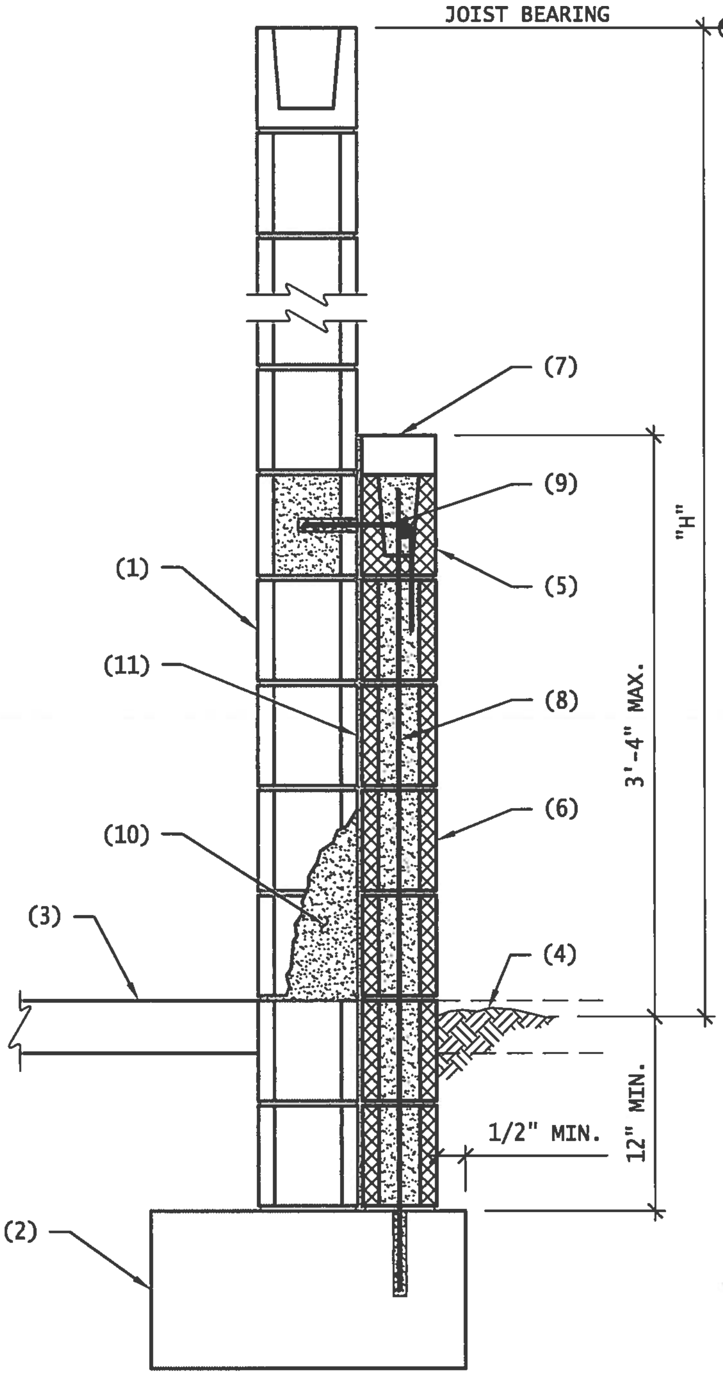
SSK1



2 SECTION

N.T.S.

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3. EXISTING CONCRETE SLAB.
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Scottsdale, Arizona 85260
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6095 WEST MARYLAND AVENUE
GLENDALE, AZ 85303

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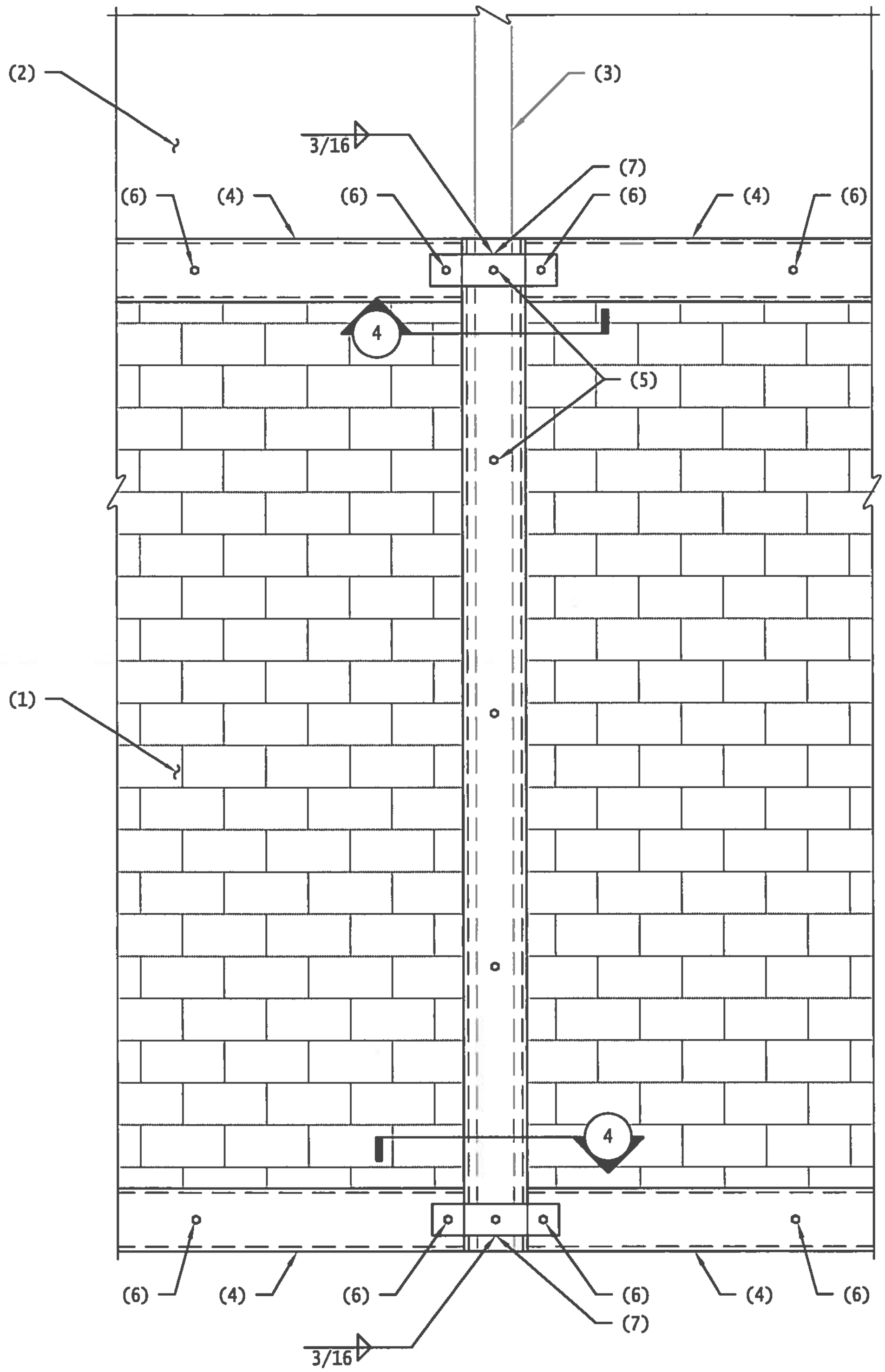
SSK2



3 ELEVATION

N.T.S.

NOTES:

1. EXISTING MASONRY WALL.
2. EXISTING WINDOW OPENING.
3. EXISTING WOOD COLUMN.
4. C6x8.2 CONT.
5. 1/2"Ø x 4" EMBED LAG SCREWS @ 24"O.C.
6. 1/2"Ø x 6" EMBED EPOXY BOLTS @ 24"O.C.
7. 1/4"x3"x1'-0" STEEL PLATE.

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DON MESSENDICK SCHOOL
5535 NORTH 67TH AVENUE
GLENDALE, AZ 85301

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID
BIXLER
DATE SIGNED 8/31/16
ARIZONA, U.S.A.
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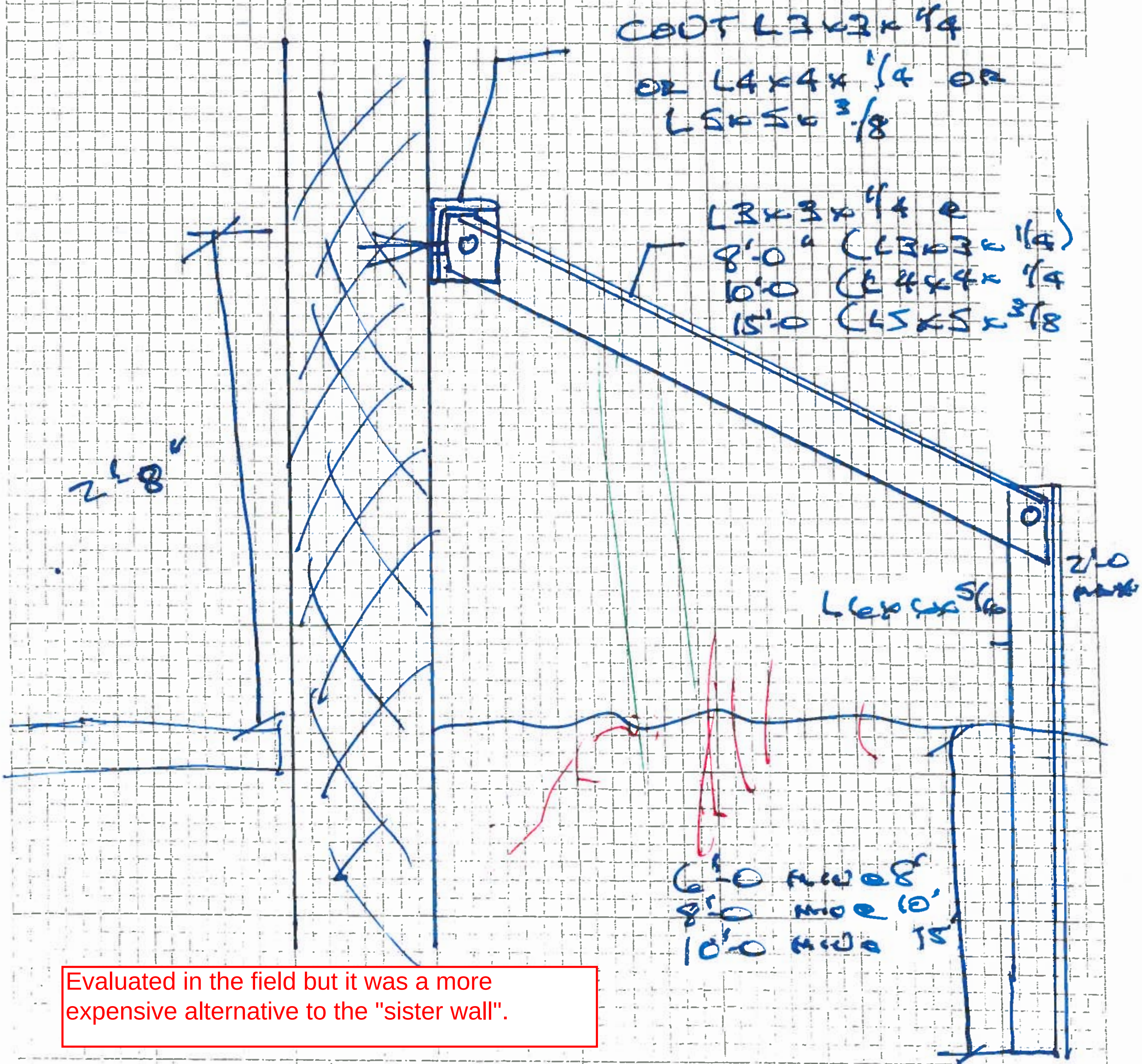
PRINTED:	08.31.2016

SSK1

DAVID BIXLER & ASSOCIATES

Project: GESD Pre-Site Walk
Project #: Proposed Shoring Detail
Prepared by:
Date: 8/30/16
Subject:
Sheet: of:



Evaluated in the field but it was a more expensive alternative to the "sister wall".

LANDMARK RESEAL

Glendale Elementary School District SFB Projects: Construction Cost Estimates

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August 26, 2016

SPS+ ARCHITECTS
Robert L Pian, AIA
William R Pittenger, RA, CSI
Mark A Davenport, AIA, LEED AP
Herb W Schneider, FAIA
Howell Lewis Shay, AIA

Mr. Greg Gilliam
Director of Maintenance & Operations
Glendale Elementary School District #40
Support Services
7015 W. Maryland Avenue
Glendale, AZ 85303

RE: Glendale Elementary School District #40
SFB Corrections at Landmark School – Additional Services Request
SPS+ Architects Fee Proposal 1535A.4
GESD Purchase Order 3602079
SFB Project # 070440111-999-003-BRG

Dear Mr. Gilliam:

Thank you for the opportunity to work with you on your SFB Corrections at the above referenced School. We understand this will be an SFB funded project using Building Renewal Grants. Thank you in advance for your consideration of our additional services request.

Additional Services Scope of work:
Structural remediation in accordance with the attached coversheet from our structural engineer Bixler and associates. Please see below for an executive summary:

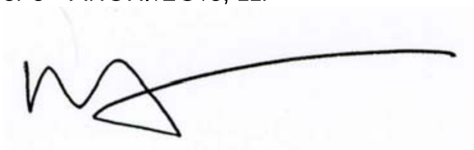
- Structural: Our engineer agrees with the Gervasio reports for structural repairs at the gym, media and admin areas. This includes painting at areas of repair.
- Weatherization project conditions: There was a significant amount of damage discovered for the reinforcing steel near the bottom of the walls. When you add the moisture conditions present, the amount of cracking, the fact that basically all the holes that had reinforcing, the reinforcing was approximately 33% to 66% rusted. In essence, at all those cracks along grade, the CMU face shells are basically delaminated, so the old 8" wall is now 5-6" or 4" at that point and then obviously the wall that is not close to current code now, is much worse. The engineer is unable to perform calculations without knowing to what extent the steel has delaminated. Therefore, I concur with the engineer and recommend to move forward with these repairs as soon as possible and brace immediately. We also recommend removing grass and irrigation within 5 feet of the buildings.

Fee Proposal: $34,650
Fee includes Architectural and Structural services for the following:
- o Coordination of immediate implementation of wall bracing.
- o Construction documents and construction administration utilizing a district procured contractor of the scope of work described above and attached.
- o Special structural inspections during construction administration.
- o Reimbursable expenses for printing, travel, etc.

Please let me know if you have any comments regarding our proposal. We are anticipating this proposal being approved at the September 7th, 2016 SFB board meeting.

Sincerely,

SPS+ ARCHITECTS, LLP



Mark Davenport, AIA, LEED AP BD&C
Partner

enclosure

Cc: Mike Barragan, David Kennon, Terry Tower, Jennifer Bowen

SPS+ Architects LLP | 8681 East Via de Negocio | Scottsdale, AZ 85258-3330
P: 480.991.0800 | F: 480.991.2623 | www.spsplusarchitects.com

August 23, 2016

Mark Davenport AIA, CEFPI, LEED AP, BD+C
SPS+ ARCHITECTS LLP
8681 E. Via de Negocio
Scottsdale, AZ 85258

Re: Landmark Middle School
Glendale, AZ

Dear Mr. Davenport:

Per your request, we visited the Landmark Middle School on several occasions. I also have reviewed the reports from both Speedie and Associates and Gervasio and Associates, which are attached to the end of this report, along with pictures from our site visits during the CMU removal to investigate the reinforcing and typical pictures of the type of cracking along the buildings. We also reviewed the existing plans of the buildings which we have received. The purpose of this report is to review the conditions of the existing buildings along with the reports prepared by other consultants, and to recommend a plan of action going forward on the best course of action to remedy the deficient areas.

The buildings are typically steel and wood framed roofs bearing on CMU exterior walls and concrete spread footings.

Based on the surface penetrating radar investigations Speedie and Associates performed, the vertical reinforcing appears to be installed for the most part correctly, and based off of their radar findings, there is nothing that is significantly different than what we would expect.

Based on the soils investigations performed by Speedie and Associate, there does not appear to be a specific cause of the masonry distress due to the soils themselves, except the fact that the soil conditions are very moist. The moisture fluctuations in the soils will have a tendency to cause continuous movement in the soils which will induce stresses on the buildings which will sometimes result in cracks of the CMU.

There were three reports done by Gervasio and Associates that we have received and reviewed: (1) report dated February 15, 2011 dealing mostly with cracks in the North-East corner of the Gym Building, (2) report dated May 27, 2014 dealing with cracks in the masonry piers at the Administration building, and (3) report dated July 20, 2015 dealing with cracks in the interior and exterior walls, deteriorating concrete piers, corroded metal deck and steel joist bearings in the media center. For the gymnasium cracks, Gervasio maintains that there were three different types of cracks, a stair-stepped crack near the corner, a vertical crack at the change in parapet height and a crack at beam bearing. They indicated that only the crack at the beam bearing was in need of repair and that the others could be caulked to prevent moisture. Gervasio recommended that the crack at beam bearing be modified to allow for thermal movement in the beam. All of the additional investigations that have been performed since then would indicate that they are most likely correct. Since the moisture around the building is currently in the process of getting corrected, I would recommend that instead of just caulking the cracks, I would repoint and repair or replace the block as required to bring it back to its original state. At the vertical crack I would recommend adding the vertical masonry control joint that is missing to prevent future cracking.

Finally, at the beam bearing location, this bearing condition needs to be rebuilt with a neoprene pad below the beam bearing to allow for movement and the CMU below should be rebuilt and grouted properly. In the second report dealing with the vertical cracks in the masonry piers, Gervasio recommended tying the two walls together by doweling and epoxying them and attaching the piers to the building with doweling and epoxying as well. I agree with their recommendations since the moisture issue is being corrected. For the media center for the interior and exterior cracks, Gervasio recommends drying out the crawl space and fixing the broken water line and then repairing the cracks. For the deteriorated concrete piers Gervasio recommends installing new posts besides the beam to support the beam. Since the moisture issues are being corrected, I recommend repairing the concrete piers. This will not change the current load path and will remove the corroded steel in the piers which will continue to deteriorate even with the moisture removed. For the steel joist bearing on wood blocks, Gervasio recommends removing the wood shims and installing dry pack below the joist; I agree with this recommendation.

From our review of the CMU demolition and our cursory review of the buildings in general, we discovered numerous cracking and rusted reinforcing.

From the four holes that were opened up to expose the reinforcing, we found rusted and deteriorated vertical and horizontal reinforcing in each location. The footings in three of the locations appeared to be in good condition and the correct size, but the fourth was tapered from maybe only 8 inches thick to 2 inches thick at the edge.

From our visual inspection, we noticed several different types of cracks, and too many to document all of them. They basically fell into two categories:

1. There were several areas where there are shrinkage cracks, most likely due to insufficient or improper locations of masonry control joints, or improperly installed masonry control joints (see photographs 8 and 11 on building 1, photos 4 and 9 on building 2, photo 6 and 15 on building 3 and photo 1 on building 6 and photo 3 on building 7). While these are not structural in nature, they will affect the waterproofing integrity of the building and therefore I recommend that new masonry control joints be installed and for the CMU in these areas to be tuck pointed and repaired or replaced as applicable. There were approximately 10-15 locations throughout the school where this occurred.

2. The remaining photos appear to be related to moisture and the rusting of the reinforcing in the CMU. Since reinforcing when it rusts can grow to over 400% of its original size, it appears that the reinforcing has rusted, expanded and has cracked the CMU. Since the face shell is now delaminated, it causes the CMU to be reduced in size and therefore to be reduced in strength. There is no real way to determine the loss in strength without knowing the exact thickness of the delaminated CMU. This is a very old building that does not comply with the current building codes, and there is reduced strength of the existing wall with the delamination of the face shells. The reduction in strength could easily range from 33%-90%. Therefore, I recommend that the CMU walls be braced immediately until the repairs are complete.

In addition, there is no real way to eliminate moisture from entering into the CMU with the cracks in it and this will continue to make the condition worse. There is no easy or accurate way to determine the extents of the rusting in the CMU without removing the face shells and investigating the reinforcing as we did in those four locations. The repair for these locations would be extremely expensive but would entail removing the CMU and exposing the rusted reinforcing and then removing it and replacing it with new reinforcing, grout and CMU. This would need to be done in an explorative manner where you start at each of the cracks and then you expand outward until you get to undamaged CMU and reinforcing. Therefore, there is no real way to determine the extents but due to the moisture conditions and the amount of cracking that is visible I would not be surprised if 50%-75% of the length of the walls at the grade line are damaged in this manner. The CMU walls should be braced immediately until the repairs are complete. To avoid continued and future damage, the drainage around the buildings should be also corrected. All sprinkler lines should be moved away from the buildings, and all of the grades should be sloped to divert the water away from the buildings.

If the decision is to repair the school, then this should start immediately, and we should brace the CMU walls until the repairs are completed. Without knowing the extent of the damage, it is extremely difficult to determine how the walls will perform as the reinforcing continues to rust and the walls continue to worsen.

While it is extremely difficult to provide any budgetary numbers due to the uncertainty of the full scope and amount of damage we estimate the following corresponding to the item numbers above:

1) Temporary bracing of the CMU walls:	$70,000
2) Installation of masonry control joints and repair of damaged CMU:	$40,000
3) Repair of the cracked CMU and rusted reinforcing (not including drainage):	$250,000
4) Gervasio report regarding gym cracks:	$20,000
5) Gervasio report regarding column cracks:	$25,000
6) Gervasio report regarding the media center:	$150,000

Please understand that this report represents a professional opinion based upon the results of our limited observations, and past experience with similar conditions. Our study was strictly limited to visual observations as stated above. This report is not intended to be a complete or comprehensive study of the structure. We have not reviewed, nor have we been asked to review, the capacity of the existing structure per the current code. Our work has been performed in accordance with generally accepted principles and practices of structural engineering.

We cannot be responsible for any future changes in the condition of the structure. No warranty is provided, either expressed or implied.

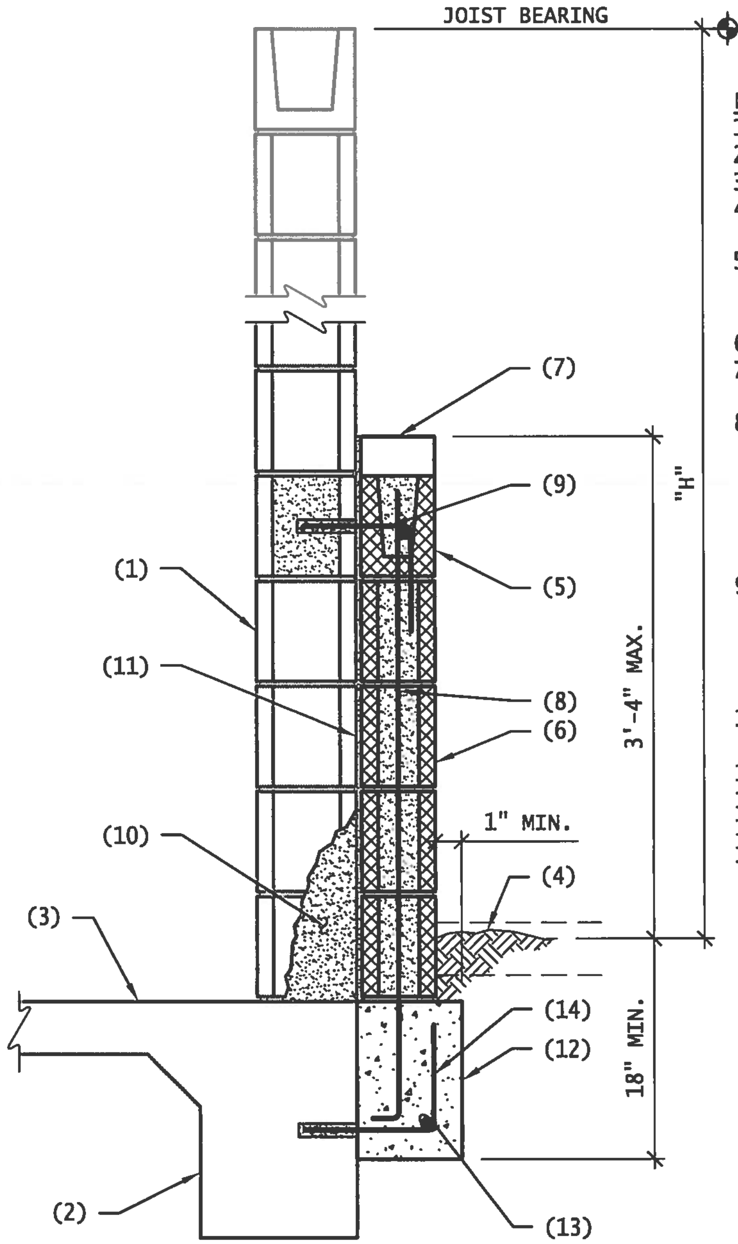
If there are any additional concerns or questions, please feel free to contact our office. Thank you for the opportunity to assist you on this project.

Sincerely,

David Bixler

David Bixler, PE, SE President
David Bixler & Associates, PLLC

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID BIXLER
Date Signed 8/12/16
ARIZONA U.S.A.
Expires 06/30/2019



NOTES:
1. EXISTING MASONRY WALL.
2. EXISTING CONCRETE FOOTING.
3. EXISTING CONCRETE SLAB.
4. CONCRETE SLAB OR FINISHED GRADE AS OCCURS.
5. CONTINUOUS FULLY GROUTED BOND BEAM REINFORCED W/1-#4 CONTINUOUS.
6. 6" CONCRETE MASONRY WALL.
7. CAP BLOCK PER ARCHITECTURAL DRAWINGS.
8. WHERE "H" IS 12'-0" OR LESS, REINFORCE W/#4 VERTICALS @ 32"O.C. WHERE "H" IS GREATER THAN 12'-0", REINFORCE W/#4 VERTICALS @ 16"O.C.
9. #4 DOWELS WITH STD. 90° HOOK @ 48"O.C. MAX. DRILL AND EPOXY INTO EXISTING FULLY GROUTED CELL W/4" MIN. EMBED.
10. REMOVE DELAMINATED & CRACKED CMU & GROUT SOLID.
11. MORTAR COLLAR JOINT SOLID.
12. CONCRETE FOOTING.
13. 1-#4 CONTINUOUS.
14. #4 DOWELS WITH STD. 90° HOOK @ 18"O.C. MAX. DRILL AND EPOXY INTO EXISTING FOOTING W/4" MIN. EMBED.

1 SECTION

N.T.S.

DAVID BIXLER & ASSOCIATES

David Bixler & Associates
Stuctural Engineering
8360 East Raintree Drive, Suite 110
Scottsdale, Arizona 85260
Office: (480) 219-2886 Fax: (480) 588-8584
www.dbaaeng.com

UNLESS THIS DRAWING IS SIGNED AND SEALED BY A LICENSED STRUCTURAL ENGINEER, IT IS A PRELIMINARY DESIGN AND SHALL NOT BE USED FOR CONSTRUCTION

LANDMARK SCHOOL
5730 WEST MYRTLE AVENUE
GLENDALE, AZ

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID BIXLER
DATE SIGNED 8/31/16
ARIZONA, U.S.A.
Expires 6/30/19

DRAWN BY:	ERB
CHECKED BY:	WDB
JOB NO:	16.097
PRINTED:	08.31.2016

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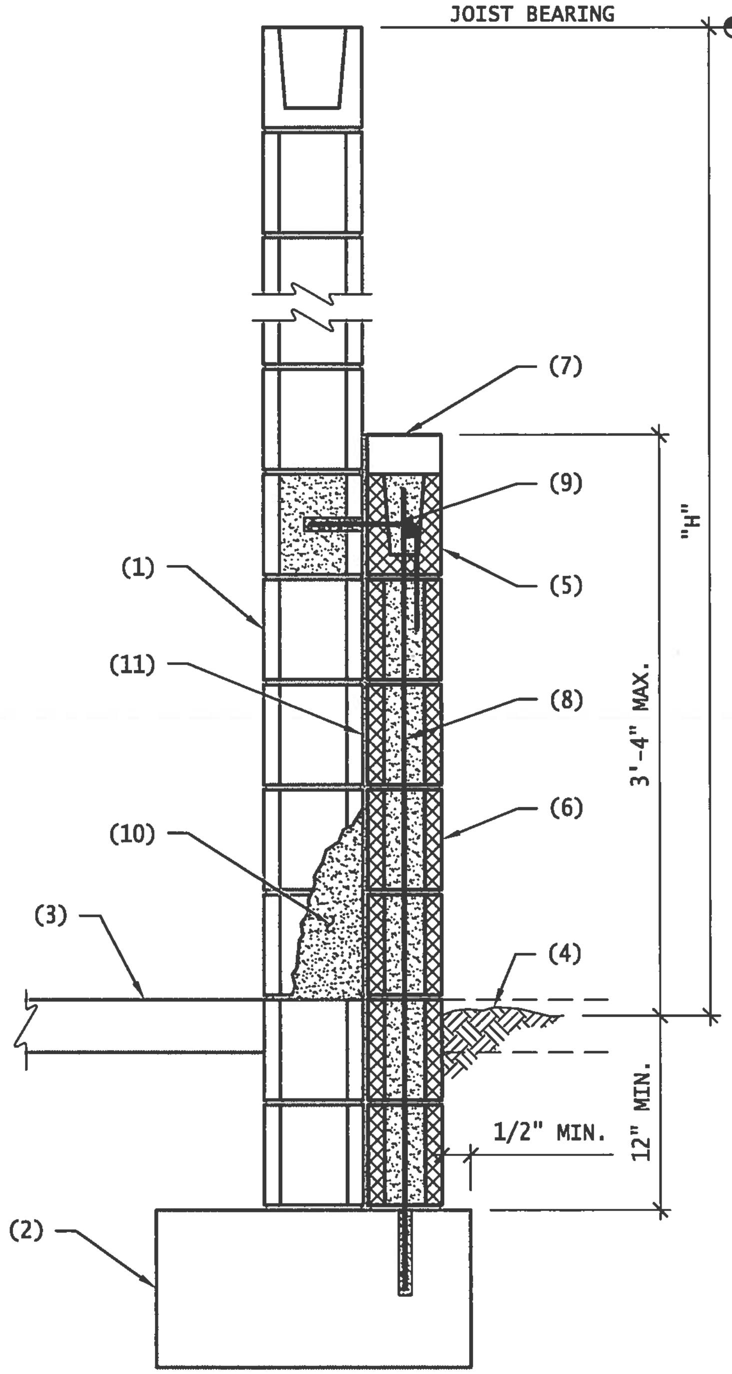

NOTES:
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2. EXISTING CONCRETE FOOTING.
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10. REMOVE DELAMINATED & CRACKED CMU & GROUT SOLID.
11. MORTAR COLLAR JOINT SOLID.

2 SECTION

N.T.S.

DAVID BIXLER & ASSOCIATES

David Bixler & Associates
Stuctural Engineering
8360 East Raintree Drive, Suite 110
Scottsdale, Arizona 85260
Office: (480) 219-2886 Fax: (480) 588-8584
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JOB NO:	16.097
PRINTED:	08.31.2016

SSK2

DAVID
BIXLER
& ASSOCIATES

STRUCTURAL CALCULATIONS FOR LANDMARK ELEMENTARY SCHOOL WALL REPAIRS

DBAA Job No. 16.097

August 31, 2016

PREPARED FOR:

Jennifer Bowen, Director of Design

SPS+ Architects LLP

Jbowen@spsplusarchitects.com

480.544.5851

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID
BIXLER
Date Signed 8/31/16
ARIZONA U.S.A.
Expires 06/30/2019

PREPARED BY:

DAVID BIXLER & ASSOCIATES
STRUCTURAL ENGINEERING
8360 E. RAINTREE DR., SUITE 110
SCOTTSDALE, AZ 85260
PHONE: (480) 219-2886
david.bixler@dbaaeng.com
www.dbaaeng.com

•Integrity• Service•Collaboration•Quality•Efficiency•

> 12'0"
3.0 PSF (24'/2) = 360#
M = 360# (3'-4") = 1198 #'
M_u = 1.6 (1198#') = 1918 #'

DAVID
BIXLER
& ASSOCIATES

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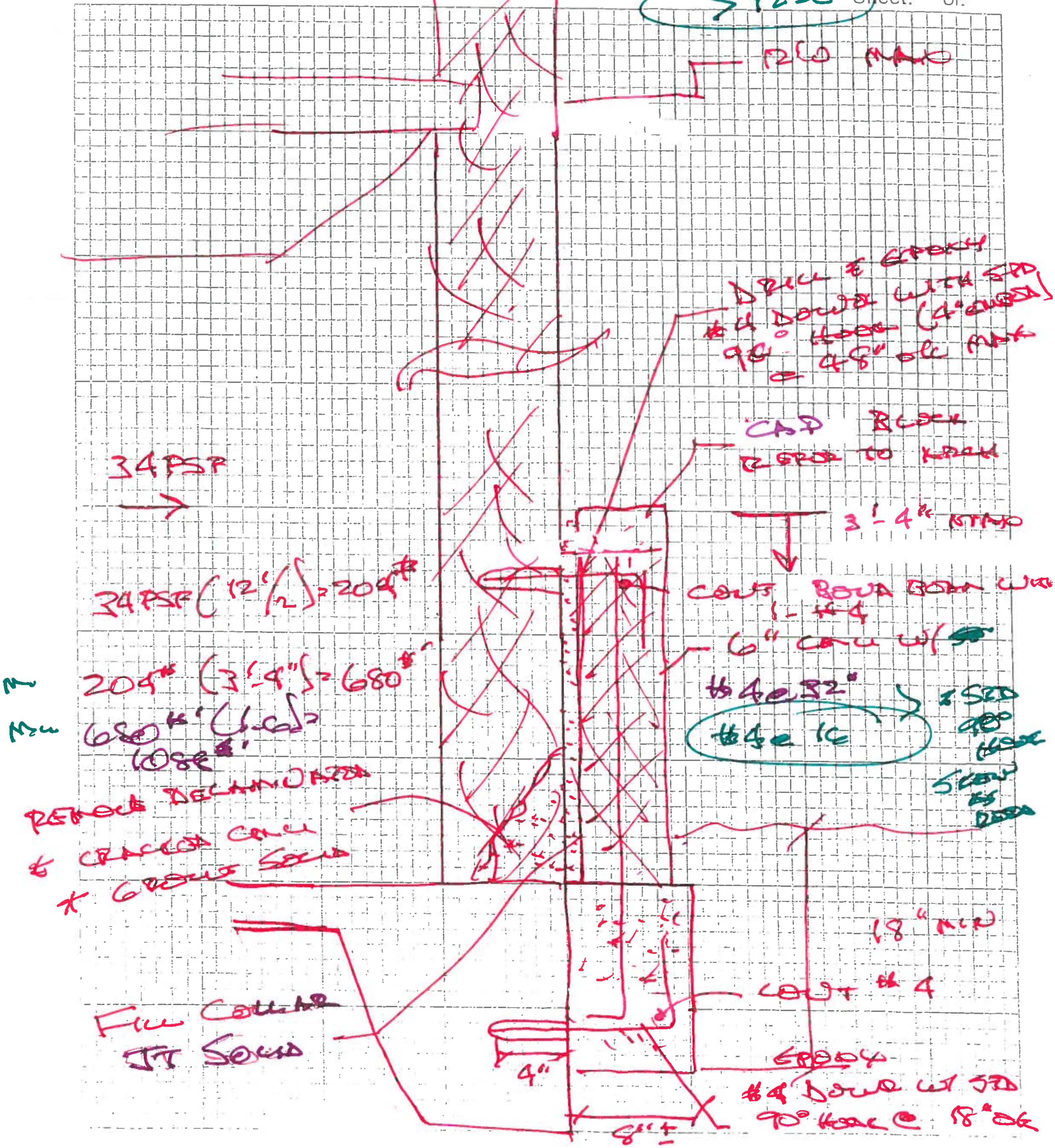
Project #:
Prepared by:
Date:
Subject:
> 12'-0
Sheet: of:



DAVID BIXLER & ASSOCIATES

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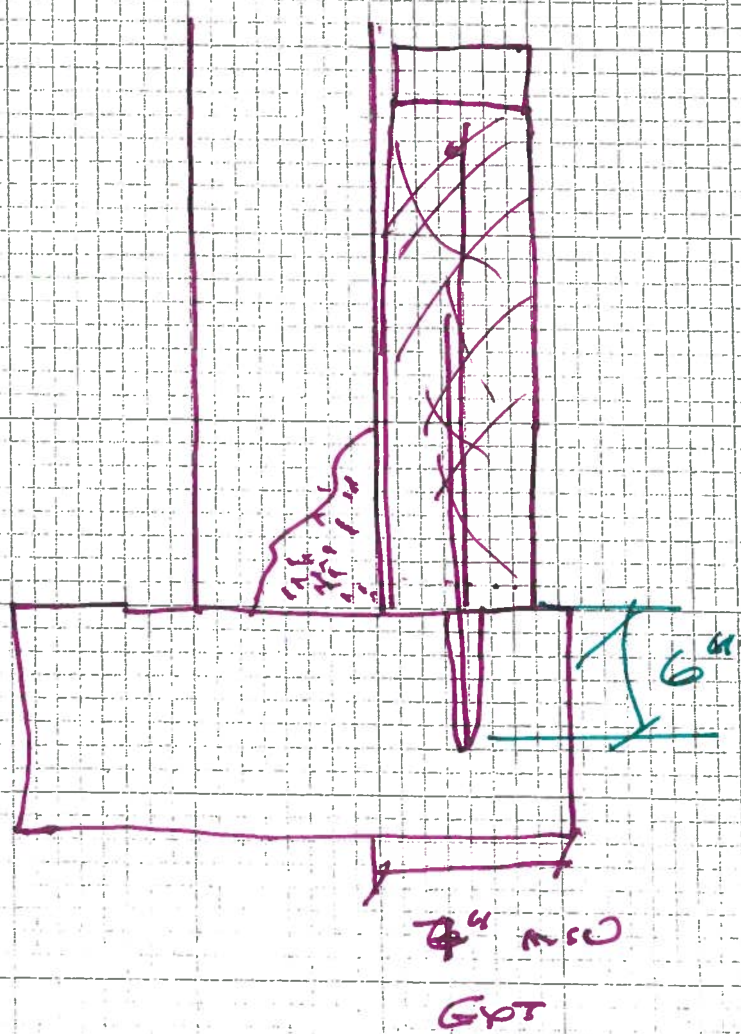
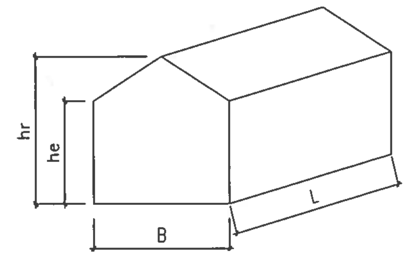


Wind Analysis for Low-rise Building, Based on ASCE 7-2010

INPUT DATA



Exposure category (B, C or D, ASCE 7-10 26.7.3)		C	
Importance factor (ASCE 7-10 Table 1.5-2)	I_w =	1.00	for all Category
Basic wind speed (ASCE 7-10 26.5.1 or 2012 IBC)	V =	120	mph
Topographic factor (ASCE 7-10 26.8 & Table 26.8-1)	K_{zt} =	1	Flat
Building height to eave	h_e =	10	ft
Building height to ridge	h_r =	10	ft
Building length	L =	100	ft
Building width	B =	50	ft
Effective area of components (or Solar Panel area)	A =	33	ft^2

DESIGN SUMMARY

Max horizontal force normal to building length, L, face	=	19.12 kips, SD level (LRFD level), Typ.
Max horizontal force normal to building length, B, face	=	9.93 kips
Max total horizontal torsional load	=	222.03 ft-kips
Max total upward force	=	97.43 kips

ANALYSIS

Velocity pressure

$q_h = 0.00256\, K_h\, K_{zt}\, K_d\, V^2$ = **26.63** psf

where: q_h = velocity pressure at mean roof height, h. (Eq. 28.3-1 page 298 & Eq. 30.3-1 page 316)

K_h = velocity pressure exposure coefficient evaluated at height, h, (Tab. 28.3-1, pg 299) = **0.85**

K_d = wind directionality factor. (Tab. 26.6-1, for building, page 250) = **0.85**

h = mean roof height = **10.00** ft

< 60 ft, [Satisfactory] (ASCE 7-10 26.2.1)

< Min (L, B), [Satisfactory] (ASCE 7-10 26.2.2)

Design pressures for MWFRS

$p = q_h\, [(G\, C_{pf}) - (G\, C_{pi})]$

where: p = pressure in appropriate zone. (Eq. 28.4-1, page 298). p_{min} = **16** psf (ASCE 7-10 28.4.4)

$G\, C_{pf}$ = product of gust effect factor and external pressure coefficient, see table below. (Fig. 28.4-1, page 300 & 301)

$G\, C_{pi}$ = product of gust effect factor and internal pressure coefficient.(Tab. 26.11-1, Enclosed Building, page 258)

= **0.18** or **-0.18**

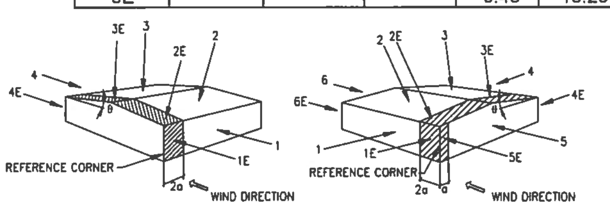
a = width of edge strips, Fig 28.4-1, note 9, page 301, MAX[MIN(0.1B, 0.1L, 0.4h), MIN(0.04B, 0.04L), 3] = **4.00** ft

Net Pressures (psf), Basic Load Cases

Surface	Roof angle θ = 0.00			Roof angle θ = 0.00		
	$G\, C_{pf}$	Net Pressure with		$G\, C_{pf}$	Net Pressure with	
		$(+GC_{pi})$	$(-GC_{pi})$		$(+GC_{pi})$	$(-GC_{pi})$
1	0.40	5.86	15.45	-0.45	-16.78	-7.19
2	-0.69	-23.17	-13.58	-0.69	-23.17	-13.58
3	-0.37	-14.65	-5.06	-0.37	-14.65	-5.06
4	-0.29	-12.52	-2.93	-0.45	-16.78	-7.19
5				0.40	5.86	15.45
6				-0.29	-12.52	-2.93
1E	0.61	11.45	21.04	-0.48	-17.58	-7.99
2E	-1.07	-33.29	-23.70	-1.07	-33.29	-23.70
3E	-0.53	-18.91	-9.32	-0.53	-18.91	-9.32
4E	-0.43	-16.25	-6.66	-0.48	-17.58	-7.99
5E				0.61	11.45	21.04
6E				-0.43	-16.25	-6.66

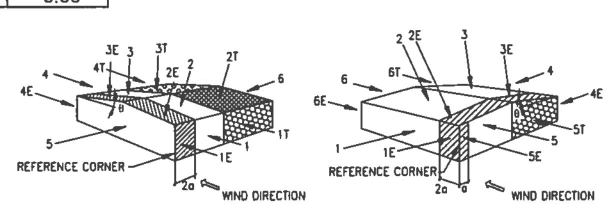
Net Pressures (psf), Torsional Load Cases

Surface	Roof angle θ = 0.00		
	$G\, C_{pf}$	Net Pressure with	
		$(+GC_{pi})$	$(-GC_{pi})$
1T	0.40	1.46	3.86
2T	-0.69	-5.79	-3.40
3T	-0.37	-3.66	-1.27
4T	-0.29	-3.13	-0.73
Surface	Roof angle θ = 0.00		
	$G\, C_{pf}$	Net Pressure with	
		$(+GC_{pi})$	$(-GC_{pi})$
5T	0.40	1.46	3.86
6T	-0.29	-3.13	-0.73



Load Case A (Transverse) Load Case B (Longitudinal)

Basic Load Cases



Load Case A (Transverse) Load Case B (Longitudinal)

Torsional Load Cases

Basic Load Case A (Transverse Direction)

Surface	Area (ft^2)	Pressure (k) with $(+GC_{pi})$	Pressure (k) with $(-GC_{pi})$
1	920	5.39	14.21
2	2300	-53.30	-31.24
3	2300	-33.69	-11.64
4	920	-11.52	-2.70
1E	80	0.92	1.68
2E	200	-6.66	-4.74
3E	200	-3.78	-1.86
4E	80	-1.30	-0.53
Σ	Horiz.	19.12	19.12
	Vert.	-97.43	-49.49
Min. wind 28.4.4	Horiz.	16.00	16.00
	Vert.	-80.00	-80.00

Basic Load Case B (Longitudinal Direction)

Surface	Area (ft^2)	Pressure (k) with $(+GC_{pi})$	Pressure (k) with $(-GC_{pi})$
2	2300	-53.30	-31.24
3	2300	-33.69	-11.64
5	420	2.46	6.49
6	420	-5.26	-1.23
2E	200	-6.66	-4.74
3E	200	-3.78	-1.86
5E	80	0.92	1.68
6E	80	-1.30	-0.53
Σ	Horiz.	9.93	9.93
	Vert.	-87.37	-41.73
Min. wind 28.4.4	Horiz.	8.00	8.00
	Vert.	-80.00	-80.00

Torsional Load Case A (Transverse Direction)

Surface	Area (ft^2)	Pressure (k) with $(+GC_{pi})$	Pressure (k) with $(-GC_{pi})$	Torsion (ft-k) $(+GC_{pi})$	Torsion (ft-k) $(-GC_{pi})$
1	420	2.46	6.49	57	149
2	1050	-24.33	-14.26	0	0
3	1050	-15.38	-5.31	0	0
4	420	-5.26	-1.23	121	28
1E	80	0.92	1.68	42	77
2E	200	-6.66	-4.74	0	0
3E	200	-3.78	-1.86	0	0
4E	80	-1.30	-0.53	60	25
1T	500	0.73	1.93	-18	-48
2T	1250	-7.24	-4.24	0	0
3T	1250	-4.58	-1.58	0	0
4T	500	-1.56	-0.37	-39	-9
Total Horiz. Torsional Load, M_T				222	222

Torsional Load Case B (Longitudinal Direction)

Surface	Area (ft^2)	Pressure (k) with $(+GC_{pi})$	Pressure (k) with $(-GC_{pi})$	Torsion (ft-k) $(+GC_{pi})$	Torsion (ft-k) $(-GC_{pi})$
2	2300	-53.30	-31.24	0	0
3	2300	-33.69	-11.64	0	0
5	170	1.00	2.63	10	28
6	170	-2.13	-0.50	22	5
2E	200	-6.66	-4.74	0	0
3E	200	-3.78	-1.86	0	0
5E	80	0.92	1.68	21	39
6E	80	-1.30	-0.53	30	12
5T	250	0.37	0.97	-5	-12
6T	250	-0.78	-0.18	-10	-2
Total Horiz. Torsional Load, M_T				69.4	69.4

Design pressures for components and cladding

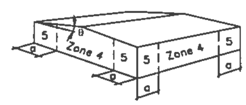
$p = q_h[(G C_p) - (G C_{pi})]$

where: p = pressure on component. (Eq. 30.4-1, pg 318)

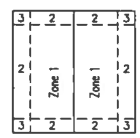
p_{min} = 16.00 psf (ASCE 7-10 30.2.2)

$G C_p$ = external pressure coefficient.

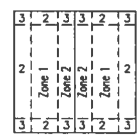
see table below. (ASCE 7-10 30.4.2)



Walls



Roof θ≤7°



Roof θ>7°

	Effective Area (ft^2)	Zone 1 GC_p	Zone 1 $-GC_p$	Zone 2 GC_p	Zone 2 $-GC_p$	Zone 3 GC_p	Zone 3 $-GC_p$	Zone 4 GC_p	Zone 4 $-GC_p$	Zone 5 GC_p	Zone 5 $-GC_p$
Comp.	33	0.25	-0.95	0.25	-1.44	0.25	-1.92	0.82	-0.91	0.82	-1.10

(Walls reduced 10 %, Fig. 6-11A note 5.)

Comp. & Cladding Pressure (psf)	Zone 1 Positive	Zone 1 Negative	Zone 2 Positive	Zone 2 Negative	Zone 3 Positive	Zone 3 Negative	Zone 4 Positive	Zone 4 Negative	Zone 5 Positive	Zone 5 Negative
	16.00	-30.05	16.00	-43.07	16.00	-55.89	26.57	-28.97	26.57	-33.96

Note: If the effective area is roof Solar Panel area, the only zone 1, 2 , or 3 apply.

Masonry Slender Wall

Description : equivalent cantilevered wall in fromt of existing wall

Code References

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-10

General Information

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10

Construction Type : Grouted Hollow Concrete Masonry

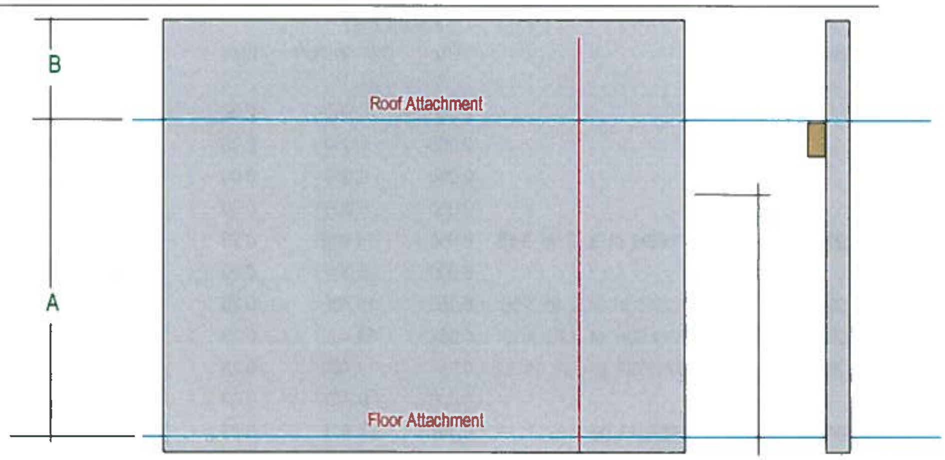
F'm	=	1.50 ksi	Nom. Wall Thickness	6 in	Temp Diff across thickness	=	deg F
Fy - Yield	=	60.0 ksi	Actual Thickness	5.625 in	Min Allow Out-of-plane Defl Ratio	=	0
Fr - Rupture	=	61.0 psi	Rebar "d" distance	3.8125 in	Minimum Vertical Steel %	=	0.0020
Em = f'm *	=	900.0	Lower Level Rebar . . .				
Max % of ρ bal.	=	0.1106	Bar Size #	4			
Grout Density	=	140 pcf	Bar Spacing	32.0 in			
Block Weight		Normal Weight					
Wall Weight	=	47.0 psf					

Wall is grouted at rebar cells only

One-Story Wall Dimensions

A Clear Height = 4.660 ft
B Parapet height = 0.0 ft

Wall Support Condition Top & Bottom Pinned



Lateral Loads

Wind Loads :
Full area WIND load 34.0 psf

Seismic Loads :
Wall Weight Seismic Load Input Method : Direct entry of Lateral Wall Weight
Seismic Wall Lateral Load 0.0 psf

Fp 1.0 = 0.0 psf

(Applied to full "STRIP Width")

	D	Lr	L	E	W	Endpoints from Base top	bottom
Distributed Lateral Load	0.0	0.0	0.0	0.0	4.0 k/ft	4.660	3.660 k/ft

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

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Masonry Slender Wall

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ENERCALC, INC. 1983-2016, Build:6.16.6.7, Ver:6.16.6.7

Lic. # : KW-06009174

Licensee : DAVID BIXLER AND ASSOCIATES

Description : equivalent cantilevered wall in fromt of existing wall

> 1088 ft·#

DESIGN SUMMARY

Results reported for "Strip Width" of 12.0 in

	Governing Load Combination . . .	Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check +0.90D+W+0.90H	Maximum Bending Stress Ratio =	0.9770		
		Max Mu	1.216 k-ft	Phi * Mn	1.245 k-ft
PASS	Service Deflection Check W Only	Actual Defl. Ratio L/	405	Allowable Defl. Ratio	150
		Max. Deflection	0.1380 in		
PASS	Axial Load Check +1.20D+0.50Lr+0.50L+W+1.60H	Max Pu / Ag	1.126 psi	Max. Allow. Defl.	0.3728 in
		Location	3.806 ft	0.2 * f'm	300.0 psi
PASS	Reinforcing Limit Check				
		Controlling As/bd	0.001639	As/bd θ.1106 rho bal	0.1106

Maximum Reactions . . .	for Load Combination....	
Top Horizontal	W Only	3.152 k
Base Horizontal	W Only	0.3854 k
Vertical Reaction	+D+0.60W+H	0.2190 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	0.2*f'm*b*t k	Mcr k-ft	Mu k-ft	Phi	Phi Mn k-ft	As in^2	As Ratio	0.6 * rho bal
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
+1.20D+1.60Lr+0.50W+1.60H at 3.73 to 3.88	0.053	14.400	0.26	0.61	0.90	1.25	0.075	0.0016	0.1106
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
+1.20D+1.60S+0.50W+1.60H at 3.73 to 3.88	0.053	14.400	0.26	0.61	0.90	1.25	0.075	0.0016	0.1106
+1.20D+0.50Lr+0.50L+W+1.60H at 3.73 to 3.	0.054	14.400	0.26	1.22	0.90	1.25	0.075	0.0016	0.1106
+1.20D+0.50L+0.50S+W+1.60H at 3.73 to 3.8	0.054	14.400	0.26	1.22	0.90	1.25	0.075	0.0016	0.1106
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
+0.90D+W+0.90H at 3.73 to 3.88	0.041	14.400	0.26	1.22	0.90	1.24	0.075	0.0016	0.1106
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values Mcr k-ft	Mactual k-ft	Stiffness I gross in^4	I cracked in^4	I effective in^4	Deflections Deflection in	Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+0.60W+H at 2.80 to 2.95	0.088	0.26	0.58	142.30	16.85	17.206	0.065	858.4
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+0.750Lr+0.750L+0.450W+H at 2.80 to 2.9	0.088	0.26	0.44	142.30	16.85	17.867	0.038	1,465.1
+D+0.750L+0.750S+0.450W+H at 2.80 to 2.95	0.088	0.26	0.44	142.30	16.85	17.867	0.038	1,465.1
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+0.60D+0.60W+0.60H at 2.80 to 2.95	0.053	0.26	0.58	142.30	16.74	17.098	0.065	854.1
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Masonry Slender Wall

Description : equivalent cantilevered wall in fromt of existing wall

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu (k)	Moment Values Mcr (k-ft)	Moment Values Mactual (k-ft)	Stiffness I gross (in^4)	Stiffness I cracked (in^4)	Stiffness I effective (in^4)	Deflections Deflection (in)	Deflections Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
W Only at 2.64 to 2.80	0.000	0.26	0.92	142.30	16.58	16.657	0.138	405.4
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Reactions - Vertical & Horizontal

Results reported for "Strip Width" = 12 in.

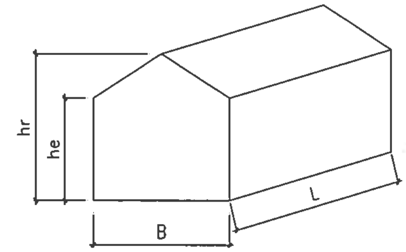
Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
+D+H	0.0 k	0.00 k	0.219 k
+D+L+H	0.0 k	0.00 k	0.219 k
+D+Lr+H	0.0 k	0.00 k	0.219 k
+D+S+H	0.0 k	0.00 k	0.219 k
+D+0.750Lr+0.750L+H	0.0 k	0.00 k	0.219 k
+D+0.750L+0.750S+H	0.0 k	0.00 k	0.219 k
+D+0.60W+H	0.2 k	1.89 k	0.219 k
+D+0.70E+H	0.0 k	0.00 k	0.219 k
+D+0.750Lr+0.750L+0.450W+H	0.2 k	1.42 k	0.219 k
+D+0.750L+0.750S+0.450W+H	0.2 k	1.42 k	0.219 k
+D+0.750L+0.750S+0.5250E+H	0.0 k	0.00 k	0.219 k
+0.60D+0.60W+0.60H	0.2 k	1.89 k	0.131 k
+0.60D+0.70E+0.60H	0.0 k	0.00 k	0.131 k
D Only	0.0 k	0.00 k	0.219 k
Lr Only	0.0 k	0.00 k	0.000 k
L Only	0.0 k	0.00 k	0.000 k
S Only	0.0 k	0.00 k	0.000 k
W Only	0.4 k	3.15 k	0.000 k
E Only	0.0 k	0.00 k	0.000 k
H Only	0.0 k	0.00 k	0.000 k

BIXLER	PROJECT : CLIENT : JOB NO. : DATE :	PAGE : DESIGN BY : REVIEW BY :

Wind Analysis for Low-rise Building, Based on ASCE 7-2010

INPUT DATA

Exposure category (B, C or D, ASCE 7-10 26.7.3)		C	
Importance factor (ASCE 7-10 Table 1.5-2)	I_w =	1.00	for all Category
Basic wind speed (ASCE 7-10 26.5.1 or 2012 IBC)	V =	120	mph
Topographic factor (ASCE 7-10 26.8 & Table 26.8-1)	K_{zt} =	1	Flat
Building height to eave	h_e =	20	ft
Building height to ridge	h_r =	20	ft
Building length	L =	100	ft
Building width	B =	50	ft
Effective area of components (or Solar Panel area)	A =	140	ft^2



DESIGN SUMMARY

Max horizontal force normal to building length, L, face	=	40.89 kips, SD level (LRFD level), Typ.
Max horizontal force normal to building length, B, face	=	21.43 kips
Max total horizontal torsional load	=	492.60 ft-kips
Max total upward force	=	103.92 kips

ANALYSIS

Velocity pressure

$q_h = 0.00256\ K_h K_{zt} K_d V^2$ = **28.20** psf

where: q_h = velocity pressure at mean roof height, h. (Eq. 28.3-1 page 298 & Eq. 30.3-1 page 316)

K_h = velocity pressure exposure coefficient evaluated at height, h, (Tab. 28.3-1, pg 299) = **0.90**

K_d = wind directionality factor. (Tab. 26.6-1, for building, page 250) = **0.85**

h = mean roof height = **20.00** ft

< 60 ft, [Satisfactory] (ASCE 7-10 26.2.1)

< Min (L, B), [Satisfactory] (ASCE 7-10 26.2.2)

Design pressures for MWFRS

$p = q_h\ [(G\ C_{pf}) - (G\ C_{pi})]$

where: p = pressure in appropriate zone. (Eq. 28.4-1, page 298). p_{min} = **16** psf (ASCE 7-10 28.4.4)

$G\ C_{pf}$ = product of gust effect factor and external pressure coefficient, see table below. (Fig. 28.4-1, page 300 & 301)

$G\ C_{pi}$ = product of gust effect factor and internal pressure coefficient.(Tab. 26.11-1, Enclosed Building, page 258)

= **0.18** or **-0.18**

a = width of edge strips, Fig 28.4-1, note 9, page 301, MAX[MIN(0.1B, 0.1L, 0.4h), MIN(0.04B, 0.04L), 3] = **5.00** ft

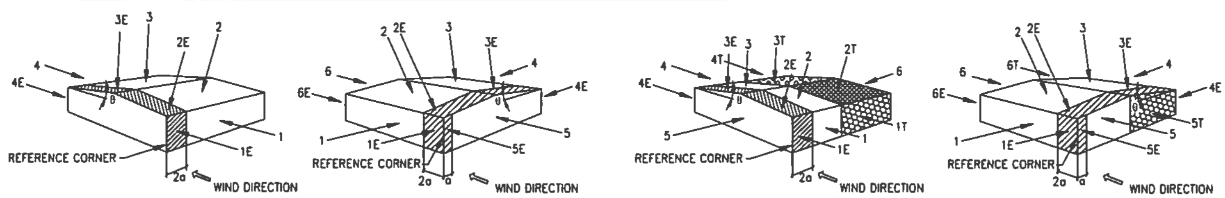
Net Pressures (psf), Basic Load Cases

Surface	Roof angle θ = 0.00			Roof angle θ = 0.00		
	$G\ C_{pf}$	Net Pressure with		$G\ C_{pf}$	Net Pressure with	
		$(+GC_{pi})$	$(-GC_{pi})$		$(+GC_{pi})$	$(-GC_{pi})$
1	0.40	6.20	16.36	-0.45	-17.77	-7.61
2	-0.69	-24.53	-14.38	-0.69	-24.53	-14.38
3	-0.37	-15.51	-5.36	-0.37	-15.51	-5.36
4	-0.29	-13.25	-3.10	-0.45	-17.77	-7.61
5				0.40	6.20	16.36
6				-0.29	-13.25	-3.10
1E	0.61	12.13	22.28	-0.48	-18.61	-8.46
2E	-1.07	-35.25	-25.10	-1.07	-35.25	-25.10
3E	-0.53	-20.02	-9.87	-0.53	-20.02	-9.87
4E	-0.43	-17.20	-7.05	-0.48	-18.61	-8.46
5E				0.61	12.13	22.28
6E				-0.43	-17.20	-7.05

Net Pressures (psf), Torsional Load Cases

Surface	Roof angle θ = 0.00		
	$G\ C_{pf}$	Net Pressure with	
		$(+GC_{pi})$	$(-GC_{pi})$
1T	0.40	1.55	4.09
2T	-0.69	-6.13	-3.60
3T	-0.37	-3.88	-1.34
4T	-0.29	-3.31	-0.78

Surface	Roof angle θ = 0.00		
	$G\ C_{pf}$	Net Pressure with	
		$(+GC_{pi})$	$(-GC_{pi})$
5T	0.40	1.55	4.09
6T	-0.29	-3.31	-0.78



Load Case A (Transverse) Load Case B (Longitudinal) Load Case A (Transverse) Load Case B (Longitudinal)

Basic Load Cases Torsional Load Cases

Basic Load Case A (Transverse Direction)

Surface	Area (ft^2)	Pressure (k) with ($+GC_{pi}$)	Pressure (k) with ($-GC_{pi}$)
1	1800	11.17	29.44
2	2250	-55.20	-32.36
3	2250	-34.90	-12.06
4	1800	-23.86	-5.58
1E	200	2.43	4.46
2E	250	-8.81	-6.27
3E	250	-5.01	-2.47
4E	200	-3.44	-1.41
Σ	Horiz.	40.89	40.89
	Vert.	-103.92	-53.16
Min. wind 28.4.4	Horiz.	32.00	32.00
	Vert.	-80.00	-80.00

Basic Load Case B (Longitudinal Direction)

Surface	Area (ft^2)	Pressure (k) with ($+GC_{pi}$)	Pressure (k) with ($-GC_{pi}$)
2	2250	-55.20	-32.36
3	2250	-34.90	-12.06
5	800	4.96	13.09
6	800	-10.60	-2.48
2E	250	-8.81	-6.27
3E	250	-5.01	-2.47
5E	200	2.43	4.46
6E	200	-3.44	-1.41
Σ	Horiz.	21.43	21.43
	Vert.	-91.12	-41.37
Min. wind 28.4.4	Horiz.	16.00	16.00
	Vert.	-80.00	-80.00

Torsional Load Case A (Transverse Direction)

Surface	Area (ft^2)	Pressure (k) with ($+GC_{pi}$)	Pressure (k) with ($-GC_{pi}$)	Torsion (ft-k) ($+GC_{pi}$)	Torsion (ft-k) ($-GC_{pi}$)
1	800	4.96	13.09	112	294
2	1000	-24.53	-14.38	0	0
3	1000	-15.51	-5.36	0	0
4	800	-10.60	-2.48	239	56
1E	200	2.43	4.46	109	201
2E	250	-8.81	-6.27	0	0
3E	250	-5.01	-2.47	0	0
4E	200	-3.44	-1.41	155	63
1T	1000	1.55	4.09	-39	-102
2T	1250	-7.67	-4.49	0	0
3T	1250	-4.85	-1.67	0	0
4T	1000	-3.31	-0.78	-83	-19
Total Horiz. Torsional Load, M_T				493	493

Torsional Load Case B (Longitudinal Direction)

Surface	Area (ft^2)	Pressure (k) with ($+GC_{pi}$)	Pressure (k) with ($-GC_{pi}$)	Torsion (ft-k) ($+GC_{pi}$)	Torsion (ft-k) ($-GC_{pi}$)
2	2250	-55.20	-32.36	0	0
3	2250	-34.90	-12.06	0	0
5	300	1.86	4.91	19	49
6	300	-3.98	-0.93	40	9
2E	250	-8.81	-6.27	0	0
3E	250	-5.01	-2.47	0	0
5E	200	2.43	4.46	55	100
6E	200	-3.44	-1.41	77	32
5T	500	0.78	2.04	-10	-26
6T	500	-1.66	-0.39	-21	-5
Total Horiz. Torsional Load, M_T				160.0	160.0

Design pressures for components and cladding

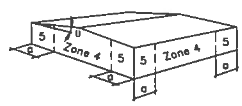
$p = q_h[(G\,C_p) - (G\,C_{pi})]$

where: p = pressure on component. (Eq. 30.4-1, pg 318)

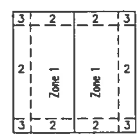
p_{min} = 16.00 psf (ASCE 7-10 30.2.2)

G C_p = external pressure coefficient.

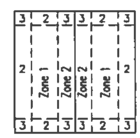
see table below. (ASCE 7-10 30.4.2)



Walls



Roof θ≤7°



Roof θ>7°

	Effective Area (ft^2)	Zone 1 GC_p	Zone 1 $-GC_p$	Zone 2 GC_p	Zone 2 $-GC_p$	Zone 3 GC_p	Zone 3 $-GC_p$	Zone 4 GC_p	Zone 4 $-GC_p$	Zone 5 GC_p	Zone 5 $-GC_p$
Comp.	140	0.20	-0.90	0.20	-1.10	0.20	-1.10	0.72	-0.81	0.72	-0.90

(Walls reduced 10 %, Fig. 6-11A note 5.)

Comp. & Cladding Pressure (psf)	Zone 1 Positive	Zone 1 Negative	Zone 2 Positive	Zone 2 Negative	Zone 3 Positive	Zone 3 Negative	Zone 4 Positive	Zone 4 Negative	Zone 5 Positive	Zone 5 Negative
	16.00	-30.46	16.00	-36.10	16.00	-36.10	25.32	-27.86	25.32	-30.34

Note: If the effective area is roof Solar Panel area, the only zone 1, 2 , or 3 apply.

Masonry Slender Wall

Description : equivalent cantilevered wall in fromt of existing wall

Code References

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-10

General Information

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10

Construction Type : Grouted Hollow Concrete Masonry

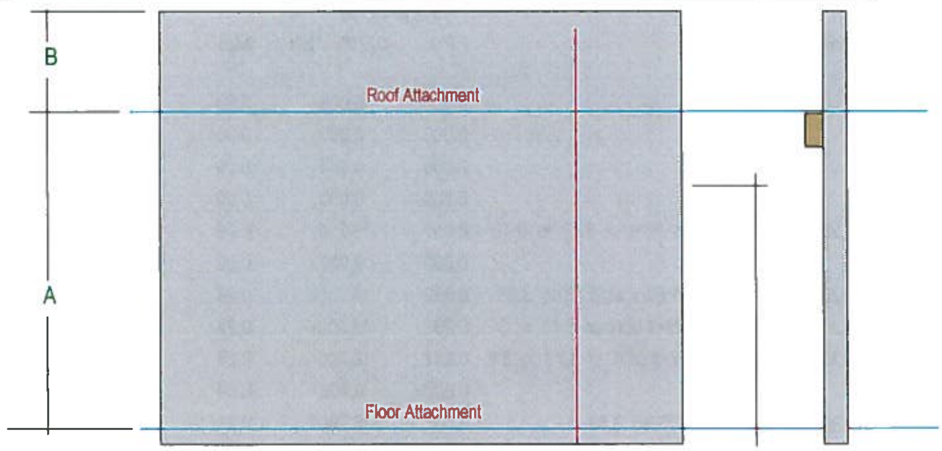
F'm	= 1.50 ksi	Nom. Wall Thickness	6 in	Temp Diff across thickness	=	deg F
Fy - Yield	= 60.0 ksi	Actual Thickness	5.625 in	Min Allow Out-of-plane Defl Ratio	=	0
Fr - Rupture	= 61.0 psi	Rebar "d" distance	3.813 in	Minimum Vertical Steel %	=	0.0020
Em = f'm *	= 900.0	Lower Level Rebar . . .				
Max % of ρ bal.	= 0.1455	Bar Size #	4			
Grout Density	= 140 pcf	Bar Spacing	16.0 in			
Block Weight	Normal Weight					
Wall Weight	= 52.0 psf					

Wall is grouted at rebar cells only

One-Story Wall Dimensions

A Clear Height = 4.660 ft
B Parapet height = ft

Wall Support Condition Top & Bottom Pinned



Lateral Loads

Wind Loads :
Full area WIND load 34.0 psf

Seismic Loads :
Wall Weight Seismic Load Input Method : Direct entry of Lateral Wall Weight
Seismic Wall Lateral Load psf

Fp 1.0 = 0.0 psf

(Applied to full "STRIP Width")

	D	Lr	L	E	W	Endpoints from Base top	bottom
Distributed Lateral Load					7.0 k/ft	4.660	3.660 k/ft

Masonry Slender Wall

Description : equivalent cantilevered wall in fromt of existing wall

DESIGN SUMMARY

Results reported for "Strip Width" of 12.0 in

	Governing Load Combination . . .	Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check	Maximum Bending Stress Ratio =	0.8757		
	+0.90D+W+0.90H	Max Mu	2.087 k-ft	Phi * Mn	2.383 k-ft
PASS	Service Deflection Check	Actual Defl. Ratio L/	383	Allowable Defl. Ratio	150
	W Only	Max. Deflection	0.1462 in		
PASS	Axial Load Check	Max Pu / Ag	1.135 psi	Max. Allow. Defl.	0.3728 in
	+1.20D+0.50Lr+0.50L+W+1.60H	Location	3.806 ft	0.2 * f'm	300.0 psi
PASS	Reinforcing Limit Check				
		Controlling As/bd	0.003278	As/bd 0.1455 rho bal	0.1455

Maximum Reactions . . .	for Load Combination....	
Top Horizontal	W Only	5.456 k
Base Horizontal	W Only	0.6151 k
Vertical Reaction	+D+0.60W+H	0.2423 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Axial Load 0.2*f'm*b*t k	Mcr k-ft	Moment Values Mu k-ft	Phi	Phi Mn k-ft	As in^2	As Ratio	0.6 * rho bal
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
+1.20D+1.60Lr+0.50W+1.60H at 3.73 to 3.88	0.059	16.200	0.28	1.04	0.90	2.39	0.150	0.0033	0.1454
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
+1.20D+1.60S+0.50W+1.60H at 3.73 to 3.88	0.059	16.200	0.28	1.04	0.90	2.39	0.150	0.0033	0.1454
+1.20D+0.50Lr+0.50L+W+1.60H at 3.73 to 3.	0.061	16.200	0.28	2.09	0.90	2.39	0.150	0.0033	0.1454
+1.20D+0.50L+0.50S+W+1.60H at 3.73 to 3.8	0.061	16.200	0.28	2.09	0.90	2.39	0.150	0.0033	0.1454
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000
+0.90D+W+0.90H at 3.73 to 3.88	0.047	16.200	0.28	2.09	0.90	2.38	0.150	0.0033	0.1454
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values Mcr k-ft	Moment Values Mactual k-ft	I gross in^4	Stiffness I cracked in^4	I effective in^4	Deflections Deflection in	Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+0.60W+H at 2.64 to 2.80	0.105	0.28	0.93	154.20	29.17	29.324	0.079	709.1
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+0.750Lr+0.750L+0.450W+H at 2.64 to 2.8	0.105	0.28	0.70	154.20	29.17	29.572	0.053	1,049.2
+D+0.750L+0.750S+0.450W+H at 2.64 to 2.80	0.105	0.28	0.70	154.20	29.17	29.572	0.053	1,049.2
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+0.60D+0.60W+0.60H at 2.64 to 2.80	0.063	0.28	0.93	154.20	29.07	29.221	0.079	707.2
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Masonry Slender Wall

Description : equivalent cantilevered wall in fromt of existing wall

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu (k)	Moment Values Mcr (k-ft)	Moment Values Mactual (k-ft)	I gross (in^4)	Stiffness I cracked (in^4)	Stiffness I effective (in^4)	Deflections Deflection (in)	Deflections Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
W Only at 2.64 to 2.80	0.000	0.28	1.55	154.20	28.91	28.941	0.146	382.6
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Reactions - Vertical & Horizontal

Results reported for "Strip Width" = 12 in.

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
+D+H	0.0 k	0.00 k	0.242 k
+D+L+H	0.0 k	0.00 k	0.242 k
+D+Lr+H	0.0 k	0.00 k	0.242 k
+D+S+H	0.0 k	0.00 k	0.242 k
+D+0.750Lr+0.750L+H	0.0 k	0.00 k	0.242 k
+D+0.750L+0.750S+H	0.0 k	0.00 k	0.242 k
+D+0.60W+H	0.4 k	3.27 k	0.242 k
+D+0.70E+H	0.0 k	0.00 k	0.242 k
+D+0.750Lr+0.750L+0.450W+H	0.3 k	2.46 k	0.242 k
+D+0.750L+0.750S+0.450W+H	0.3 k	2.46 k	0.242 k
+D+0.750L+0.750S+0.5250E+H	0.0 k	0.00 k	0.242 k
+0.60D+0.60W+0.60H	0.4 k	3.27 k	0.145 k
+0.60D+0.70E+0.60H	0.0 k	0.00 k	0.145 k
D Only	0.0 k	0.00 k	0.242 k
Lr Only	0.0 k	0.00 k	0.000 k
L Only	0.0 k	0.00 k	0.000 k
S Only	0.0 k	0.00 k	0.000 k
W Only	0.6 k	5.46 k	0.000 k
E Only	0.0 k	0.00 k	0.000 k
H Only	0.0 k	0.00 k	0.000 k

DAVID BIXLER & ASSOCIATES
Structural Engineering

VISION

Our vision is to be recognized throughout the Southwest as the leader in structural engineering.

COMMITMENT

We are committed to
- technological leadership
- innovative and cost-effective solutions
- quality work
- client satisfaction.

VALUES

Our team delivers integrity service collaboration quality efficiency

August 23, 2016

Mark Davenport AIA, CEFPI, LEED AP, BD+C
SPS+ ARCHITECTS LLP
8681 E. Via de Negocio
Scottsdale, AZ 85258

Re: Landmark Middle School
Glendale, AZ

Dear Mr. Davenport:

Per your request, we visited the Landmark Middle School on several occasions. I also have reviewed the reports from both Speedie and Associates and Gervasio and Associates, which are attached to the end of this report, along with pictures from our site visits during the CMU removal to investigate the reinforcing and typical pictures of the type of cracking along the buildings. We also reviewed the existing plans of the buildings which we have received. The purpose of this report is to review the conditions of the existing buildings along with the reports prepared by other consultants, and to recommend a plan of action going forward on the best course of action to remedy the deficient areas.

The buildings are typically steel and wood framed roofs bearing on CMU exterior walls and concrete spread footings.

Based on the surface penetrating radar investigations Speedie and Associates performed, the vertical reinforcing appears to be installed for the most part correctly, and based off of their radar findings, there is nothing that is significantly different than what we would expect.

Based on the soils investigations performed by Speedie and Associate, there does not appear to be a specific cause of the masonry distress due to the soils themselves, except the fact that the soil conditions are very moist. The moisture fluctuations in the soils will have a tendency to cause continuous movement in the soils which will induce stresses on the buildings which will sometimes result in cracks of the CMU.

... Drive Suite 110 • Scottsdale• Arizona • 85260 • Phone (480) 219-2886 Fax (480) 588-8584 • david.bixler@...

There were three reports done by Gervasio and Associates that we have received and reviewed: (1) report dated February 15, 2011 dealing mostly with cracks in the North-East corner of the Gym Building, (2) report dated May 27, 2014 dealing with cracks in the masonry piers at the Administration building, and (3) report dated July 20, 2015 dealing with cracks in the interior and exterior walls, deteriorating concrete piers, corroded metal deck and steel joist bearings in the media center. For the gymnasium cracks, Gervasio maintains that there were three different types of cracks, a stair-stepped crack near the corner, a vertical crack at the change in parapet height and a crack at beam bearing. They indicated that only the crack at the beam bearing was in need of repair and that the others could be caulked to prevent moisture. Gervasio recommended that the crack at beam bearing be modified to allow for thermal movement in the beam. All of the additional investigations that have been performed since then would indicate that they are most likely correct. Since the moisture around the building is currently in the process of getting corrected, I would recommend that instead of just caulking the cracks, I would repoint and repair or replace the block as required to bring it back to its original state. At the vertical crack I would recommend adding the vertical masonry control joint that is missing to prevent future cracking.

Finally, at the beam bearing location, this bearing condition needs to be rebuilt with a neoprene pad below the beam bearing to allow for movement and the CMU below should be rebuilt and grouted properly. In the second report dealing with the vertical cracks in the masonry piers, Gervasio recommended tying the two walls together by doweling and epoxying them and attaching the piers to the building with doweling and epoxying as well. I agree with their recommendations since the moisture issue is being corrected. For the media center for the interior and exterior cracks, Gervasio recommends drying out the crawl space and fixing the broken water line and then repairing the cracks. For the deteriorated concrete piers Gervasio recommends installing new posts besides the beam to support the beam. Since the moisture issues are being corrected, I recommend repairing the concrete piers. This will not change the current load path and will remove the corroded steel in the piers which will continue to deteriorate even with the moisture removed. For the steel joist bearing on wood blocks, Gervasio recommends removing the wood shims and installing dry pack below the joist; I agree with this recommendation.

From our review of the CMU demolition and our cursory review of the buildings in general, we discovered numerous cracking and rusted reinforcing.

From the four holes that were opened up to expose the reinforcing, we found rusted and deteriorated vertical and horizontal reinforcing in each location. The footings in three of the locations appeared to be in good condition and the correct size, but the fourth was tapered from maybe only 8 inches thick to 2 inches thick at the edge.

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From our visual inspection, we noticed several different types of cracks, and too many to document all of them. They basically fell into two categories:

1. There were several areas where there are shrinkage cracks, most likely due to insufficient or improper locations of masonry control joints, or improperly installed masonry control joints (see photographs 8 and 11 on building 1, photos 4 and 9 on building 2, photo 6 and 15 on building 3 and photo 1 on building 6 and photo 3 on building 7). While these are not structural in nature, they will affect the waterproofing integrity of the building and therefore I recommend that new masonry control joints be installed and for the CMU in these areas to be tuck pointed and repaired or replaced as applicable. There were approximately 10-15 locations throughout the school where this occurred.

2. The remaining photos appear to be related to moisture and the rusting of the reinforcing in the CMU. Since reinforcing when it rusts can grow to over 400% of its original size, it appears that the reinforcing has rusted, expanded and has cracked the CMU. Since the face shell is now delaminated, it causes the CMU to be reduced in size and therefore to be reduced in strength. There is no real way to determine the loss in strength without knowing the exact thickness of the delaminated CMU. This is a very old building that does not comply with the current building codes, and there is reduced strength of the existing wall with the delamination of the face shells. The reduction in strength could easily range from 33%-90%. Therefore, I recommend that the CMU walls be braced immediately until the repairs are complete.

In addition, there is no real way to eliminate moisture from entering into the CMU with the cracks in it and this will continue to make the condition worse. There is no easy or accurate way to determine the extents of the rusting in the CMU without removing the face shells and investigating the reinforcing as we did in those four locations. The repair for these locations would be extremely expensive but would entail removing the CMU and exposing the rusted reinforcing and then removing it and replacing it with new reinforcing, grout and CMU. This would need to be done in an explorative manner where you start at each of the cracks and then you expand outward until you get to undamaged CMU and reinforcing. Therefore, there is no real way to determine the extents but due to the moisture conditions and the amount of cracking that is visible I would not be surprised if 50%-75% of the length of the walls at the grade line are damaged in this manner. The CMU walls should be braced immediately until the repairs are complete. To avoid continued and future damage, the drainage around the buildings should be also corrected. All sprinkler lines should be moved away from the buildings, and all of the grades should be sloped to divert the water away from the buildings.

If the decision is to repair the school, then this should start immediately, and we should brace the CMU walls until the repairs are completed. Without knowing the extent of the damage, it is extremely difficult to determine how the walls will perform as the reinforcing continues to rust and the walls continue to worsen.

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While it is extremely difficult to provide any budgetary numbers due to the uncertainty of the full scope and amount of damage we estimate the following corresponding to the item numbers above:

1) Temporary bracing of the CMU walls:	$70,000
2) Installation of masonry control joints and repair of damaged CMU:	$40,000
3) Repair of the cracked CMU and rusted reinforcing (not including drainage):	$250,000
4) Gervasio report regarding gym cracks:	$20,000
5) Gervasio report regarding column cracks:	$25,000
6) Gervasio report regarding the media center:	$150,000

Please understand that this report represents a professional opinion based upon the results of our limited observations, and past experience with similar conditions. Our study was strictly limited to visual observations as stated above. This report is not intended to be a complete or comprehensive study of the structure. We have not reviewed, nor have we been asked to review, the capacity of the existing structure per the current code. Our work has been performed in accordance with generally accepted principles and practices of structural engineering.

We cannot be responsible for any future changes in the condition of the structure. No warranty is provided, either expressed or implied.

If there are any additional concerns or questions, please feel free to contact our office. Thank you for the opportunity to assist you on this project.

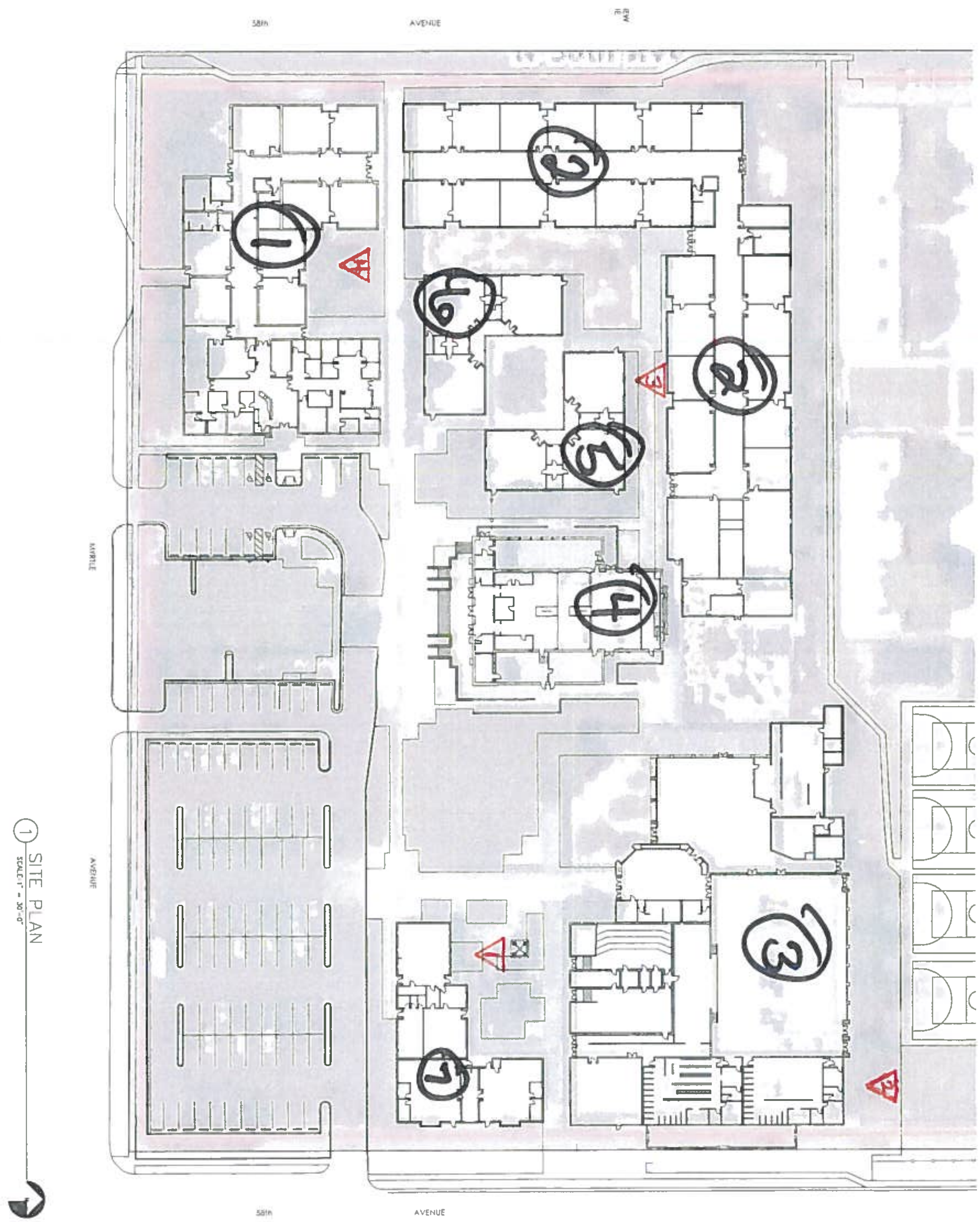
Sincerely,

David Bixler

Registered Professional Engineer (Structural) CERTIFICATE NO. 46644 W. DAVID BIXLER Date Signed 8/26/16 ARIZONA U.S.A. Expires 06/30/2019

David Bixler, PE, SE President
David Bixler & Associates, PLLC

CMU REMOVAL AND INVESTIGATION PICTURES



LANDMARK MIDDLE SCHOOL
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
5730 WEST MYRTLE AVENUE
GLENDALE, AZ 85301

SITE PLAN

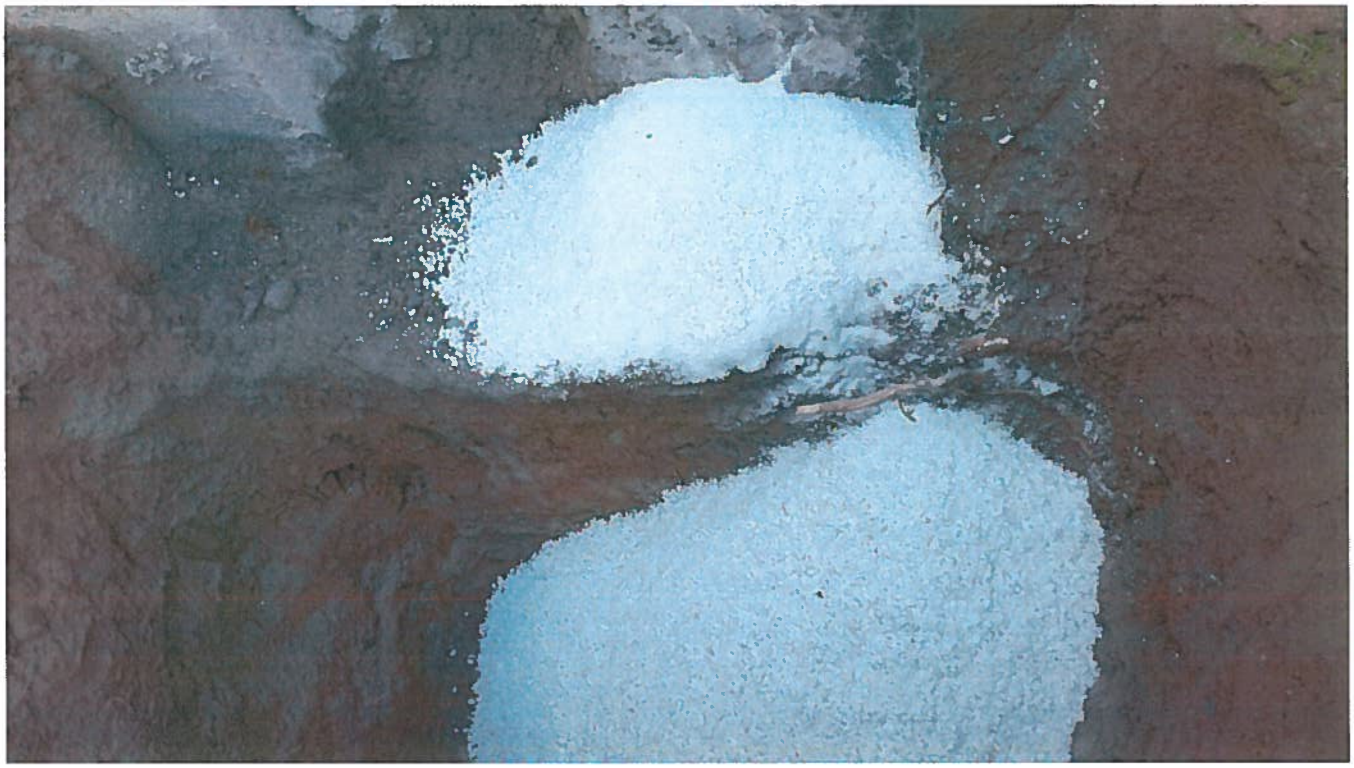
SPS+ ARCHITECTS LLP
SCOTTSDALE, AZ 85258
TEL: 480.991.0800
FAX: 480.991.2623
spsplusarchitects.com

REVIEWED BY
DRAWN BY

PRELIMINARY NOT FOR CONSTRUCTION

DATE 2/24/2015
JOB No. 14348
SHEET A100

LANDMARK – BLDG. 7 - MARKER #1



PICTURE NO. 1

PICTURE NO. 2

LANDMARK – BLDG. 7 - MARKER #1

PICTURE NO. 3

PICTURE NO. 4

LANDMARK – BLDG. 3 - MARKER #2

PICTURE NO. 1

PICTURE NO. 2

LANDMARK – BLDG. 2 - MARKER #3

PICTURE NO. 1

PICTURE NO. 2

LANDMARK – BLDG. 2 - MARKER #3

PICTURE NO. 3

LANDMARK – BLDG. 2 - MARKER #3

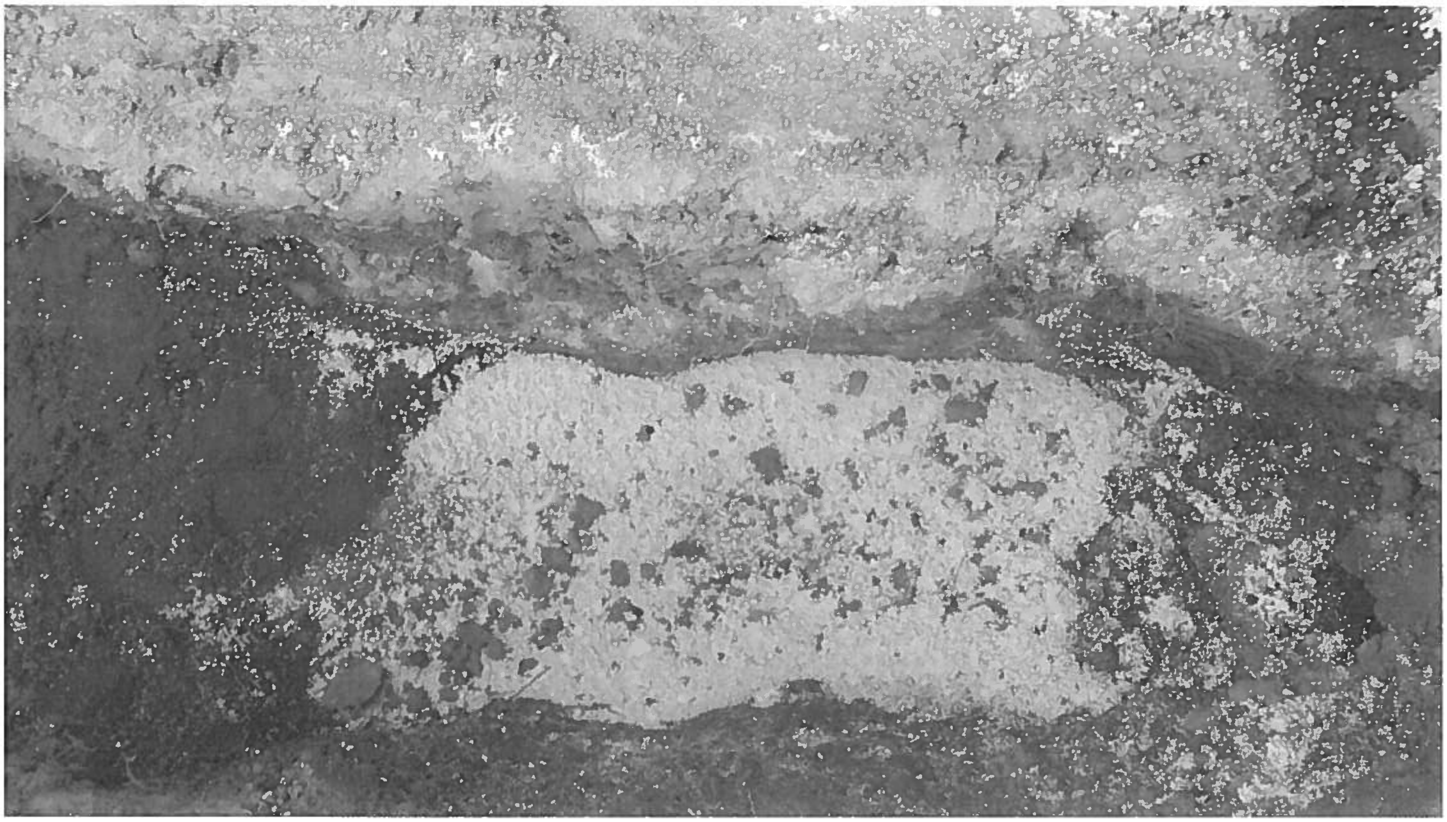
PICTURE NO. 4

LANDMARK – BLDG. 1 - MARKER #4

PICTURE NO. 1

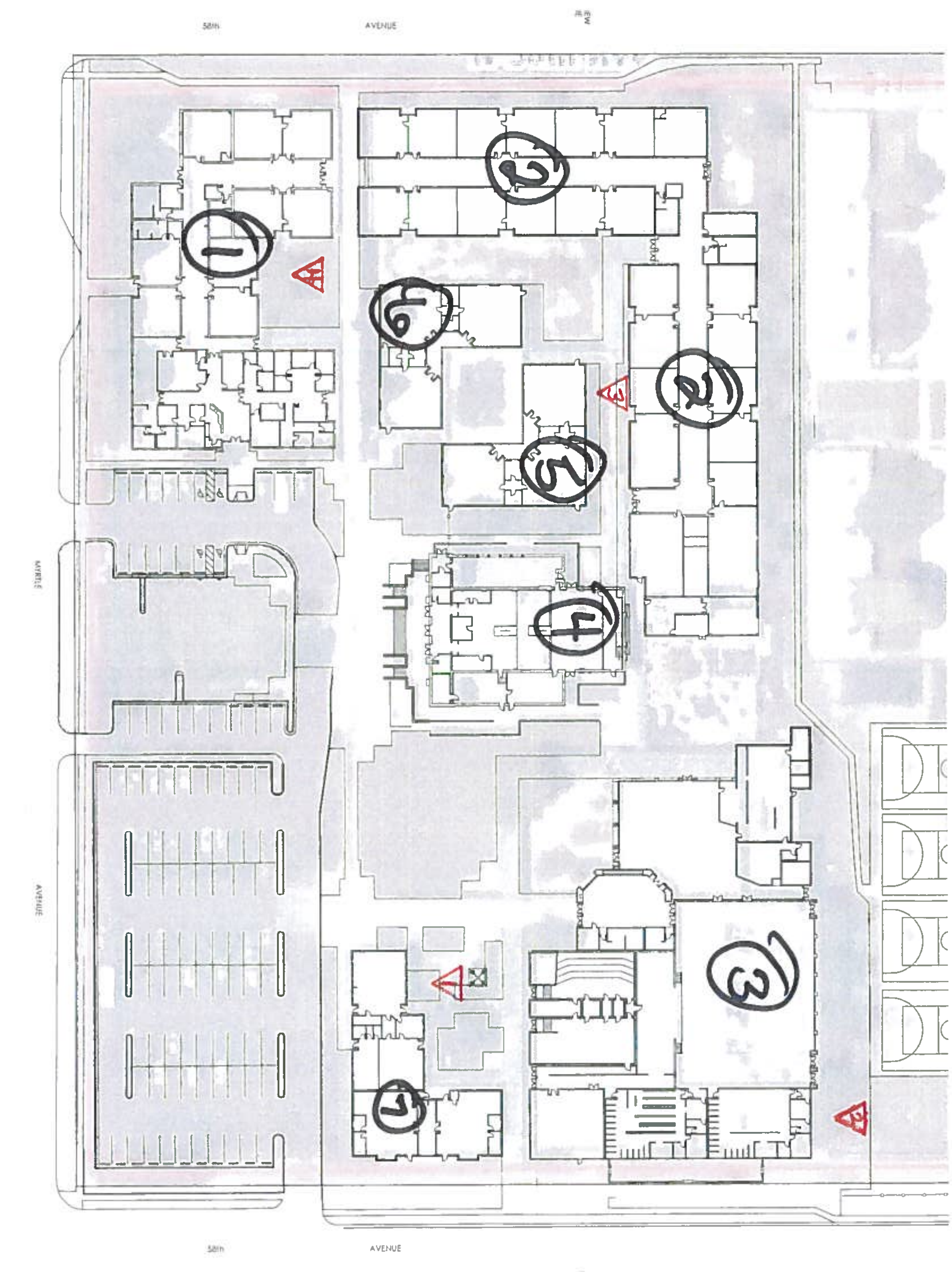
PICTURE NO. 2

LANDMARK – BLDG. 1 - MARKER #4



PICTURE NO. 3

SITE INVESTIGATION PICTURES



1 SITE PLAN
SCALE: 1" = 30'-0"

SPS+ ARCHITECTS

SPS+ ARCHITECTS LLP
SCOTTSDALE AZ 85258
TEL 480.991.0800
FAX 480.991.2623
spsplusarchitects.com

LANDMARK MIDDLE SCHOOL
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
5730 WEST MYRTLE AVENUE
GLENDALE, AZ 85301

SITE PLAN

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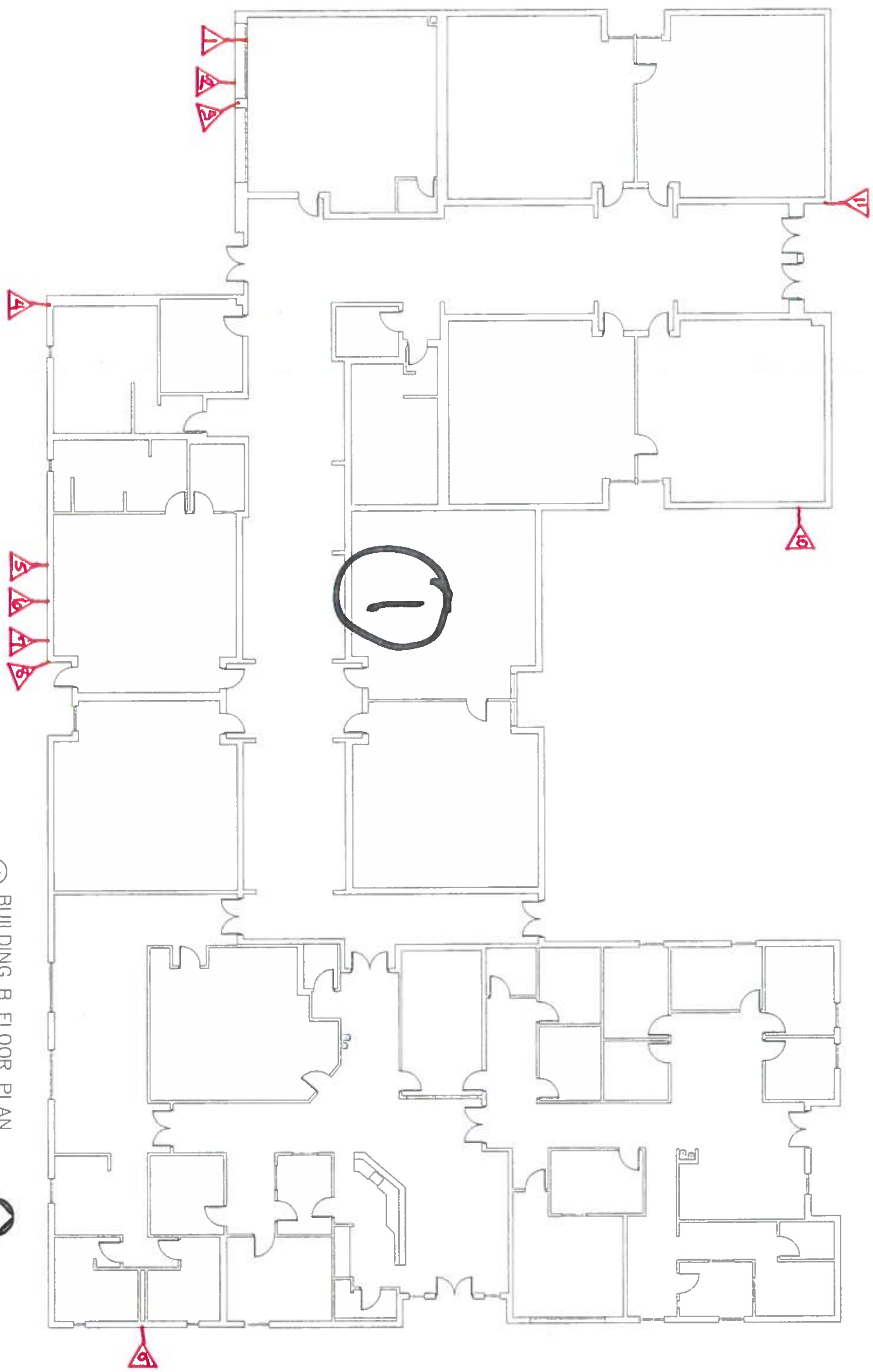
SHEET

A100



1 BUILDING B FLOOR PLAN
SCALE: 1/8"=1'-0"

LANDMARK MIDDLE SCHOOL

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
5730 WEST MYRTLE AVENUE
GLENDALE, AZ 85301

BUILDING B FLOOR PLAN

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SCOTTSDALE, AZ 85258
TEL: 480.991.0800
FAX: 480.991.2623
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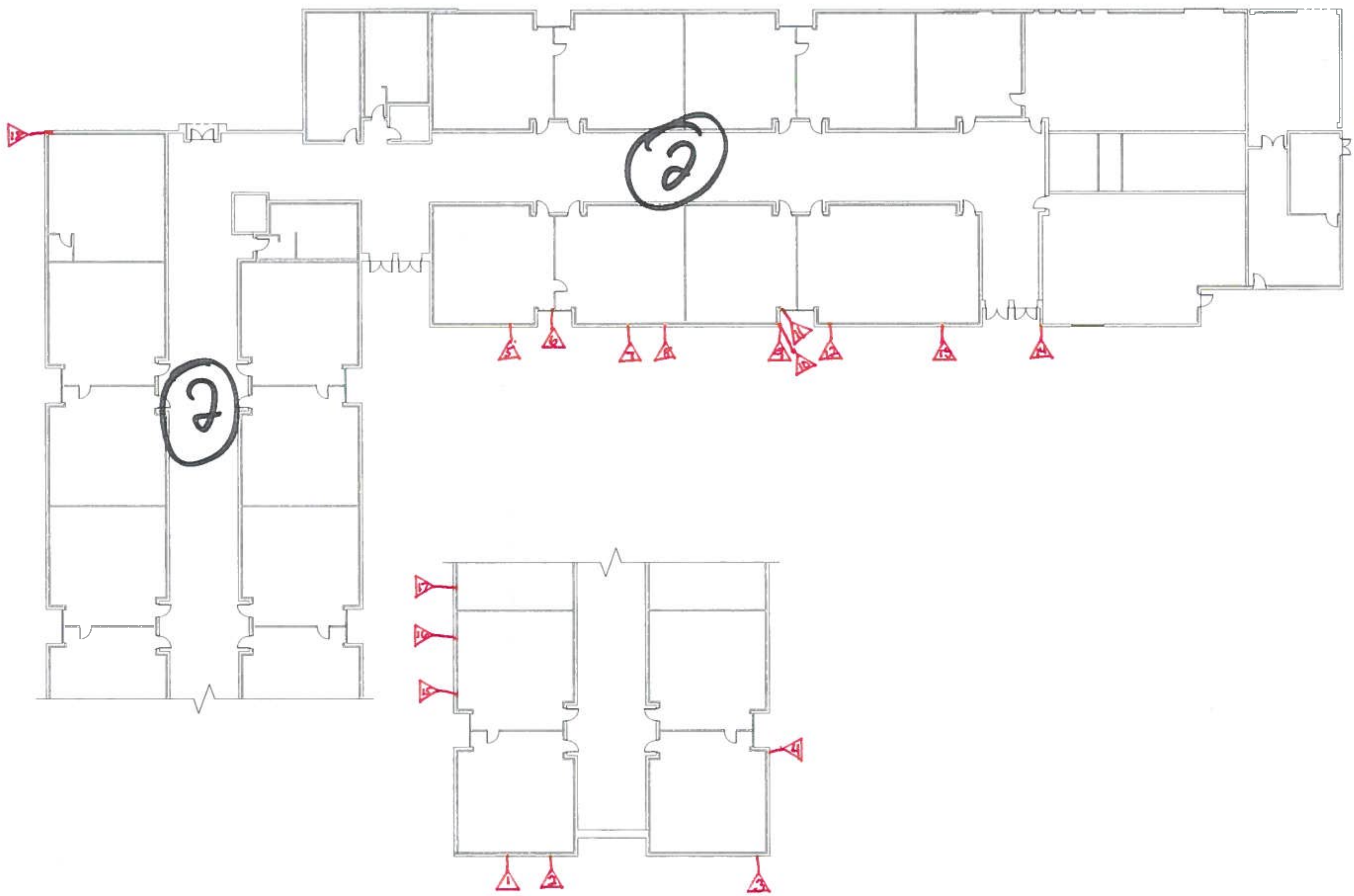
SHEET

A201



1 BUILDING C + D FLOOR PLANS
SCALE: 3/32"=1'-0"

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SPS+ ARCHITECTS LLP
SCOTTSDALE, AZ 85258
TEL: 480 991 0800
FAX: 480 991 2623
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BUILDING C + D FLOOR PLANS

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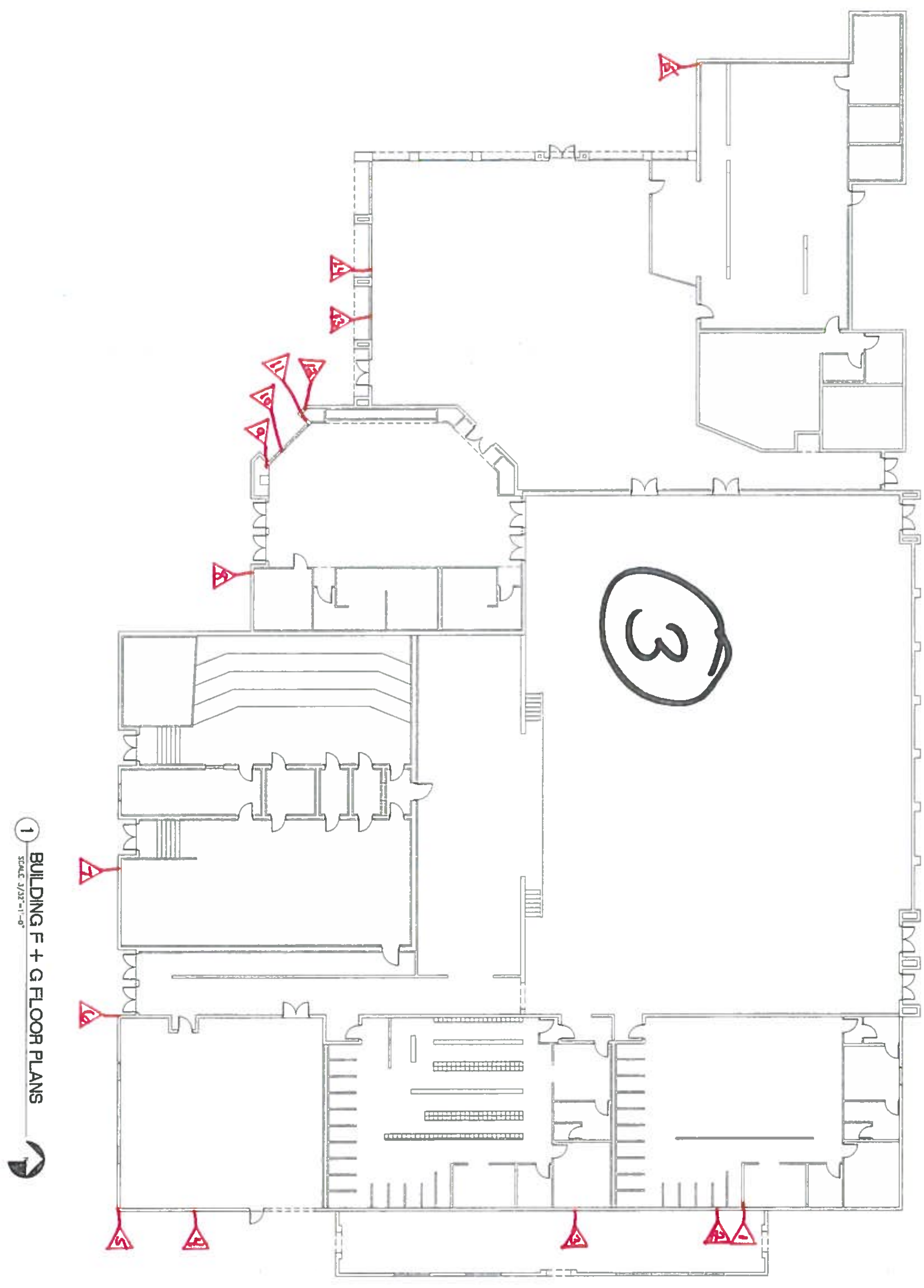
PRELIMINARY NOT FOR CONSTRUCTION

DATE: 2/24/2015
JOB No: 14343
SHEET
A202



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5730 WEST MYRTLE AVENUE
GLENDALE, AZ 85301

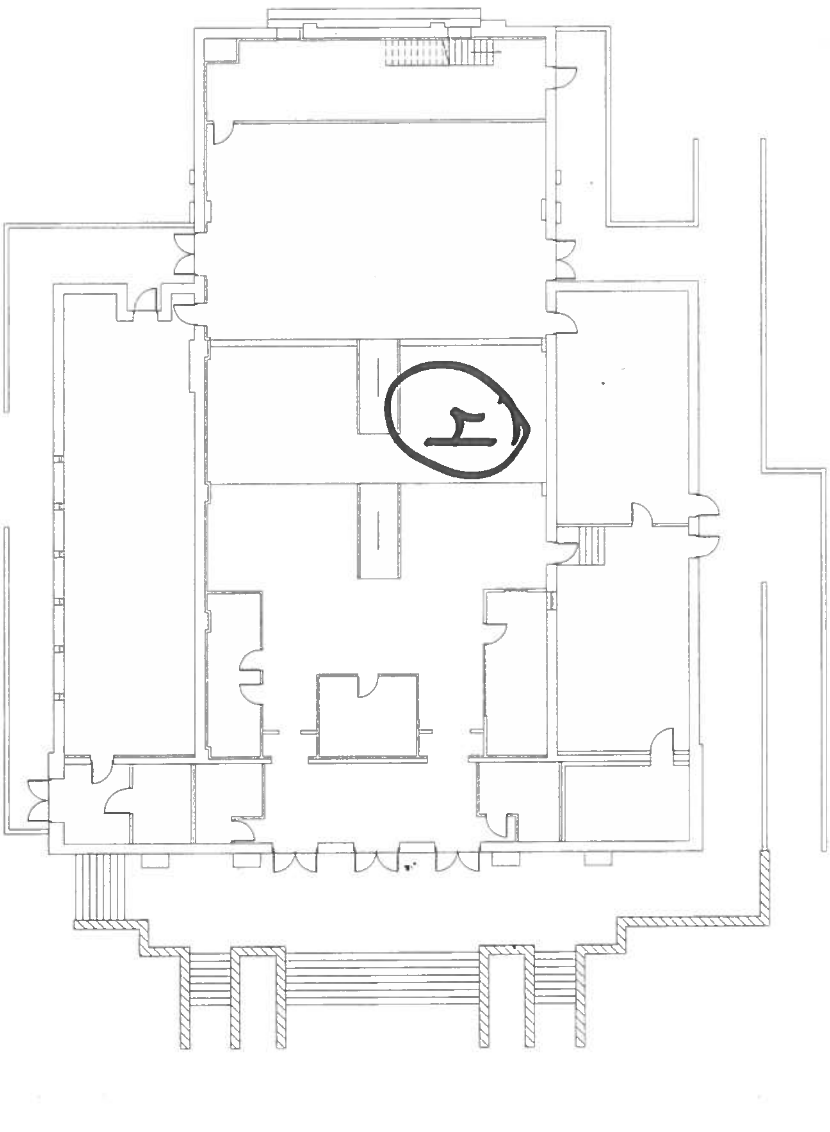
BUILDING F + G FLOOR PLAN

PRELIMINARY NOT FOR CONSTRUCTION

REVIEWED BY
DRAWN BY

DATE 3/24/2015
JOB NO.
SHEET

A204



1 BUILDING A FLOOR PLAN
SCALE: 1/8" = 1'-0"

SPS+ ARCHITECTS LLP
SCOTTSDALE, AZ 85258
TEL. 480.991.0800
FAX: 480.991.2623
spsplusarchitects.com

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LANDMARK MIDDLE SCHOOL

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
5730 WEST MYRTLE AVENUE
GLENDALE, AZ 85301

BUILDING A FLOOR PLAN

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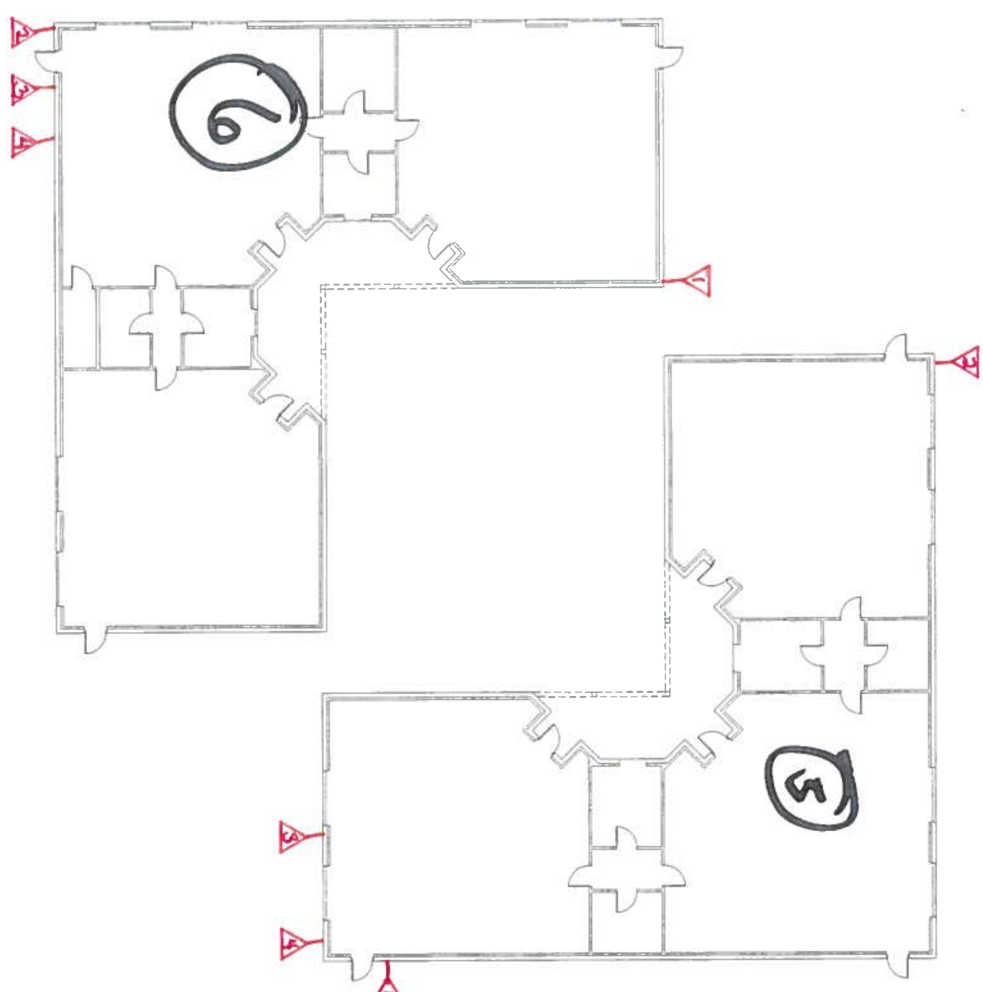
PRELIMINARY NOT FOR CONSTRUCTION

DATE 2/24/2015
JOB No. 14348
SHEET: A200



1 BUILDING E FLOOR PLANS
SCALE: 1/8"=1'-0"

LANDMARK MIDDLE SCHOOL
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
5730 WEST MYRTLE AVENUE
GLENDALE, AZ 85301

BUILDING E FLOOR PLAN

SPS+ ARCHITECTS LLP
SCOTTSDALE, AZ 85258
TEL. 480.991.0800
FAX 480.991.2623
spsplusarchitects.com

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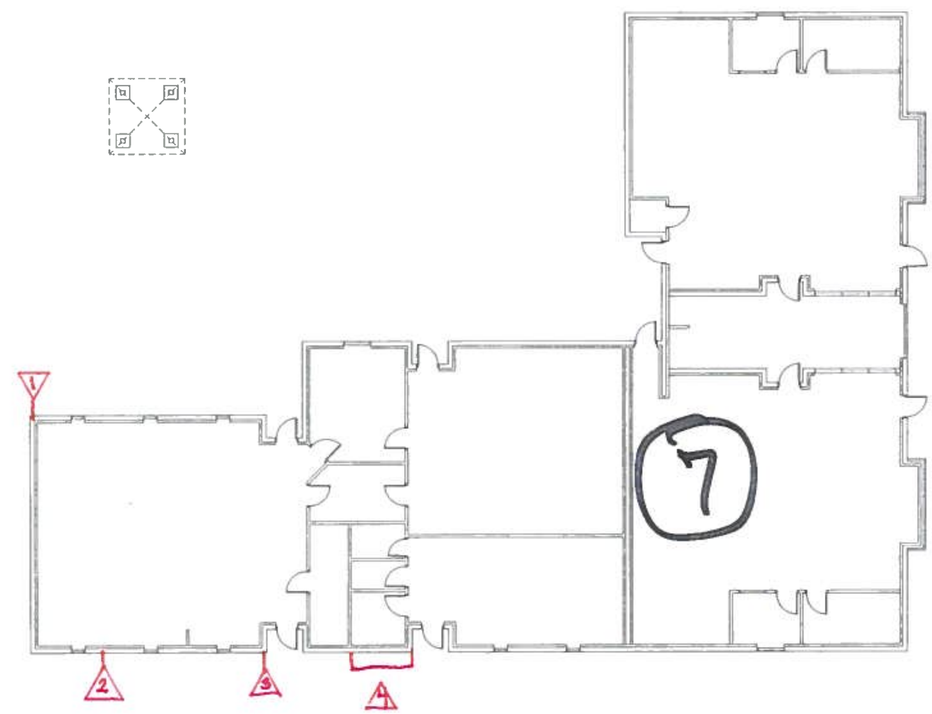
SCHEMATIC

DATE 2/24/2015
JOB No
SHEET A203



1 BUILDING H FLOOR PLAN
SCALE: 1/8" = 1'0"

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SPS+ ARCHITECTS LLP
SCOTTSDALE, AZ 85258
TEL: 480 991 0800
FAX: 480 991 2623
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LANDMARK MIDDLE SCHOOL
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
5730 WEST MYRTLE AVENUE
GLENDALE, AZ 85301

BUILDING H FLOOR PLAN

REVISIONS

REVIEWED BY:
DRAWN BY:

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 2/24/2015
JOB No: 14348
SHEET:
A205

LANDMARK – BUILDING 1

MARKER NO. 1

MARKER NO. 2

LANDMARK – BUILDING 1

MARKER NO. 3

MARKER NO. 4

LANDMARK – BUILDING 1

MARKER NO. 5

MARKER NO. 6

LANDMARK – BUILDING 1

MARKER NO. 7

MARKER NO. 8

LANDMARK – BUILDING 1

MARKER NO. 9

MARKER NO. 10

LANDMARK – BUILDING 1

MARKER NO. 11

LANDMARK – BUILDING 2

MARKER NO. 1

MARKER NO. 2

LANDMARK – BUILDING 2

MARKER NO. 3

MARKER NO. 4

LANDMARK – BUILDING 2

MARKER NO. 5

MARKER NO. 6

LANDMARK – BUILDING 2

MARKER NO. 7

MARKER NO. 8

LANDMARK – BUILDING 2

MARKER NO. 9

MARKER NO. 10

LANDMARK – BUILDING 2

MARKER NO. 11

MARKER NO. 12

LANDMARK – BUILDING 2

MARKER NO. 13

MARKER NO. 14

LANDMARK – BUILDING 2

MARKER NO. 15

MARKER NO. 16

LANDMARK – BUILDING 2

MARKER NO. 17

MARKER NO. 18

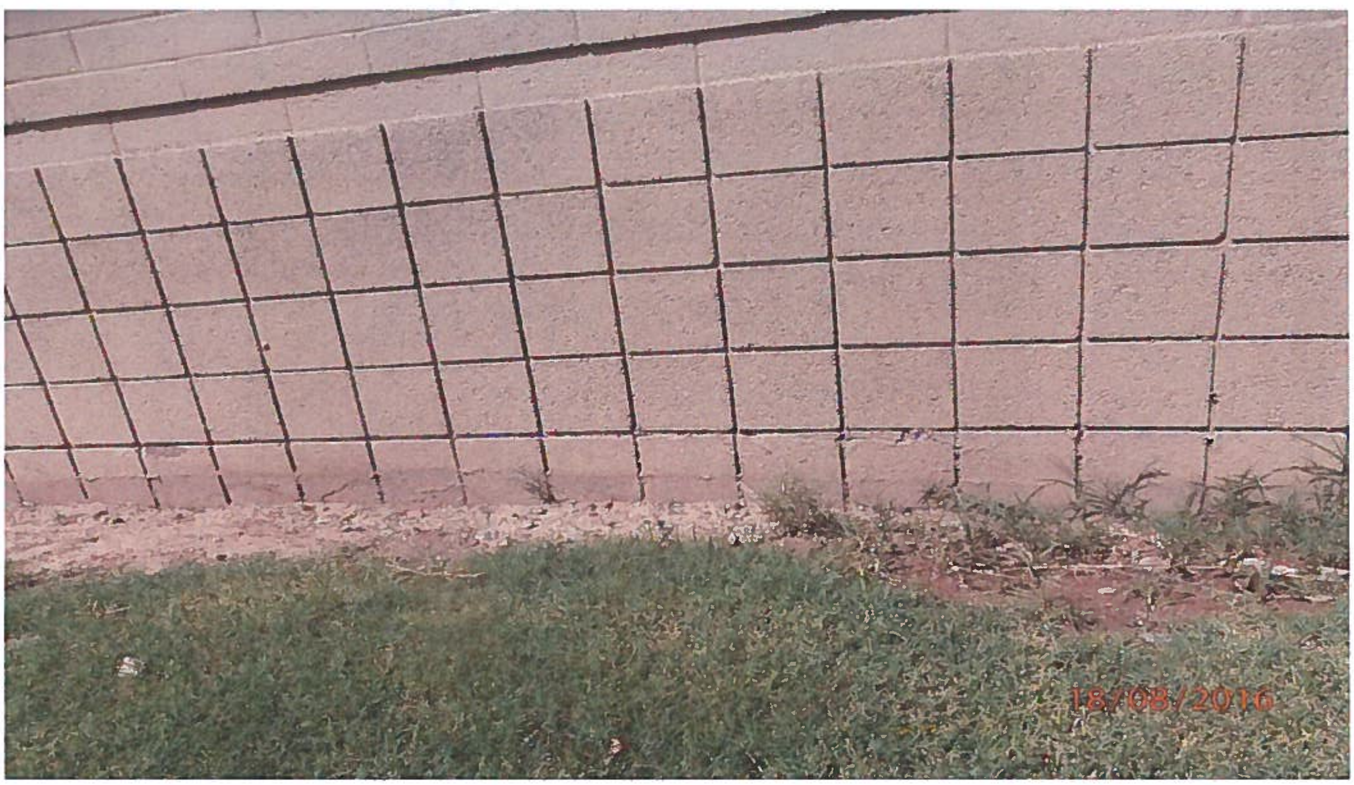
LANDMARK – BUILDING 3

MARKER NO. 1

MARKER NO. 2

LANDMARK – BUILDING 3

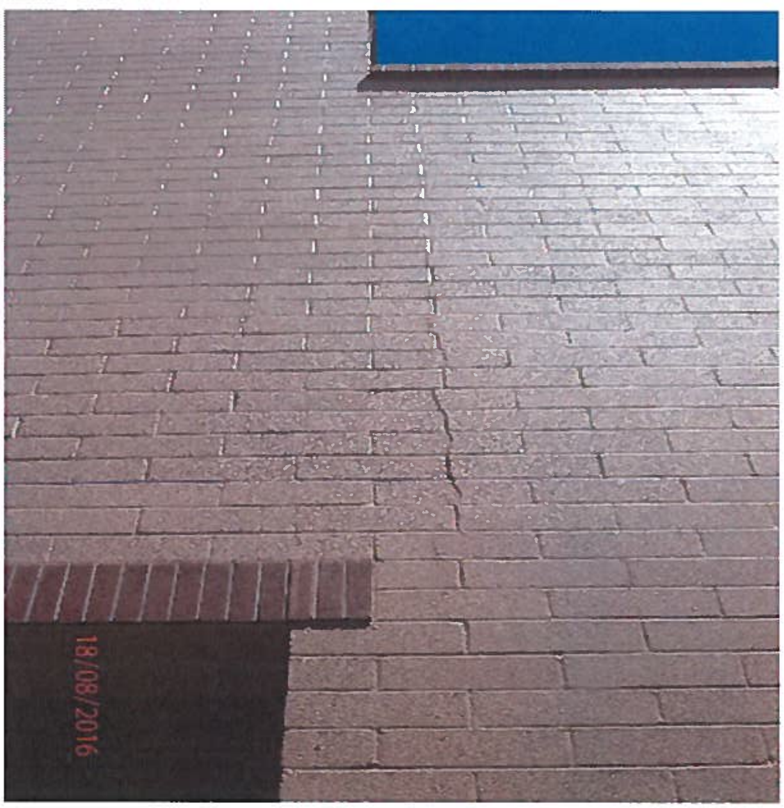
MARKER NO. 3



MARKER NO. 4

LANDMARK – BUILDING 3

MARKER NO. 5



MARKER NO. 6

LANDMARK – BUILDING 3

MARKER NO. 7

MARKER NO. 8

LANDMARK – BUILDING 3

MARKER NO. 9

MARKER NO. 10

LANDMARK – BUILDING 3

MARKER NO. 11

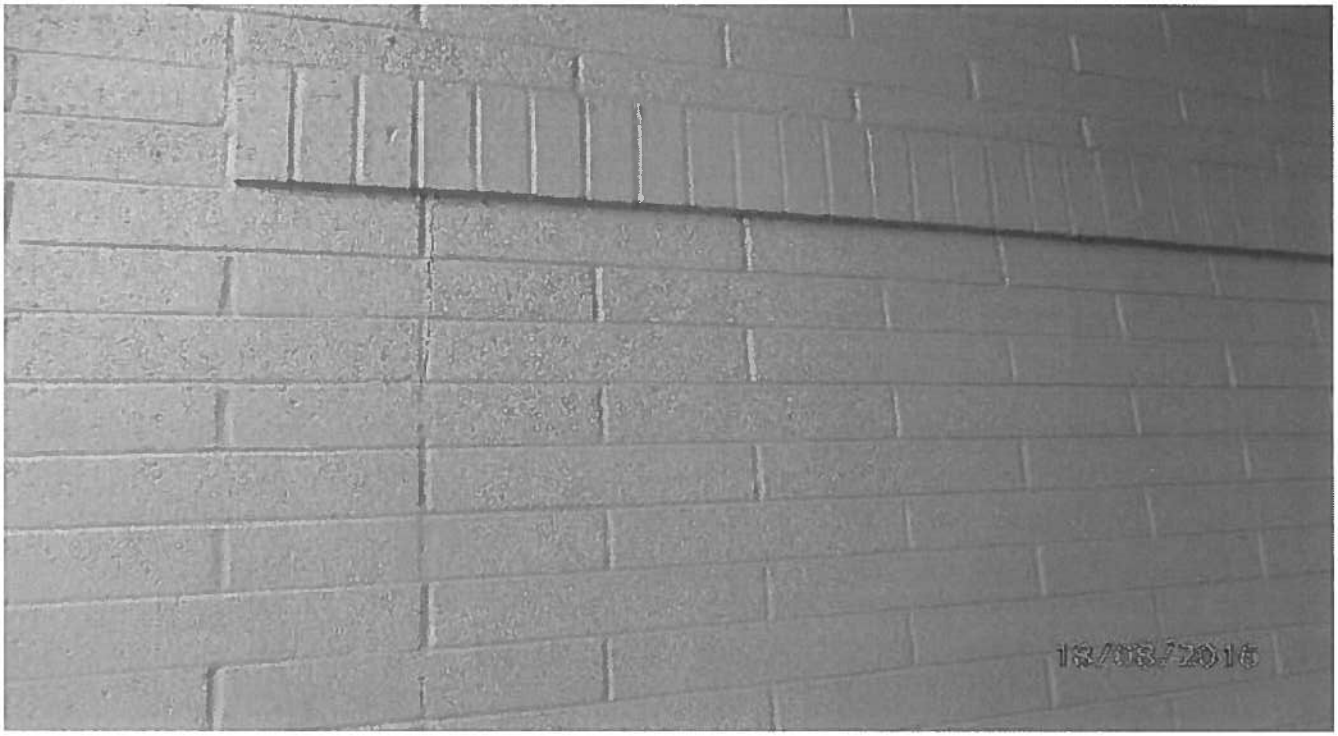
MARKER NO. 12

LANDMARK – BUILDING 3

MARKER NO. 13

MARKER NO. 14

LANDMARK – BUILDING 3



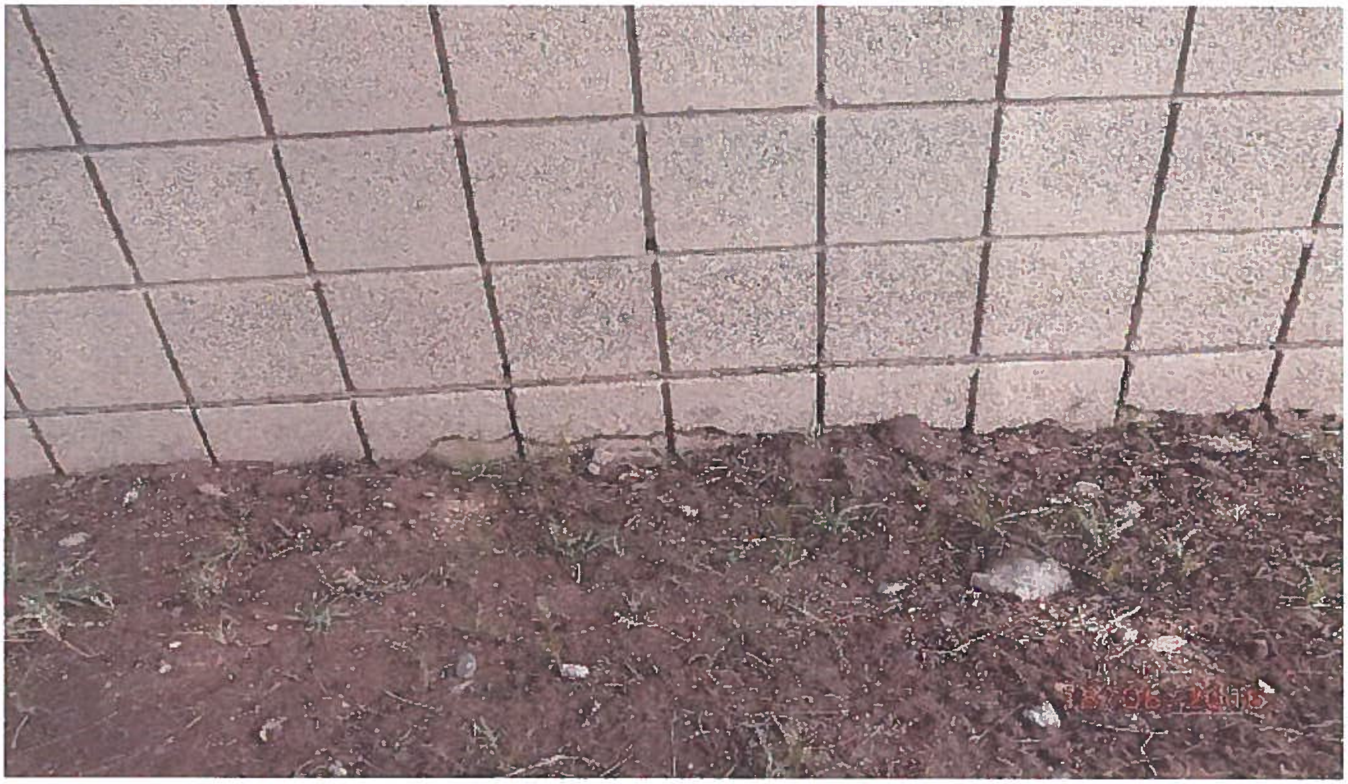
MARKER NO. 15

LANDMARK – BUILDING 5

MARKER NO. 1

MARKER NO. 2

LANDMARK – BUILDING 5



MARKER NO. 3

MARKER NO. 4

LANDMARK – BUILDING 6

MARKER NO. 1

LANDMARK – BUILDING 6

MARKER NO. 2

MARKER NO. 3

LANDMARK – BUILDING 6

MARKER NO. 4

LANDMARK – BUILDING 7

MARKER NO. 1

MARKER NO. 2

LANDMARK – BUILDING 7

MARKER NO. 3

MARKER NO. 4

SURFACE PENETRATING RADAR REPORT

SPEEDIE AND ASSOCIATES

GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR FIELD REPORT

Project Name: Landmark School-Building Distress - GPR **Project #:** 161292TA **Date:** 07/11/16

Project Location: 5730 W. Myrtle Ave. - Glendale, AZ. **Time Start:** 4:30 AM **Time Stop:** 12:30 PM

Client: SPS Arrchitects **Rep:** Jennifer Bowen **Doc #:** *GPR* RW434

WORK ORDERED BY CLIENT:

STRUCTURE TYPE: Cast in Place ☑ Pre-Cast ☐ Masonry ☑ Other ☐ ________

STRUCTURE ELEMENT: Footing ☐ SOG ☑ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ________

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☑ Other ☐ ________

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Duct Tape ☑

SIZE / LOCATION OF AREA(S):

S&A performed Ground Penetrating Radar (GPR) scanning at the Landmark Elementary School buildings. We utilized the GSSI SIR-3000 Data Acquisition System with model 5100B - 1600 and 2000 MHz antennas. We scanned the CMU walls at locations that were predetermined by the structural engineer to identify and note reinforcement indications. Per our proposal, we scanned each approximate 10' x 10' wall section from the bottom of existing exterior grade. The existing grade was removed about a shovels width along the stem wall at many locations. We utilized colored tape to marked reinforcement indications. The tape markings were terminated at the limits of the scanned sections.

* Please see our attached site plan for specific locations.
* Observations and measurements were reported separately at each scan location (see scan notes).
* A photo of each scanned location was taken for reference (see photo outline-(PO)) .

1. Landmark Elementary School:
A. (7) CMU Wall with approximate 10'x10' areas scanned.

GPR SERVICE PROVIDED:	QUANTITY	UNIT PRICE	EXTENSION
Trip Charge	________	$ ________	$ ________
GPR Technician (3 hr. minimum)	________	$ ________	$ ________
Support Tech (3 hr. minimum)	________	$ ________	$ ________
3-D Imaging	________	$ ________	$ ________
Additional Services	________	$ ________	$ ________
		TOTAL	

On Account ☑ COD – Cash ☐ Check ☐ # ________ Credit Card - VISA ☐ MC ☐ DISCOVER ☐

The information presented is based upon interpretation of the data collected and is provided solely for illustration and informational purposes. Speedie & Associates is not responsible for any loss or damage caused, arising out of the use of or reliance on the data collected or the report generated. Speedie & Associates hereby disclaims all warranties, expressed or implied with respect to the nature, or quality of the services performed hereunder and except to the extent of its sole gross negligence shall not be liable for any damages as a result of its performance.

Accepted By:________________________ Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Landmark Elementary School Distress - GPR	**Project #:** 161292TA	**Date:** 07/11/2016
Project Location: 5730 W. Myrtle Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 12:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW434-1

SCAN NUMBER: 1-Wall

SCAN LOCATION: Landmark School, Gym Building, North Wall (PO - Picture 1)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ______

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ______

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ______

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ______
Vertical Target Depth: ______

Horizontal Target Spacing: ______
Horizontal Target Depth: ______

Longitudinal Target Spacing: ______
Longitudinal Target Depth: ______

Lateral Target Spacing: ______
Lateral Target Depth: ______

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: Varies, see photo outline pic 1. (grouted)
Vertical Target Depth: ______

Horizontal Target Spacing: Bottom course-stem wall (grouted)
Horizontal Target Depth: ______

Masonry Joint Reinf. Spacing: Approx. 16" OC

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x8" & 4"x8"x16" CMU block
Stem appears to be at or slightly above existing grade elevation

Accepted By: ______ Technician: Rodd Whisel

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GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Landmark Elementary School Distress - GPR		**Project #:** 161292TA	**Date:** 07/11/2016
Project Location: 5730 W. Myrtle Ave., Glendale AZ		**Time Start:** 4:30AM	**Time Stop:** 12:30PM
Client: SPS Architects		**Rep:** Jennifer Bowen	**Doc #:** GPR RW434-2

SCAN NUMBER: 2-Wall

SCAN LOCATION: Landmark School, Kitchen Building, North Wall (PO - Picture 2)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ____

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ____

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ____

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ____
Vertical Target Depth: ____

Horizontal Target Spacing: ____
Horizontal Target Depth: ____

Longitudinal Target Spacing: ____
Longitudinal Target Depth: ____

Lateral Target Spacing: ____
Lateral Target Depth: ____

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: 48" on-center, wall corner and at control joint see pic 2. (grouted)
Vertical Target Depth: ____

Horizontal Target Spacing: Bond beam at approx. 9' above FF elev. (grouted)
Horizontal Target Depth: ____

Masonry Joint Reinf. Spacing: Varies, (see picture for specific spacing)

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x8" & 4"x8"x16" CMU block
Stem wall appears to be at existing grade elevation

Accepted By: ____ Technician: Rodd Whisel

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GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Landmark Elementary School Distress - GPR	**Project #:** 161292TA	**Date:** 07/11/2016
Project Location: 5730 W. Myrtle Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 12:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW434-3

SCAN NUMBER: 3-Wall

SCAN LOCATION: Landmark School, Building 'D', South Wall (PO - Picture 3)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing:
Vertical Target Depth:

Horizontal Target Spacing:
Horizontal Target Depth:

Longitudinal Target Spacing:
Longitudinal Target Depth:

Lateral Target Spacing:
Lateral Target Depth:

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: Varies see pic 3. (grouted)
Vertical Target Depth:

Horizontal Target Spacing: Stem wall and bond beam at approx. 9'-8" above FF elev. (grouted)
Horizontal Target Depth:

Masonry Joint Reinf. Spacing: Varies (see picture for specific spacing)

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x8" & 4"x8"x16" & 8"x8"x16" CMU block
Stem appears to be at or slightly above existing grade with one 8"x8"x16" course buried below it

Accepted By: Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Landmark Elementary School Distress - GPR	**Project #:** 161292TA	**Date:** 07/11/2016
Project Location: 5730 W. Myrtle Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 12:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW434-4

SCAN NUMBER: 4-Wall

SCAN LOCATION: Landmark School, Building 'C', East Wall (PO - Picture 4)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ______

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ______

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐
Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ______

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ______
Vertical Target Depth: ______

Horizontal Target Spacing: ______
Horizontal Target Depth: ______

Longitudinal Target Spacing: ______
Longitudinal Target Depth: ______

Lateral Target Spacing: ______
Lateral Target Depth: ______

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: Varies at approx. 56", 40", 48", see pic 3. (grouted)
Vertical Target Depth: ______

Horizontal Target Spacing: Stem wall and bond beam at approx. 9'-4" above FF elev. (grouted)
Horizontal Target Depth: ______

Masonry Joint Reinf. Spacing: Varies (see picture for specific spacing)

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x8" & 4"x8"x16" & 8"x8"x16" CMU block
Stem appears to be at or above existing grade with one 8"x8"x16" course buried below

Accepted By: ______ Technician: Rodd Whisel

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GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Landmark Elementary School Distress - GPR	**Project #:** 161292TA	**Date:** 07/11/2016
Project Location: 5730 W. Myrtle Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 12:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW434-5

SCAN NUMBER: 5-Wall

SCAN LOCATION: Landmark School, Building 'B', East Wall (PO - Picture 5)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ______

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ______

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ______

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ______
Vertical Target Depth: ______

Horizontal Target Spacing: ______
Horizontal Target Depth: ______

Longitudinal Target Spacing: ______
Longitudinal Target Depth: ______

Lateral Target Spacing: ______
Lateral Target Depth: ______

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: At corner and 40" OC (grouted)
Vertical Target Depth: ______

Horizontal Target Spacing: Stem wall and bond beam at approx. 9'-8" above existing grade elev. (grouted)
Horizontal Target Depth: ______

Masonry Joint Reinf. Spacing: 16" OC

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x8" & 4"x8"x16" & 8"x8"x16" CMU block
Stem appears to be above existing grade with one 8"x8"x16" course buried below it

Accepted By: ______ Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Landmark Elementary School Distress - GPR	**Project #:** 161292TA	**Date:** 07/11/2016
Project Location: 5730 W. Myrtle Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 12:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW434-6

SCAN NUMBER: 6-Wall

SCAN LOCATION: Landmark School, Building 'B', Student Services, North Wall (PO - Picture 6)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing:
Vertical Target Depth:

Horizontal Target Spacing:
Horizontal Target Depth:

Longitudinal Target Spacing:
Longitudinal Target Depth:

Lateral Target Spacing:
Lateral Target Depth:

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: Varies see pic 6 (grouted)
Vertical Target Depth:

Horizontal Target Spacing: Stem wall and bond beam at approx. 9' above FF elev. (grouted)
Horizontal Target Depth:

Masonry Joint Reinf. Spacing: Varies see pic 6

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x8" & 4"x8"x16" & 8"x8"x16" CMU block
Stem appears to be at or slightly above existing grade with one 8"x8"x16" course below

Accepted By:

Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Landmark Elementary School Distress - GPR		**Project #:** 161292TA	**Date:** 07/11/2016
Project Location: 5730 W. Myrtle Ave., Glendale AZ		**Time Start:** 4:30AM	**Time Stop:** 12:30PM
Client: SPS Architects		**Rep:** Jennifer Bowen	**Doc #:** GPR RW434-7

SCAN NUMBER: 7-Wall

SCAN LOCATION: Landmark School, Building 'H', PD Room, North Wall (PO - Picture 7)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ____

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ____

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ____

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ____
Vertical Target Depth: ____

Horizontal Target Spacing: ____
Horizontal Target Depth: ____

Longitudinal Target Spacing: ____
Longitudinal Target Depth: ____

Lateral Target Spacing: ____
Lateral Target Depth: ____

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: Varies see pic 7 (grouted)
Vertical Target Depth: ____

Horizontal Target Spacing: Stem wall and bond beam at approx. 8'-4" above FF elev. (grouted)
Horizontal Target Depth: ____

Masonry Joint Reinf. Spacing: Varies see pic 7

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x8" & 4"x8"x16" & CMU block
Stem appears to be at or slightly above existing grade

Accepted By: ____ Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR
SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR

SCAN NUMBER:_______

SCAN LOCATION:______________________________

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☐ Other ☐ __________

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☐ Column ☐ Beam ☐ Deck ☐ Other ☐ _______

TARGET INDICATIONS: Reinforcing Steel ☐ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☐ Un-Grouted Cells ☐ Other ☐ __________

PICTURES TAKEN: Yes ☐ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☐

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing:__________
Vertical Target Depth:__________

Horizontal Target Spacing:__________
Horizontal Target Depth:__________

Longitudinal Target Spacing:__________
Longitudinal Target Depth:__________

Lateral Target Spacing:__________
Lateral Target Depth:__________

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

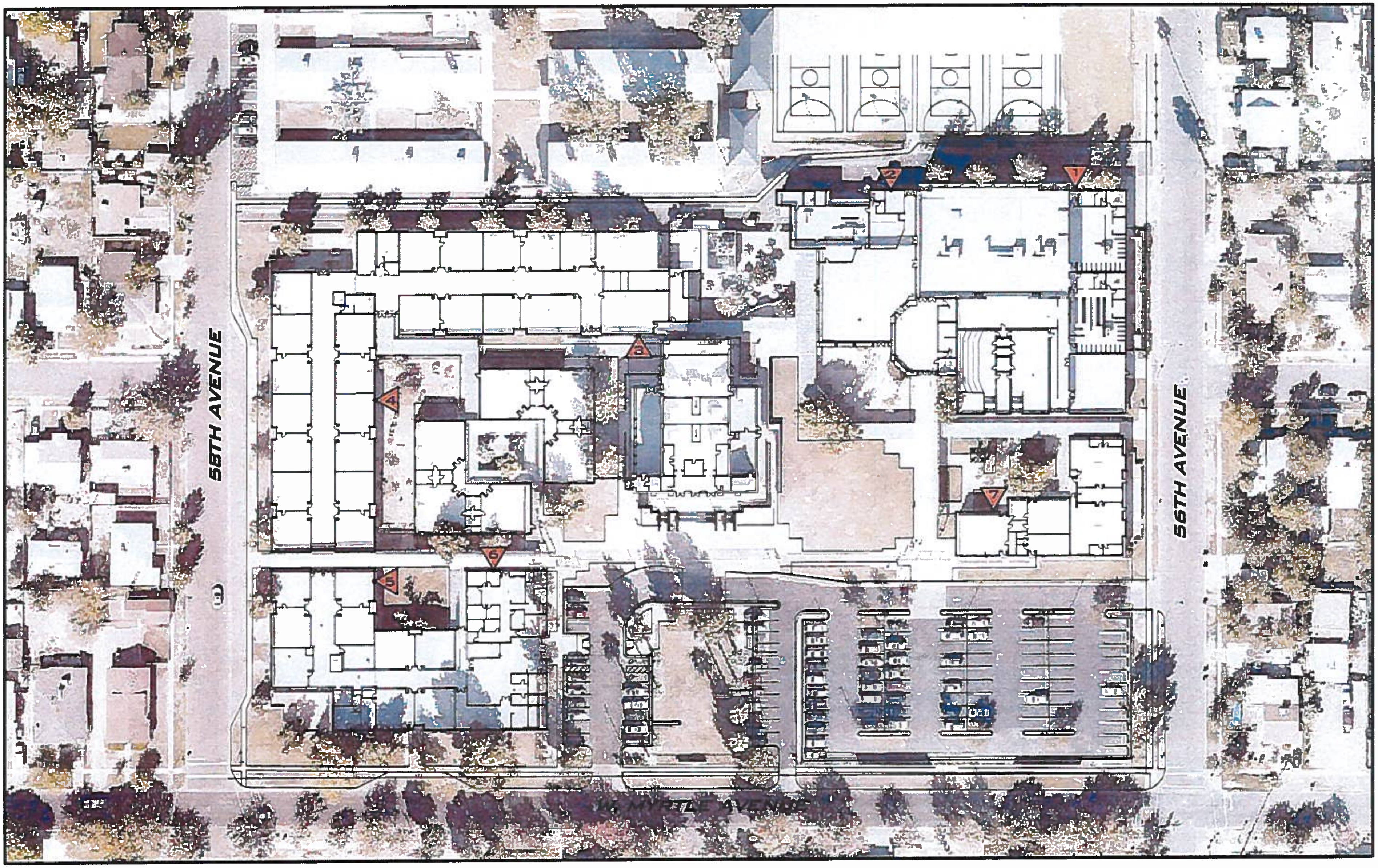
Vertical Target Spacing:__________
Vertical Target Depth:__________

Horizontal Target Spacing:__________
Horizontal Target Depth:__________

Masonry Joint Reinf. Spacing:__________

ADDITIONAL NOTES/OBSERVATIONS:

Accepted By:__________________ Technician: Rodd Whisel



- APPROXIMATE GPR SCAN LOCATIONS (CMU WALL)

G.P.R. SCAN LOCATION PLAN

DR: TSW	REV:	CHK:	DATE: 07/06/16	PROJECT NO. 161292TA

LANDMARK SCHOOL BUILDING DISTRESS
5730 W. MYRTLE AVENUE
GLENDALE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-6391

Project Address: 5730 W. Myrtle Ave. - Glendale, AZ.
Photo Outline

Project No.:161292TA / GPR RW434 Date: July 11, 2016

No. 1 Scan 1 Wall: Gym Bldg., N. wall. White tape indicating vert. & horiz. reinf (grouted), Green tape- joint reinf,

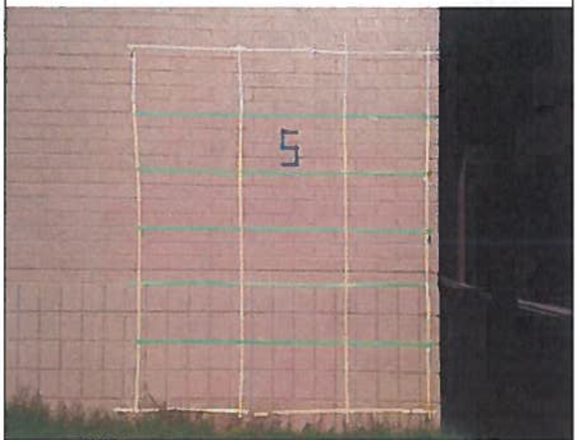
No. 2 Scan 2 Wall. Kitchen Bldg., N. wall. White tape-vert. & horiz. reinf (grouted), Green tape-joint reinf. Please note, reinf. stem wall is burried

No. 3 Scan 3 Wall: Bldg. D S. wall. White tape-vert. & horiz. reinf (grouted). Green tape-joint reinf.

No. 4 Scan 4 Wall: Bldg. C E. Wall. White tape-vert. & horiz. reinf (grouted). Green tape–joint reinf.

Project Address: 5730 W. Myrtle Ave. - Glendale, AZ.
Photo Outline

Project No.:161292TA / GPR RW434 Date: July 11, 2016



No. 5 Scan 5 Wall: Bldg. B Courtyard, E. Wall. White tape-vert. & horiz. reinf (grouted). Green tape-joint reinf.

No. 6 Scan 6 Wall: Bldg. B Student Services, N. Wall. White tape-vert. & horiz. reinf (grouted). Green tape-joint reinf.

No. 7 Scan 7 Wall: Bldg. H, PD Room, N. Wall. White-vert. & horiz. reinf (grouted), Green-joint reinf.

SOILS INVESTIGATION REPORT

SPEEDIE AND ASSOCIATES
Geotechnical ■ Environmental ■ Materials Engineers

August 9, 2016

Jennifer Bowen, AIA
SPS+ Partners Architects LLP
8681 E. Via de Negocio
Scottsdale, AZ 85258

RE: Project No. 161301SA
Landmark School Building Distress
5730 W. Myrtle Avenue
Glendale, AZ
Findings & Test Results

Dear Ms. Bowen:

This letter presents the findings of our visual site assessment, limited subsurface investigation and our opinions on the possible cause(s) for the stair step cracking of the masonry walls, separation of doorframes from masonry walls and evidence of slab movement of the interior of the buildings resulting in slab cracks.

On July 11, 2016, representatives from Speedie & Associates were at the site to conduct a limited soil investigation, as outlined in our proposal number 56067s. The investigation was broken into three tasks. The first task consisted of coring the interior slab of the buildings at two (2) locations and obtaining soil samples. The second task was to hand auger up to fifteen (15) exterior locations and obtaining soil samples. The third task was to drill three (3) deep structural borings to depths of 20 feet below existing ground surface and obtaining soil samples.

The results of the sampling and individual logs of each core, boring and test pit location and laboratory data are attached to this report. The approximate locations of each are located on the attached Soil Boring Location Plan.

<u>Interior Testing</u>
Two cores were selected at the interior of two separate buildings spread throughout the school campus. Each core was made along the interior walls. Coring consisted of hand augering and sampling of soils from 0.8 to 3 feet below grade. Coring C-1 encountered auger refusal on gravel at a depth of 10 inches below existing grade.

The concrete building slab thicknesses were ranged from 3.5 to 4.0 inches underlain by 4.0 to 4.5 inches of aggregate base course. The subgrade soils consisted of lean clay with sand and subordinate amounts of gravel. Based on visual and tactile observation, the soils were in a 'dry to moist' to 'moist' state at the time of investigation. An undisturbed ring sample was taken of the subgrade soils of core C-2 at a depth of 1.5 feet below the existing surface. The sample was obtained by driving a ring sampler with a 30-lb post hammer. It took 16 blows to drive the hammer 12 inches.

Exterior Testing

Fifteen hand auger borings were selected throughout the school campus in the landscaped areas closest to the buildings. The majority of the landscaping was consistent with irrigated grass and large trees. Each boring was hand augured to a depth of approximately three feet below existing grade and soil a sample was obtained at each location.

An undisturbed ring sample was taken of the subgrade soils at borings B-1 and B-11 at a depth of 1.0 foot below the existing surface. The samples were obtained by driving a ring sampler with a 30-lb post hammer. It took 22 blows for boring B-1 and 16 blows for boring B-11 to drive the hammer 12 inches. Subgrade soils consisted predominately of lean clay with sand, silty clayey sand, silty sand and clayey sand with subordinate amounts of gravel. Based on visual and tactile observation, the soils were in a 'dry' to 'moist' state at the time of investigation.

Drill Rig Borings

As part of this analysis, three locations of the campus were selected to drill structural borings to a depth of 20 feet below existing grade. Boring B-17 was not accessible by the drill rig and Boring B-18 was relocated to the west side along 58th Avenue. An undisturbed ring sample was taken at a depth of 1 foot and 5 feet below existing grades for each boring. A Standard Penetration Resistance Test (SPT) was then taken at five foot intervals thereafter. The SPT values ranged from 7 to 50+ blows per foot. It is noted that loose/firm soils were encountered at boring B-16 at a depth of 10 feet and at boring B-18 at a depth of 1 to 10 feet. The subgrade soils consisted of sandy lean clay, clayey sand and silty clayey sand with subordinate amounts of gravel and weak calcareous cementation. Based on visual and tactile observation, the soils ranged from a 'dry' to 'moist' state at the time of investigation.

General Subsurface Conditions

The native subsoils consisted primarily of clayey sand, sandy lean clay and lean clay. Subordinate amounts of gravel and weak calcareous cementation were also noted throughout the profile. No groundwater was encountered during this investigation. Based on visual and tactile observation, the upper soils ranged from a 'dry' to 'moist' state at the time of investigation. It is noted that structural fill was encountered in borings B-6, B-8, B-9, B-14, B-15 and B-16 at depths of 1.0 to 2.5 feet below existing grade.

Laboratory testing indicates in-situ dry densities of the upper soils ranged from 74 to 112 pcf and water contents from 3.7 to **33.1** percent at the time of investigation. Liquid limits ranged from 30 to 46 percent with plasticity indices at 7 to 22 percent. The upper clayey soils exhibit volume increase **(swell)** due to wetting of 5.4 percent when compacted to moisture and density levels normally expected during construction. Undisturbed samples displayed minor to moderate (1.5 to 2.5%) compression due to incremental loading and moderate to moderate (1 to 3%) additional compression due to inundation under a maximum confining load of 3,200 psf.

Conclusions

At this time no obvious single cause was observed to cause the distress in the building. Based on the limited investigation, our laboratory testing and field observation, it is our opinion that the distress may be related to a combination of water induced settlement, or shrinkage of the soil and possibly minor amounts of slab heave or swell as a result of moisture fluctuations in the supporting soils. These moisture fluctuations are a result of the constant irrigation of the grassy areas surrounding the buildings. Based on the soil classification and observations, the soils on the site are moisture sensitive and will be prone to volume change (both shrinkage and swelling) as a result of moisture changes (drying and wetting).

Most all soils related issues are in direct relationship to moisture change in the supporting soils. This can come from results of wet utility leaks or breaks, over irrigation, or poor drainage. Based on the samples obtained, the amounts of moisture in the majority of the soils were around the optimum moisture percentage.

At this time our scope was only to conduct the field sampling and laboratory testing and provide the data obtained. If there are any questions, or wish to discuss the results please feel free to call.

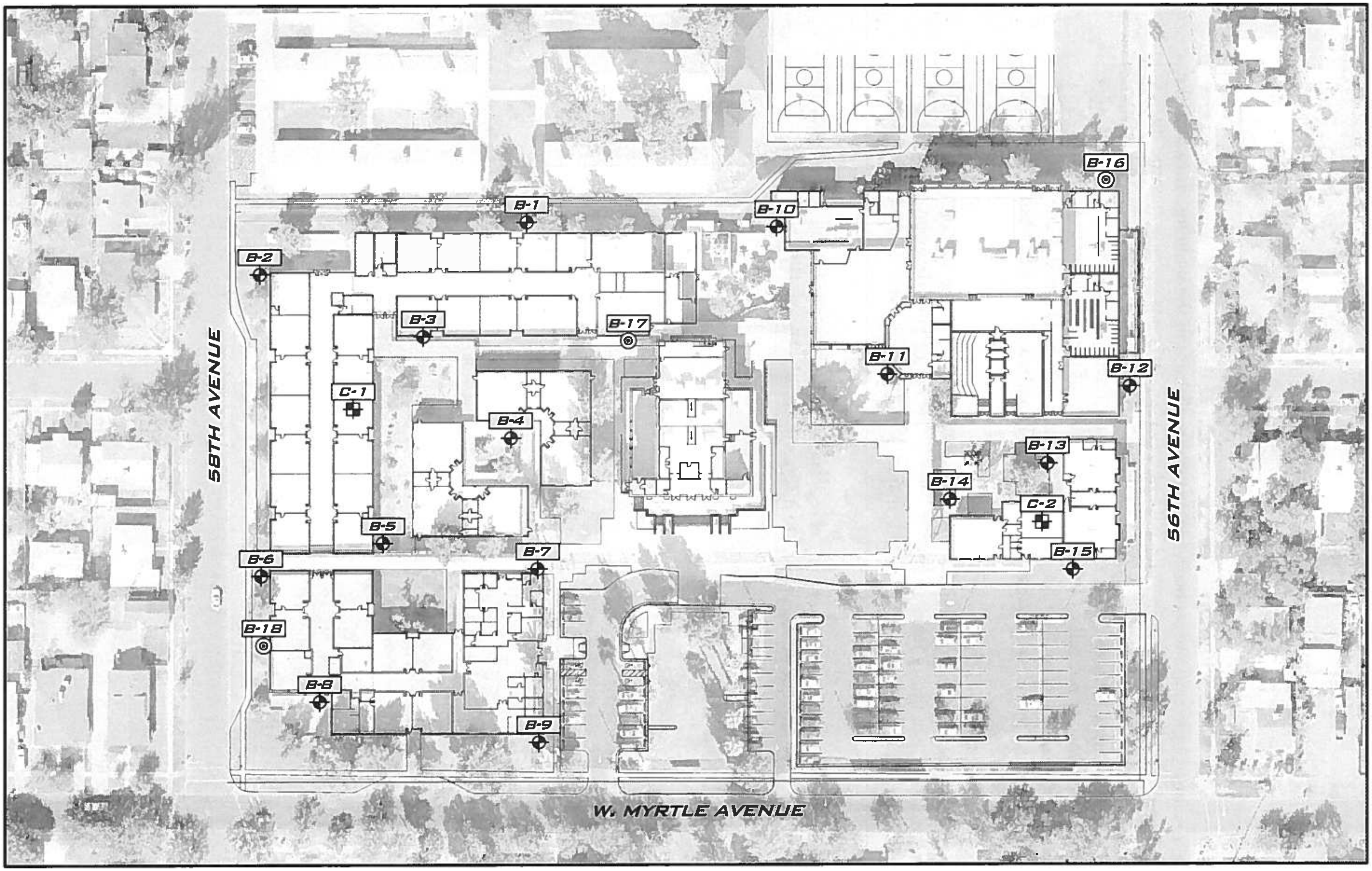
Respectfully Submitted,
SPEEDIE & ASSOCIATES, INC.

Ray C. Markley Jr., E.I.T.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
37292
KEITH R.
GRAVEL
Date Signed 8-9-16
ARIZONA, U.S.A.
Expires 03/31/2017

Keith R. Gravel, P.E.

Attachments:



- APPROXIMATE HAND-AUGER BORING LOCATIONS
- APPROXIMATE FLOOR SLAB CORE LOCATIONS
- APPROXIMATE SOIL BORING LOCATIONS (20' DEPTH)

SOIL BORING LOCATION PLAN

DR: TSW	REV:	CHK:	DATE: 07/06/16	PROJECT NO. 161212SA

LANDMARK SCHOOL BUILDING DISTRESS
5730 W. MYRTLE AVENUE
GLENDALE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-6391

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Brown CLAYEY SAND (SC-Dry) with Little Gravel					
1.0		Very Stiff Brown SILT (ML-Dry to Moist)					
			RS-1	2.0	12.4	74.2	
3.0		End of Boring					
5							

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 1**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Rig Type:	Hand Auger
Boring Type:	Hollow Stem Auger
Surface Elevation:	N/A

Depth (feet)	Graphic Log	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Brown LEAN CLAY with SAND (CL-Moist) with Little Gravel						
			3.0	AS-1	3.0	26.9	NT	
		End of Boring						
5								

Boring Date:	7-11-16
Field Engineer/Technician:	T. Wilmsen
Driller:	R. Markley
Contractor:	Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 2**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Brown LEAN CLAY with SAND (CL-Moist) with Trace Gravel	3.0	AS-1	3.0	26.2	NT	
		End of Boring						
5								

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 3

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: 161212SA

SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		Brown LEAN CLAY with SAND (CL-Dry) with Trace Gravel					
		3.0	AS-1	3.0	7.5	NT	
		End of Boring					
5							

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 4

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: 161212SA

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Brown LEAN CLAY with SAND (CL-Moist) with Trace Gravel					
3.0		End of Boring	AS-1	3.0	17.3	NT	
5							

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 5**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Rig Type: **Hand Auger**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Graphic Log	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		FILL: Brown SILTY, CLAYEY SAND (SC/SM-Dry) with Some Gravel	2.0	AS-1	2.0	3.7	NT	
		Auger Refusal on Gravel						
5								

Boring Date: **7-11-16**
Field Engineer/Technician: **T. Wilmsen**
Driller: **R. Markley**
Contractor: **Speedie & Assoc.**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 6**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 8/9/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		Brown LEAN CLAY with SAND (CL-Dry to Moist) with Trace Gravel	3.0	AS-1	3.0	10.4	NT	
		End of Boring						
5								

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 7

Landmark School-Building Distress
5730 West Myrtle Avenue
Glendale, Arizona

Project No.: 161212SA

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		FILL: Brown CLAYEY SAND (SC-Dry) with Some Gravel						
		Brown LEAN CLAY (CL-Moist) with Trace Gravel	1.5					
		End of Boring	3.0	AS-1	3.0	23.5	NT	
5								

Rig Type: **Hand Auger**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Boring Date: **7-11-16**
Field Engineer/Technician: **T. Wilmsen**
Driller: **R. Markley**
Contractor: **Speedie & Assoc.**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 8**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		FILL: Brown CLAYEY SAND (SC-Dry) with Some Gravel					
2.0		Brown LEAN CLAY (CL-Dry to Moist)					
3.5		End of Boring	AS-1	3.5	14.3	NT	
5							

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 9**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Stiff Brown LEAN CLAY with SAND (CL-Moist) with Trace Gravel	3.0	AS-1	3.0	21.6	NT	
		End of Boring						
5								

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-10**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Rig Type:	Hand Auger
Boring Type:	Hollow Stem Auger
Surface Elevation:	N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Brown LEAN CLAY with SAND (CL-Moist) with Trace Gravel					
		RS-1	2.0	14.3	109.5	
3.0	End of Boring					
5						

Boring Date:	7-11-16
Field Engineer/Technician:	T. Wilmsen
Driller:	R. Markley
Contractor:	Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-11**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0	Brown LEAN CLAY with SAND (CL-Moist to Wet) with Trace Gravel					
3.0	End of Boring	AS-1	3.0	33.1	NT	
5						

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-12**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		Brown LEAN CLAY with SAND (CL-Moist) with Little Gravel					
		3.0	AS-1	3.0	21.4	NT	
		End of Boring					
5							

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-13**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		FILL: Brown CLAYEY SAND (SC-Dry) with Some Gravel	1.0					
		Brown LEAN CLAY (CL-Moist) with Trace Gravel	3.0	AS-1	3.0	23.1	NT	
		End of Boring						
5								

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-14**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		FILL: Brown CLAYEY SAND (SC-Dry) with Some Gravel	1.0					
		Brown LEAN CLAY (CL-Dry to Moist)	3.0	AS-1	3.0	10.4	NT	
		End of Boring						
5								

Rig Type: **Hand Auger**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Boring Date: **7-11-16**
Field Engineer/Technician: **T. Wilmsen**
Driller: **R. Markley**
Contractor: **Speedie & Assoc.**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-15**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

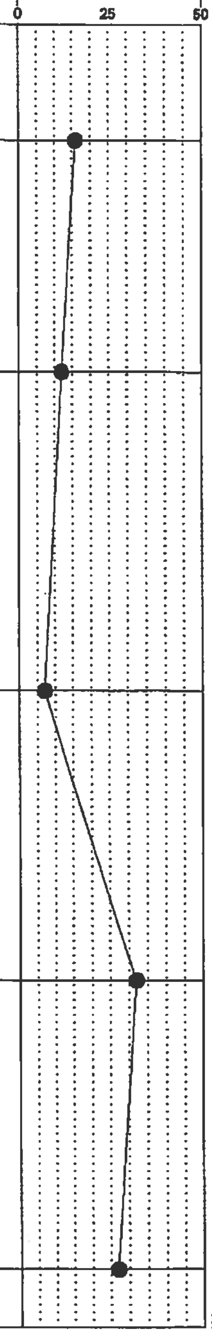
Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Rig Type:	**CME-75**
Boring Type:	**Hollow Stem Auger**
Surface Elevation:	**N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	FILL: Brown CLAYEY SAND (SC-Moist) with Trace Gravel, Piece of Concrete	RS-1	2.0	11.3	85.6
2.5	Stiff Brown LEAN CLAY with SAND (CL-Dry)	RS-2	6.0	NT	NT
8.0	Loose Light Brown CLAYEY SAND (SC-Dry to Moist) with Trace Gravel	S-3	11.5	NT	NT
	Dense	S-4	16.5	NT	NT
	Medium Dense, Weak Calcareous Cementation	S-5	21.5	NT	NT
21.5	End of Boring				

Penetration Resistance Blows per Foot



Boring Date:	**7-13-16**
Field Engineer/Technician:	**K. Euge II**
Driller:	**C. Garcia**
Contractor:	**Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-16**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: CME-75 Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		NOT ACCESSIBLE					
5							
10							
15							
20							

Boring Date: 7-13-16
Field Engineer/Technician: K. Euge II
Driller: C. Garcia
Contractor: Geomechanics SW

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-17**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

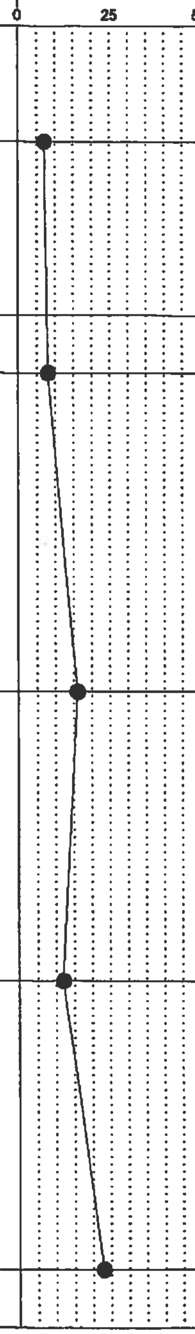
Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 8/5/16

Rig Type:	CME-75
Boring Type:	Hollow Stem Auger
Surface Elevation:	N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	Firm Brown <u>LEAN CLAY</u> (CL-Moist)				
		RS-1	2.0	18.8	86.7
5		BS-2	5.0	NT	NT
		RS-3	6.0	17.6	90.2
8.0	Medium Dense Light Brown <u>SILTY, CLAYEY SAND</u> (SC/SM-Dry) with Trace Gravel, Weak Calcareous Cementation				
10					
		S-4	11.5	NT	NT
12.0	Stiff Brown <u>SANDY LEAN CLAY</u> (CL-Moist) with Trace Weak Calcareous Cementation				
15					
		S-5	16.5	NT	NT
20					
21.5	End of Boring	S-6	21.5	NT	NT

Penetration Resistance Blows per Foot



Boring Date:	7-13-16
Field Engineer/Technician:	K. Euge II
Driller:	C. Garcia
Contractor:	Geomechanics SW

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-18**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		4" Concrete					
0.3		4" Aggregate Base					
0.7		Brown LEAN CLAY with SAND (CL-Moist) with Gravel					
0.8		Auger Refusal on Gravel					
5							

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **C-1**

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: **161212SA**

_SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		3.5" Concrete	0.3					
		4.5" Aggregate Base	0.7					
		Very Stiff Brown LEAN CLAY with SAND (CL-Dry to Moist) with Trace Gravel		RS-1	2.5	10.7	111.9	●
		End of Boring	3.0					
5								

Boring Date: 7-11-16
Field Engineer/Technician: T. Wilmsen
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: C-2

Landmark School-Building Distress

5730 West Myrtle Avenue

Glendale, Arizona

Project No.: 161212SA

SPEEDIE 161212SA.GPJ GENGEO.GDT 7/26/16

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B- 1	RS-1	RING	1.0 - 2.0	12.4	74.2	91	100	100	100	100	30	23	7	ML	SILT
B- 2	AS-1	AS	1.0 - 3.0	26.9	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B- 3	AS-1	AS	1.0 - 3.0	26.2	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B- 4	AS-1	AS	1.0 - 3.0	7.5	NT	76	85	93	96	100	36	23	13	CL	LEAN CLAY with SAND
B- 5	AS-1	AS	1.0 - 3.0	17.3	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B- 6	AS-1	AS	1.0 - 3.0	3.7	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B- 7	AS-1	AS	1.0 - 3.0	10.4	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B- 8	AS-1	AS	1.5 - 3.0	23.5	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B- 9	AS-1	AS	2.0 - 3.5	14.3	NT	87	93	94	95	100	46	24	22	CL	LEAN CLAY
B-10	AS-1	AS	1.0 - 3.0	21.6	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-11	RS-1	RING	1.0 - 2.0	14.3	109.5	79	88	92	94	100	37	21	16	CL	LEAN CLAY with SAND
B-12	AS-1	AS	1.0 - 3.0	33.1	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-13	AS-1	AS	1.0 - 3.0	21.4	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-14	AS-1	AS	1.0 - 3.0	23.1	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-15	AS-1	AS	1.0 - 3.0	10.4	NT	94	99	100	100	100	41	24	17	CL	LEAN CLAY
B-16	RS-1	RING	1.0 - 2.0	11.3	85.6	NT	NT	NT	NT	NT	NT	NT	NT		

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

NT=Not Tested

Sheet 1 of 2

Landmark School-Building Distress
5730 West Myrtle Avenue
Glendale, Arizona
Project No. 161212SA

SPEEDIE AND ASSOCIATES

TABULATION OF TEST DATA 161212SA.GPJ GENGEO.GDT 7/26/16

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B-18	BS-2	BULK	0.0 - 5.0	NT	NT	86	95	98	99	100	44	24	20	CL	LEAN CLAY
B-18	RS-1	RING	1.0 - 2.0	18.8	86.7	NT	NT	NT	NT	NT	NT	NT	NT		
B-18	RS-3	RING	5.0 - 6.0	17.6	90.2	NT	NT	NT	NT	NT	NT	NT	NT		
C-2	RS-1	RING	1.5 - 2.5	10.7	111.9	75	82	88	91	100	37	22	15	CL	LEAN CLAY with SAND

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

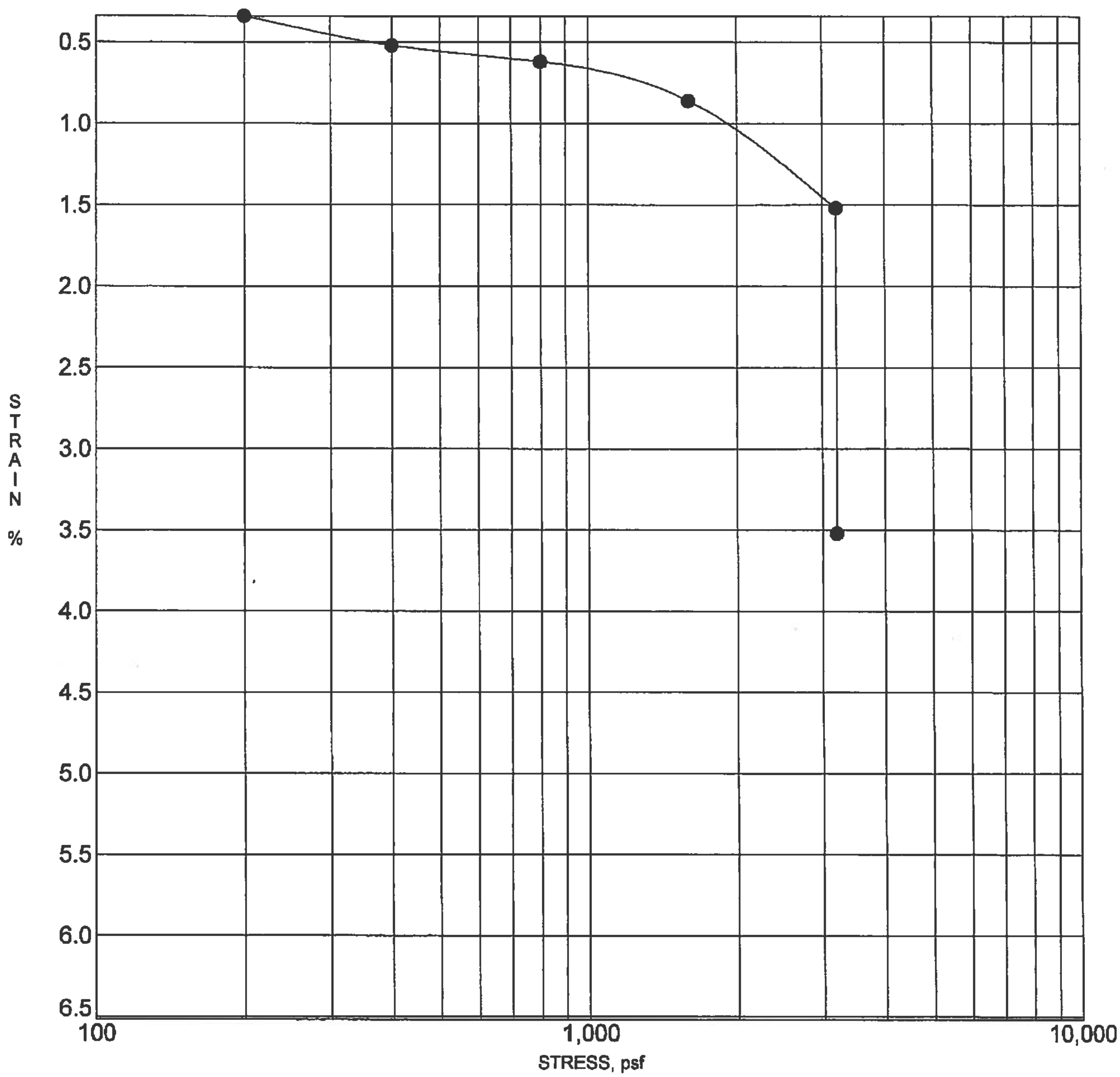
NT=Not Tested

Landmark School-Building Distress
5730 West Myrtle Avenue
Glendale, Arizona
Project No. 161212SA

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST

PROJECT:	Landmark School-Building Distress				PROJECT NO.: 161212SA
LOCATION:	5730 West Myrtle Avenue				DATE: 7/11/16
BORING NO.: C-2	SAMPLE NO.: RS-1	SAMPLE DEPTH: 1.5 to 2.5			LABORATORY NO.:
LIQUID LIMIT:	37	PLASTIC LIMIT:	22	PLASTICITY INDEX:	14
CLASSIFICATION:	CL	ASTM SOIL DESCRIPTION:	LEAN CLAY with SAND		



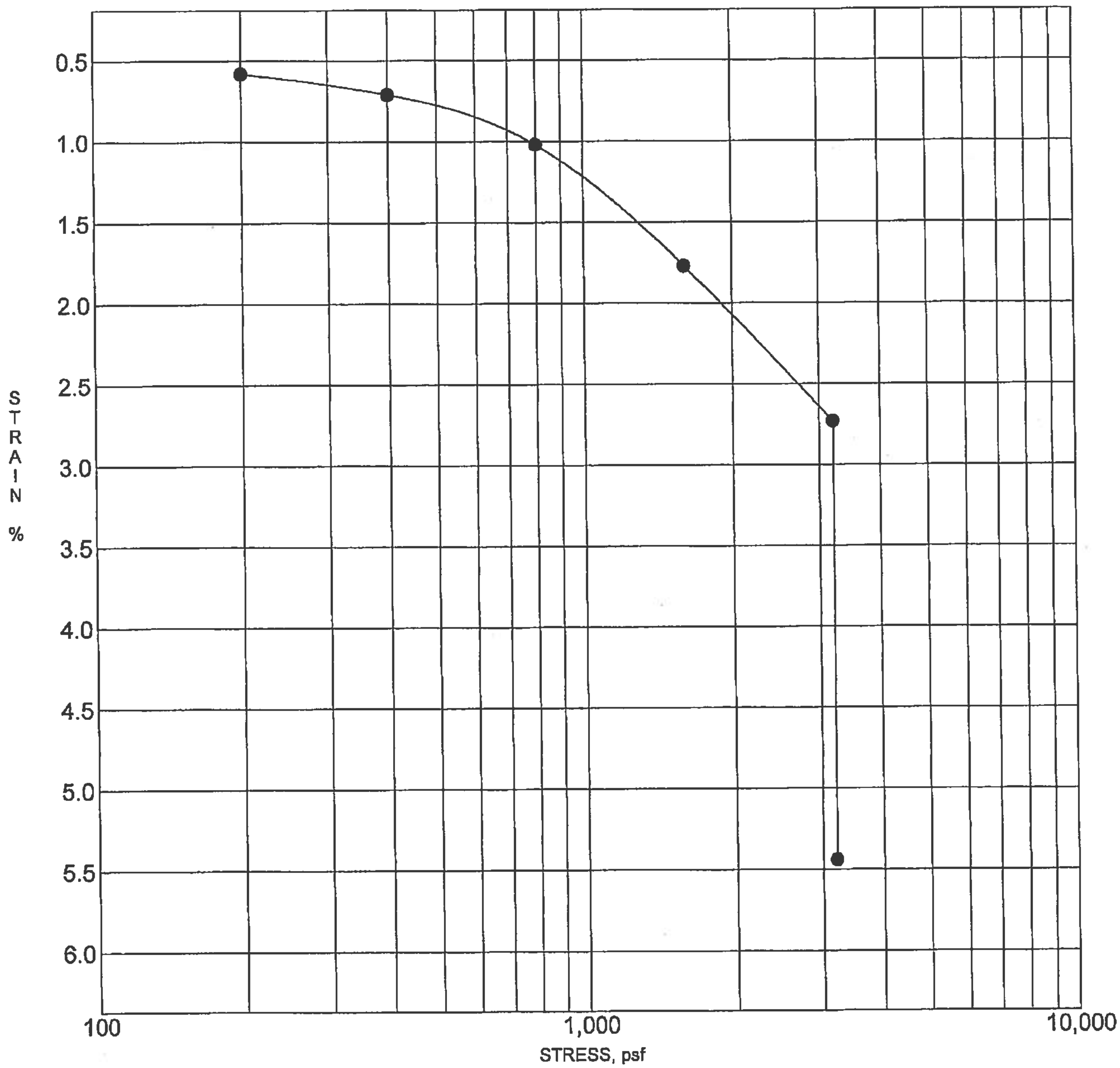
Sample inundated at end of test at 3200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 161212SA.GPJ GENGEO.GDT 7/26/16

CONSOLIDATION TEST

PROJECT: Landmark School-Building Distress | PROJECT NO.: 161212SA
LOCATION: 5730 West Myrtle Avenue | DATE: 7/13/16
BORING NO.: B-18 | SAMPLE NO.: RS-1 | SAMPLE DEPTH: 1 to 2 | LABORATORY NO.:
LIQUID LIMIT: | PLASTIC LIMIT: | PLASTICITY INDEX:
CLASSIFICATION: | ASTM SOIL DESCRIPTION:



Sample inundated at end of test at 3200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 161212SA.GPJ GENGEO.GDT 7/26/16

CONSOLIDATION TEST

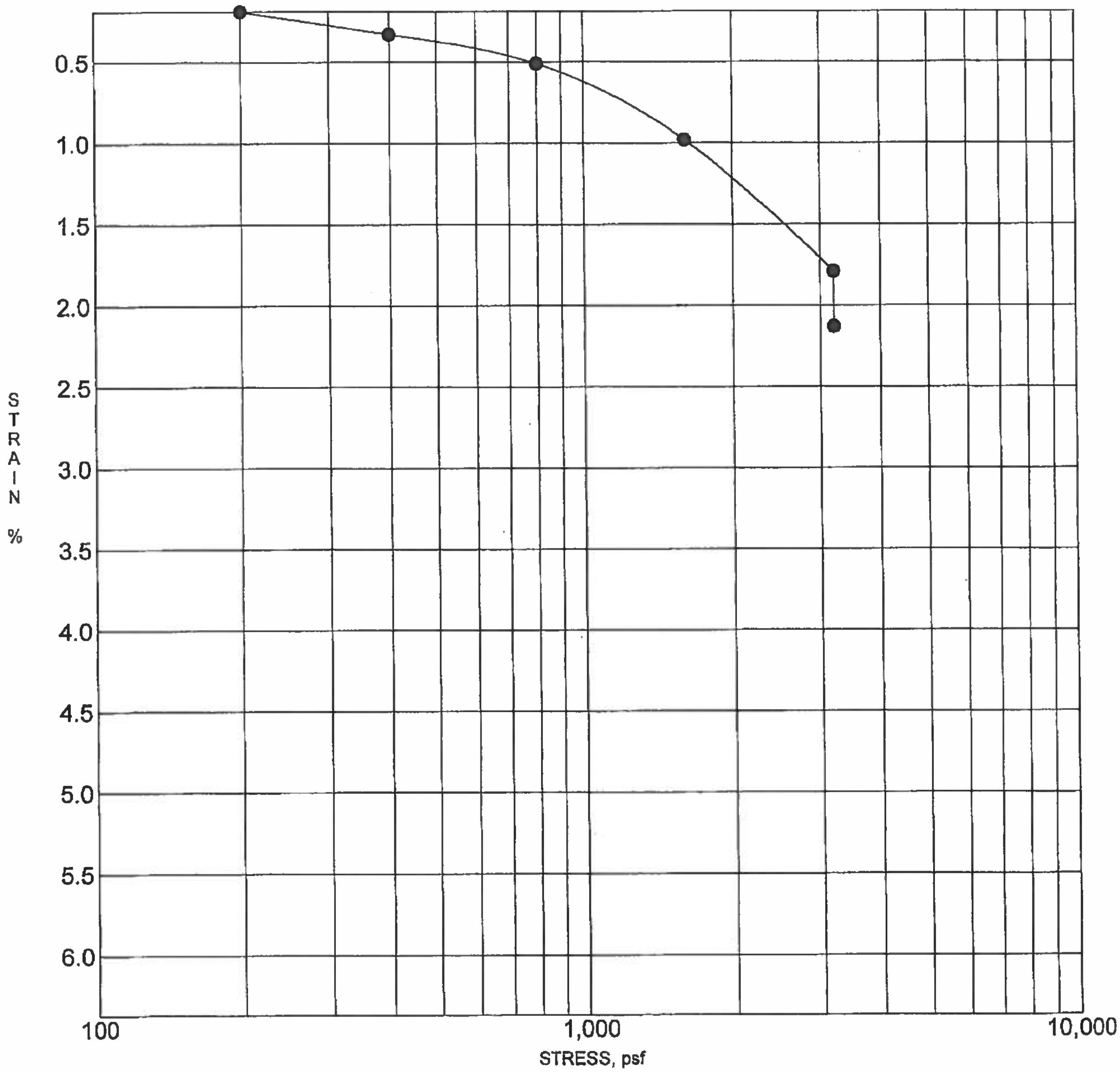
PROJECT: Landmark School-Building Distress — PROJECT NO.: 161212SA

LOCATION: 5730 West Myrtle Avenue — DATE: 7/11/16

BORING NO.: B-11 — SAMPLE NO.: RS-1 — SAMPLE DEPTH: 1 to 2 — LABORATORY NO.:

LIQUID LIMIT: 37 — PLASTIC LIMIT: 21 — PLASTICITY INDEX: 16

CLASSIFICATION: CL — ASTM SOIL DESCRIPTION: LEAN CLAY with SAND



Sample inundated at end of test at 3200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 161212SA.GPJ GENGEO.GDT 7/26/16

MOISTURE-DENSITY RELATIONS

PROJECT: Landmark School-Building Distress
PROJECT NO.: 161212SA

LOCATION: 5730 West Myrtle Avenue
DATE: 7/13/16

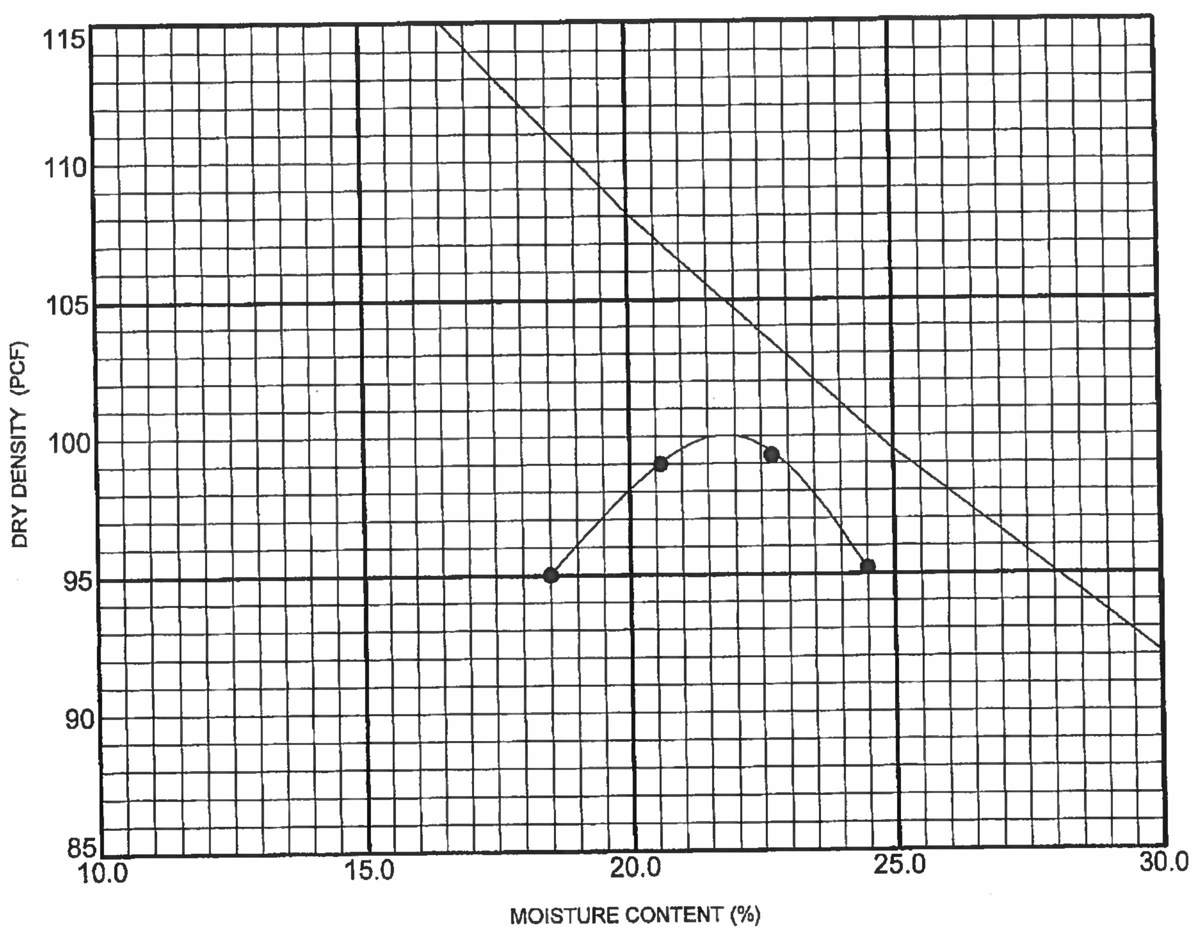
BORING NO.: B-18 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0 to 5
LABORATORY NO.:

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 44 PLASTIC LIMIT: 24 PLASTICITY INDEX: 20

CLASSIFICATION: CL ASTM SOIL DESCRIPTION: LEAN CLAY

MAXIMUM DRY DENSITY: 100.0 PCF
OPTIMUM MOISTURE CONTENT: 21.6%



SPEEDIE AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	PERCENT COMPACTION	FINAL MOISTURE CONTENT (%)	CONFINING LOAD (psf)	TOTAL SWELL (%)
B-18, BS-2	5.0	100.0	21.6	95.3	19.4	95.3	30.1	100	5.4

Landmark School-Building Distress
5730 West Myrtle Avenue
Glendale, Arizona
Project No. 161212SA

SPEEDIE AND ASSOCIATES

GERVASIO INVESTIGATION REPORTS

GERVASIO & ASSOC., INC.
CONSULTING ENGINEERS
77 EAST THOMAS ROAD, SUITE 120
PHOENIX, ARIZONA 85012
(602) 285-1720 • (602) 285-1530 (FAX)

February 15, 2011

Mr. Mike Coppa
ARIZONA SCHOOL RISK RETENTION TRUST, INC.
333 East Osborn Road, Suite 300
Phoenix, AZ 85012

RE: LANDMARK MIDDLE SCHOOL
5730 West Myrtle, Glendale, Arizona
MASONRY WALL CRACKS INVESTIGATION
G&A Job No. 0250 F

Dear Mr. Coppa:

In accordance with your request, we have performed a limited investigation to evaluate the existing cracks in the masonry walls at the northeast corner of the Gym Building at the above referenced location. While viewing the Gym Building, we discovered masonry cracks at exterior steel canopy beam bearings; therefore, we will include these cracks in our report as well. The following letter report presents our findings, conclusions, and recommendations and includes:

Appendix A: Field Notes & Photo Location Plans
Appendix B: Partial Plumbing and Water & Sewer Plans of the NEC of the Gym Building by NBBJ Group/Gresham Larson dated 3/30/87

During our site visit by Marlene Betani, P.E., of Gervasio & Assoc., Inc. on December 2, 2010, we took forty-two (42) digital photos, one (1) copy each enclosed.

FINDINGS, CONCLUSIONS & RECOMMENDATIONS

The Gym Building is a one-story concrete masonry structure built circa 1987. The roof structure is constructed with metal roof deck supported by steel joists that bear on the masonry walls. The roofing is built-up type roofing.

There are three different types of masonry cracks at the Gym Building. These are :

- Stair-step cracks
- Vertical cracks
- Cracks at beam bearings

Stair-Step Cracks:

There are stair-step cracks near the northeast corner of the building that generally follow the mortar joints in the east/west exterior wall and the east/west interior wall between the Janitor's Room and Storage Room and between the Boy's Locker Room and the Office (Photos A6-A14 & A31). Stair-step cracks of the type present here indicate foundation settlement. Settlement can occur when the foundation soils become wet. The soils outside the northeast building corner appeared moist. There are numerous underground pipes in the vicinity of the building corner including the fire sprinkler check valve, and floor sink supply and drain piping (see Appendix B & Photos A32-A36). There is also a roof drain outlet nearby that directs rainwater into the planting area near the check valve piping. Water lines are required to be set on a bed of sand in the bottom of the trench prior to backfilling. This sand layer creates an easy pathway for water to migrate beyond the water source and into the foundation soils. The roof joists above this area bear on the east exterior masonry wall and remain adequately supported.

We conclude that the cracks are not a structural concern at this time, but may become a concern if additional foundation movement occurs.

We recommend that the cracks be monitored to determine if they are getting larger. If additional movement occurs, there is likely an underground water source that should be located and eliminated. If the School District wants to repair the cracks at this time, we recommend that the cracked mortar joints be repointed.

Vertical Cracks:

There is a vertical crack in the south wall of the Gym Building (Photos A17 & A39). This crack occurs near a step in the wall height and near a jamb of a door opening. This is an expansion/contraction crack and is located where the stiffness of the wall changes with the change in wall height. The original building drawings show a masonry control joint at the change in wall height, but the control joint was not installed.
There is also a vertical crack in the west wall of the Gym (Photos A25-A27). This crack is most likely also due to expansion/contraction. The original building drawings show masonry control joints at approximately 30 feet on center. The National Concrete Masonry Association (NCMA) technical note TEK 10-2C recommends control joint spacing of 25 feet on center maximum. It is likely that the longer than recommended joint spacing and restraint provided by nearby intersecting masonry walls contributed to this vertical crack.

We conclude that the cracks are not a structural concern.

We recommend that the cracks be caulked to prevent moisture from entering the building walls.

Cracks at Beam Bearings:

There is cracked and displaced masonry at three exterior steel canopy beam bearings. Two of the beams are located at the south entry to the Lobby of the Gym Building at the north end of the approximately 124 ft. long steel canopy structure (Photos A1-A5). The third beam is parallel to the west side of the Multi-Purpose Room at the north end of the 84 ft. long exterior steel canopy (Photos A41-A43). The original building drawings indicate that these three beams are welded to a steel bearing plate that is anchored to the masonry wall. These long steel canopies are exposed to daily and seasonal temperature swings that cause thermal expansion/contraction. Because the beams are rigidly attached to the walls, the brittle masonry material has cracked to relieve the induced thermal forces.

We conclude that the beams do not currently present a danger of sudden collapse, but could become dangerous in the future if not repaired. The potential for falling chunks of masonry presents a safety hazard.

We recommend that the beam bearings be modified to allow for thermal movement. Conceptually, this can be accomplished by shoring each beam, removing the loose and broken masonry, and cutting the welds that connect the beam to the bearing plate. The masonry should then be repaired, leaving a gap around the beam so it can move. A shelf angle with a neoprene bearing pad should then be installed with epoxy anchors below the beam to the face of the masonry wall to provide bearing.

This letter is based on the facts and evidence known to us as of this date and may be amended if new facts and/or evidence are presented or discovered.

We appreciate the opportunity to provide this service and welcome any questions.

Sincerely,

GERVASIO & ASSOC., INC.

Registered Professional Engineer (Structural)
CERTIFICATE
20369
MARLENE
BETANI
Date Signed 2/15/11
ARIZONA, U.S.A.
Expires 06/30/2012

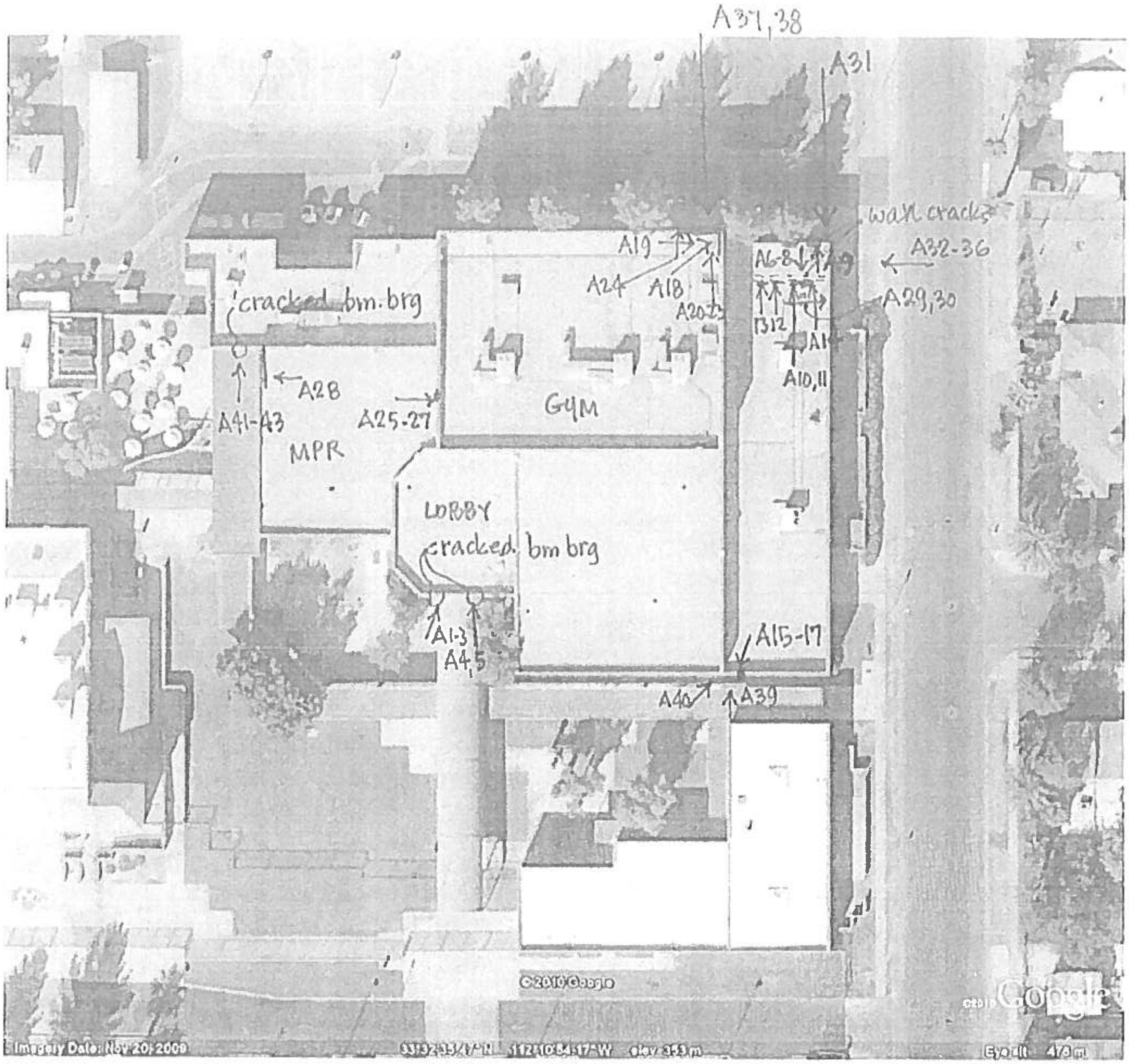
Marlene Betani, P.E.
Forensic Structural Engineer

MB:blm

Enclosures

APPENDIX A

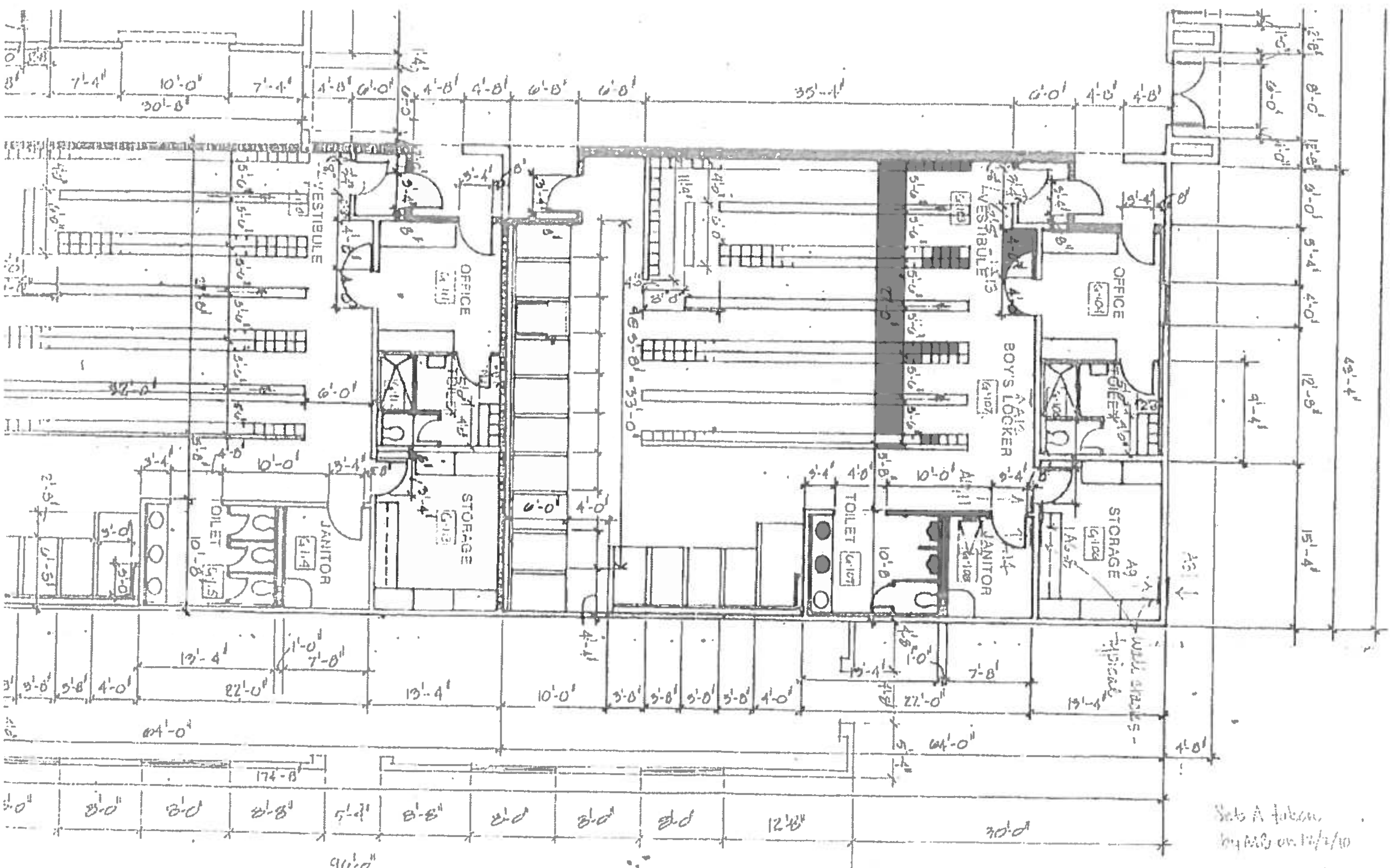
FIELD NOTES &
PHOTO LOCATION PLANS



Landmark Middle School
5730 W. Myrtle Ave.

FIELD NOTES & PHOTO LOCATION PLAN N

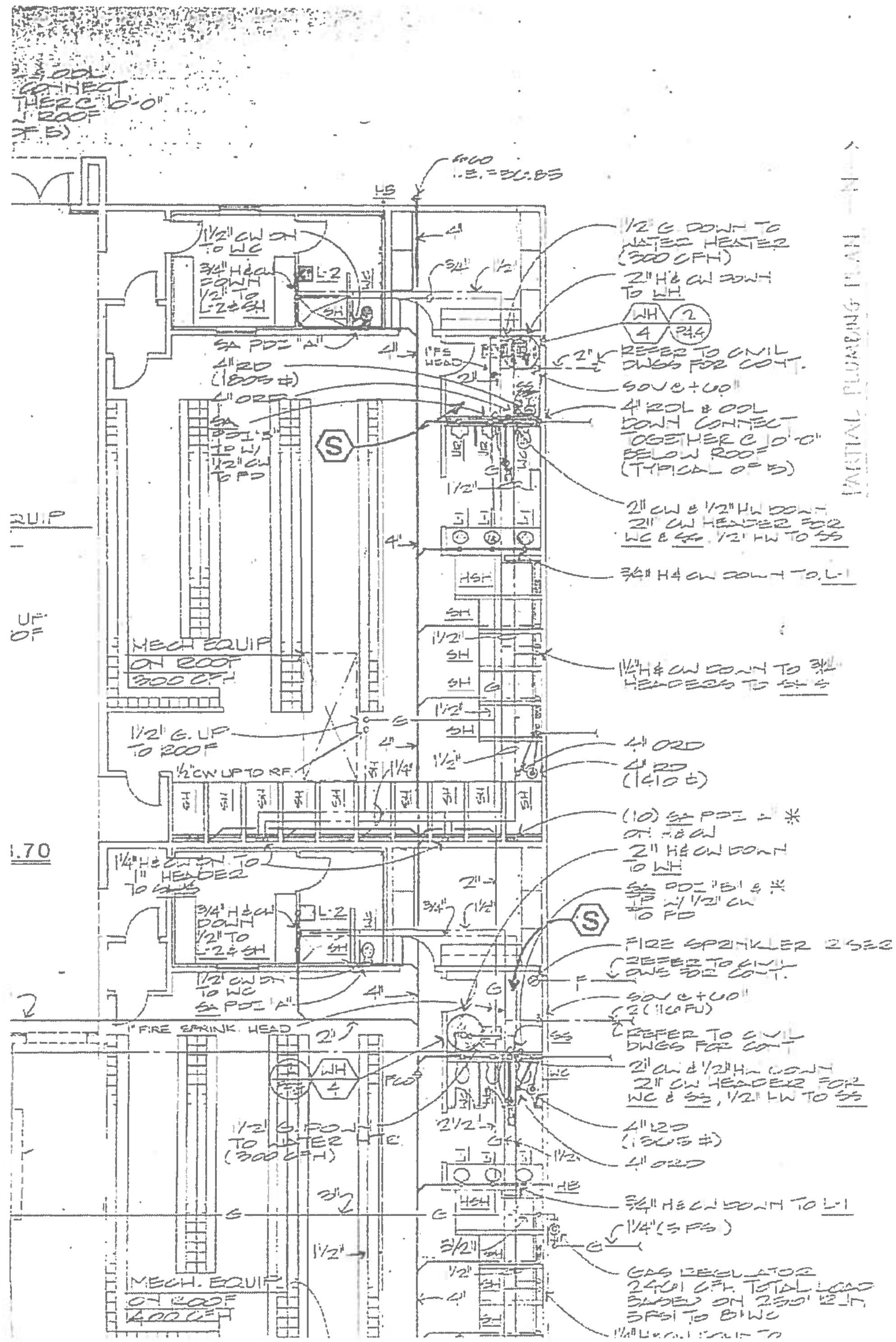
12/2/10 by MB



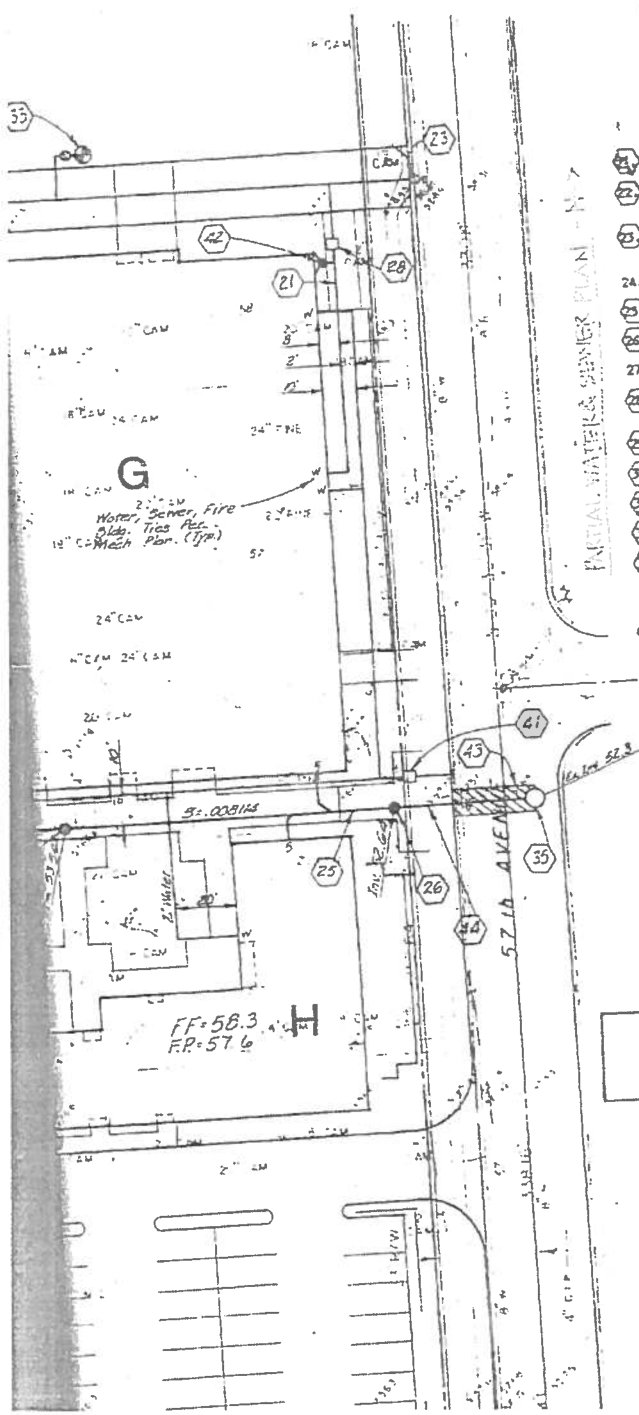
FIELD NOTES & PHOTO LOCATION PLAN —N→

APPENDIX B

PARTIAL PLUMBING AND WATER & SEWER PLANS
OF THE NEC OF THE GYM BUILDING
BY NBBJ GROUP/GRESHAM LARSON
DATED 3/30/87


PARTIAL PLUMBING PLAN
1/2" G. DOWN TO WATER HEATER (300 CFH)
2" H & CW DOWN TO WH
REFER TO CIVIL DWGS FOR CONT.
SOV & + CO
MECH EQUIP ON ROOF 300 CFH
1/2" G. UP TO ROOF
1/2" CW UP TO RF.
4" ORD
FIRE SPRINKLER RISER
1" FIRE SPRINK. HEAD
1/2" G. DOWN TO WATER HTR. (300 CFH)
MECH. EQUIP ON ROOF 400 CFH
GAS REGULATOR

Landmark Middle School
1987 dwgs.



21. 6" FIRELINE TYPE C-900 OR APPROVED EQUAL.
22. 6" T.S. & V. WITH BOX AND COVER, MAG ST DETAIL 391-1-C.
23. 8" T.S. & V. WITH BOX AND COVER, MAG ST DETAIL 391-1-C.
24. INSTALL 6" V.C.P. SEWER LINE.
25. INSTALL 6" DIA. P.V.C. (SDR 35) SEWER.
26. INSTALL CLEANOUT, MAG STD. DETAIL 441.
27. INSTALL SEWER MANHOLE, MAG. STD. DETAIL 42
28. INSTALL 6" CHECK VAULT, CITY OF GLENDALE DETAIL 345. SEE SHEET 1.
29. INSTALL 8" A.C.P. WATER LINE.
30. INSTALL 6"X 8" TEE.
31. 8" V.B.& C., MAG. STD. DETAIL 391-1 (TYPE
32. INSTALL 22-1/2" BEND.
33. INSTALL COMPLETE FIRE HYDRANT ASSEMBLY CITY OF GLENDALE STD. DETAIL 360.
34. REMOVE EXISTING C.O.
35. CONSTRUCT SEWER MANHOLE MAG STD. DETAIL 4
36. INSTALL 8" V.C.P. SEWER LINE.
37. REMOVE EXISTING SEWER LINE.
38. CONNECT TO EXIST. SEWER LINE TO NORTH SEWER LINE TO SOUTH.
39. CONNECT TO EXIST. SEWER LINE TO SOUTH, SEWER LINE TO NORTH.
40. 6"x8" REDUCER
41. 2" METER BOX M.A.G. STD DETAIL 320
42. 4" PUMPER CONNECTION.
43. SAWCUT, REMOVE & REPLACE PAVEMENT M.A.G. STD. DET. 200, "T" TYPE.
44. 43± L.F. OF 8" V.C.P. SEWER LINE @ S=0.
45. 82± L.F. OF 8" V.C.P. SEWER LINE @ S=0.

NOTE: CONTRACTOR SHALL USE THIS PLAN FOR REFERENCE O

GERVASIO & ASSOC., INC.
CONSULTING ENGINEERS
77 EAST THOMAS ROAD, SUITE 120
PHOENIX, ARIZONA 85012
(602) 285-1720 • (602) 285-1530 (FAX)

May 27, 2014

Mr. David Frandsen
ARIZONA SCHOOL RISK RETENTION TRUST, INC.
333 East Osborn Road, Suite 300
Phoenix, AZ 85012

via Email: dfrandsen@the-trust.org

RE: LANDMARK ELEMENTARY SCHOOL
5730 West Myrtle, Glendale, Arizona
MASONRY WALL CRACKS INVESTIGATION
G&A Job No. 0250.1 F

Dear Mr. Frandsen:

In accordance with your request, we have performed a limited investigation to evaluate the existing vertical cracks at the control joints in the masonry piers at the entrance to the Administration Building at the above referenced location. The following letter report presents our findings, conclusions, and recommendations and includes:

Appendix A:	Field Notes & Photo Location Plans
Appendix B:	Natural Resources Conservation Service Soil Shrink/Swell Potential Map of the Greater Phoenix Area
Appendix C:	Selected Original Building Drawings by The NBBJ Group/Gresham Larson dated 3-30-87
Appendix D:	Parapet Repair Sketches prepared by Gervasio & Assoc., Inc. dated 5-27-14

During our site visit by Marlene Betani, P.E., of Gervasio & Assoc., Inc. on March 27, 2014, we took twenty-four (24) digital photos, one (1) copy each enclosed.

FINDINGS, CONCLUSIONS & RECOMMENDATIONS

The Administration Building is a one-story concrete masonry structure built circa 1988. The roof structure is constructed with plywood deck supported by wood trusses with metal web members. The trusses bear on the interior and exterior masonry walls and interior glue-laminated wood beams. The roofing is built-up type roofing.

The entrance is located on the east side of the building. There is a 24 in. square masonry pier on each side of the doorway alcove that projects 16 in. past the face of the building. At the parapet, there is a brick faced parapet cap approximately 28 in. wide that covers the tops of the piers and the masonry walls above the entry openings between the piers. There is a full height masonry control joint where the piers abut the face of the building. At the south pier, the top of the pier has rotated outward approximately 3/4 in., leaving a large gap where rainwater can enter the entry alcove ceiling area below (Photos A5, A8, & A19). The gap is on the vertical face and has also opened the mortar joints in the horizontal parapet cap (Photos A8 - A10, & A20). There are signs that this rotation has been ongoing, based on the repair attempts made at both ends of the entry parapet (Photos A11 & A12), but it was reported to have gotten worse since the building was painted in October of 2013. The caulk in the joint is very thick with no visible backer rod. The caulk thickness into the wall creates a strong layer of caulk that will break or tear rather than flex with small movements. A backer rod allows a thinner cross section of caulk to be installed so that it can stretch slightly like a thin rubber band and can accommodate small movements.

The outward rotation of the pier had not yet caused cracking in the masonry and ceiling material in the entry alcove itself and the damage was limited to the parapet area at the time of our inspection.

It was reported that the landscape areas adjacent to the entry were changed from grass to desert landscaping a few years ago. The irrigation system was modified to a drip system with water targeted at each plant. This landscaping change resulted in a significant drop in the moisture added to the soils adjacent to the masonry piers. We attempted to obtain a copy of the Soil Report for this building project from the Geotechnical Engineer, but were told that they do not keep records from that long ago. We located the site on the Natural Resources Conservation Service Soil Shrink/Swell Potential Map of the Greater Phoenix Area (Appendix B). The school is located in an area with a low swell/shrink potential. The Structural Notes indicate that the building foundations were to be built on 2 ft. of recompacted native soil. This reuse of native soils also suggests that the site soils have a low shrink/swell potential.

We reviewed the available building drawings while on site. There are 3 roof drains on the east side of the building, one of which is behind the entry parapet, but the available drawings did not indicate where they outlet. The drawings indicate regularly spaced ties in the masonry piers, but the manner in which the pier is rotating suggests that the ties were not installed (Appendix C, Detail 6/S36). The drawings show a control joint at the junction between the exterior wall and the pier, and one was installed there, but there is also a control joint between the pier and the wall parallel to the wall face. Horizontal joint reinforcement is usually not continued through a control joint, but horizontal bond beam steel at the roof line and top of parapet is typically continuous through the joint with the reinforcing steel bars taped with a bond breaking tape to allow for a small amount of movement. Based on the size of the gap at the parapet, it does not appear that there is reinforcing steel tying the end of the pier to the building wall.

Along the top of the brick faced parapet cap over the entry, there is a gap in the mortar joint between the bricks over the exterior or eastmost entry wall and the bricks that cover the top of the building wall parapet and the 8 in. gap between the two walls (Photos A10 & A20). This gap indicates that the two walls are not tied together at the top and are moving relative to each other. It also indicates that the bricks over the 8 in. space between the walls could lose support at one end and fall into the gap and onto the entry ceiling below.

We conclude that the pier movement may be due to the change in the amount of moisture in the soil adjacent to the pier foundations. The pier is lightly loaded and can safely carry the imposed dead loads and Code required live loads. The gaps in the parapet cap above the entry pose a safety concern due to the potential for bricks dislodging and falling, particularly though the entry ceiling. The gaps also allow rainwater to enter the building where it can damage interior finishes and provide moisture for mold growth.

We recommend the following:

1. That the two parapet walls over the entry be tied together at the top with a reinforced slab between the walls per Detail 2/SS-2 in Appendix D.

2. That the piers at each end of the entry be tied to the building wall per Detail 1/SS-2 in Appendix D.

3. That the control joints be recaulked, completely removing the old caulk by grinding and installing a paintable polyurethane sealant on a continuous closed cell backer rod per Detail 3/ SS-3 in Appendix D.

4. After the repairs noted above are completed, the joint should be monitored approximately every 3 months to determine if it is getting larger. If additional movement occurs, then a Structural Engineer should be consulted for possible solutions such as underpinning of the pier foundation.

This letter is based on the facts and evidence known to us as of this date and may be amended if new facts and/or evidence are presented or discovered.

We appreciate the opportunity to provide this serv ce and welcome any questions.

Sincerely,

GERVASIO & ASSOC., INC.

Registered Professional Engineer (Structural)
CERTIFICATE NO.
20309
MARLENE
BETANI
Date Signed
ARIZONA, U.S.A.
Expires 06/30/2015

Marlene Betani, P.E.
Forensic Structural Engineer

MB:rz

Enclosures

APPENDIX A

FIELD NOTES & PHOTO LOCATION PLANS

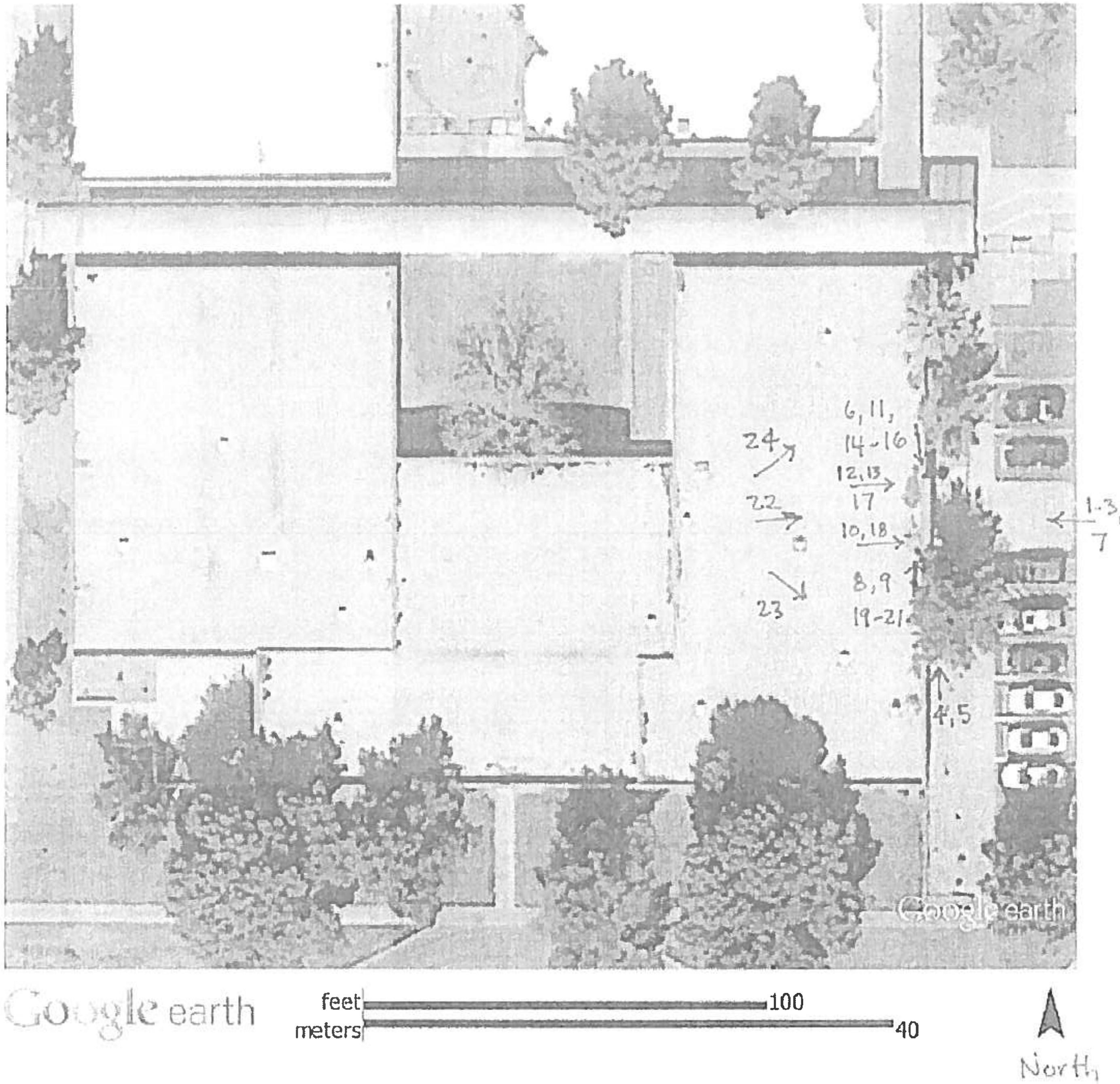
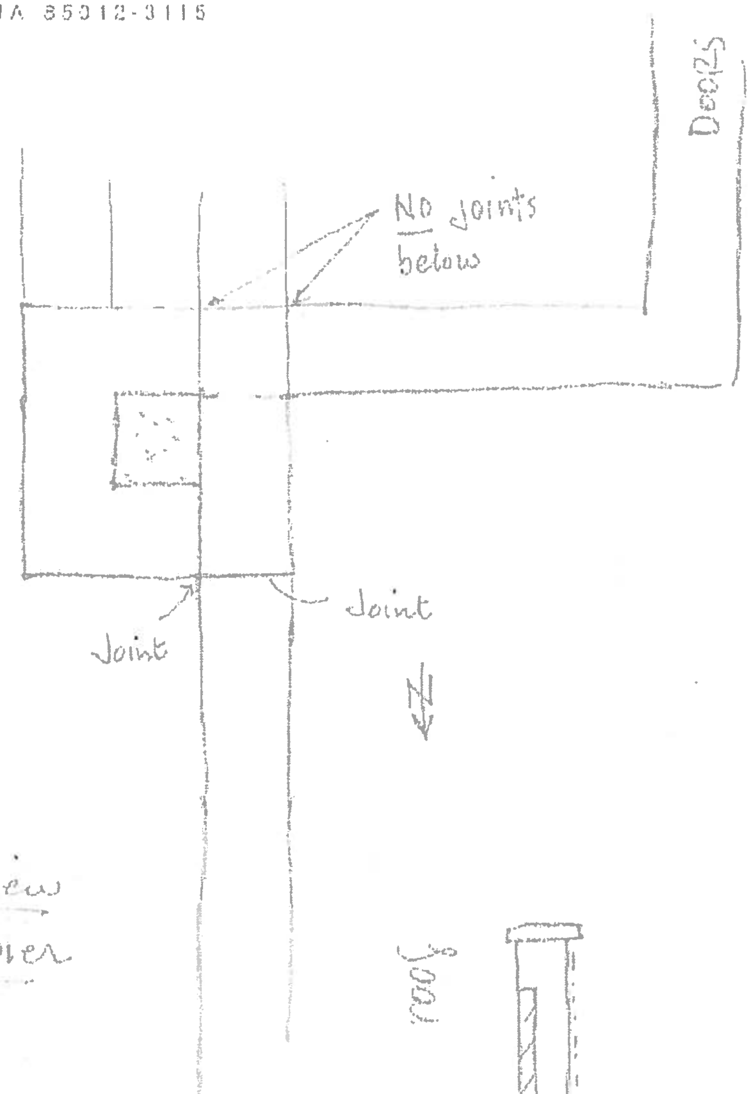


Photo Location Plan

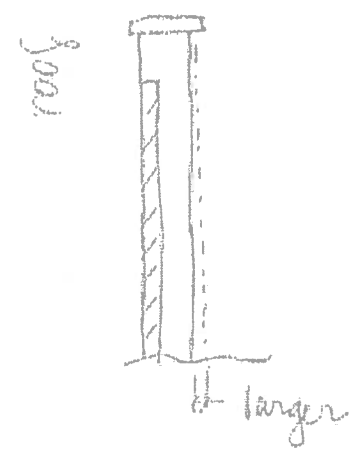
Set A
Taken 3.27.14
by MB

GERVASIO & ASSOC. INC.
CONSULTING ENGINEERS
(602) 265 1720 • 77 East Thomas Road, Suite 120
PHOENIX, ARIZONA 85012-3115

Date 3-27-14 Job No. 0250.1
By MB Sheet No. 1



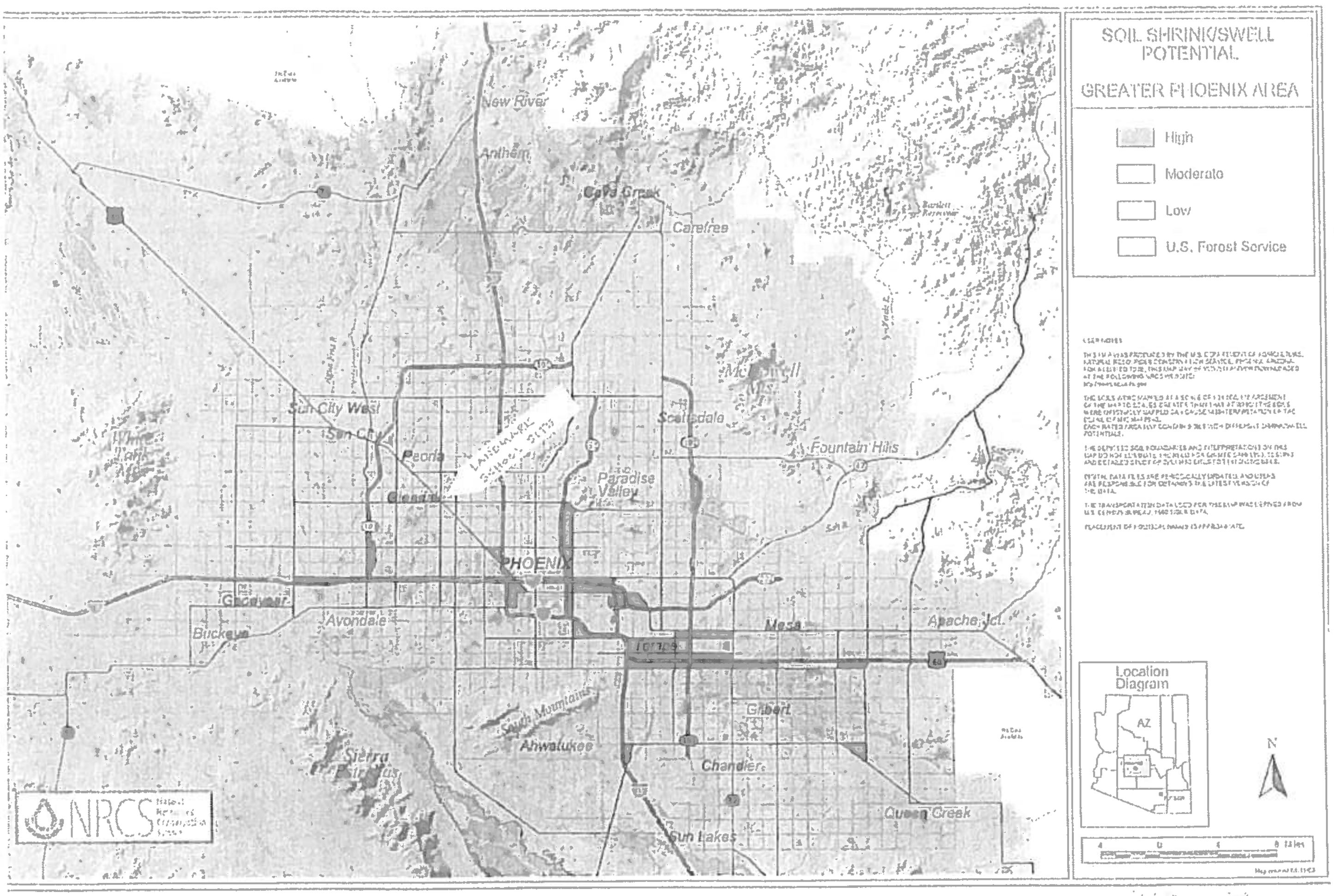
Plan view
North pier



South Pier
looking north

APPENDIX B

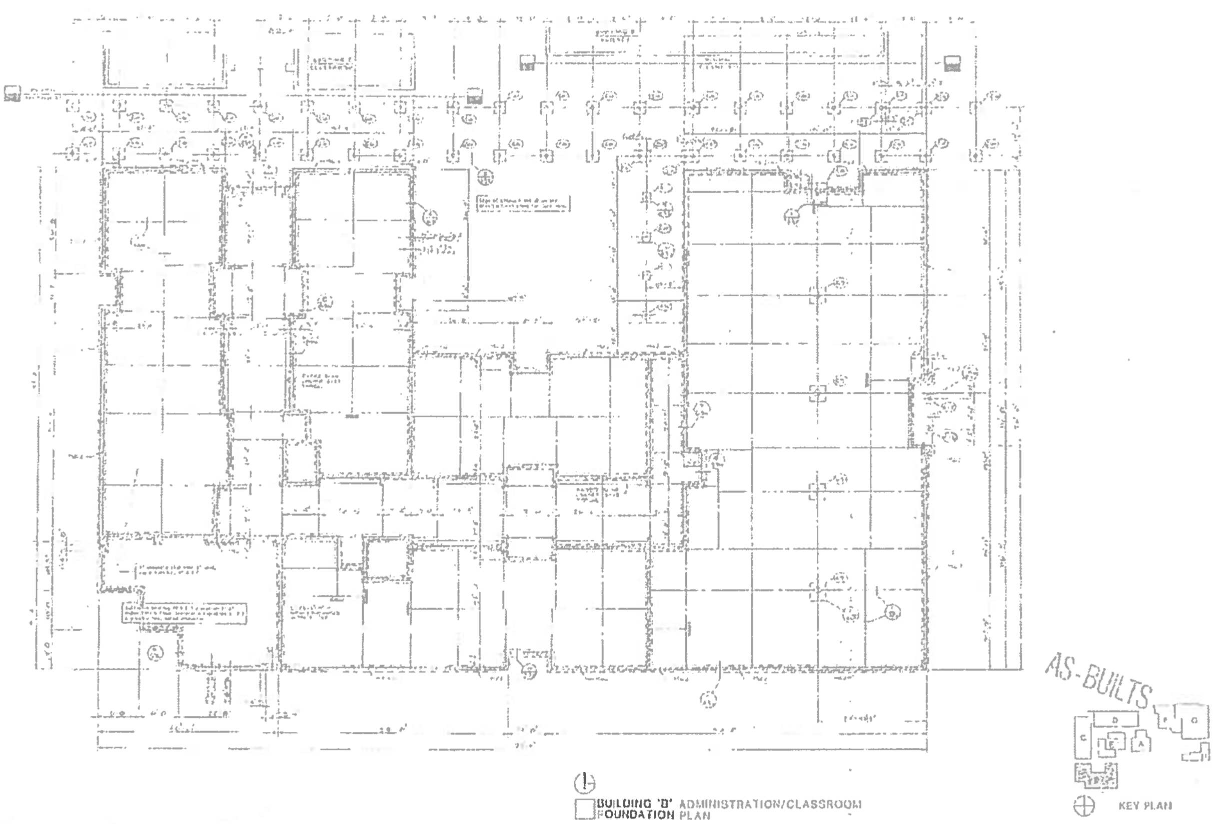
NATURAL RESOURCES CONSERVATION SERVICE SOIL SHRINK/SWELL POTENTIAL MAP OF THE GREATER PHOENIX AREA



SOIL SHRINK/SWELL POTENTIAL
GREATER PHOENIX AREA
High
Moderate
Low
U.S. Forest Service
Location Diagram
AZ
New River
Anthem
Cave Creek
Carefree
Sun City West
Sun City
Peoria
Glendale
Scottsdale
Fountain Hills
Paradise Valley
PHOENIX
Goodyear
Buckeye
Avondale
Mesa
Apache Jct.
Tempe
Gilbert
Chandler
South Mountains
Ahwatukee
Queen Creek
Sun Lakes
NRCS

APPENDIX C

SELECTED ORIGINAL BUILDING DRAWINGS BY
THE NBBJ GROUP/GRESHAM LARSON DATED 3-30-87

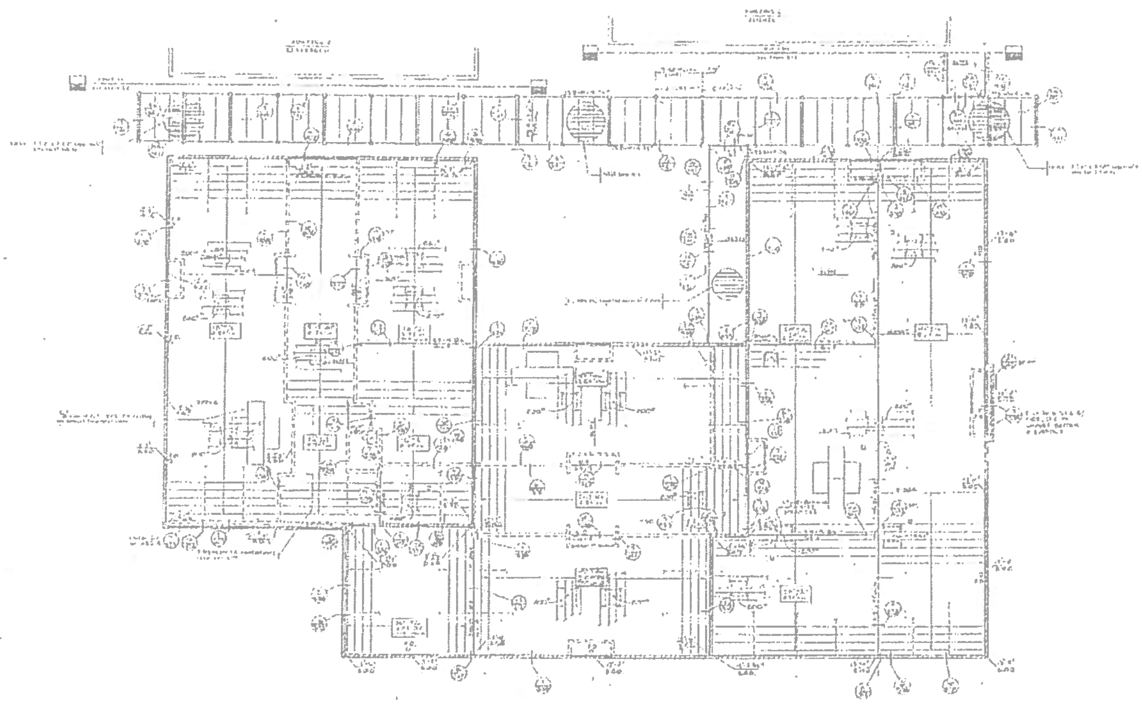


BUILDING 'D' ADMINISTRATION/CLASSROOM FOUNDATION PLAN

The NBBJ Group/Gresham Larson

Glendale Elementary School District #40
Landmark Site

S5



BUILDING "B" ADMINISTRATION/CLASSROOM
ROOF FRAMING PLAN

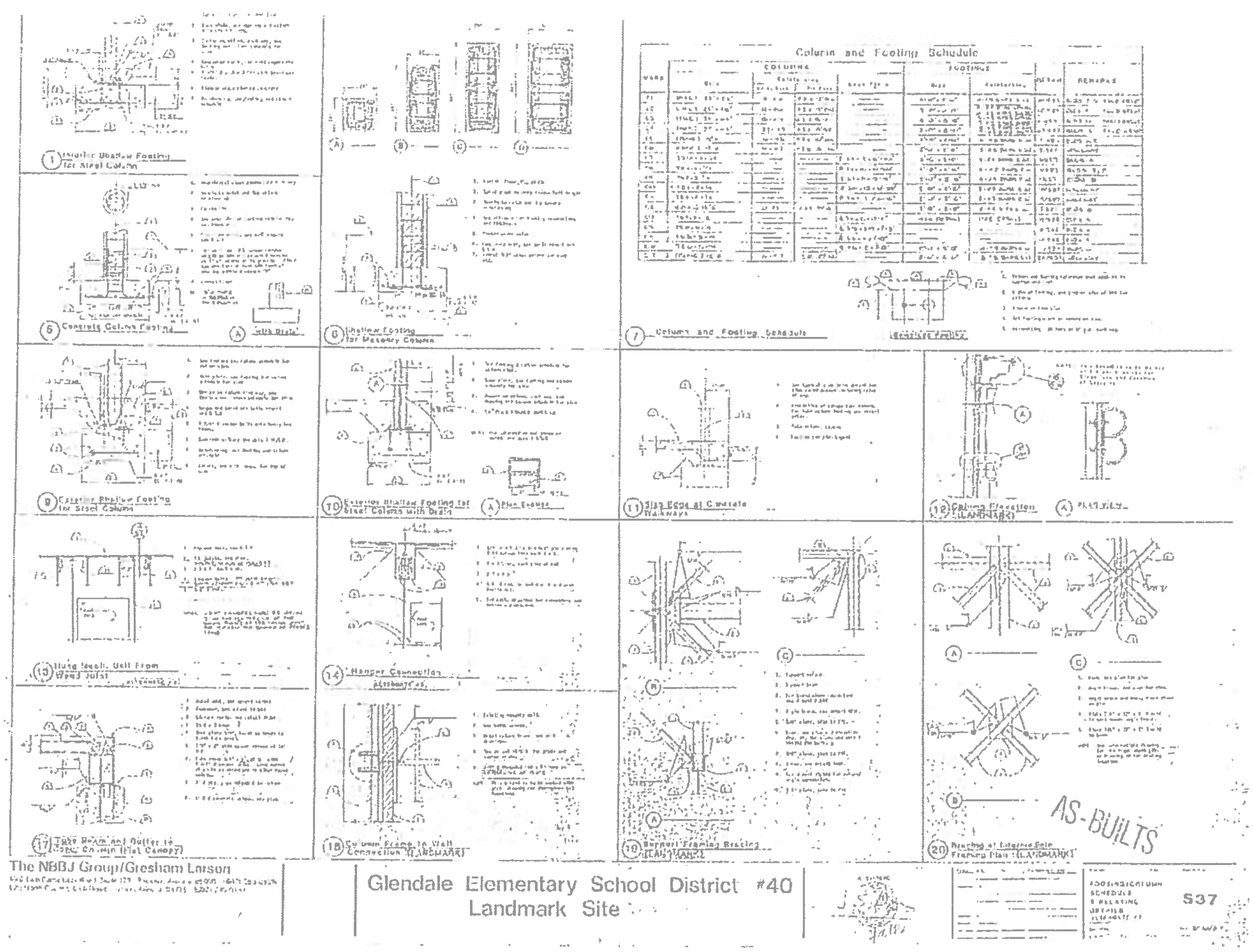
AS-BUILTS

KEY PLAN

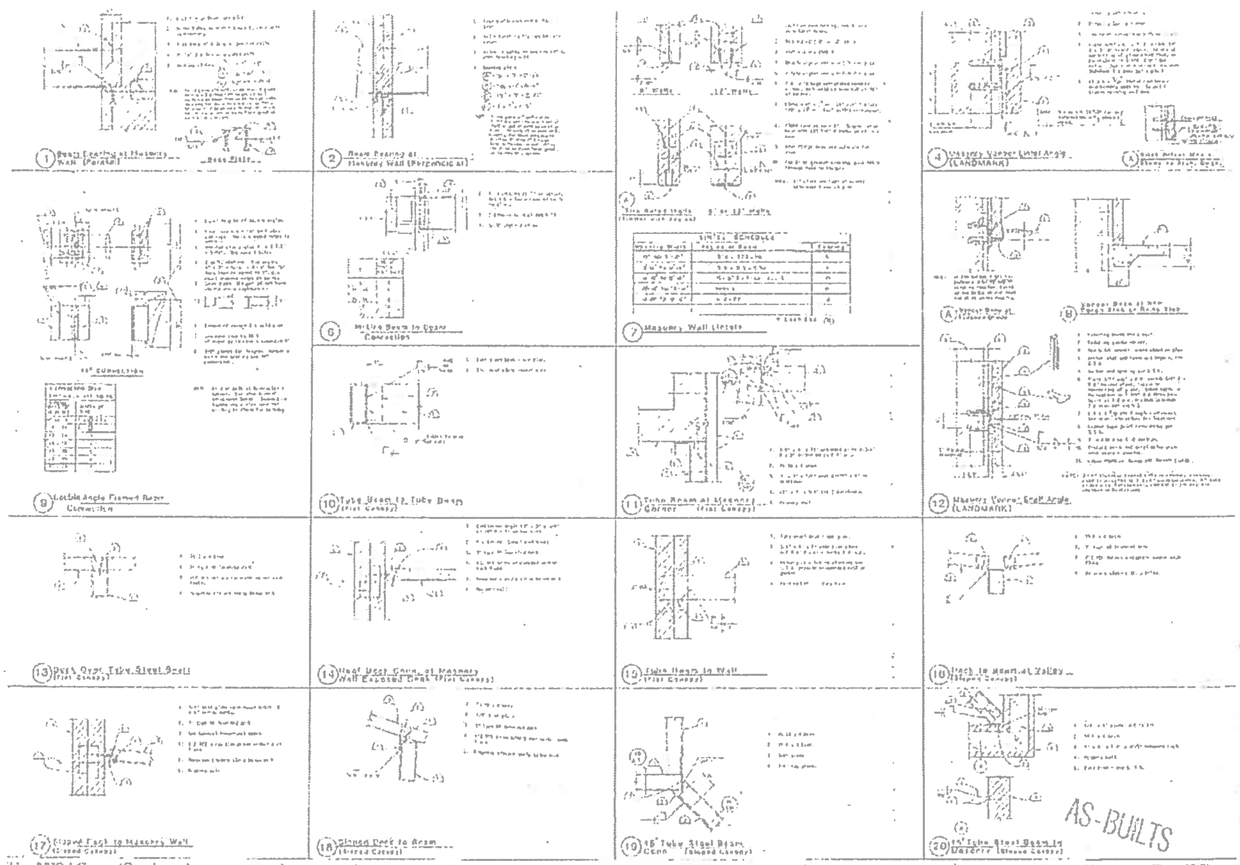
The NBBJ Group/Gresham Larson

Glendale Elementary School District #40
Landmark Site

S6



Column and Footing Schedule
Column and Footing Schedule
AS-BUILTS
The NBBJ Group/Gresham Larson
Glendale Elementary School District #40
Landmark Site
S37

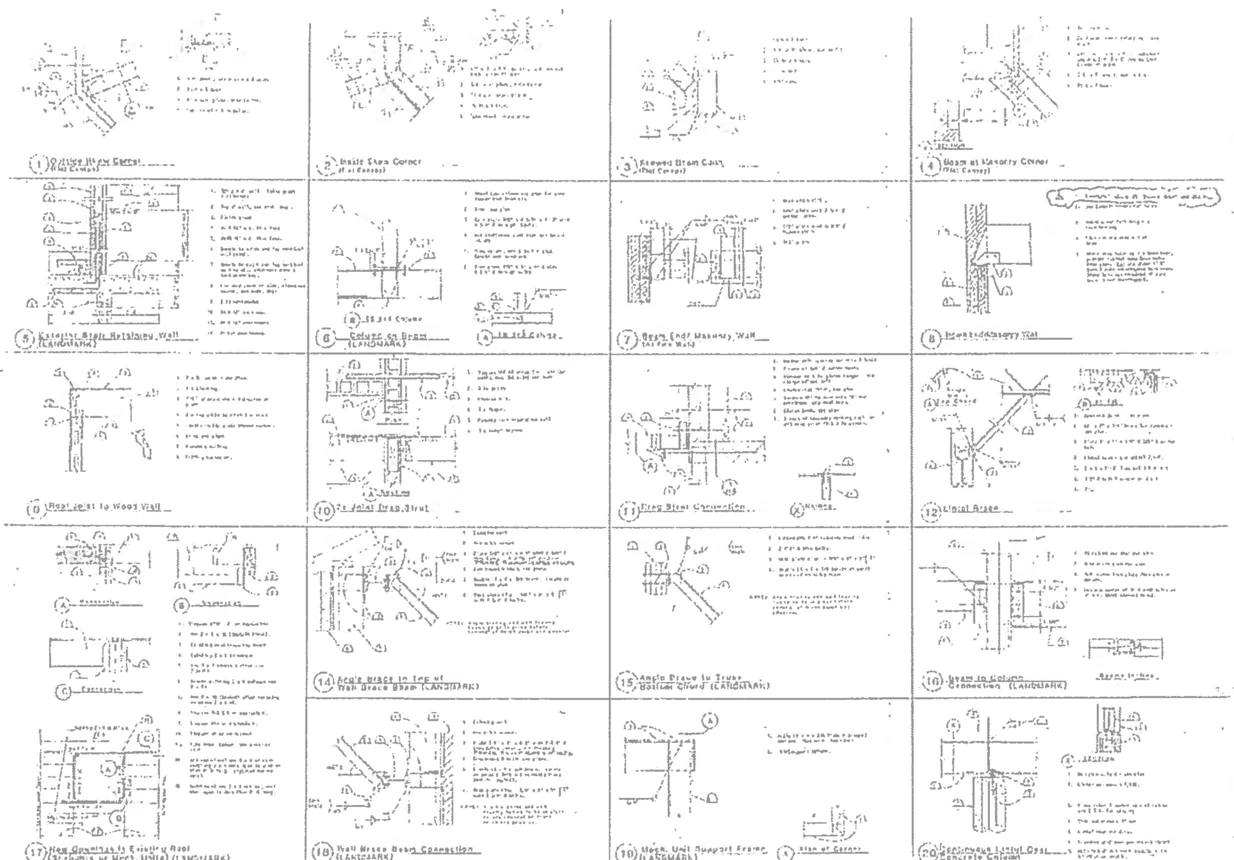


The NBBJ Group/Gresham Larson

Glendale Elementary School District #40
Landmark Site

LINTELS AND CANOPY DETAILS

S39



The NBBJ Group/Gresham Larson

Glendale Elementary School District #40
Landmark Site

S42

APPENDIX D

PARAPET REPAIR SKETCHES PREPARED BY
GERVASIO & ASSOC., INC. DATED 5-27-14

PROJECT

SCOPE OF STRUCTURAL WORK (GENERAL)

1. Remove brick parapet cap over office entry.
2. Epoxy horizontal dowels at each end of entry parapet per Det. 1/SS2.
3. Install ties & grout at top of parapet per Det. 2/SS2.
4. Replace brick parapet cap.
5. Repair existing masonry control joints per Det. 3/SS3.

REPAIR GENERAL NOTES

1. All parties involved in the repair work shall visit the site, become familiar with the existing conditions and verify these existing conditions shown on the drawings.
2. Verify all dimensions and conditions prior to starting work. Notify the Engineer of any discrepancies or inconsistencies.
3. Any damage to existing ceilings, roofing, lights, fixtures or other materials caused by the repair work shall be repaired and/or replaced to match existing conditions. All painting and surface treatments shall also match existing conditions.
4. Provide all necessary temporary bracing, shoring, guying or other means to avoid excessive stresses and to hold structural elements in place during construction.
5. Any engineering design provided by others and submitted for review shall bear the seal and signature of an Engineer registered in Arizona.

REINFORCING

1. ASTM A615, Grade 60, deformed bars. CRSI and ACI manuals apply.
2. Place reinforcing per ACI 318-05 and CRSI Standards.

MASONRY

1. Brick units at parapet cap to match existing.
2. Mortar: Type S, 1800 psi.
3. Grout: 2000 psi. A maximum of 18% by weight of the total cementious materials may be replaced by fly ash, provided the fly-ash conforms to ASTM A618, Type F.

SPECIAL INSPECTION

Special Inspection is required for all repair work. Call Structural Engineer for inspection, phone number (602) 285 1720. Provide 48 hours notice.

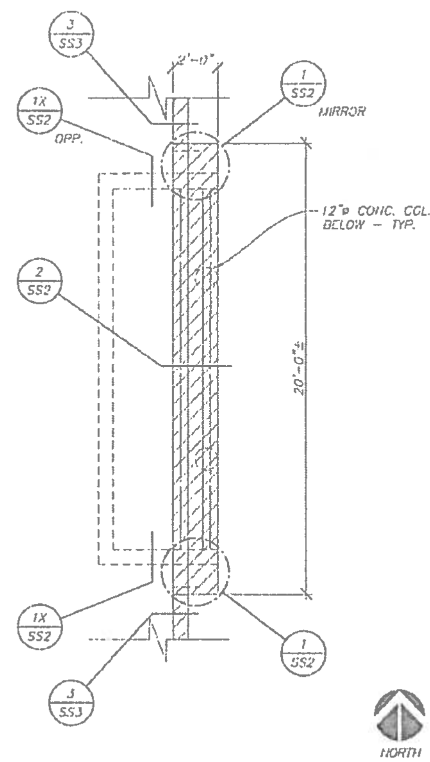
Special inspection is to be provided in addition to the inspections conducted by the Department of Building Safety and shall not be construed to relieve the Owner or his authorized agent from requesting the periodic and called inspections required by Section 110 of the International Building Code. The special inspector shall be approved by the City Building Official prior to starting work.

SPECIAL INSPECTION IS REQUIRED FOR THE FOLLOWING WORK:
(PER IBC SECTION 1705)

EPOXY GROUTED ANCHORS:
During installation of epoxy grouted anchors.

STRUCTURAL MASONRY:

1. During sampling and placing of all masonry units, placement of reinforcement, inspection of grout space, immediately prior to closing of cleanouts and during all grouting operations.
2. Special inspection for the placing of the units shall be performed in accordance with IBC Section 1705.4 on a periodic basis.



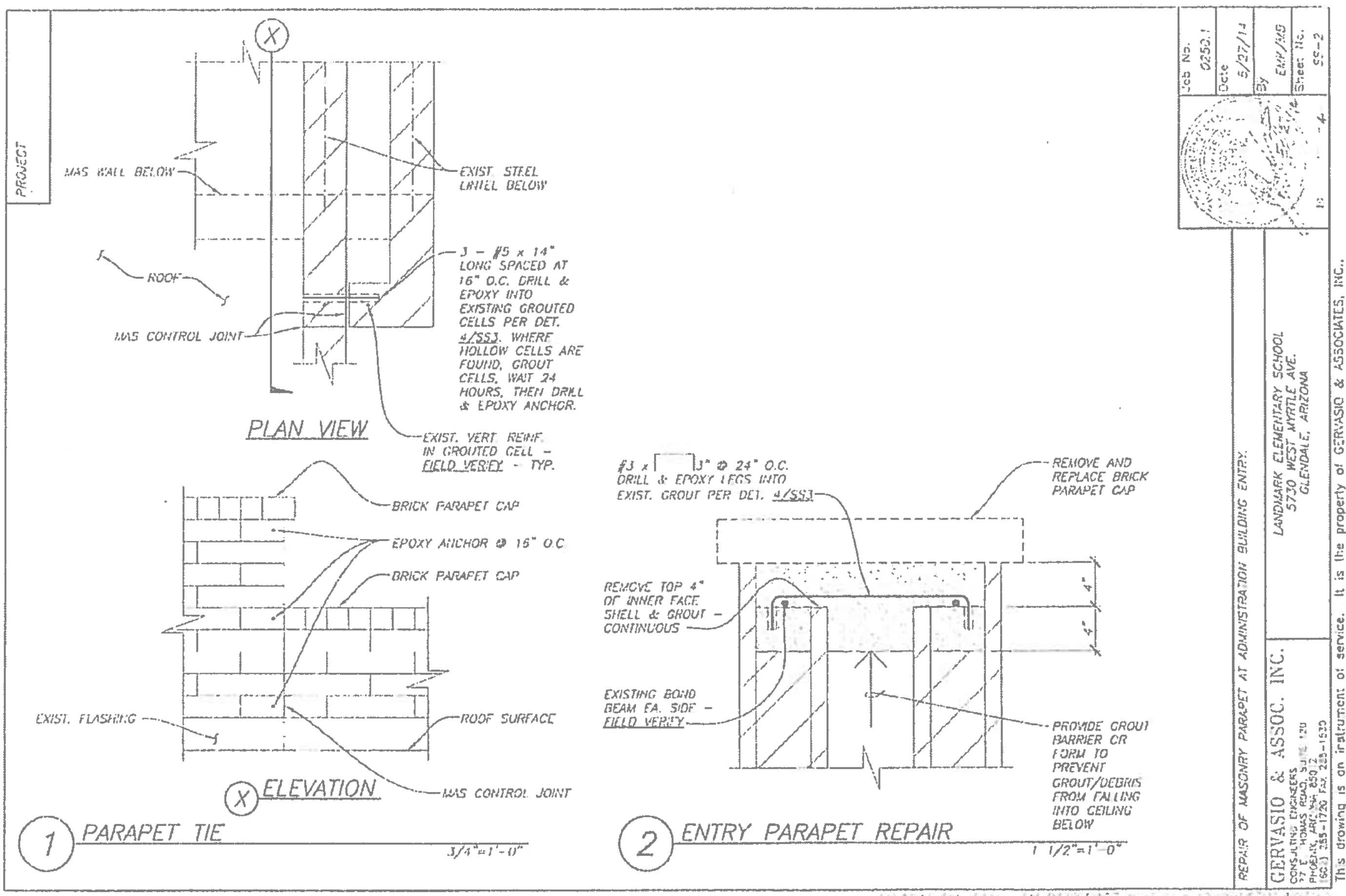
PLAN @ ADMIN BLDG ENTRY
1/4"=1'-0"

Job No. 0255.1
Date 5/27/14
By EMK/MB
Sheet No. SS-1

REPAIR OF MASONRY PARAPET AT ADMINISTRATION BUILDING ENTRY

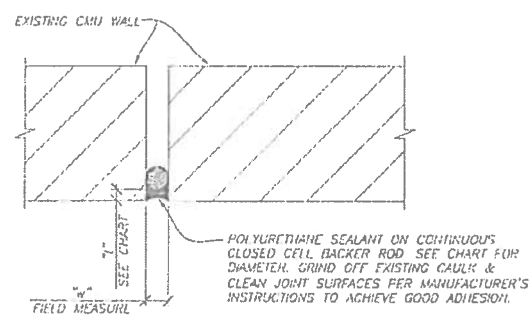
LANDMARK ELEMENTARY SCHOOL
5730 WEST MYRTLE AVE.
GLENDALE, ARIZONA

GERVASIO & ASSOC. INC.
CONSULTING ENGINEERS
E. THOMAS ROAD SUITE 120
PHOENIX, ARIZONA 85012
(602) 285-1720 FAX 285-1533


PROJECT
PLAN VIEW
MAS WALL BELOW
EXIST. STEEL LINTEL BELOW
ROOF
3 – #5 x 14" LONG SPACED AT 16" O.C. DRILL & EPOXY INTO EXISTING GROUTED CELLS PER DET. 4/SS1. WHERE HOLLOW CELLS ARE FOUND, GROUT CELLS, WAIT 24 HOURS, THEN DRILL & EPOXY ANCHOR.
MAS CONTROL JOINT
EXIST. VERT. REINF. IN GROUTED CELL – FIELD VERIFY – TYP.
BRICK PARAPET CAP
EPOXY ANCHOR @ 16" O.C.
BRICK PARAPET CAP
EXIST. FLASHING
ROOF SURFACE
ELEVATION
MAS CONTROL JOINT
1 PARAPET TIE
3/4"=1'-0"
#3 x [ ]3" @ 24" O.C. DRILL & EPOXY LEGS INTO EXIST. GROUT PER DET. 4/SS1
REMOVE AND REPLACE BRICK PARAPET CAP
REMOVE TOP 4" OF INNER FACE SHELL & GROUT – CONTINUOUS
4"
4"
EXISTING BOND BEAM EA. SIDE – FIELD VERIFY
PROVIDE GROUT BARRIER OR FORM TO PREVENT GROUT/DEBRIS FROM FALLING INTO CEILING BELOW
2 ENTRY PARAPET REPAIR
1 1/2"=1'-0"
Job No. 0253.1
Date 5/27/14
By EMH/HG
Sheet No. SS-2
REPAIR OF MASONRY PARAPET AT ADMINISTRATION BUILDING ENTRY
LANDMARK ELEMENTARY SCHOOL
5730 WEST MYRTLE AVE.
GLENDALE, ARIZONA
GERVASIO & ASSOC. INC.
CONSULTING ENGINEERS
This drawing is an instrument of service. It is the property of GERVASIO & ASSOCIATES, INC., and may not be reproduced or reproduction hereof used without permission.

PROJECT

JOINT WIDTH "w"	CAULK THICKNESS "t" = "w"/2	BACKER ROD DIAMETER = 1.25 x "w"
3/8"	3/16"	1/2"
1/2"	1/4"	5/8"
5/8"	5/16"	3/4"
3/4"	3/8"	1"
7/8"	3/8"–1/2" MAX	1 1/4"
1" OR GREATER	3/8"–1/2" MAX	1 1/4" OR 1.25 x "w" WHICHEVER IS GREATER



3 JOINT AT EXISTING CMU WALL N.T.S.

ADHESIVE ANCHOR INSTALLATION PROCEDURE

1. DRILL HOLE: See details for anchor type (i.e., rebar or all-thread rod) and anchor diameter. Drill hole in existing masonry walls with a hand-held rotary hammer drill with a carbide drill bit, 1/8" larger diameter than anchor to be used. Embedment depth shall be as shown in details. Anchor must be embedded in solid grouted cells, with 8" grout around anchor.

2. CLEAN HOLE: Clean hole with nylon brush and blow out hole using oil free and moisture-free compressed air. For wet-drilled holes, wash out hole to remove drilling slurry residue, remove free standing water and allow hole to dry thoroughly.

3. ADHESIVE: Hilti HY-70 Adhesive Anchor System (ICC ESR 2682) or Simpson SET Anchoring Adhesive (ICC ESR 1772). Anchor installation per manufacturers recommendations. Other adhesive may be used if approved by the Structural Engineer.

4. TEMPERATURE REQUIREMENTS: Base material temperature must be between 41°F and 110°F at the time of installation. Adhesive temperature must be between 41°F and 90°F at the time of installation.

5. PREPARE ANCHOR: Clean, dry and wipe anchor free of all water, dirt, oil and grease, etc.

6. SET ANCHOR: Fill hole 1/2 to 2/3 full with adhesive, insert anchor and twist during installation to insure complete embedment.

7. SET OR CURE TIME: Do not displace or move anchor in any way after anchor is set. Allow adhesive to cure for 24 hours minimum before tightening nuts on anchor.

8. SPECIAL INSPECTION: Adhesive anchor installations require special inspection in accordance with the Code. The special inspector records the drill bit compliance with ANSI B212.15-1994; hole depth and cleanliness; product description, including product name; rod diameter and length; adhesive expiration date; and verification of anchor installation with manufacturer's published instructions.

4 ADHESIVE ANCHOR INSTALLATION FOR MASONRY NO SCALE

Job No. 0259.1
Date 5/27/14
By EMK/MB
Sheet No. SS-3

REPAIR OF MASONRY PARAPET AT ADMINISTRATION BUILDING ENTRY.

LANDMARK ELEMENTARY SCHOOL
5730 WEST MYRTLE AVE.
GLENDALE, ARIZONA

GERVASIO & ASSOC. INC.
CONSULTING ENGINEERS
77 E THOMAS ROAD, SUITE 123
PHOENIX, ARIZONA 85012
(602) 285-1720 FAX 285-1530

GERVASIO & ASSOC., INC.
CONSULTING ENGINEERS
77 EAST THOMAS ROAD, SUITE 120
PHOENIX, ARIZONA 85012
(602) 285-1720 • (602) 285-1530 (FAX)

July 20, 2015

Ms. Sarafina Fornara
ARIZONA SCHOOL RISK RETENTION TRUST, INC.
333 East Osborn Road, Suite 300
Phoenix, AZ 85012

Via email: sfornara@the-trust.org

RE: GLENDALE - LANDMARK ELEMENTARY SCHOOL
5730 West Myrtle, Glendale, Arizona
MEDIA CENTER WALL CRACKS INVESTIGATION
Trust RMAR No. 2014-0044
G&A Job No. 0250.2 F

Dear Ms. Fornara:

In accordance with your request, we have performed a limited investigation to evaluate the cracks at the exterior masonry walls and the interior librarian's office walls at the Media Center Building at the above referenced location. While on site, we observed unrelated structural concerns which are discussed in Appendix E. The following letter report presents our findings, conclusions, and recommendations and includes:

- Appendix A: Field Notes & Photo Location Plans
- Appendix B: Structural Rehabilitation Drawings by Magadini Associates dated 1/28/69
- Appendix C: Floor Elevation Survey by Gervasio & Assoc., Inc. dated 3/4/15
- Appendix D: Uniform Building Code Standard 21-8 "Pointing of Unreinforced Masonry Walls"
- Appendix E: Observations of Other Conditions

During our investigation by Marlene Betani, P.E., of Gervasio & Assoc., Inc. on March 2 & 4, May 14 & 28, 2015, we took one hundred eleven (111) digital photographs. A digital copy of the photographs has been provided.

Our assignment was limited to determining the cause of the wall cracking and to determine if the cracks represent a risk of structural instability.

FINDINGS, CONCLUSIONS & RECOMMENDATIONS

The Media Center Building is a two-story brick masonry structure built circa 1917. The building has been remodeled numerous times, and incomplete original building drawings were available for a 1969 structural rehabilitation project and a 1988 building remodel. The roof structure is a wood system with large wood [illegible] access to this unused floor was removed circa 1988. The lobby floor is constructed of concrete over metal form deck on steel joists spaced approximately 3 feet on center. This is not original construction, but it is not known when the steel joists were installed. There is a crawl space that is approximately 5 feet high beneath the lobby floor. An access hole had to be installed in order for us to investigate the structure in the crawl space area. The floor of the Media Center Offices is concrete floor slab on ground.

In late February, a leak was discovered in an underground water pipe that runs along the south end of the building. Although the water valve was then shut off, water continued to leak under the building on the west end of the Lobby for a few more days until the valve was repaired (Photos A5 & A6). Wet soils at grade were present at a waterline valve/junction box on the west side of the building in a grass landscaped area in line with the broken water line (Photo B35). The water leak saturated the soils in the crawl space below the Lobby. In late February, large cracks developed in the drywall of the Media Center Offices, and the glass windows surrounding the offices began to shift in their frames. Also discovered were cracks in the west exterior wall of the building and the adjacent ramp wall. Smaller cracks were found in the east exterior wall.

The cracks in the Office walls were near the south wall of the Office, which is the north wall of the lobby. This wall supports the north half of the abandoned second level and Lobby floor. Below the Lobby floor, the wall is constructed of red clay brick on a concrete stem wall and foundation.

We reviewed the available building drawings. In 1969, Magadini Associates prepared structural rehabilitation drawings for the building. Included in the drawings is a Foundation Plan showing foundations to be stabilized by pressure grouting. All the foundations in the south part of the building are shown to require pressure grouting **except** the wall between the Offices and the Lobby. See Appendix B, Sheet F-1.

Site Soils:

Based on the appearance of the soil in the crawl space and our experience with a property located 0.2 mile directly south of the Media Center Building, the existing soils are clay with moderate to high swell potential and some to extensive additional compression following wetting. This means that the foundations could settle if the foundation soils become wet. We inserted a 4 ft. long fiberglass soil probe into the crawl space soil in 2 places. In one case, the probe could be easily inserted the full 4 ft. length, and in the other case, the probe was inserted 3 ft. 5 in. into the soil (Photo C25). This indicates very soft soils due to water infiltration to a depth below the foundations.

Floor Elevation Survey:

We performed a floor elevation survey of the Lobby and Office area of the Media Center (Appendix C). The high point of the floor slab in the area we investigated occurs on the slab on ground in the Media Center approximately 30 ft. north of the low spot. The low point was the area at the west entry from the Lobby into the Media Center. The difference in elevation between the low and high points was [illegible] in. We [illegible] end of the wall between the Lobby and Offices along the retaining wall that had not been stabilized during the 1969 structural rehabilitation. The Office walls and ceiling near this low area had the most damage.

Crawl Space:

As noted above, we found wet to very moist soils throughout the crawl space area (Photos A4, A5, B46 - B48). There were numerous vertical and stair step cracks in the brick retaining wall between the Lobby area and the Office area (Photos C21, C24, C28 - C32). None of the cracks appear to be new, but additional movement has likely occurred at them.

Exterior Wall Cracks:

The cracks in the east and west building walls occur at the jambs of old window openings that were infilled with concrete masonry units during the 1987 remodel (Photos B27 - B30 & B41 - B43). Since the block was not toothed in or interlocked with the original brick units, there is effectively a masonry control joint that opened up when there was some additional settlement of the walls due to moisture infiltration under the foundations. The cracks most noticeable in the masonry ramp wall on the west side which is near the wet area around the junction/valve box (Photos B21 & B31). There are signs of past movement in the sidewalks in this area evidenced by a replaced sidewalk section and grind marks at the sidewalk joints (Photos B21 - B24 & B40).

Interior Wall Cracks:

There are numerous cracks in the drywall of the Office and Lobby areas of the building (Photos A12 - A17 & A20 - A23). The largest cracks occur in the Office walls that are perpendicular to the north wall of the Lobby. They are in the narrow section of wall at the top and bottom of the windows just a few feet north of the Lobby. The cracks indicate settlement of the north Lobby wall particularly at the west side near where the water line break was discovered. We looked above the ceiling in numerous areas in the Offices and at the surrounding soffits. We looked for, but did not see, signs of structural distress in the roof or unused upper level floor structure at this time.

We conclude that the exterior and interior wall cracking is due to the change in the amount of moisture in the soil under and surrounding the foundations. The water source is the broken water line that runs under the building along the south side. The cracks are not structurally significant.

We recommend the following:

1. That the soils in the crawl space area be allowed to dry out until a soil probe cannot be inserted into the soil more than a few inches. This could take many months.

2. That after the soil has been allowed to dry out, if settlement of this lightly loaded wall has stopped, then the interior drywall be patched and the window frames be plumbed and leveled before reinstalling the glass. If settlement continues [illegible]

3. That the cracks in the north clay brick retaining wall in the crawl space under the Lobby be repointed per Uniform Building Code Standard 21-8 "Pointing of Unreinforced Masonry Walls" (Appendix D).

4. That cracks in the exterior building wall be patched to prevent moisture from entering the building envelope.

This letter is based on the facts and evidence known to us as of this date and may be amended if new facts and/or evidence are presented or discovered.

We appreciate the opportunity to provide this service and welcome any questions.

Sincerely,

GERVASIO & ASSOC., INC.

Marlene Betani, P.E.
Forensic Structural Engineer

MB:rz

Enclosures

cc: Mike Coppa - Arizona Schools Risk Retention Trust, Inc., via email: mcoppa@ashtontiffany.com

APPENDIX A

FIELD NOTES &
PHOTO LOCATION PLANS

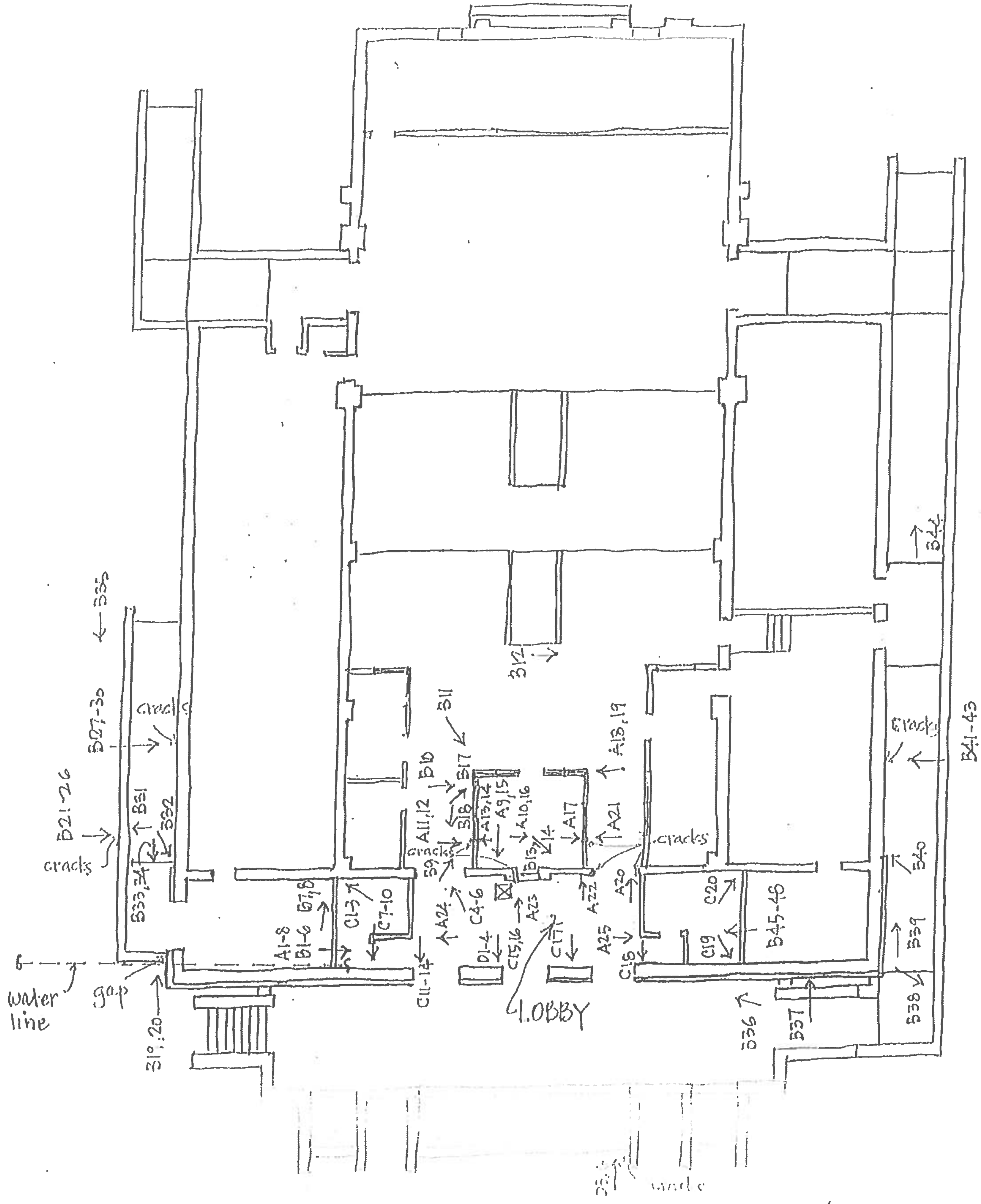


PHOTO LOCATION PLAN & FIELD NOTES

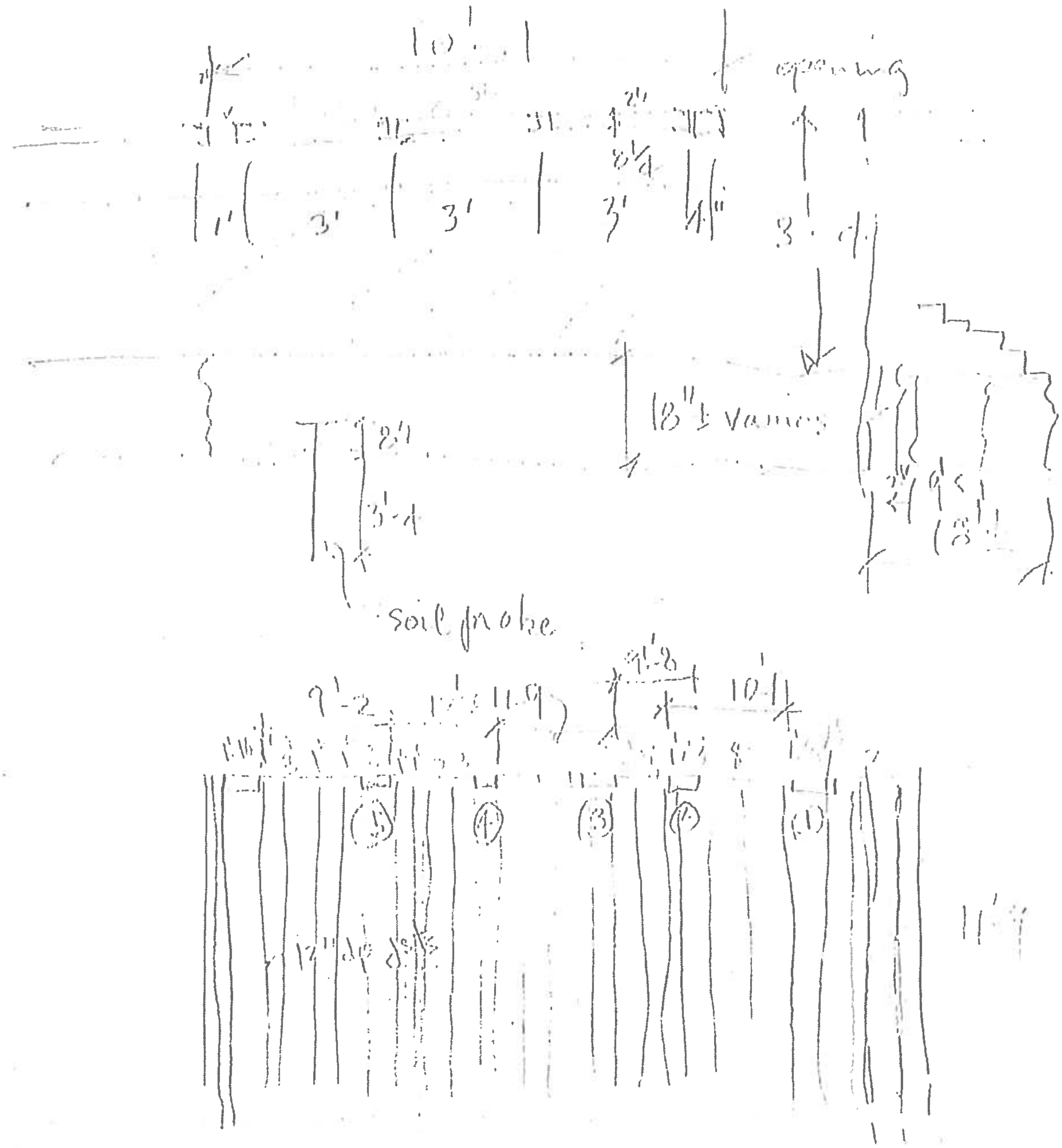
GERVASIO & ASSOC. INC.
CONSULTING ENGINEERS

(602) 285-1720 • 77 East Thomas Road, Suite 120
PHOENIX, ARIZONA 85012-3115

Date [illegible] Job No. [illegible]

By MB Sheet No. 1

FIELD NOTES



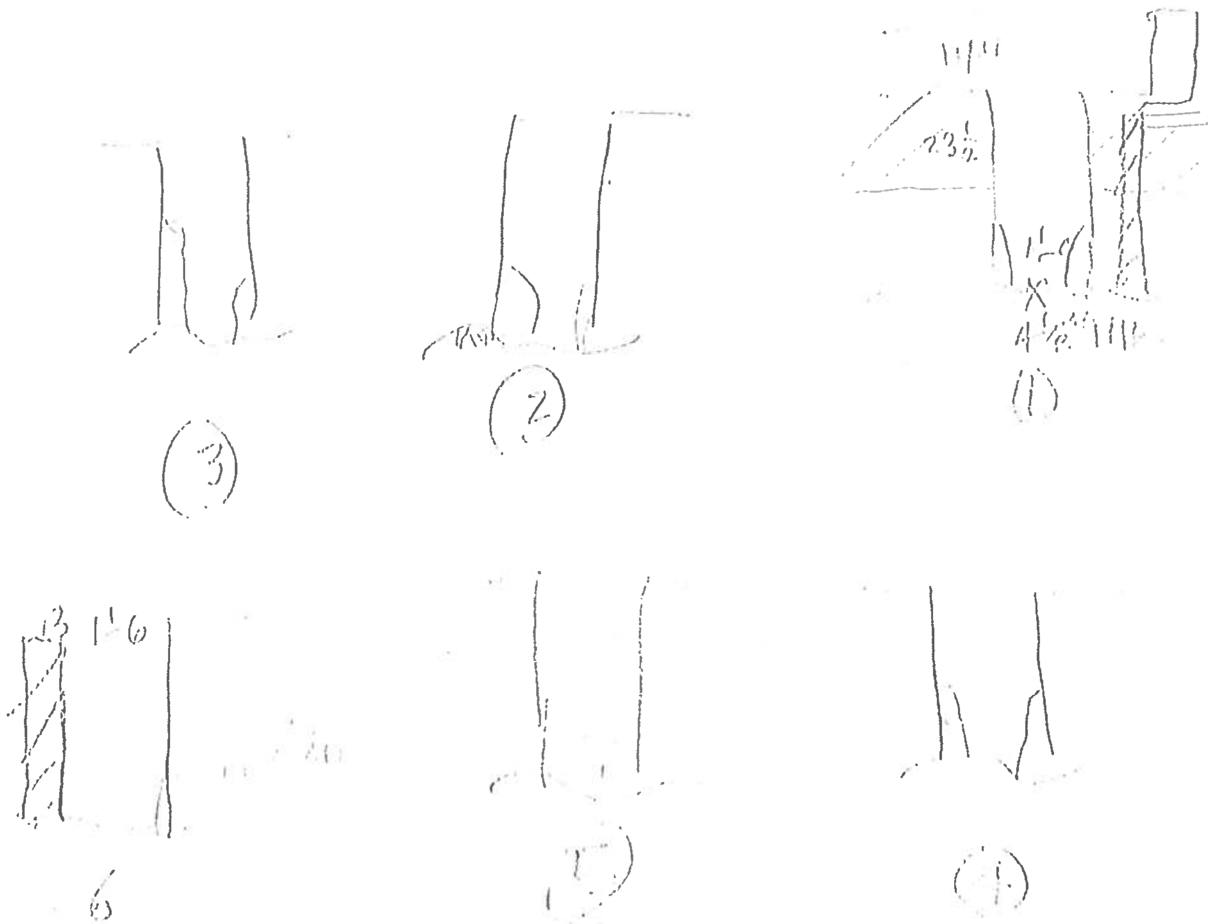
GERVASIO & ASSOC. INC.
CONSULTING ENGINEERS

(602) 285-1720 • 77 East Thomas Road, Suite 120
PHOENIX, ARIZONA 85012-3115

Date 5-14-15 Job No. [illegible]

By MB Sheet No. 2

FIELD NOTES



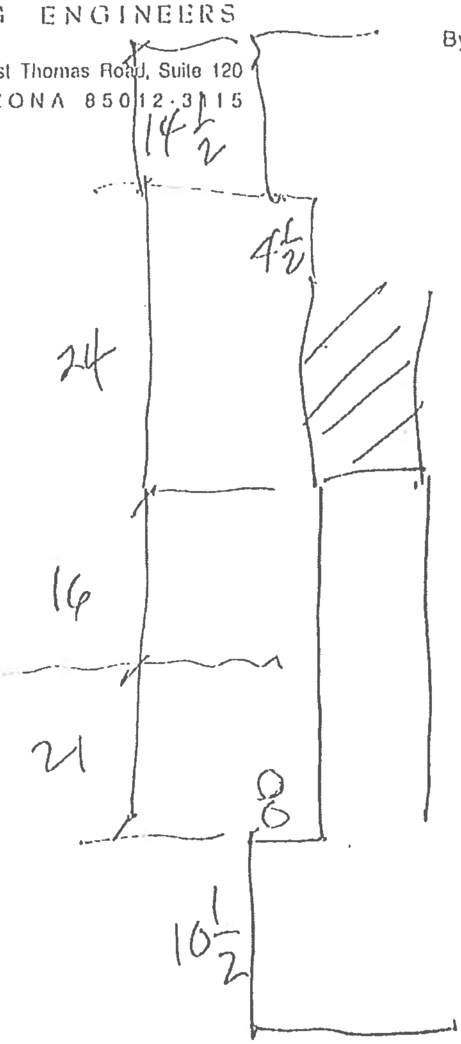
GERVASIO & ASSOC. INC.
CONSULTING ENGINEERS
(602) 285-1720 • 77 East Thomas Road, Suite 120
PHOENIX, ARIZONA 85012-3115

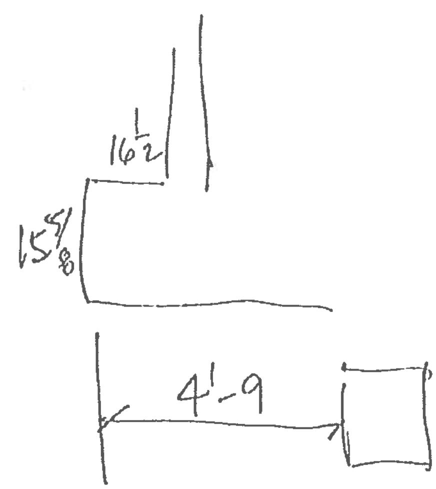
Date 5-28-15 Job No. [illegible]

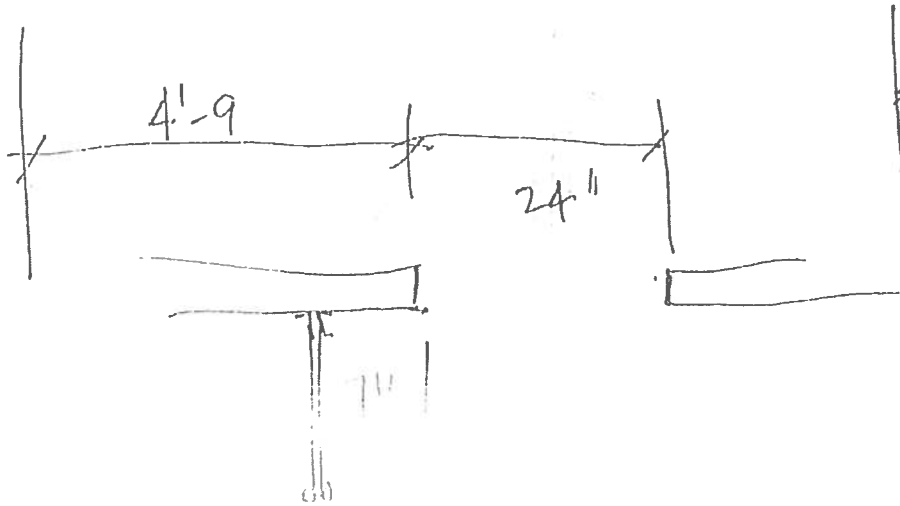
By MJB Sheet No. 1

FIELD NOTES

joist brg depth = 2½







APPENDIX B

STRUCTURAL REHABILITATION DRAWINGS
BY MAGADINI ASSOCIATES DATED 1/28/69

PRESSURE GROUTING & FOUNDATION STABILIZATION

[illegible]

Accurate records shall be kept of grout mix proportions, quantities at each location and injection pressures. The actual sequence of grouting operation, proportioning of grout mixes, etc., will be as herein provided, except that these provisions may be modified by the owner's representative as required by field conditions.

II. Equipment

Only approved mixing and pumping equipment shall be used in the preparation and handling of grout. All oil or other rust inhibitors shall be removed from the mixing drums, stirring mechanisms, and other portions of the equipment in contact with the grout before the mixers are used. All equipment shall be maintained in first class operating condition at all times and shall include, but not be limited to, the following items:

A. Specially equipped injection grout pump capable of operating at a maximum discharge pressure as required by site conditions.

B. A power operated grout mixer specifically designed for the proper mixing of [illegible] slurry, together with a mechanically agitated [illegible], if necessary, to maintain uninterrupted grout supply.

C. Valves, pressure gauges, pressure hose, supply lines and small tools as may be necessary to provide continuous supply of grout and accurate pressure control.

The capacity of the above listed plant shall be not less than [illegible] cubic feet of grout per hour when operated at a maximum discharge pressure of 100 p.s.i.

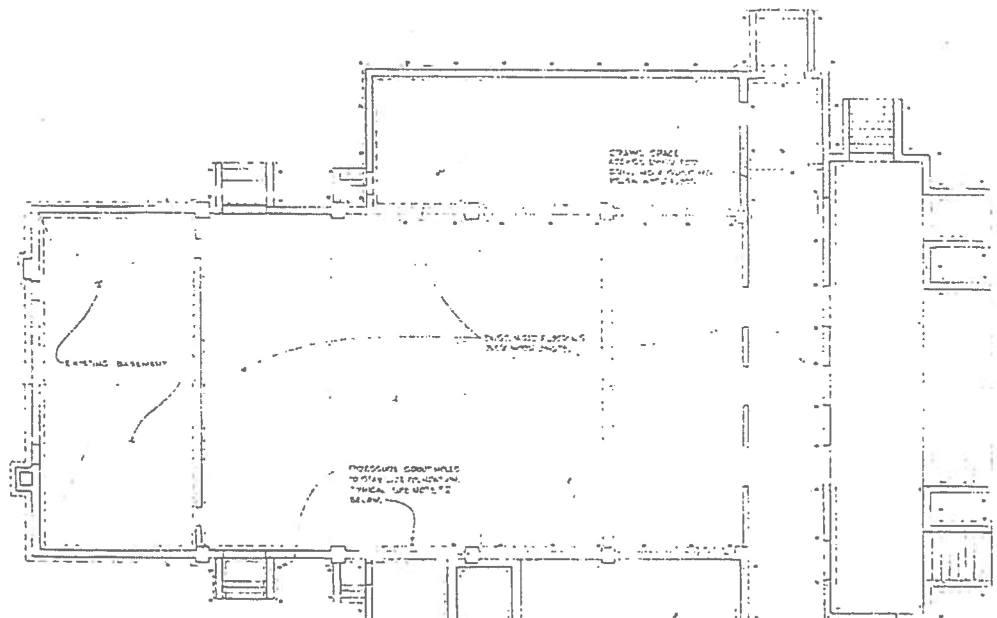
III. Mix Proportions

All materials shall be accurately measured by volume, weight, or other approved means. Sand or bulk filler shall be added to the mixture, when, in the opinion of the owner's representative, the [illegible] is such as to warrant its use.

The grout mix proportions shall be adjusted for each point of injection, and from time to time during injection, if necessary, to obtain maximum grout take and penetration at minimum pressure, consistent with requirements of Section II [illegible].

IIII. [illegible]

[illegible]



NOTES:

1. WALLS SHOWN SHADED ARE TO BE STABILIZED AGAINST FUTURE SETTLEMENT.
2. GROUT HOLES SHOWN (•), ARE AT SUGGESTED LOCATIONS ONLY. ACTUAL NUMBERS, LOCATIONS AND DEPTH OF HOLES ARE TO BE DETERMINED BY GROUTING CONTRACTOR, AS REQUIRED TO STABILIZE FOUNDATIONS.
3. WHERE NECESSARY TO DRILL THRU EXIST. FLOORS, HOLES FOR GROUT SHALL BE NEATLY DRILLED WITH MINIMUM CLEARANCE AND LEFT NEAT AND READY FOR REPAIR. CONTRACTOR SHALL COORDINATE WITH OWNER ON LOCATION AND SIZE OF HOLES.
4. WHERE CRAWL SPACE PERMITS, THE GROUTING CONTRACTOR SHALL ACCOMPLISH HIS WORK WITHOUT DRILLING HOLES IN THE WOOD FLOORING.

FOUNDATION PLAN

SCALE: 1/8" = 1'-0"

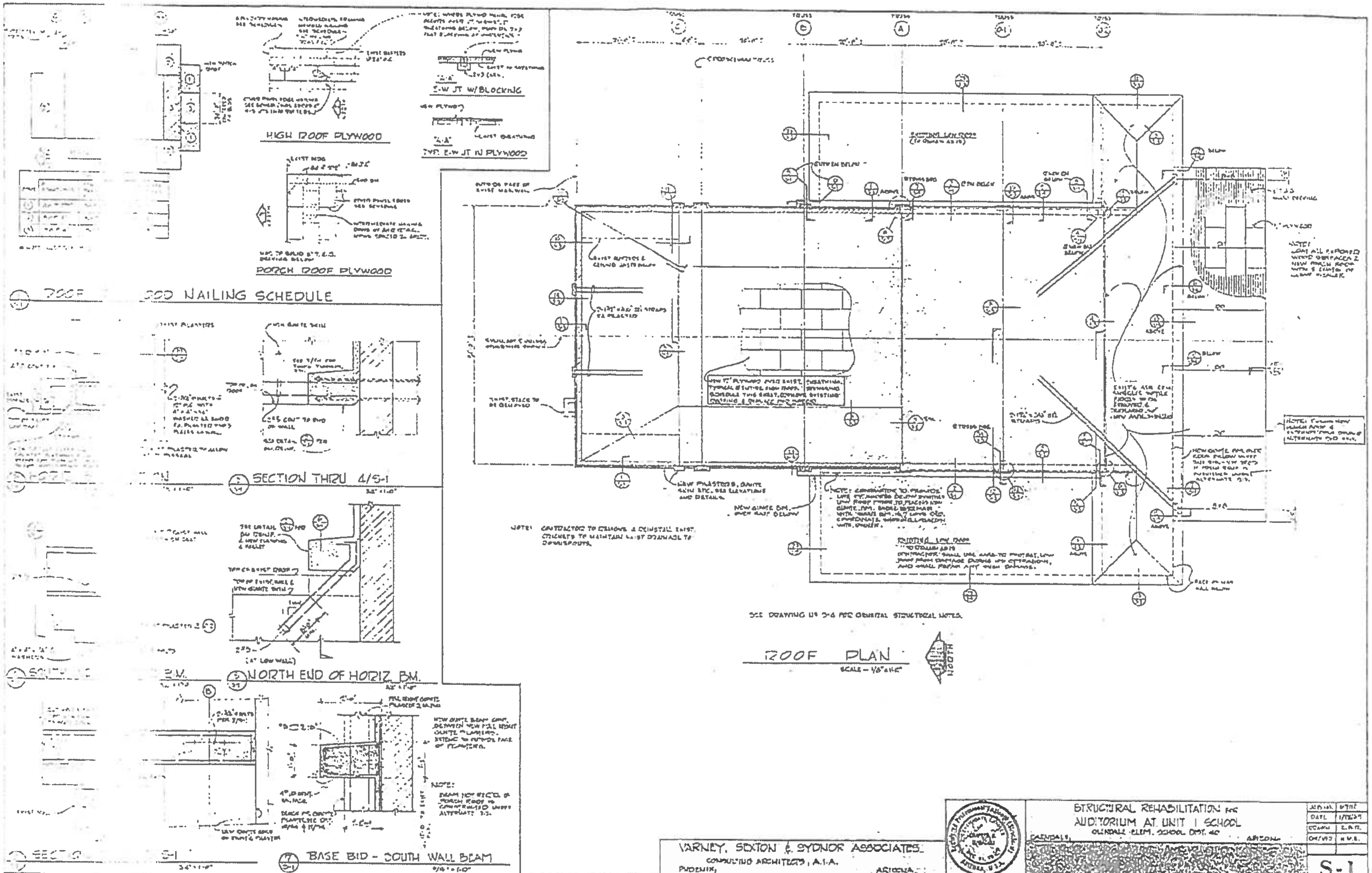
NORTH

VARNEY, SEXTON & SYDNOR ASSOCIATES
CONSULTING ARCHITECTS, A.I.A.
PHOENIX, ARIZONA

STRUCTURAL REHABILITATION FOR AUDITORIUM AT UNIT I SCHOOL
GLENDALE ELEM. SCHOOL DIST. 40
GLENDALE, ARIZONA

MAGADINI ASSOC
consulting engineers
Phoenix,

F-1

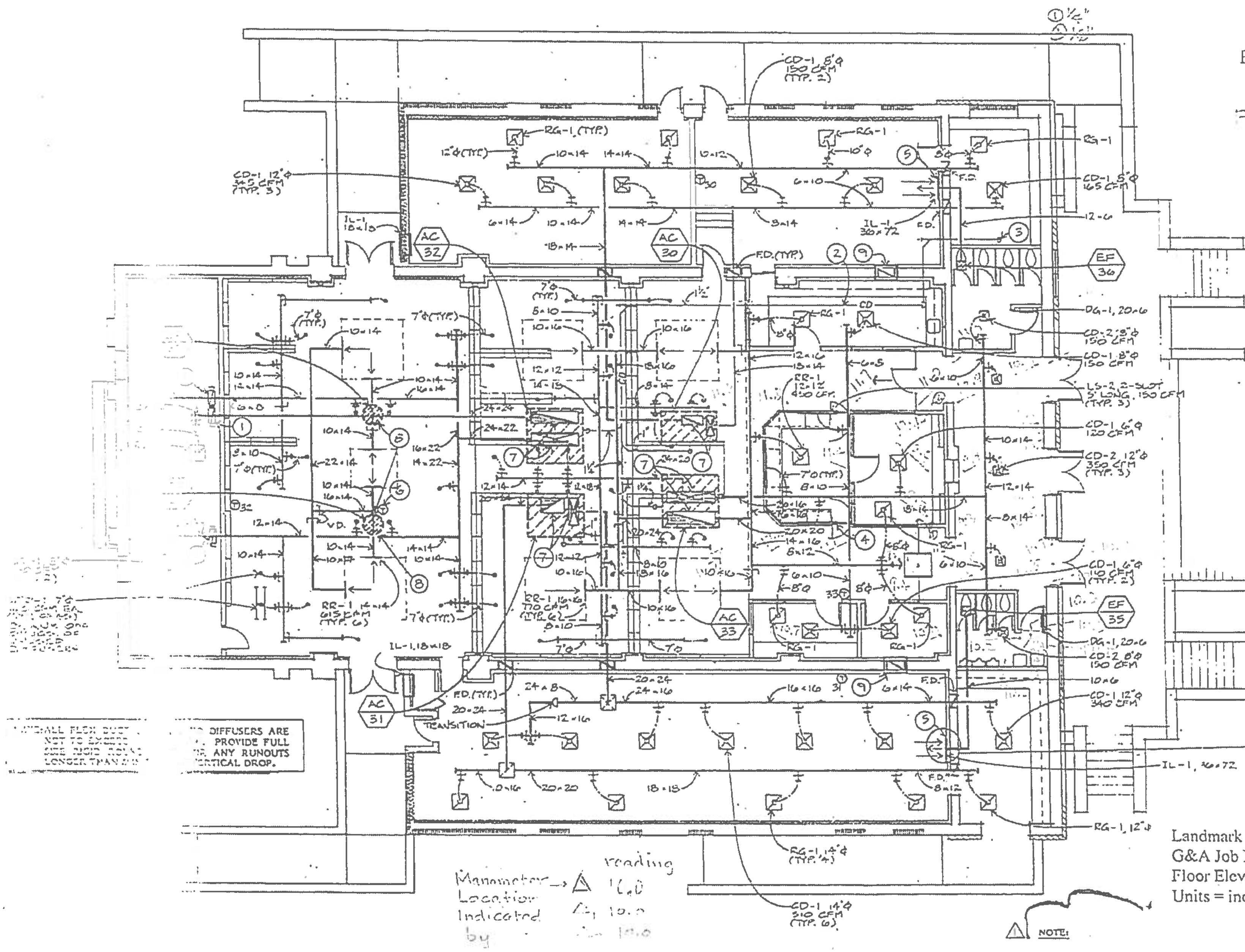


HIGH ROOF PLYWOOD
S-W JT W/BLOCKING
TYP. E-W JT IN PLYWOOD
PORCH ROOF PLYWOOD
ROOF PLYWOOD NAILING SCHEDULE
SECTION THRU 4/S-1
NORTH END OF HORIZ BM.
BASE BID - SOUTH WALL BEAM
ROOF PLAN
NORTH
SEE DRAWING U9 S-6 FOR GENERAL STRUCTURAL NOTES.
NOTE: CONTRACTOR TO REMOVE & REINSTALL EXIST. CRICKETS TO MAINTAIN EXIST DRAINAGE TO DOWNSPOUTS.
VARNEY, SEXTON & SYDNOR ASSOCIATES
CONSULTING ARCHITECTS, A.I.A.
PHOENIX, ARIZONA
STRUCTURAL REHABILITATION FOR AUDITORIUM AT UNIT I SCHOOL
GLENDALE ELEM. SCHOOL DIST. 40
S-1

APPENDIX C

FLOOR ELEVATION SURVEY
BY GERVASIO & ASSOC., INC. DATED 3/4/15

Floor Elevation Survey



Landmark Elem. School - Media Center
G&A Job No. 0250.2
Floor Elevation Survey by MB on 3/4/15
Units = inches

APPENDIX D

UNIFORM BUILDING CODE STANDARD 21-8
"POINTING OF UNREINFORCED MASONRY WALLS"

UNIFORM BUILDING CODE STANDARD 21-8
POINTING OF UNREINFORCED MASONRY WALLS

Construction Specification of the International Conference of Building Officials

See Appendix Chapter 1, Section A106.3.3.2,
Uniform Code for Building Conservation

SECTION 21.801 — SCOPE

Pointing of deteriorated mortar joints when required by the *Uniform Code for Building Conservation* shall be in accordance with this standard.

SECTION 21.802 — JOINT PREPARATION

The old or deteriorated mortar joint shall be cut out, by means of a toothing chisel or nonimpact power tool, to a uniform depth of $^{3}/_{4}$ inch (19 mm) until sound mortar is reached. Care shall be taken not to damage the brick edges. After cutting is complete, all loose material shall be removed with a brush, air or water stream.

SECTION 21.803 — MORTAR PREPARATION

The mortar mix shall be Type N or Type S proportioned as required by the construction specifications. The pointing mortar shall be prehydrated by first thoroughly mixing all ingredients dry and then mixing again, adding only enough water to produce a damp unworkable mix which will retain its form when pressed into a ball. The mortar shall be kept in a damp condition for one and one-half hours; then sufficient water shall be added to bring it to a consistency that is somewhat drier than conventional masonry mortar.

SECTION 21.804 — PACKING

The joint into which the mortar is to be packed shall be damp but without freestanding water. The mortar shall be tightly packed into the joint in layers not exceeding $^{1}/_{4}$ inch (6.4 mm) in depth until it is filled; then it shall be tooled to a smooth surface to match the original profile.

APPENDIX E

OBSERVATIONS OF OTHER CONDITIONS

OBSERVATIONS OF OTHER CONDITIONS

While at the Landmark Elementary School Media Center, we observed some conditions in the crawl space area below the Lobby that are structural concerns, but unrelated to the purpose of our site investigation and not included in our scope of work. These conditions include:

1. Deteriorating Concrete Piers:

   At the south wall of the Lobby, the floor joists are supported on a narrow concrete beam that has been poured against the original brick retaining wall. The concrete beam is supported at approximately 10 ft. on center by narrow concrete piers. The edges of the lower part of these piers are cracked due to corroded reinforcing steel. The corrosion will accelerate and can lead to loss of support of the concrete beam. The corrosion indicates that the piers are absorbing moisture from the crawl space soil. The amount of corrosion and subsequent concrete cracking indicates that the crawl space soils have been moist for a long time.

   We recommend that the narrow concrete beam be supported by steel posts installed adjacent to the existing concrete piers between the existing beam and continuous wall footing. These support posts and their connections should be designed by a qualified Structural Engineer.

2. Corroded Metal Deck:

   The existing metal deck under the Lobby floor slab is corroded throughout. This metal deck is likely a form only because welded wire fabric reinforcing was found in the floor slab.

   We recommend that the crawl space be ventilated to reduce the humidity in the space. The Building Code requires that all crawl spaces be ventilated.

3. Steel Joists Bearing on Wood Blocks:

   Many of the existing steel joists that support the Lobby floor are bearing on wood shim blocks rather than on cementitious material such as drypack or non-shrink grout. At present, the wood does not show signs of decay, or excessive compression.

   We recommend that the joists be shored, the wood shim blocks removed, and that the joist bearings be drypacked.

LANDMARK STRUCTURAL

Glendale Elementary School District SFB Projects: Construction Cost Estimates

BRG:	Project:	Scope: Updated 9/1/16	Cost Estimate:
070440101-1001-009-BRG	Landmark Structural		
	Phase 2	Gervasio report regarding media center cracks	$ 150,000.00
		Gervasio report regarding gym cracks	$ 20,000.00
		Gervasio report regarding column cracks	$ 25,000.00
		Estimated Phase 2 Subtotal	**$ 195,000.00**
		Estimated Total Repair:	**$ 195,000.00**

CHALLENGER RESEAL

Glendale Elementary School District SFB Projects: Construction Cost Estimates

BRG:	Project:	Scope: Updated 9/1/16	Cost Estimate:
070440111-9999-004-BRG	Challenger Reseal		
	Phase 1	Sister wall: this is inclusive of footings, spoil removal, backfill, drilling, doweling, install and everything in the details and put back like we were never there.	$ 870,756.00
		Adjustments required for sister wall installation; extend electrical, downspouts, relocate irrigation boxes and other conflicts	$ 225,296.00
		Estimated Phase 1 Subtotal	**$ 1,096,052.00**
	Phase 2	Installation of masonry control joints/repair CMU	$ 60,000.00
		Beam bearing cracks	$ 30,000.00
		Riddle blockfill of new masonry and coating of Drylok extreme at exposed footing	$ 11,000.00
		Estimated Phase 2 Subtotal	**$ 101,000.00**
		Estimated Total Repair:	**$ 1,197,052.00**

August 26, 2016

SPS+ ARCHITECTS
Robert L Pian, AIA
William R Pittenger, RA, CSI
Mark A Davenport, AIA, LEED AP
Herb W Schneider, FAIA
Howell Lewis Shay, AIA

Mr. Greg Gilliam
Director of Maintenance & Operations
Glendale Elementary School District #40
Support Services
7015 W. Maryland Avenue
Glendale, AZ 85303

RE: Glendale Elementary School District #40
SFB Corrections at Challenger School – Additional Services Request
SPS+ Architects Fee Proposal 1535B.2
GESD Purchase Order 3601552
SFB Project # 070440111-999-004-BRG

Dear Mr. Gilliam:

Thank you for the opportunity to work with you on your SFB Corrections at the above referenced School. We understand this will be an SFB funded project using Building Renewal Grants. Thank you in advance for your consideration of our additional services request.

Additional Services Scope of work:
Structural remediation in accordance with the attached coversheet from our structural engineer Bixler and associates. Please see below for an executive summary:

- Structural: Our engineer agrees with the Gervasio reports for CMU cracking and structural repairs. This includes painting at areas of repair.
- Weatherization project conditions: There was a significant amount of damage discovered for the reinforcing steel near the bottom of the walls. When you add the moisture conditions present, the amount of cracking, the fact that basically all the holes that had reinforcing, the reinforcing was approximately 33% to 66% rusted. In essence, at all those cracks along grade, the CMU face shells are basically delaminated, so the old 8" wall is now 5-6" or 4" at that point and then obviously the wall that is not close to current code now, is much worse. The engineer is unable to perform calculations without knowing to what extent the steel has delaminated. Therefore, I concur with the engineer and recommend to move forward with these repairs as soon as possible and brace immediately. In addition to civil projects that may be happening at these sites, we recommend removing grass and irrigation within 5 feet of the buildings.

Fee Proposal: $41,088
Fee includes Architectural and Structural services for the following:

- Coordination of immediate implementation of wall bracing.
- Construction documents and construction administration utilizing a district procured contractor of the scope of work described above and attached.
- Special structural inspections during construction administration.
- Reimbursable expenses for printing, travel, etc.

Please let me know if you have any comments regarding our proposal. We are anticipating this proposal being approved at the September 7th, 2016 SFB board meeting.

Sincerely,

SPS+ ARCHITECTS, LLP

Mark Davenport, AIA, LEED AP BD&C
Partner

enclosure

Cc: Mike Barragan, David Kennon, Terry Tower, Jennifer Bowen

SPS+ Architects LLP | 8681 East Via de Negocio | Scottsdale, AZ 85258-3330
P: 480.991.0800 | F: 480.991.2623 | www.spsplusarchitects.com

August 23, 2016

Mark Davenport AIA, CEFPI, LEED AP, BD+C
SPS+ ARCHITECTS LLP
8681 E. Via de Negocio
Scottsdale, AZ 85258

Re: Challenger Middle School
Glendale, AZ

Dear Mr. Davenport:

Per your request, we have visited the Challenger Middle School site on several occasions. We have also reviewed the reports from both Speedie and Associates, and Gervasio and Associates attached to the end of this report, along with pictures from our site visits during the CMU removal to investigate the reinforcing and typical pictures of the type of cracking along the buildings. We have also reviewed the existing plans of the buildings which we have received. The purpose of this report is to review the conditions of the existing buildings along with the reports prepared by other consultants and to recommend a plan of action going forward on the best course of action to remedy the deficient areas.

The buildings are typically steel and wood framed roofs bearing on CMU exterior walls and concrete spread footings.

Based on the surface penetrating radar investigations Speedie and Associates performed the vertical reinforcing appears to be installed for the most part correctly, however there are a few areas where you can see from the pictures that the reinforcing appears to stop in the middle of the wall and then sometimes starts again. This could be due to a faulty reading or it could be that is the way it was installed but based off of their radar findings there is nothing that is significantly different than what we would expect.

Based on the soils investigations performed by Speedie and Associates, there does not appear to be a specific cause of the masonry distress due to the soils themselves, except the fact that the soil is very moist. The moisture fluctuations in the soils will have a tendency to cause continuous movement, which will induce stresses on the buildings and this sometimes will result in cracks in the CMU. My understanding is that there is currently a project in place that will solve or reduce the amount of moisture in the soil and will divert the water away from the buildings.

There was a report done by Gervasio and Associates that we received dated on October 17, 2014, dealing mostly with cracks in the east exterior of Building D at the vestibule. Gervasio maintains that the cracks are due mostly to misplaced masonry control joints. Based on the additional information we have ascertained, I would agree with their conclusion. The repairs that they recommended were to saw-cut new masonry control joints into the walls and tuck point and repair/replace the cracked masonry. This is the repair method I would recommend in this area as well.

From our review of the CMU demolition and our cursory review of the buildings in general, we discovered numerous cracking and rusted reinforcing. The footings in these locations however appeared to be in good condition

From the four holes that were opened up to expose the reinforcing we found rusted and deteriorated vertical and horizontal reinforcing in each location. There was also standing water in the holes showing the amount of saturation these walls are going through along with a picture of sand bags next to a doorway further showing the extent of the moisture issues at this school.

From our visual inspection we noticed several different types of cracks and too many to document all of them however. They basically fall into 3 categories:

1. There were several areas where there are shrinkage cracks most likely due to insufficient or improper locations of masonry control joints or improperly installed masonry control joints (see photographs 1, 2, 4 and 7 on building 1, photos 1, 5 and 12 on building 2, photo 6 on building 6 and photo 4 on building 7). While these are not structural in nature they will affect the water tightness of the building and therefore I recommend that new masonry control joints be installed and for the CMU in these areas to be tuck pointed and repaired or replaced as applicable. There were approximately 10-15 locations throughout the school where this occurred.

2. There were some cracks at beam bearing locations where it appears that the beam was not allowed thermal movement and has cracked the CMU at the bearing locations (see photo 7 on building 6 and photo 3 on building 7). These cracks are structural in nature due to the fact they are supporting the beam ends and therefore should be repaired in a timely manner. The repair for these would be a combination of adding a masonry control joints and removing and reinstalling the beam and bearing plate in a manner that would allow it to move as the temperature changes such as a neoprene pad beneath the beam. There are approximately 6 locations that this would be required.

3. The remaining photos appear to be related to moisture and the rusting of the reinforcing in the CMU. Since reinforcing when it rusts can grow to over 400% of its original size, it appears that the reinforcing has rusted and expanded and has cracked the CMU. This causes the face shells to delaminate and then the CMU is essentially reduced in size and therefore reduced in strength. There is no real way to determine the loss in strength without knowing the exact thickness of the delaminated CMU. This is a very old building that does not comply with the current building codes, and additionally, there is reduced strength of the existing wall. The reduction in strength could easily range from 33%-90%. In addition, there is no real way to eliminate moisture from entering into the cracks in the CMU, which will continue to make the condition worse. There is no easy or accurate way to determine the extents of the rusting in the CMU without removing the face shells and investigating the reinforcing, as we did in those four locations. The repair for these locations would be extremely expensive, but would entail removing the CMU at the cracked locations, and then removing and replacing the rusted reinforcing with new reinforcing, grout and CMU. This would need to be done in an explorative manner, where you start at each of the cracks, and then expand outward until you get to undamaged CMU and reinforcing. Therefore, there is no real way to determine the damage extents, but due to the moisture conditions and the amount of cracking, I would not be surprised if 50%-75% of the length of the walls are damaged at grade in this manner. Therefore, the CMU walls should be braced immediately until the repairs are complete.

If the decision is to repair the school, then this should start immediately, and we should brace the CMU walls until the repairs are completed. Without knowing the extent of the damage, it is extremely difficult to determine how the walls will perform as the reinforcing continues to rust and the walls continue to worsen.

While it is extremely difficult to provide any budgetary numbers due to the uncertainty of the full scope and amount of damage, we estimate the following corresponding to the item numbers above:

1) Bracing of CMU walls:	$70,000
2) Installation of masonry control joints and repair of damaged CMU:	$60,000
3) Beam bearing cracks:	$30,000
4) Repair of the cracked CMU and rusted reinforcing:	$400,000
5) Gervasio crack repair:	$20,000

Please understand that this report represents a professional opinion based upon the results of our limited observations, and past experience with similar conditions. Our study was strictly limited to visual observations as stated above. This report is not intended to be a complete or comprehensive study of the structure. We have not reviewed, nor have we been asked to review, the capacity of the existing structure per the current code. Our work has been performed in accordance with generally accepted principles and practices of structural engineering.

We cannot be responsible for any future changes in the condition of the structure. No warranty is provided, either expressed or implied.

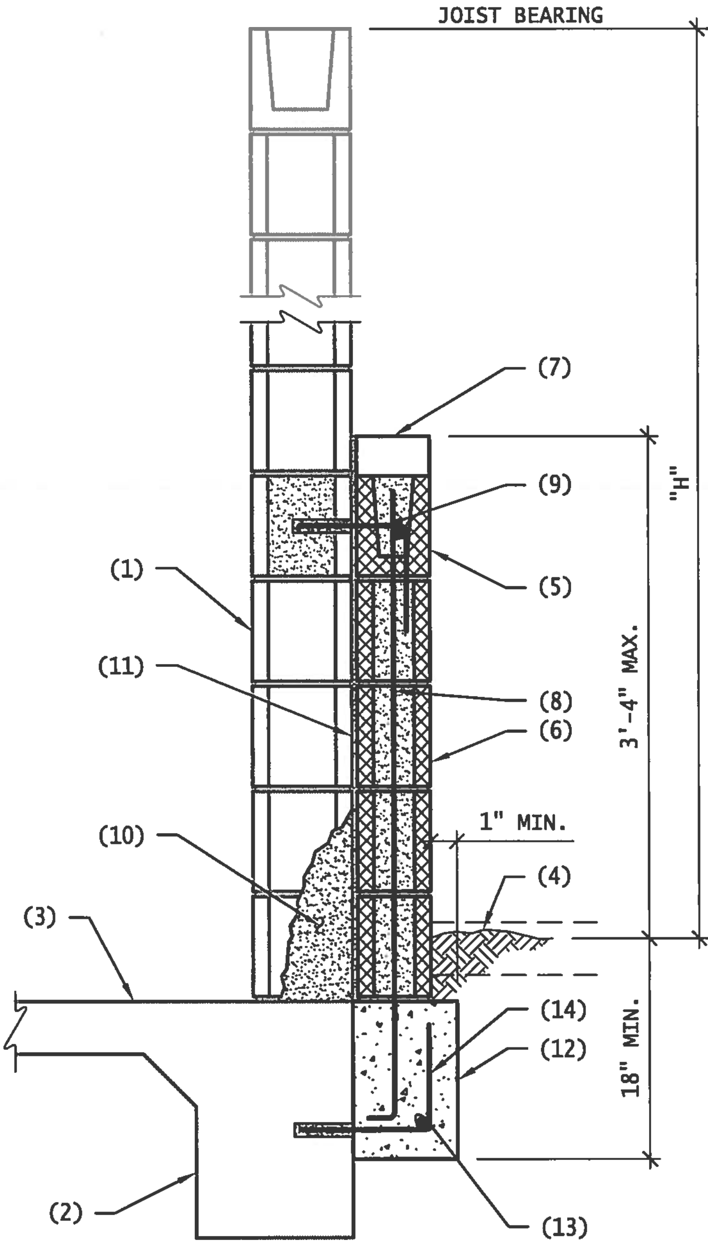
If there are any additional concerns or questions, please feel free to contact our office. Thank you for the opportunity to assist you on this project.

Sincerely,

David Bixler

David Bixler, PE, SE President
David Bixler & Associates, PLLC

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID
BIXLER
Date Signed 8/26/14
ARIZONA U.S.A.
Expires 06/30/2019



NOTES:

1. EXISTING MASONRY WALL.
2. EXISTING CONCRETE FOOTING.
3. EXISTING CONCRETE SLAB.
4. CONCRETE SLAB OR FINISHED GRADE AS OCCURS.
5. CONTINUOUS FULLY GROUTED BOND BEAM REINFORCED W/1-#4 CONTINUOUS.
6. 6" CONCRETE MASONRY WALL.
7. CAP BLOCK PER ARCHITECTURAL DRAWINGS.
8. WHERE "H" IS 12'-0" OR LESS, REINFORCE W/#4 VERTICALS @ 32"O.C. WHERE "H" IS GREATER THAN 12'-0", REINFORCE W/#4 VERTICALS @ 16"O.C.
9. #4 DOWELS WITH STD. 90° HOOK @ 48"O.C. MAX. DRILL AND EPOXY INTO EXISTING FULLY GROUTED CELL W/4" MIN. EMBED.
10. REMOVE DELAMINATED & CRACKED CMU & GROUT SOLID.
11. MORTAR COLLAR JOINT SOLID.
12. CONCRETE FOOTING.
13. 1-#4 CONTINUOUS.
14. #4 DOWELS WITH STD. 90° HOOK @ 18"O.C. MAX. DRILL AND EPOXY INTO EXISTING FOOTING W/4" MIN. EMBED.

1 SECTION

N.T.S.

DAVID BIXLER & ASSOCIATES

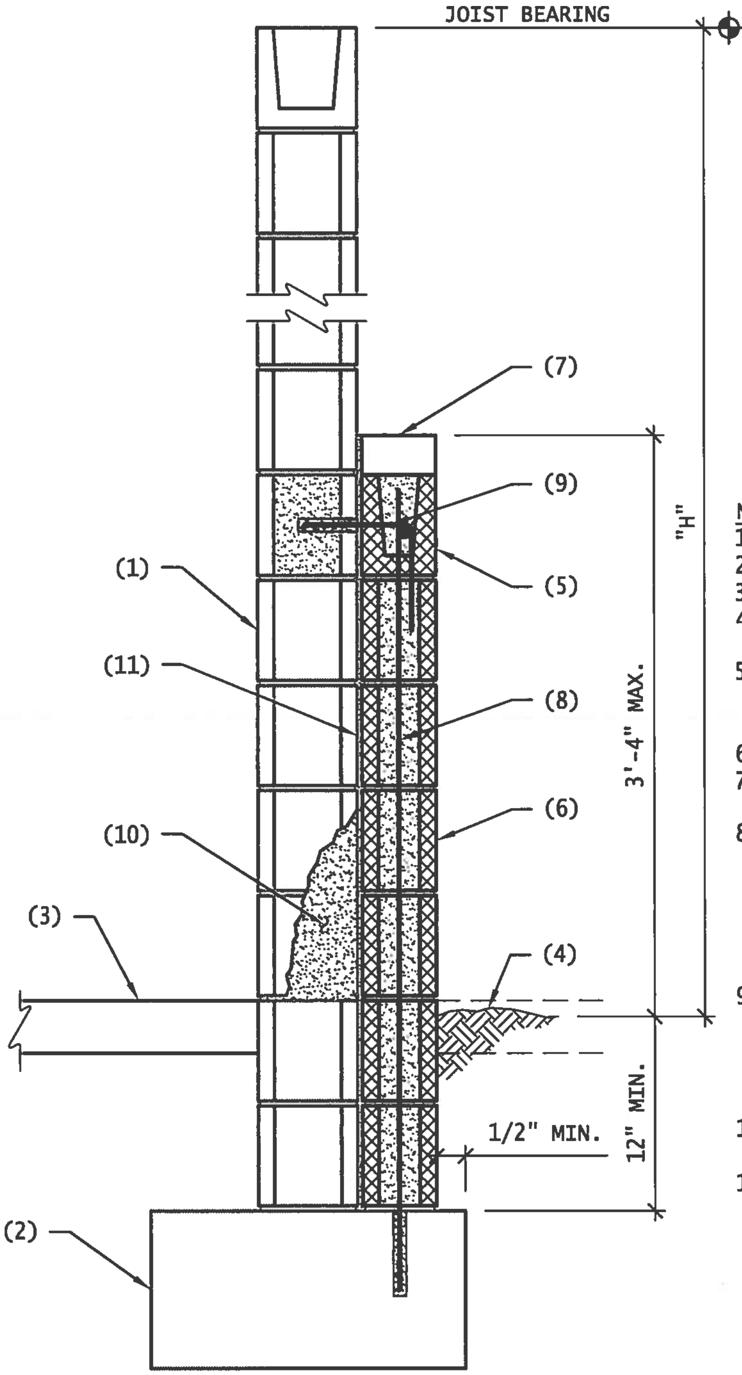
David Bixler & Associates
Stuctural Engineering
8360 East Raintree Drive, Suite 110
Scottsdale, Arizona 85260
Office: (480) 219-2886 Fax: (480) 588-8584
www.dbaaeng.com

CHALLENGER SCHOOL
6095 WEST MARYLAND AVENUE
GLENDALE, AZ 85303

Registered Professional Engineer (Structural)
CERTIFICATE NO. 46644
W. DAVID BIXLER
DATE SIGNED 8/31/16
ARIZONA, U.S.A.
Expires 6/30/19

DRAWN BY:	ERB
CHECKED BY:	WDB
JOB NO:	16.096
PRINTED:	08.31.2016

SSK1



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10. REMOVE DELAMINATED & CRACKED CMU & GROUT SOLID.
11. MORTAR COLLAR JOINT SOLID.

2 SECTION

N.T.S.

DAVID BIXLER & ASSOCIATES

David Bixler & Associates
Stuctural Engineering
8360 East Raintree Drive, Suite 110
Scottsdale, Arizona 85260
Office: (480) 219-2886 Fax: (480) 588-8584
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SSK2

DAVID BIXLER & ASSOCIATES

STRUCTURAL CALCULATIONS FOR CHALLENGER ELEMENTARY SCHOOL WALL REPAIRS

DBAA Job No. 16.096

August 31, 2016

PREPARED FOR:

Jennifer Bowen, Director of Design

SPS+ Architects LLP

Jbowen@spsplusarchitects.com

480.544.5851

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID BIXLER
Date Signed 8/31/16
ARIZONA U.S.A.
Expires 06/30/2019

PREPARED BY:

DAVID BIXLER & ASSOCIATES
STRUCTURAL ENGINEERING
8360 E. RAINTREE DR., SUITE 110
SCOTTSDALE, AZ 85260
PHONE: (480) 219-2886
david.bixler@dbaaeng.com
www.dbaaeng.com

DAVID BIXLER & ASSOCIATES

Project:

Project #:

Prepared by:

Date:

Subject:

Sheet: of:

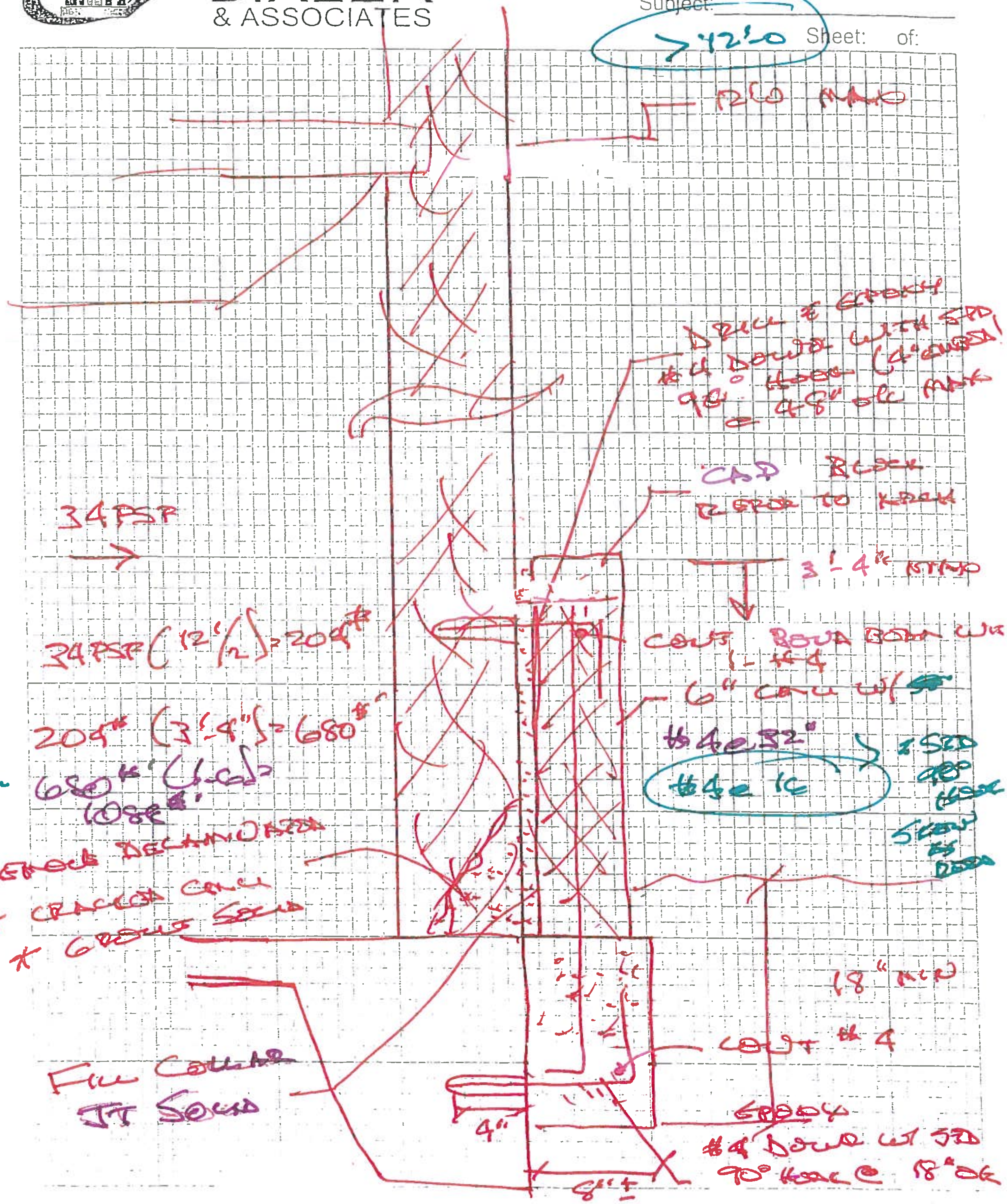
> 12.1'

30PSF (24'/2) = 360#

M = 360# (3'-4") = 1198 #-ft

Mu = 1.6 (1198#') = 1918 #-ft

> 12'-0



DAVID BIXLER & ASSOCIATES

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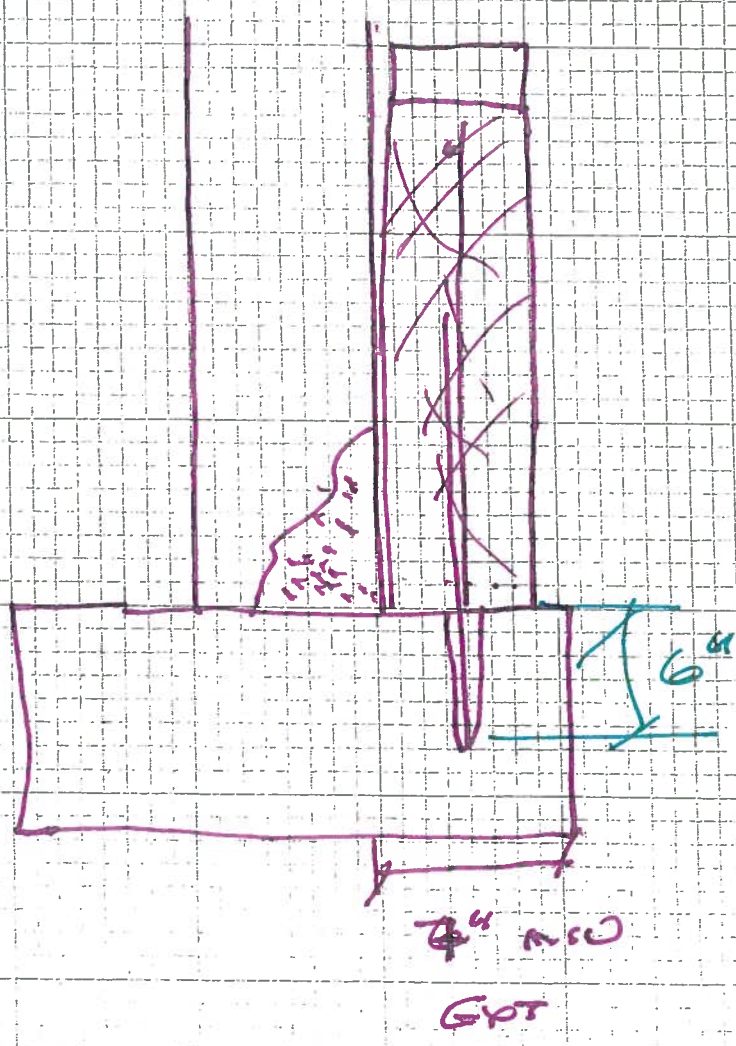


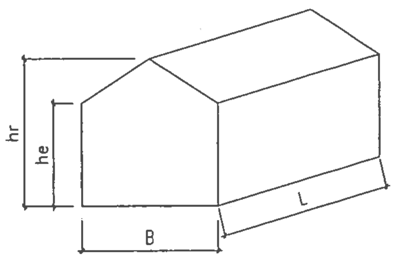
BIXLER

PROJECT :
CLIENT :
JOB NO. :
DATE :
PAGE :
DESIGN BY :
REVIEW BY :

Wind Analysis for Low-rise Building, Based on ASCE 7-2010

INPUT DATA

Exposure category (B, C or D, ASCE 7-10 26.7.3)		C	
Importance factor (ASCE 7-10 Table 1.5-2)	I_w =	1.00	for all Category
Basic wind speed (ASCE 7-10 26.5.1 or 2012 IBC)	V =	120	mph
Topographic factor (ASCE 7-10 26.8 & Table 26.8-1)	K_{zt} =	1	Flat
Building height to eave	h_e =	10	ft
Building height to ridge	h_r =	10	ft
Building length	L =	100	ft
Building width	B =	50	ft
Effective area of components (or Solar Panel area)	A =	33	ft^2



DESIGN SUMMARY

Max horizontal force normal to building length, L, face	=	19.12 kips, SD level (LRFD level), Typ.
Max horizontal force normal to building length, B, face	=	9.93 kips
Max total horizontal torsional load	=	222.03 ft-kips
Max total upward force	=	97.43 kips

ANALYSIS

Velocity pressure

$q_h = 0.00256\, K_h\, K_{zt}\, K_d\, V^2$ = **26.63** psf

where: q_h = velocity pressure at mean roof height, h. (Eq. 28.3-1 page 298 & Eq. 30.3-1 page 316)

K_h = velocity pressure exposure coefficient evaluated at height, h, (Tab. 28.3-1, pg 299) = **0.85**

K_d = wind directionality factor. (Tab. 26.6-1, for building, page 250) = **0.85**

h = mean roof height = **10.00** ft

< 60 ft, [Satisfactory] (ASCE 7-10 26.2.1)

< Min (L, B), [Satisfactory] (ASCE 7-10 26.2.2)

Design pressures for MWFRS

$p = q_h\, [(G\, C_{pf}) - (G\, C_{pi})]$

where: p = pressure in appropriate zone. (Eq. 28.4-1, page 298). p_{min} = **16** psf (ASCE 7-10 28.4.4)

$G\, C_{pf}$ = product of gust effect factor and external pressure coefficient, see table below. (Fig. 28.4-1, page 300 & 301)

$G\, C_{pi}$ = product of gust effect factor and internal pressure coefficient.(Tab. 26.11-1, Enclosed Building, page 258)

= **0.18** or **-0.18**

a = width of edge strips, Fig 28.4-1, note 9, page 301, MAX[MIN(0.1B, 0.1L, 0.4h), MIN(0.04B, 0.04L), 3] = **4.00** ft

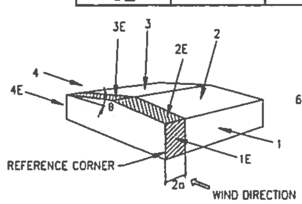
Net Pressures (psf), Basic Load Cases

Surface	Roof angle θ = 0.00			Roof angle θ = 0.00		
	$G\,C_{pf}$	Net Pressure with (+GC_{pi})	Net Pressure with (-GC_{pi})	$G\,C_{pf}$	Net Pressure with (+GC_{pi})	Net Pressure with (-GC_{pi})
1	0.40	5.86	15.45	-0.45	-16.78	-7.19
2	-0.69	-23.17	-13.58	-0.69	-23.17	-13.58
3	-0.37	-14.65	-5.06	-0.37	-14.65	-5.06
4	-0.29	-12.52	-2.93	-0.45	-16.78	-7.19
5				0.40	5.86	15.45
6				-0.29	-12.52	-2.93
1E	0.61	11.45	21.04	-0.48	-17.58	-7.99
2E	-1.07	-33.29	-23.70	-1.07	-33.29	-23.70
3E	-0.53	-18.91	-9.32	-0.53	-18.91	-9.32
4E	-0.43	-16.25	-6.66	-0.48	-17.58	-7.99
5E				0.61	11.45	21.04
6E				-0.43	-16.25	-6.66

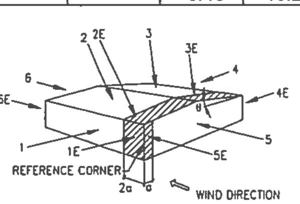
Net Pressures (psf), Torsional Load Cases

Surface	Roof angle θ = 0.00		
	$G\,C_{pf}$	Net Pressure with (+GC_{pi})	Net Pressure with (-GC_{pi})
1T	0.40	1.46	3.86
2T	-0.69	-5.79	-3.40
3T	-0.37	-3.66	-1.27
4T	-0.29	-3.13	-0.73

Surface	Roof angle θ = 0.00		
	$G\,C_{pf}$	Net Pressure with (+GC_{pi})	Net Pressure with (-GC_{pi})
5T	0.40	1.46	3.86
6T	-0.29	-3.13	-0.73

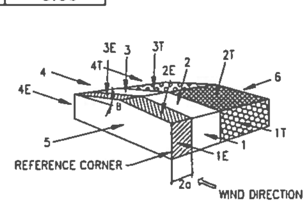


Load Case A (Transverse)

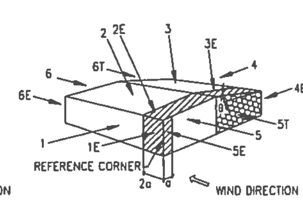


Load Case B (Longitudinal)

Basic Load Cases



Load Case A (Transverse)



Load Case B (Longitudinal)

Torsional Load Cases

Masonry Slender Wall

Description : equivalent cantilevered wall in fromt of existing wall

Code References

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-10

General Information

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10

Construction Type : Grouted Hollow Concrete Masonry

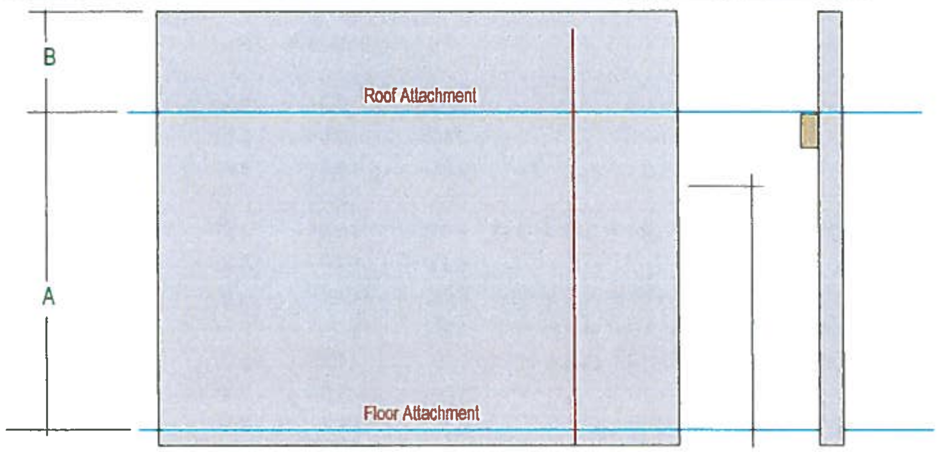
F'm	=	1.50 ksi	Nom. Wall Thickness		6 in	Temp Diff across thickness	=	deg F
Fy - Yield	=	60.0 ksi	Actual Thickness		5.625 in	Min Allow Out-of-plane Defl Ratio	=	0
Fr - Rupture	=	61.0 psi	Rebar "d" distance		3.8125 in	Minimum Vertical Steel %	=	0.0020
Em = f'm *	=	900.0	Lower Level Rebar . . .					
Max % of ρ bal.	=	0.1106	Bar Size	#	4			
Grout Density	=	140 pcf	Bar Spacing		32.0 in			
Block Weight		Normal Weight						
Wall Weight	=	47.0 psf						

Wall is grouted at rebar cells only

One-Story Wall Dimensions

A	Clear Height	=	4.660 ft
B	Parapet height	=	0.0 ft

Wall Support Condition Top & Bottom Pinned



Lateral Loads

Wind Loads :

Full area WIND load 34.0 psf

Seismic Loads :

Wall Weight Seismic Load Input Method : Direct entry of Lateral Wall Weight

Seismic Wall Lateral Load 0.0 psf

Fp 1.0 = 0.0 psf

(Applied to full "STRIP Width")

	D	Lr	L	E	W	Endpoints from Base top	bottom
Distributed Lateral Load	0.0	0.0	0.0	0.0	4.0 k/ft	4.660	3.660 k/ft

Masonry Slender Wall

Description : equivalent cantilevered wall in fromt of existing wall

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu (k)	Moment Values Mcr (k-ft)	Moment Values Mactual (k-ft)	I gross (in^4)	Stiffness I cracked (in^4)	Stiffness I effective (in^4)	Deflections Deflection (in)	Deflections Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
W Only at 2.64 to 2.80	0.000	0.26	0.92	142.30	16.58	16.657	0.138	405.4
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Reactions - Vertical & Horizontal

Results reported for "Strip Width" = 12 in.

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
+D+H	0.0 k	0.00 k	0.219 k
+D+L+H	0.0 k	0.00 k	0.219 k
+D+Lr+H	0.0 k	0.00 k	0.219 k
+D+S+H	0.0 k	0.00 k	0.219 k
+D+0.750Lr+0.750L+H	0.0 k	0.00 k	0.219 k
+D+0.750L+0.750S+H	0.0 k	0.00 k	0.219 k
+D+0.60W+H	0.2 k	1.89 k	0.219 k
+D+0.70E+H	0.0 k	0.00 k	0.219 k
+D+0.750Lr+0.750L+0.450W+H	0.2 k	1.42 k	0.219 k
+D+0.750L+0.750S+0.450W+H	0.2 k	1.42 k	0.219 k
+D+0.750L+0.750S+0.5250E+H	0.0 k	0.00 k	0.219 k
+0.60D+0.60W+0.60H	0.2 k	1.89 k	0.131 k
+0.60D+0.70E+0.60H	0.0 k	0.00 k	0.131 k
D Only	0.0 k	0.00 k	0.219 k
Lr Only	0.0 k	0.00 k	0.000 k
L Only	0.0 k	0.00 k	0.000 k
S Only	0.0 k	0.00 k	0.000 k
W Only	0.4 k	3.15 k	0.000 k
E Only	0.0 k	0.00 k	0.000 k
H Only	0.0 k	0.00 k	0.000 k

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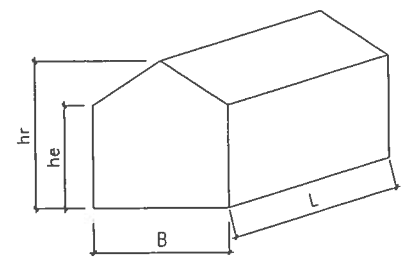
	CLIENT :		DESIGN BY :
	JOB NO. :	DATE :	REVIEW BY :

Wind Analysis for Low-rise Building, Based on ASCE 7-2010

INPUT DATA



Exposure category (B, C or D, ASCE 7-10 26.7.3)		C	
Importance factor (ASCE 7-10 Table 1.5-2)	I_w =	1.00	for all Category
Basic wind speed (ASCE 7-10 26.5.1 or 2012 IBC)	V =	120	mph
Topographic factor (ASCE 7-10 26.8 & Table 26.8-1)	K_{zt} =	1	Flat
Building height to eave	h_e =	20	ft
Building height to ridge	h_r =	20	ft
Building length	L =	100	ft
Building width	B =	50	ft
Effective area of components (or Solar Panel area)	A =	140	ft^2

DESIGN SUMMARY

Max horizontal force normal to building length, L, face	=	40.89 kips, SD level (LRFD level), Typ.
Max horizontal force normal to building length, B, face	=	21.43 kips
Max total horizontal torsional load	=	492.60 ft-kips
Max total upward force	=	103.92 kips

ANALYSIS

Velocity pressure

$q_h = 0.00256\, K_h K_{zt} K_d V^2$ = **28.20** psf

where: q_h = velocity pressure at mean roof height, h. (Eq. 28.3-1 page 298 & Eq. 30.3-1 page 316)

K_h = velocity pressure exposure coefficient evaluated at height, h, (Tab. 28 3-1, pg 299) = **0.90**

K_d = wind directionality factor. (Tab. 26.6-1, for building, page 250) = **0.85**

h = mean roof height = **20.00** ft

< 60 ft, [Satisfactory] (ASCE 7-10 26.2.1)

< Min (L, B), [Satisfactory] (ASCE 7-10 26.2.2)

Design pressures for MWFRS

$p = q_h\, [(G\, C_{pf}) - (G\, C_{pi})]$

where: p = pressure in appropriate zone. (Eq. 28.4-1, page 298). p_{min} = **16** psf (ASCE 7-10 28.4.4)

$G\, C_{pf}$ = product of gust effect factor and external pressure coefficient, see table below. (Fig. 28.4-1, page 300 & 301)

$G\, C_{pi}$ = product of gust effect factor and internal pressure coefficient.(Tab. 26.11-1, Enclosed Building, page 258)

= **0.18** or **-0.18**

a = width of edge strips, Fig 28.4-1, note 9, page 301, MAX[MIN(0.1B, 0.1L, 0.4h), MIN(0.04B, 0.04L), 3] = **5.00** ft

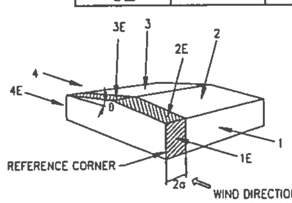
Net Pressures (psf), Basic Load Cases

Surface	Roof angle θ = 0.00			Roof angle θ = 0.00		
	$G\, C_{pf}$	Net Pressure with $(+GC_{pi})$	Net Pressure with $(-GC_{pi})$	$G\, C_{pf}$	Net Pressure with $(+GC_{pi})$	Net Pressure with $(-GC_{pi})$
1	0.40	6.20	16.36	-0.45	-17.77	-7.61
2	-0.69	-24.53	-14.38	-0.69	-24.53	-14.38
3	-0.37	-15.51	-5.36	-0.37	-15.51	-5.36
4	-0.29	-13.25	-3.10	-0.45	-17.77	-7.61
5				0.40	6.20	16.36
6				-0.29	-13.25	-3.10
1E	0.61	12.13	22.28	-0.48	-18.61	-8.46
2E	-1.07	-35.25	-25.10	-1.07	-35.25	-25.10
3E	-0.53	-20.02	-9.87	-0.53	-20.02	-9.87
4E	-0.43	-17.20	-7.05	-0.48	-18.61	-8.46
5E				0.61	12.13	22.28
6E				-0.43	-17.20	-7.05

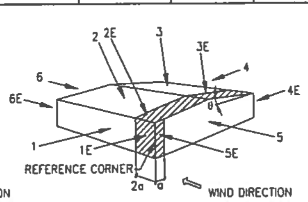
Net Pressures (psf), Torsional Load Cases

Surface	Roof angle θ = 0.00		
	$G\, C_{pf}$	Net Pressure with $(+GC_{pi})$	Net Pressure with $(-GC_{pi})$
1T	0.40	1.55	4.09
2T	-0.69	-6.13	-3.60
3T	-0.37	-3.88	-1.34
4T	-0.29	-3.31	-0.78

Surface	Roof angle θ = 0.00		
	$G\, C_{pf}$	Net Pressure with $(+GC_{pi})$	Net Pressure with $(-GC_{pi})$
5T	0.40	1.55	4.09
6T	-0.29	-3.31	-0.78

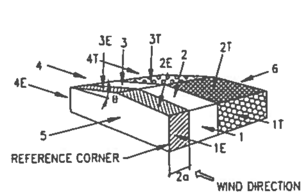


Load Case A (Transverse)

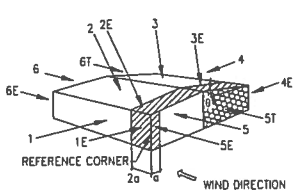


Load Case B (Longitudinal)

Basic Load Cases



Load Case A (Transverse)



Load Case B (Longitudinal)

Torsional Load Cases

Masonry Slender Wall

Description : equivalent cantilevered wall in fromt of existing wall

Code References

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-10

General Information

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10

Construction Type : Grouted Hollow Concrete Masonry

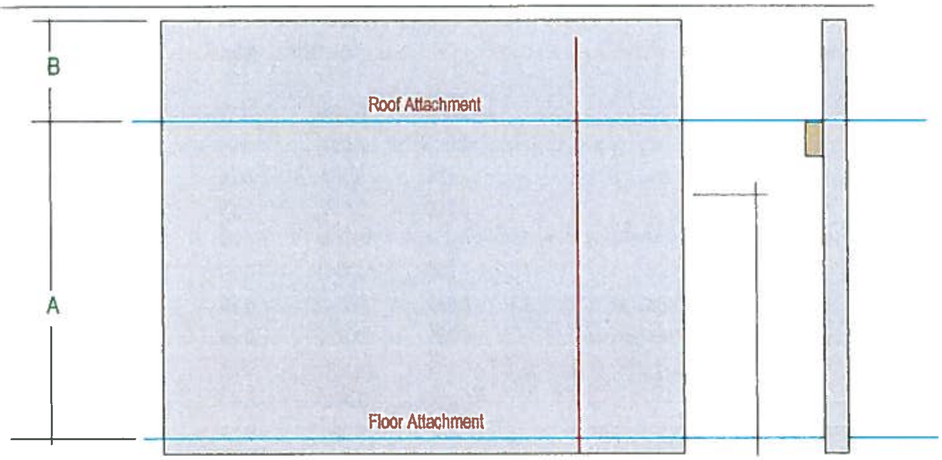
F'm	=	1.50 ksi	Nom. Wall Thickness	6 in	Temp Diff across thickness	=		deg F
Fy - Yield	=	60.0 ksi	Actual Thickness	5.625 in	Min Allow Out-of-plane Defl Ratio	=	0	
Fr - Rupture	=	61.0 psi	Rebar "d" distance	3.813 in	Minimum Vertical Steel %	=	0.0020	
Em = f'm *	=	900.0	Lower Level Rebar . . .					
Max % of ρ bal.	=	0.1455	Bar Size #	4				
Grout Density	=	140 pcf	Bar Spacing	16.0 in				
Block Weight		Normal Weight						
Wall Weight	=	52.0 psf						

Wall is grouted at rebar cells only

One-Story Wall Dimensions

A	Clear Height	=	4.660 ft
B	Parapet height	=	ft

Wall Support Condition Top & Bottom Pinned



Lateral Loads

Wind Loads :
Full area WIND load 34.0 psf

Seismic Loads :
Wall Weight Seismic Load Input Method : Direct entry of Lateral Wall Weight
Seismic Wall Lateral Load psf

Fp 1.0 = 0.0 psf

(Applied to full "STRIP Width")

	D	Lr	L	E	W	Endpoints from Base top	bottom	
Distributed Lateral Load					7.0 k/ft	4.660	3.660	k/ft

Masonry Slender Wall

Description : equivalent cantilevered wall in front of existing wall

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu (k)	Moment Values Mcr (k-ft)	Moment Values Mactual (k-ft)	I gross (in^4)	Stiffness I cracked (in^4)	I effective (in^4)	Deflections Deflection (in)	Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
W Only at 2.64 to 2.80	0.000	0.28	1.55	154.20	28.91	28.941	0.146	382.6
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Reactions - Vertical & Horizontal

Results reported for "Strip Width" = 12 in.

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
+D+H	0.0 k	0.00 k	0.242 k
+D+L+H	0.0 k	0.00 k	0.242 k
+D+Lr+H	0.0 k	0.00 k	0.242 k
+D+S+H	0.0 k	0.00 k	0.242 k
+D+0.750Lr+0.750L+H	0.0 k	0.00 k	0.242 k
+D+0.750L+0.750S+H	0.0 k	0.00 k	0.242 k
+D+0.60W+H	0.4 k	3.27 k	0.242 k
+D+0.70E+H	0.0 k	0.00 k	0.242 k
+D+0.750Lr+0.750L+0.450W+H	0.3 k	2.46 k	0.242 k
+D+0.750L+0.750S+0.450W+H	0.3 k	2.46 k	0.242 k
+D+0.750L+0.750S+0.5250E+H	0.0 k	0.00 k	0.242 k
+0.60D+0.60W+0.60H	0.4 k	3.27 k	0.145 k
+0.60D+0.70E+0.60H	0.0 k	0.00 k	0.145 k
D Only	0.0 k	0.00 k	0.242 k
Lr Only	0.0 k	0.00 k	0.000 k
L Only	0.0 k	0.00 k	0.000 k
S Only	0.0 k	0.00 k	0.000 k
W Only	0.6 k	5.46 k	0.000 k
E Only	0.0 k	0.00 k	0.000 k
H Only	0.0 k	0.00 k	0.000 k

August 23, 2016

Mark Davenport AIA, CEFPI, LEED AP, BD+C
SPS+ ARCHITECTS LLP
8681 E. Via de Negocio
Scottsdale, AZ 85258

Re: Challenger Middle School
Glendale, AZ

Dear Mr. Davenport:

Per your request, we have visited the Challenger Middle School site on several occasions. We have also reviewed the reports from both Speedie and Associates, and Gervasio and Associates attached to the end of this report, along with pictures from our site visits during the CMU removal to investigate the reinforcing and typical pictures of the type of cracking along the buildings. We have also reviewed the existing plans of the buildings which we have received. The purpose of this report is to review the conditions of the existing buildings along with the reports prepared by other consultants and to recommend a plan of action going forward on the best course of action to remedy the deficient areas.

The buildings are typically steel and wood framed roofs bearing on CMU exterior walls and concrete spread footings.

Based on the surface penetrating radar investigations Speedie and Associates performed the vertical reinforcing appears to be installed for the most part correctly, however there are a few areas where you can see from the pictures that the reinforcing appears to stop in the middle of the wall and then sometimes starts again. This could be due to a faulty reading or it could be that is the way it was installed but based off of their radar findings there is nothing that is significantly different than what we would expect.

Based on the soils investigations performed by Speedie and Associates, there does not appear to be a specific cause of the masonry distress due to the soils themselves, except the fact that the soil is very moist. The moisture fluctuations in the soils will have a tendency to cause continuous movement, which will induce stresses on the buildings and this sometimes will result in cracks in the CMU. My understanding is that there is currently a project in place that will solve or reduce the amount of moisture in the soil and will divert the water away from the buildings.

There was a report done by Gervasio and Associates that we received dated on October 17, 2014, dealing mostly with cracks in the east exterior of Building D at the vestibule. Gervasio maintains that the cracks are due mostly to misplaced masonry control joints. Based on the additional information we have ascertained, I would agree with their conclusion. The repairs that they recommended were to saw-cut new masonry control joints into the walls and tuck point and repair/replace the cracked masonry. This is the repair method I would recommend in this area as well.

From our review of the CMU demolition and our cursory review of the buildings in general, we discovered numerous cracking and rusted reinforcing. The footings in these locations however appeared to be in good condition

From the four holes that were opened up to expose the reinforcing we found rusted and deteriorated vertical and horizontal reinforcing in each location. There was also standing water in the holes showing the amount of saturation these walls are going through along with a picture of sand bags next to a doorway further showing the extent of the moisture issues at this school.

From our visual inspection we noticed several different types of cracks and too many to document all of them however. They basically fall into 3 categories:

1. There were several areas where there are shrinkage cracks most likely due to insufficient or improper locations of masonry control joints or improperly installed masonry control joints (see photographs 1, 2, 4 and 7 on building 1, photos 1, 5 and 12 on building 2, photo 6 on building 6 and photo 4 on building 7). While these are not structural in nature they will affect the water tightness of the building and therefore I recommend that new masonry control joints be installed and for the CMU in these areas to be tuck pointed and repaired or replaced as applicable. There were approximately 10-15 locations throughout the school where this occurred.

2. There were some cracks at beam bearing locations where it appears that the beam was not allowed thermal movement and has cracked the CMU at the bearing locations (see photo 7 on building 6 and photo 3 on building 7). These cracks are structural in nature due to the fact they are supporting the beam ends and therefore should be repaired in a timely manner. The repair for these would be a combination of adding a masonry control joints and removing and reinstalling the beam and bearing plate in a manner that would allow it to move as the temperature changes such as a neoprene pad beneath the beam. There are approximately 6 locations that this would be required.

6560 East Raintree Drive Suite 110 • Scottsdale• Arizona • 85260 • Phone (480) 219-2886 Fax (480) 588-8584 • david.bixler@dbaaeng.com

3. The remaining photos appear to be related to moisture and the rusting of the reinforcing in the CMU. Since reinforcing when it rusts can grow to over 400% of its original size, it appears that the reinforcing has rusted and expanded and has cracked the CMU. This causes the face shells to delaminate and then the CMU is essentially reduced in size and therefore reduced in strength. There is no real way to determine the loss in strength without knowing the exact thickness of the delaminated CMU. This is a very old building that does not comply with the current building codes, and additionally, there is reduced strength of the existing wall. The reduction in strength could easily range from 33%-90%. In addition, there is no real way to eliminate moisture from entering into the cracks in the CMU, which will continue to make the condition worse. There is no easy or accurate way to determine the extents of the rusting in the CMU without removing the face shells and investigating the reinforcing, as we did in those four locations. The repair for these locations would be extremely expensive, but would entail removing the CMU at the cracked locations, and then removing and replacing the rusted reinforcing with new reinforcing, grout and CMU. This would need to be done in an explorative manner, where you start at each of the cracks, and then expand outward until you get to undamaged CMU and reinforcing. Therefore, there is no real way to determine the damage extents, but due to the moisture conditions and the amount of cracking, I would not be surprised if 50%-75% of the length of the walls are damaged at grade in this manner. Therefore, the CMU walls should be braced immediately until the repairs are complete.

If the decision is to repair the school, then this should start immediately, and we should brace the CMU walls until the repairs are completed. Without knowing the extent of the damage, it is extremely difficult to determine how the walls will perform as the reinforcing continues to rust and the walls continue to worsen.

While it is extremely difficult to provide any budgetary numbers due to the uncertainty of the full scope and amount of damage, we estimate the following corresponding to the item numbers above:

1) Bracing of CMU walls:	$70,000
2) Installation of masonry control joints and repair of damaged CMU:	$60,000
3) Beam bearing cracks:	$30,000
4) Repair of the cracked CMU and rusted reinforcing:	$400,000
5) Gervasio crack repair:	$20,000

Please understand that this report represents a professional opinion based upon the results of our limited observations, and past experience with similar conditions. Our study was strictly limited to visual observations as stated above. This report is not intended to be a complete or comprehensive study of the structure. We have not reviewed, nor have we been asked to review, the capacity of the existing structure per the current code. Our work has been performed in accordance with generally accepted principles and practices of structural engineering.

We cannot be responsible for any future changes in the condition of the structure. No warranty is provided, either expressed or implied.

If there are any additional concerns or questions, please feel free to contact our office. Thank you for the opportunity to assist you on this project.

Sincerely,

David Bixler

David Bixler, PE, SE President
David Bixler & Associates, PLLC

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID
BIXLER
Date Signed 8/26/14
ARIZONA U.S.A.
Expires 06/30/2019

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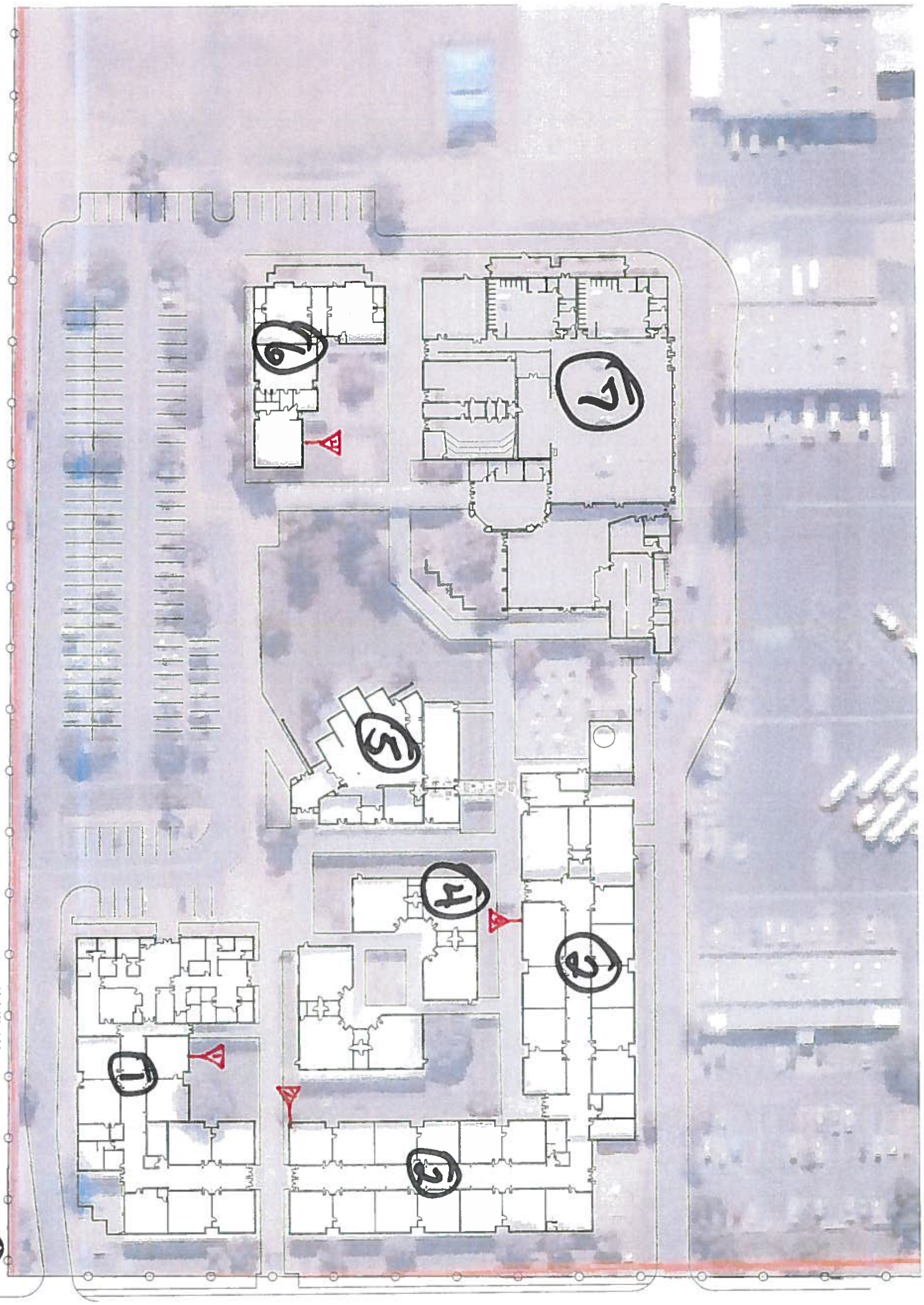
CMU REMOVAL AND INVESTIGATION PICTURES



1 SITE PLAN
SCALE: 1" = 30'-0"

SPS+ ARCHITECTS

CHALLENGER MIDDLE SCHOOL

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
6905 WEST MARYLAND AVENUE
GLENDALE, AZ 85303

CHALLENGER SITE PLAN

PRELIMINARY NOT FOR CONSTRUCTION

REVIEWED BY
DRAWN BY

DATE 3/18/2015
JOB No
SHEET

A100

CHALLENGER – BLDG. 1 - MARKER #1

PICTURE NO. 1

PICTURE NO. 2

CHALLENGER – BLDG. 1 - MARKER #1

PICTURE NO. 3

PICTURE NO. 4

CHALLENGER – BLDG. 1 - MARKER #1

PICTURE NO. 5

PICTURE NO. 6

CHALLENGER – BLDG. 1 - MARKER #1

PICTURE NO. 7

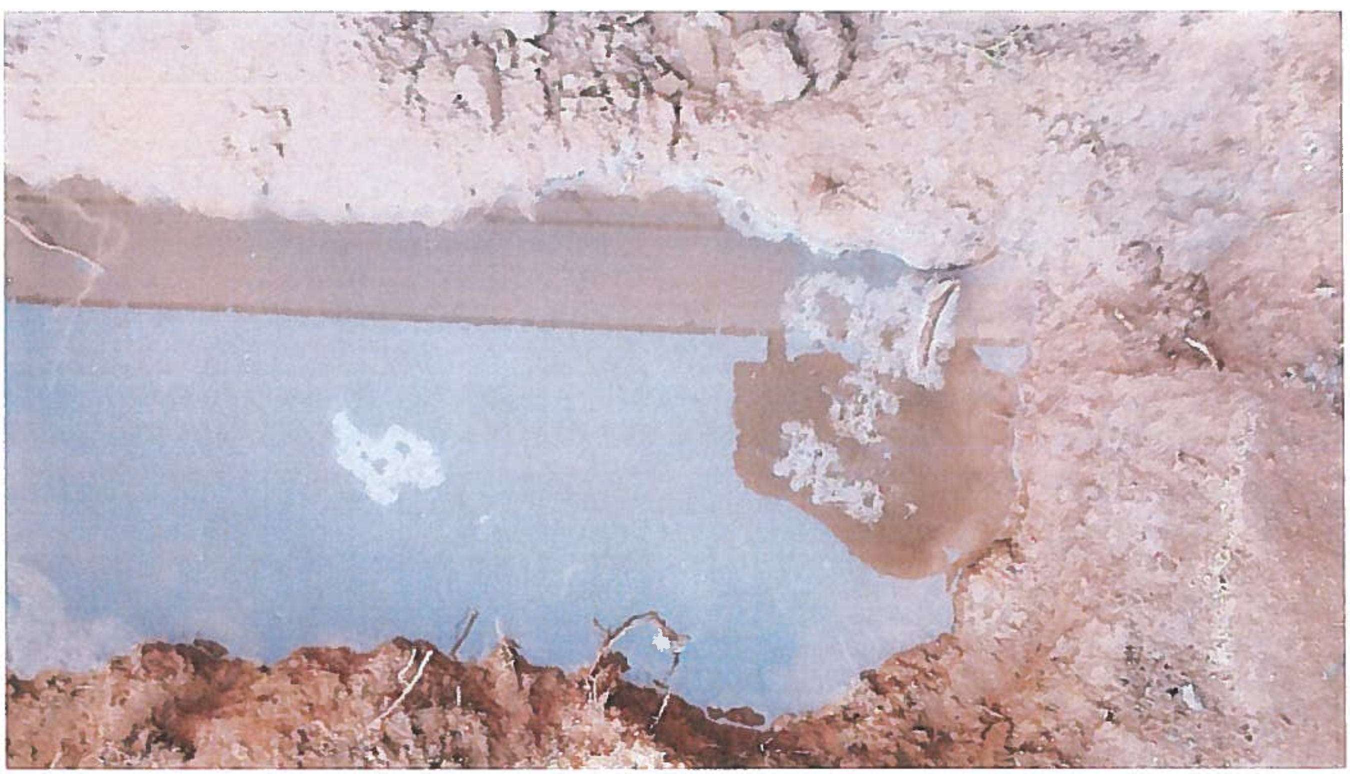
CHALLENGER – BLDG. 2 - MARKER #2

PICTURE NO. 1

PICTURE NO. 2

CHALLENGER – BLDG. 2 - MARKER #3

PICTURE NO. 1



PICTURE NO. 2

CHALLENGER – BLDG. 2 - MARKER #3

PICTURE NO. 3

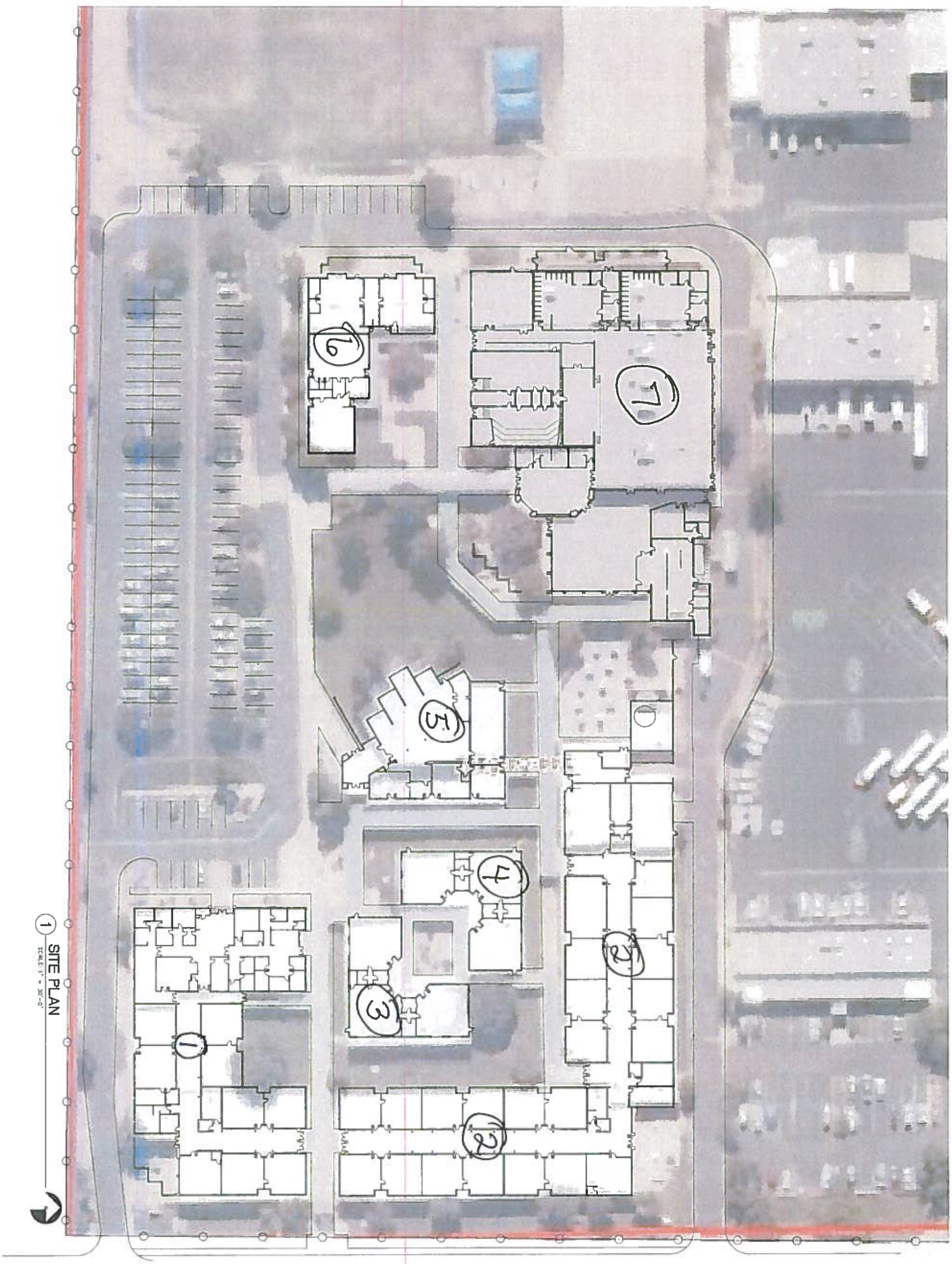
CHALLENGER – BLDG. 2 - MARKER #3

PICTURE NO. 4

SITE INVESTIGATION PICTURES

CHALLENGER – BLDG. 6 - MARKER #4

PICTURE NO. 1



CHALLENGER MIDDLE SCHOOL
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
6905 WEST MARYLAND AVENUE
GLENDALE, AZ 85303

CHALLENGER SITE PLAN

SPS+ ARCHITECTS LLP
SCOTTSDALE, AZ 85258
TEL 480 991 0800
FAX 480 991 2623
spsarchitects.com

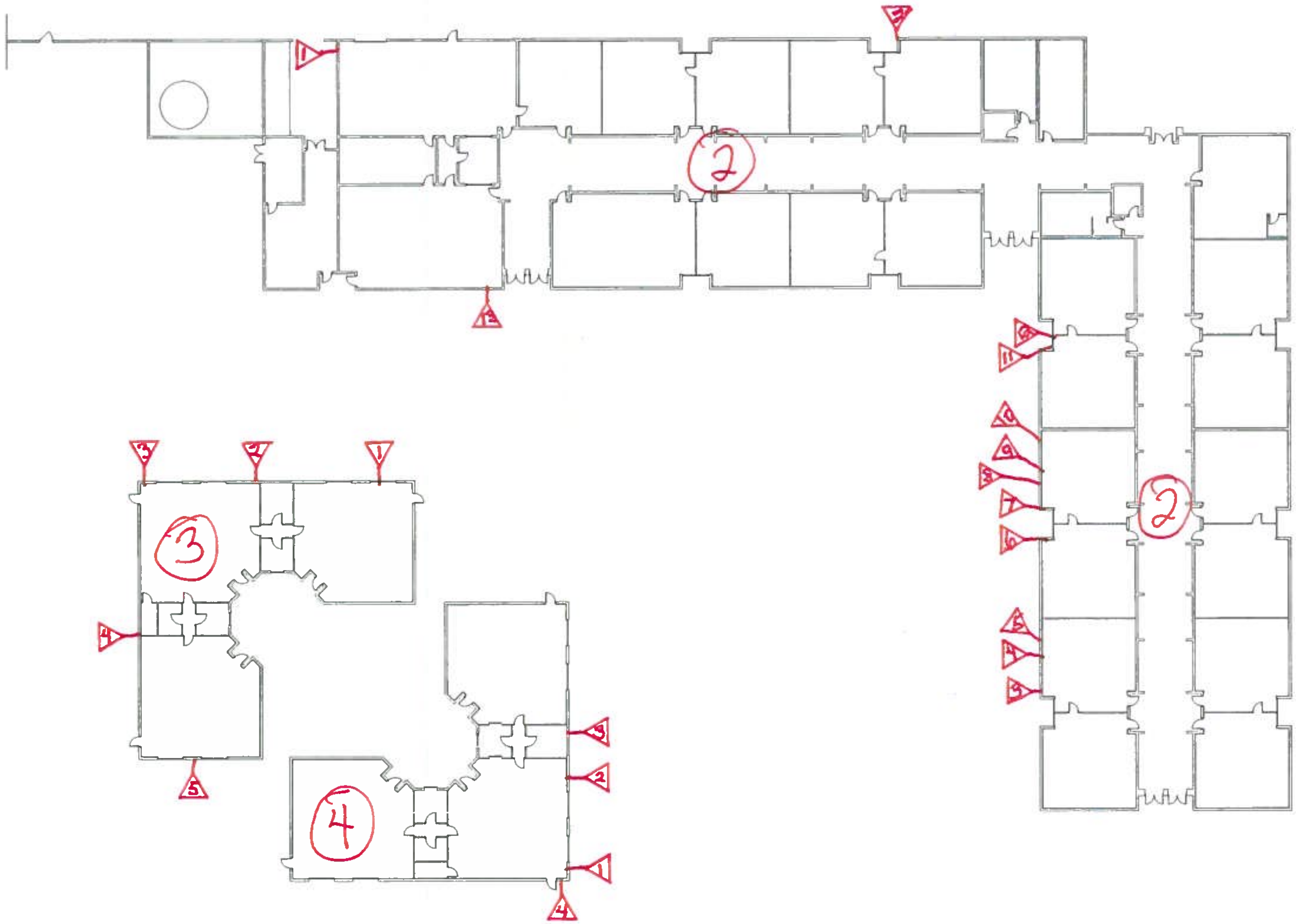
SPS+ ARCHITECTS

REVIEWED BY:
DRAWN BY:

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/18/2015
JOB No: 14348
SHEET

A100



2 BUILDING E FLOOR PLAN
SCALE: 1/16" = 1'-0"

1 BUILDING C + D FLOOR PLANS
SCALE: 1/16" = 1'-0"

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SPS+ ARCHITECTS LLP
SCOTTSDALE, AZ 85258
TEL: 480.991.0800
FAX: 480.991.2623
spsplusarchitects.com

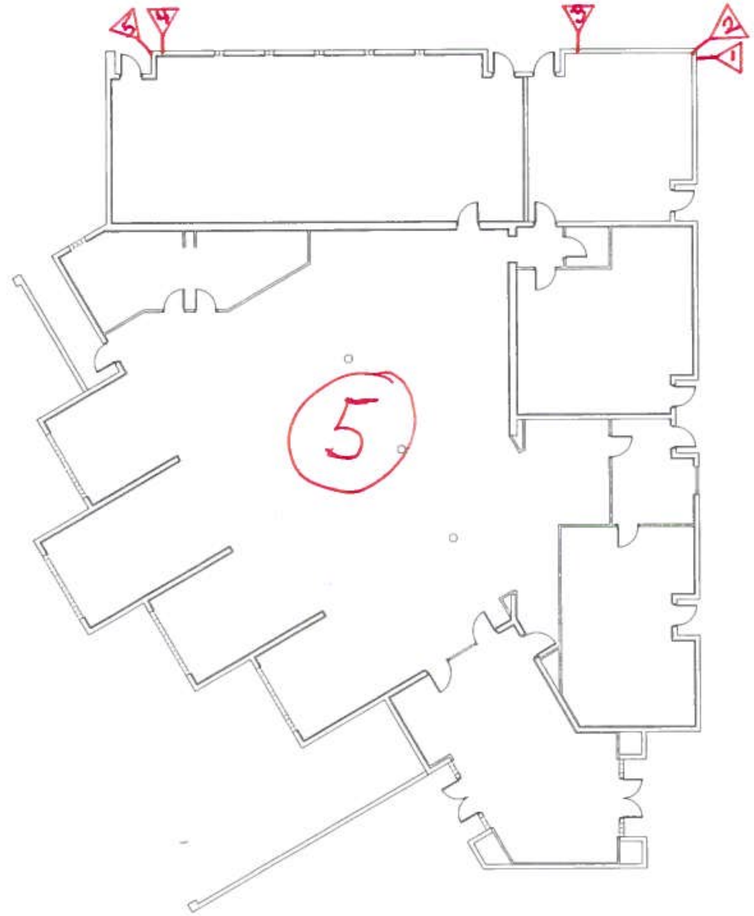
CHALLENGER MIDDLE SCHOOL
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
6905 WEST MARYLAND AVENUE
GLENDALE, AZ 85303

BUILDING C, D, + E FLOOR PLANS

REVIEWED BY:
DRAWN BY:

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/10/2015
JOB No. 14349
SHEET
A202



1 BUILDING A FLOOR PLAN
SCALE: 1/8" = 1'-0"

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SPS+ ARCHITECTS LLP
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TEL. 480.991.0800
FAX: 480.991.2623
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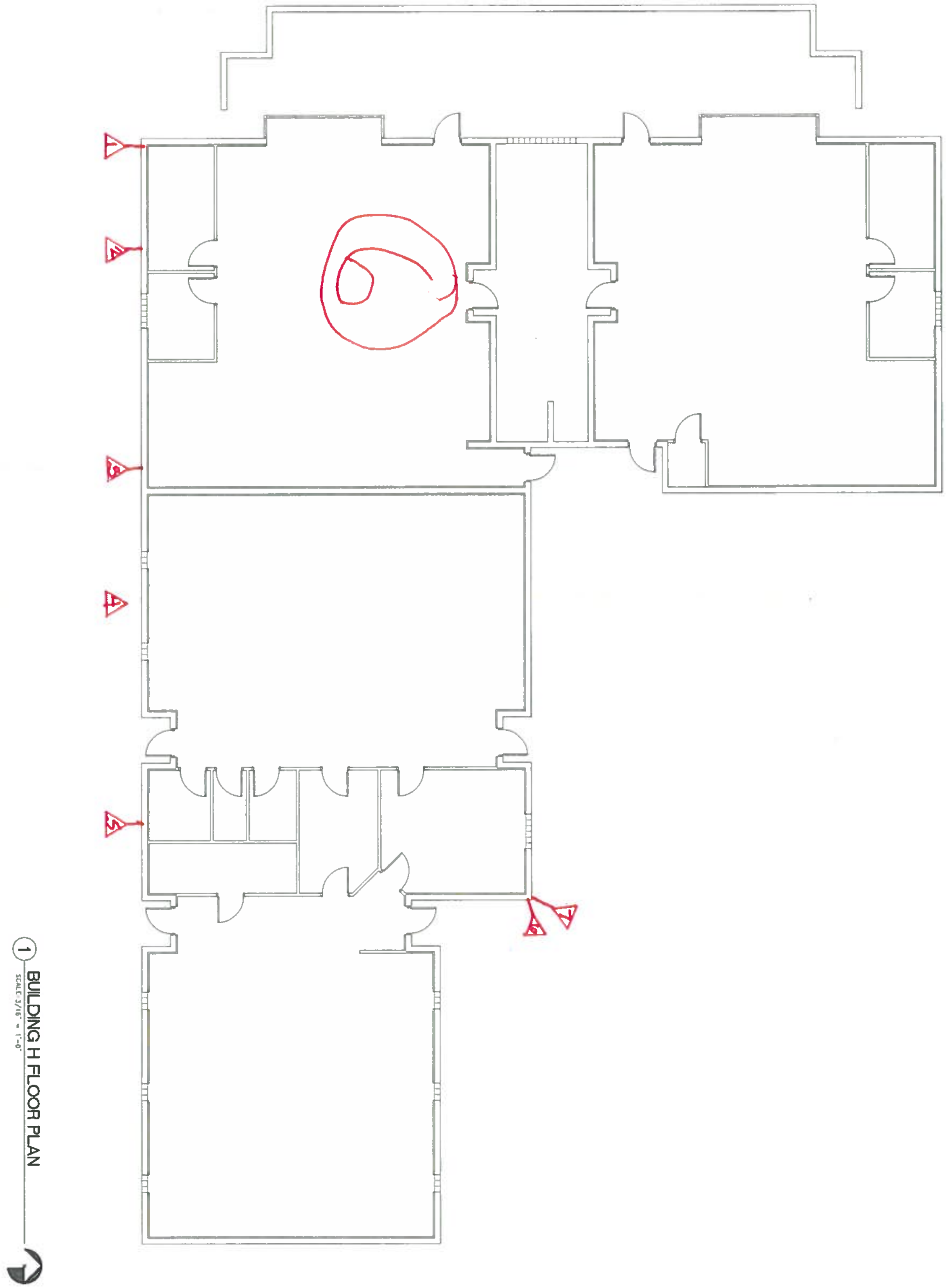
CHALLENGER MIDDLE SCHOOL
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
6905 WEST MARYLAND AVENUE
GLENDALE, AZ 85303

BUILDING A FLOOR PLAN

REVIEWED BY:
DRAWN BY:

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/18/2015
JOB No: 14349
SHEET:
A200



1 BUILDING H FLOOR PLAN

SCALE: 3/16" = 1'-0"

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TEL: 480.991.0800
FAX: 480.991.2623
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CHALLENGER MIDDLE SCHOOL

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
6905 WEST MARYLAND AVENUE
GLENDALE, AZ 85303

BUILDING H FLOOR PLAN

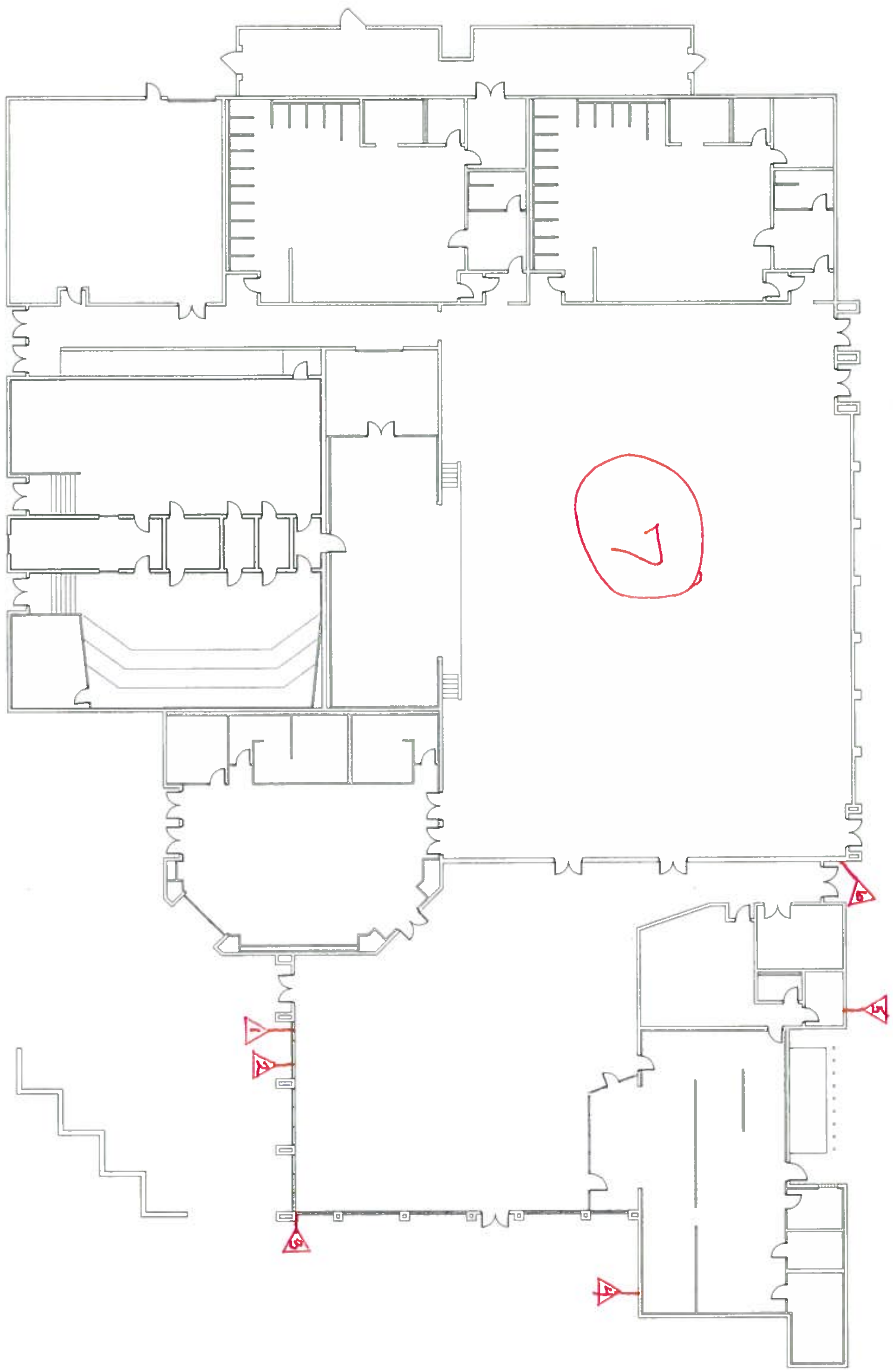
REVISIONS

REVIEWED BY:
DRAWN BY:

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/18/2015
JOB No: 14348
SHEET

A204



1 BUILDING F FLOOR PLAN
SCALE: 3/32" = 1'-0"

SPS+ ARCHITECTS

SPS+ ARCHITECTS LLP
SCOTTSDALE, AZ 85258
TEL 480.991.0800
FAX 480.991.2623
spsplusarchitects.com

CHALLENGER MIDDLE SCHOOL

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
6905 WEST MARYLAND AVENUE
GLENDALE, AZ 85303

BUILDING F FLOOR PLAN

REVIEWED BY:
DRAWN BY:

PRELIMINARY NOT FOR CONSTRUCTION

DATE 3/18/2015
JOB NO 14348
SHEET

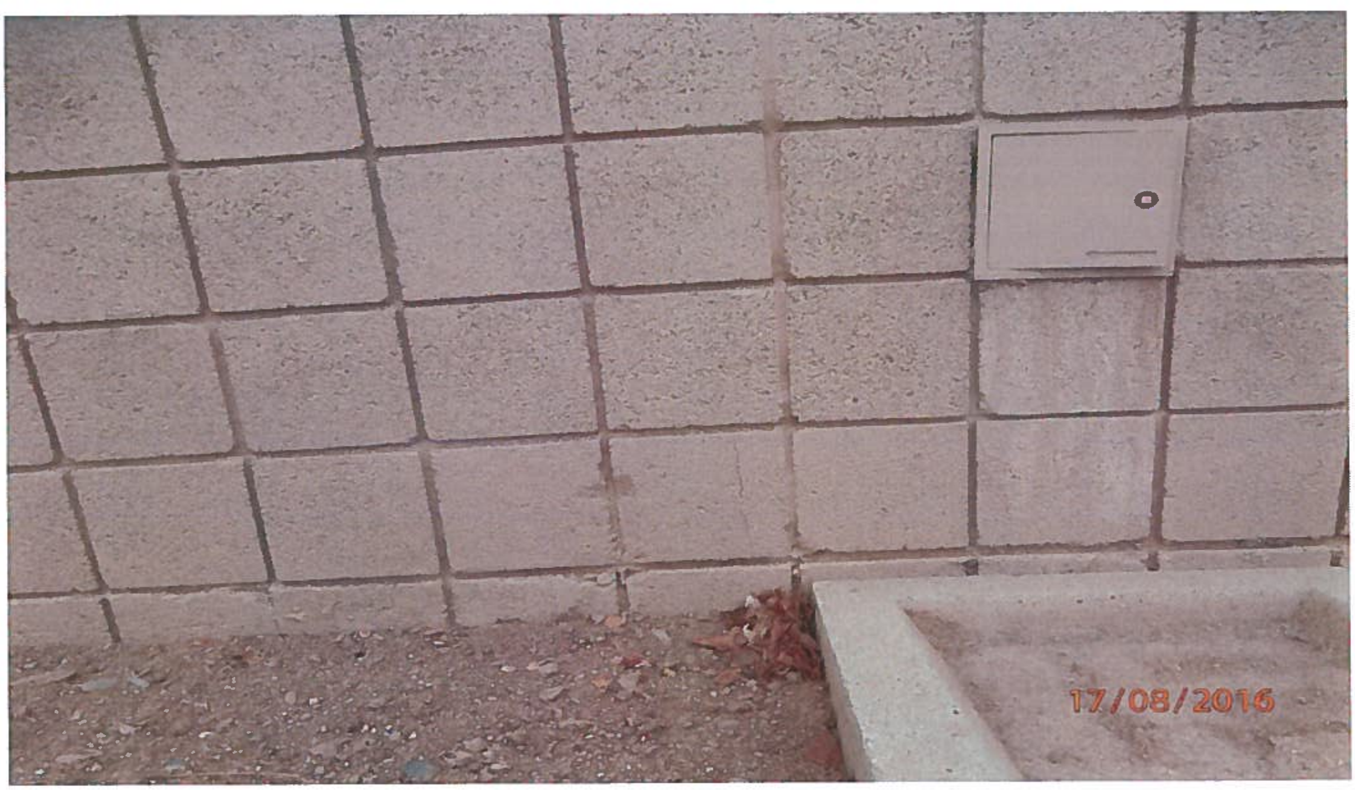
A203

CHALLENGER – BUILDING 1

MARKER NO. 1

CHALLENGER – BUILDING 1

MARKER NO. 2



MARKER NO. 3

CHALLENGER – BUILDING 1

MARKER NO. 4

MARKER NO. 5

CHALLENGER – BUILDING 1

MARKER NO. 6

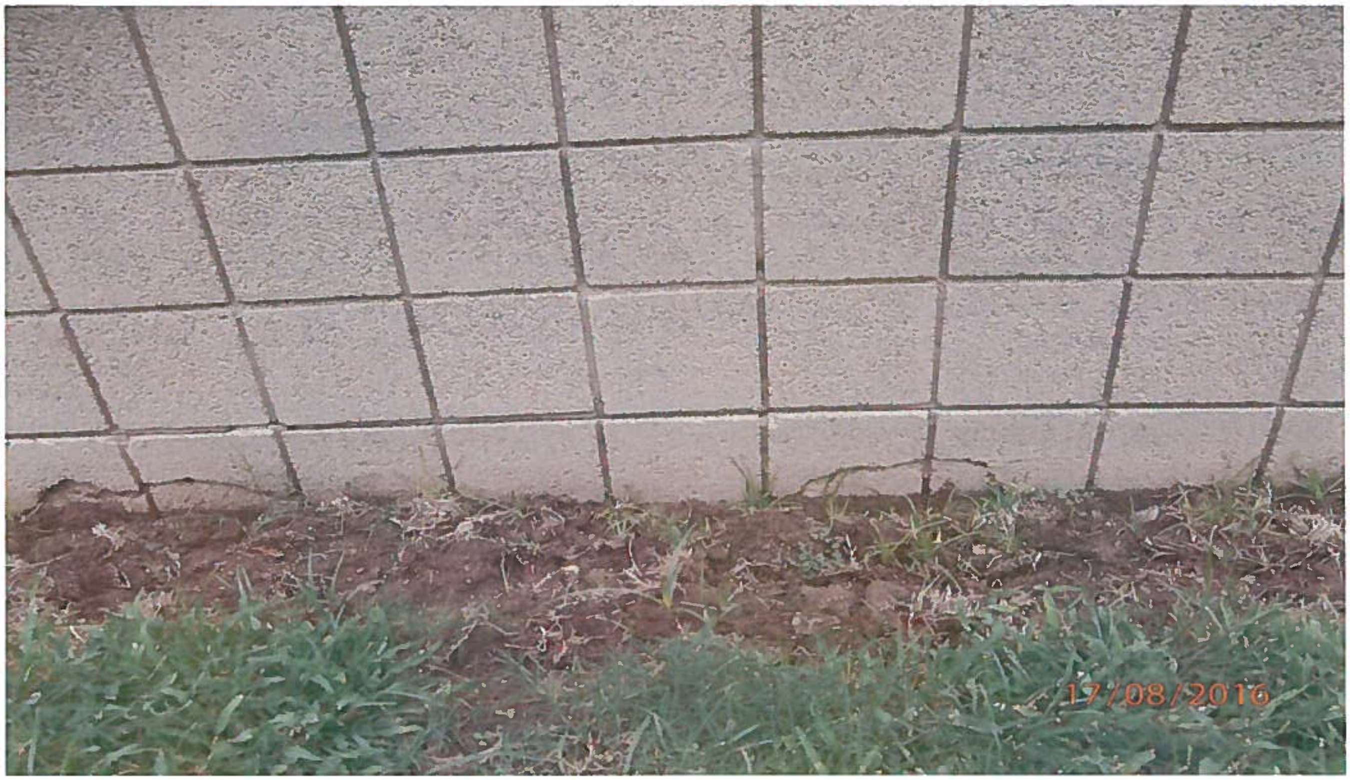
MARKER NO. 7

CHALLENGER – BUILDING 2

MARKER NO. 1

MARKER NO. 2

CHALLENGER – BUILDING 2



MARKER NO. 3

MARKER NO. 4

CHALLENGER – BUILDING 2

MARKER NO. 5

CHALLENGER – BUILDING 2

MARKER NO. 6

MARKER NO. 7

CHALLENGER – BUILDING 2

MARKER NO. 8

MARKER NO. 9

CHALLENGER – BUILDING 2

MARKER NO. 10

MARKER NO. 11

CHALLENGER – BUILDING 2

MARKER NO. 12

MARKER NO. 13

CHALLENGER – BUILDING 3

MARKER NO. 1

MARKER NO. 2

CHALLENGER – BUILDING 3

MARKER NO. 3

MARKER NO. 4

CHALLENGER – BUILDING 3

MARKER NO. 5

CHALLENGER – BUILDING 4

MARKER NO. 1

MARKER NO. 2

CHALLENGER – BUILDING 4

MARKER NO. 3

MARKER NO. 4

CHALLENGER STRUCTURAL

Glendale Elementary School District SFB Projects: Construction Cost Estimates

BRG:	Project:	Scope: Updated 9/1/16	Cost Estimate:
070440111-1003-002-BRG	Challenger Structural		
	Phase 2	Gervasio crack repair	$ 20,000.00
		Estimated Phase 2 Subtotal	**$ 20,000.00**
		Estimated Total Repair:	**$ 20,000.00**

CHALLENGER DRAINAGE

Glendale Elementary School District SFB Projects: Construction Cost Estimates

BRG:	Project:	Scope: Updated 9/1/16	Cost Estimate:
070440111-9999-005-BRG	Challenger Drainage		
	Phase2	Chasse Estimate	$ 273,966.25
		Estimated Phase 2 Subtotal	**$ 273,966.25**
		Estimated Total Repair:	**$ 273,966.25**

DRAINAGE CORRECTIONS
AT
CHALLENGER MIDDLE SCHOOL
SITE ADDRESS: 6905 W. MARYLAND AVENUE
GLENDALE, ARIZONA 85303
FOR
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40 (OWNER)

7301 N. 58TH AVENUE
GLENDALE, ARIZONA 85303
PHONE: (623) 842-8100
CONTACT: GREG GILLIAM

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

36664 PERCY MYRON JR. 8/10/16 ARIZONA, U.S.A.
EXPIRES 9-30-16

DES. DRO	DRN. JCW	CKD. DRO	JOB NO. 1510-04

GENERAL NOTES FOR CONSTRUCTION:

A. ALL CONSTRUCTION SHALL CONFORM TO THE LATEST MAG STANDARD DETAILS AND SPECIFICATIONS AND THE CITY'S CURRENT ENGINEERING DESIGN AND CONSTRUCTION STANDARDS.

B. THIS SET OF PLANS HAS BEEN REVIEWED FOR COMPLIANCE WITH CITY REQUIREMENTS PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS. HOWEVER, SUCH REVIEW AND ACCEPTANCE SHALL NOT PREVENT THE CITY FROM REQUIRING CORRECTION OF ERRORS IN SAID PLANS AND/OR CONSTRUCTION WHEN IN VIOLATION OF ANY LAWS, ORDINANCES, CODES OR STANDARDS THAT ARE IN EFFECT. REVIEW AND ACCEPTANCE OF PLANS DOES NOT RELEASE A DEVELOPER OR ENGINEER FROM RESPONSIBILITY FOR ERRORS OR OMISSIONS ON SAID PLANS.

C. THE CITY DOES NOT WARRANT ANY QUANTITIES SHOWN ON THESE PLANS.

D. THE CITY PLANS ACCEPTANCE IS FOR GENERAL LAYOUT IN THE RIGHT-OF-WAY ONLY. THIS ACCEPTANCE IS VALID FOR A PERIOD OF SIX MONTHS. CONSTRUCTION PERMITS SHALL BE OBTAINED DURING THIS PERIOD OR THE PLANS SHALL BE RESUBMITTED FOR REVIEW.

E. A CITY ACCEPTED SET OF PLANS SHALL BE AVAILABLE ON THE JOB SITE AT ALL TIMES.

F. THE CITY SHALL BE NOTIFIED 48 HOURS PRIOR TO ANY CONSTRUCTION WORK. CONSTRUCTION WORK CONCEALED WITHOUT INSPECTION BY THE CITY SHALL BE SUBJECT TO EXPOSURE AT THE CONTRACTOR'S EXPENSE.

G. A RIGHT-OF-WAY CONSTRUCTION PERMIT IS REQUIRED FOR ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY OR WITHIN A CITY EASEMENT. A 100% PERFORMANCE BOND OR EQUIVALENT FORM OF FINANCIAL SURETY MAY BE REQUIRED FOR ALL WORK WITHIN THE RIGHT-OF-WAY PRIOR TO THE ISSUANCE OF ANY RIGHT-OF-WAY CONSTRUCTION PERMIT(S). ALL WORK WITHIN THE RIGHT-OF-WAY SHALL BE INSPECTED AND APPROVED BY THE CITY'S ENGINEERING DIVISION.

H. IMPROVEMENTS SHALL NOT BE ACCEPTED UNTIL "AS-BUILT" PLANS AND ELECTRONIC (AUTOCAD) FILES HAVE BEEN SUBMITTED AND APPROVED BY THE CITY.

I. THE DEVELOPER IS RESPONSIBLE FOR ALL COSTS AND WORK RELATED TO THE REMOVAL, RELOCATION OR ABANDONMENT OF ALL OBSTRUCTIONS AND/OR UTILITIES WITHIN THE RIGHT-OF-WAY THAT CONFLICT WITH THE NEW IMPROVEMENTS.

J. THE DEVELOPER IS RESPONSIBLE FOR OBTAINING OR DEDICATING ALL REQUIRED RIGHTS-OF-WAY AND EASEMENTS TO THE CITY PRIOR TO ISSUANCE OF THE BUILDING'S CERTIFICATE OF OCCUPANCY.

K. THE CONTRACTOR SHALL CONTACT BLUE STAKE (602-263-1100) 48 HOURS PRIOR TO CONSTRUCTION.

L. THE CONTRACTOR SHALL BARRICADE CONSTRUCTION SITES AT ALL TIMES PER THE CITY OF PHOENIX TRAFFIC BARRICADE MANUAL. WHEN REQUIRED BY THE CITY, A TRAFFIC CONTROL PLAN SHALL BE SUBMITTED FOR APPROVAL A MINIMUM OF 72 HOURS IN ADVANCE OF CONSTRUCTION.

M. THE CONTRACTOR MAY OBTAIN A FIRE HYDRANT METER FOR CONSTRUCTION WATER FROM THE CITY WATER SERVICES DEPARTMENT. THE UNLAWFUL REMOVAL OF WATER FROM A FIRE HYDRANT IS A VIOLATION OF THE MUNICIPAL CODE, PUNISHABLE BY FINE AND/OR IMPRISONMENT.

N. DAMAGE CAUSED BY THE DEVELOPER DURING CONSTRUCTION TO CITY INFRASTRUCTURE OR FACILITIES SHALL BE REPAIRED OR REPLACED BY THE DEVELOPER, AT HIS EXPENSE, IN A MANNER ACCEPTABLE TO THE CITY.

O. THERE SHALL BE NO DIRT RAMPS OVER SIDEWALKS DURING CONSTRUCTION.

P. AN AZPDES PERMIT IS REQUIRED FOR ALL CONSTRUCTION THAT DISTURBS LAND OVER ONE (1) ACRE IN SIZE. PRIOR TO START OF ANY CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A NOTICE OF INTENT (NOI) TO THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ) AND A COPY TO THE CITY OF GLENDALE AND HAVE A COPY OF THE SWPPP ON SITE AT ALL TIMES.

UTILITY UNDERGROUND STATEMENT:

"PURSUANT TO CHAPTER 32.5 OF THE GLENDALE CITY CODE, ALL NEW AND EXISTING UTILITIES WITHIN OR CONTIGUOUS TO THIS STATE SHALL BE PLACED UNDERGROUND IN CONDUIT."

NOTE:

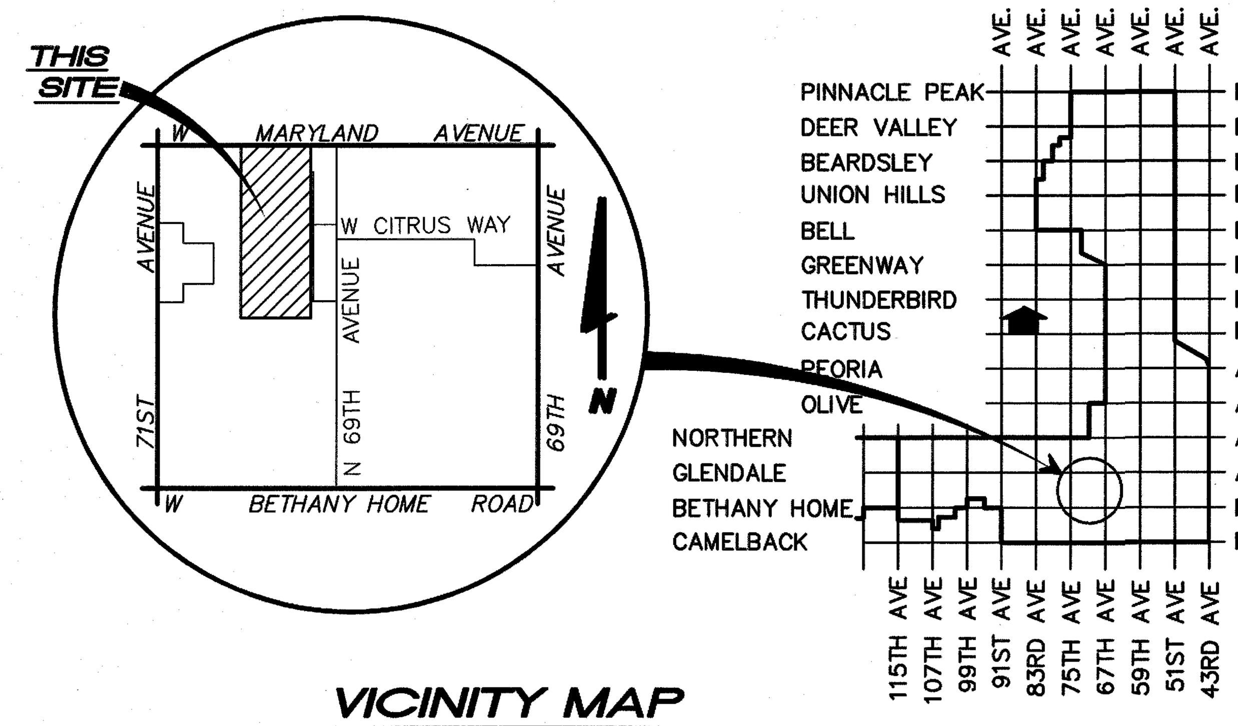
THESE DRAWINGS ARE AN INSTRUMENT OF SERVICE ONLY AND ARE AND SHALL REMAIN THE EXCLUSIVE PROPERTY OF HESS-ROUNTREE, INC. NO REPRODUCTION OR OTHER USE SHALL BE MADE BY ANY PERSON OR FIRM OTHER THAN HESS-ROUNTREE, INC. OR THE CITY OF PHOENIX WITHOUT EXPRESS PERMISSION OF HESS-ROUNTREE, INC. ANY UNAUTHORIZED USE SHALL VOID THE ENGINEER'S SEAL AND SIGNATURE HEREON AND NO PROFESSIONAL RESPONSIBILITY WILL REMAIN.

THESE PLANS HAVE BEEN SUBMITTED TO THE FOLLOWING UTILITY COMPANIES AND THE WORK CONTAINED IN THESE PLANS HAS BEEN APPROVED BY THESE COMPANIES WITHIN THEIR AREA OF INTEREST. THE SIZE AND LOCATIONS, AS SHOWN OF THE GAS, TELEPHONE AND POWER LINES, AND CONNECTIONS AGREE WITH THE INFORMATION CONTAINED IN THE UTILITY COMPANY'S RECORDS. WHERE THE WORK TO BE DONE CONFLICTS WITH ANY OF THESE UTILITIES, THE CONFLICTS WILL BE RESOLVED AS SPECIFIED IN THE SPECIAL PROVISIONS AND/OR AS OTHERWISE NOTED ON THESE PLANS. CONFLICTS ARISING DURING THE COURSE OF CONSTRUCTION FROM UNFORSEEN CIRCUMSTANCES SHALL BE REPORTED TO THE INTERESTED UTILITY COMPANY AND BE RESOLVED BY THEM AND THE DESIGN ENGINEER.

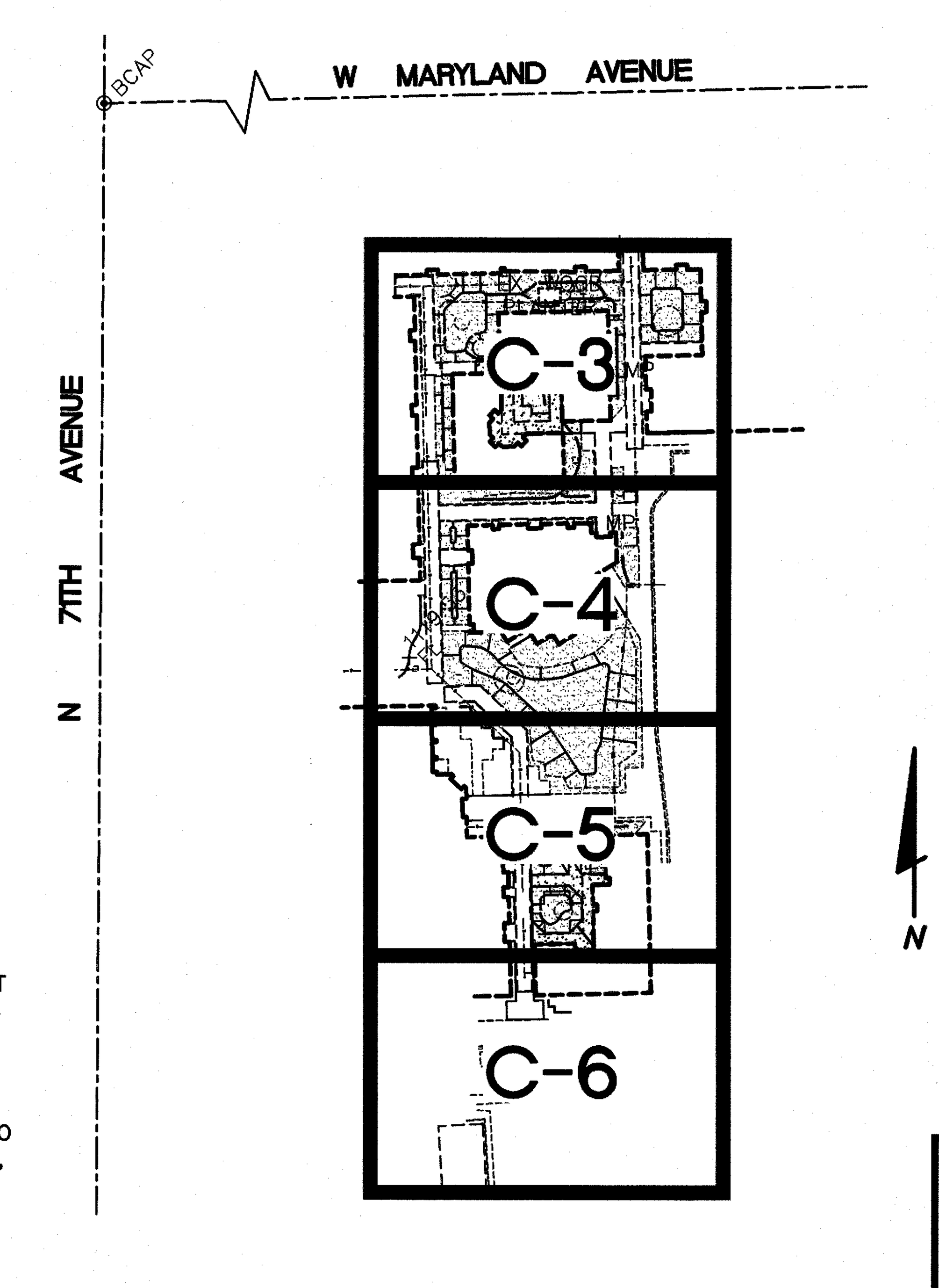
	CO. REPRESENTATIVE CONTACTED	DATE SUBMITTED
SPRINT COMMUNICATIONS	COLIN SWORD	.
COX COMMUNICATIONS	TMC-DV2-01	.
SALT RIVER PROJECT DISTRICT	BECKY THOMAS	.
S R V W U A	SUSANA ORTEGA	.
ARIZONA PUBLIC SERVICE	VIRGINIA NISKALA	.
QWEST COMMUNICATIONS	CONFLICT LIAISON DEPT.	.
EL PASO NATURAL GAS COMPANY	DENNIS SEGARS	.
KINDER MORGAN	D. TARANGO	.
SOUTHWEST GAS CORPORATION	FRANCHISE DEPT. 420-586	.

ACREAGE

GROSS SITE AREA	=19.79 ACRES
NET SITE AREA	=19.43 ACRES
CONSTRUCTION AREA	=2.42 ACRES



VICINITY MAP
NOT TO SCALE



SHEET INDEX MAP
NOT TO SCALE

GENERAL NOTES FOR GRADING AND DRAINAGE CONSTRUCTION:

A. THE DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR PAYING PERMIT FEES PRIOR TO CONSTRUCTION.

B. A SEPARATE PERMIT IS NECESSARY FOR ANY CONSTRUCTION IN THE RIGHT-OF-WAY.

C. PRIOR TO THE START OF ANY ON-SITE GRADING OPERATIONS, THE CONTRACTOR SHALL NOTIFY THE CITY ENGINEERING DIVISION AT LEAST 48 HOURS PRIOR TO COMMENCING WORK BY CALLING 623-930-3630.

D. STAKING PAD AND/OR FINISHED FLOOR ELEVATIONS ARE THE RESPONSIBILITY OF THE DEVELOPER OR HIS ENGINEER. IN NON-CRITICAL AREAS, THE DEVELOPER'S ENGINEER SHALL SUBMIT CERTIFICATIONS OF CONSTRUCTED BUILDING PAD ELEVATIONS PRIOR TO THE CITY'S ACCEPTANCE OF PROJECT. IN A CRITICAL DRAINAGE AREA, CERTIFICATION OF THE FINISHED BUILDING FLOOR OR STEM WALL ELEVATION SHALL BE SUBMITTED AND APPROVED PRIOR TO ANY VERTICAL CONSTRUCTION.

E. AN APPROVED GRADING AND DRAINAGE PLAN SHALL BE ON THE JOB SITE AT ALL TIMES. DEVIATIONS FROM THE PLAN MUST BE PRECEDED BY AN APPROVED PLAN REVISION.

F. ACCEPTANCE OF GRADING AND DRAINAGE IMPROVEMENTS SHALL INCLUDE, BUT NOT BE LIMITED TO, THE CONSTRUCTION OF RETENTION BASINS, CATCH BASINS, CURB FOR OTHER DRAINAGE FACILITIES, SITE GRADING, DRYWELLS, STORM DRAIN PIPES, UNDERGROUND STORAGE TANKS AND ASPHALT PAVEMENT.

G. DRYWELLS MUST BE DRILLED A MINIMUM OF 10 FEET INTO PERMEABLE POROUS STRATA.

H. THE CONTRACTOR SHALL CONSTRUCT ALL RETENTION BASINS TO THE ELEVATIONS AND SLOPES SHOWN ON THE PLANS.

I. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND CONFIRMING DEPTH OF ALL THE EXISTING UTILITY LINES WITHIN PROPOSED RETENTION BASIN AREAS. IF THE BASIN CANNOT BE CONSTRUCTED PER PLAN AS A RESULT OF CONFLICT WITH UNDERGROUND UTILITIES, THE CONTRACTOR SHOULD CONTACT THE CITY AND DESIGN ENGINEER AND REQUEST MODIFICATION OF THE BASIN DESIGN.

J. THIS SET OF PLANS HAS BEEN REVIEWED FOR COMPLIANCE WITH CITY REQUIREMENTS PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS AND SHALL BE KEPT AT THE CONSTRUCTION SITE. SUCH REVIEW SHALL NOT PREVENT THE CITY FROM REQUIRING CORRECTIONS TO ERRORS ON THE PLANS, WHICH ARE FOUND TO BE IN VIOLATION OF ANY LAW OR ORDINANCE.

K. NO PERSON SHALL USE ANY MECHANICAL EQUIPMENT FOR CLEARING, GRUBBING, ROAD CONSTRUCTION, TRENCHING, EXCAVATING, DEMOLITION OR ENGAGE IN ANY EARTHMOVING ACTIVITY WITHOUT FIRST OBTAINING A DUST CONTROL PERMIT FROM MARICOPA COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES.

OWNER/DEVELOPER:

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
7301 NORTH 58TH AVENUE
GLENDALE, ARIZONA 85303
PHONE: (623) 842-8100
CONTACT: GREG GILLIAM

ENGINEER:

HESS-ROUNTREE, INC.
9831 S. 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044
PHONE: (480) 496-0244
FAX: (480) 496-0094
CONTACT: PERCY MYRON JR., P.E.

SHEET INDEX:

PLANS ACCEPTANCE

THE CITY OF GLENDALE ACCEPTS THESE PLANS FOR CONSTRUCTION, AS BEING IN GENERAL COMPLIANCE WITH PLAN PREPARATION REQUIREMENTS OF THE CITY. RESPONSIBILITY FOR THE COMPLETENESS AND ACCURACY OF THE PLANS AND RELATED DESIGNS RESIDES WITH THE ENGINEER AND THE ENGINEERING FIRM OF RECORD.

LAND DEVELOPMENT ENGINEER ____________ DATE ______

TRANSPORTATION ENGINEER ____________ DATE ______

RECORD DRAWING

I CERTIFY THAT THE LOCATIONS, ELEVATIONS, DEPTHS, AND RECORD DRAWING COMMENTS ACCURATELY REFLECT THE EXISTING FIELD CONDITIONS AND MATERIALS ACTUALLY USED DURING CONSTRUCTION. THIS CERTIFICATION IS BASED ON INFORMATION OBTAINED UNDER BY DIRECT SUPERVISION AND IS CORRECT AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

NAME ____________ DATE ______

REGISTRATION NO. ____________ EXP.DATE ______

REVD BY: ____________
ENGINEERING DEPARTMENT

DRYWELL CERTIFICATION

I CERTIFY THAT ALL DRYWELLS HAVE BEEN REGISTERED WITH AND CONFORM TO ALL REQUIREMENTS OF THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ).

NAME ____________ DATE ______

COMPANY ____________

ARIZONA PUBLIC SERVICE-ELECTRICAL SOUTHWEST GAS CORPORATION – GAS SALT RIVER PROJECT – IRRIGATION SALT RIVER PROJECT – ELECTRICAL QWEST COMMUNICATIONS – CABLE TV (OTHER) **AGENCIES ALSO REQUIRING PERMITS WHEN INVOLVED ARE: MARICOPA COUNTY HIGHWAY DEPT., A.D.O.T., CITY OF PHOENIX, CITY OF PEORIA, SANTA FE RAILROAD, EL PASO NATURAL GAS, & MARICOPA COUNTY FLOOD CONTROL DISTRICT.	PLANS SUBMITTED TO (NAME)	PLANS REVIEWED BY (NAME)	PERMIT RECEIVED DATE

GRADING & DRAINAGE PERMIT FEE

BASE FEE	1	EA
ON-SITE PAVING	0	SY
CATCH BASIN/SCUPPER	0	EA
MANHOLE/DRYWELL	0	EA
STORM DRAIN PIPE (12"+)	25	LF

Call at least two full working days before you begin excavation.
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Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County: (602) 263-1100

DESIGN CIVIL ENGINEER'S NOTES TO CONTRACTOR:

1. NOTHING CONTAINED IN THE CONTRACT DOCUMENTS SHALL CREATE, NOR SHALL BE CONSTRUED TO CREATE, ANY CONTRACTUAL RELATIONSHIP BETWEEN THE DESIGN CIVIL ENGINEER AND THE CONTRACTOR OR ANY SUBCONTRACTOR.

2. THE DESIGN CIVIL ENGINEER WILL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FOR SAFETY PRECAUTIONS OR PROGRAMS UTILIZED IN CONNECTION WITH THE WORK, THESE ARE SOLELY THE CONTRACTOR'S RESPONSIBILITY. THE DESIGN CIVIL ENGINEER WILL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S FAILURE TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

3. THE CONTRACTOR SHALL PROVIDE ADEQUATE MEANS OF CLEANING TRUCKS AND/OR OTHER EQUIPMENT OF MUD PRIOR TO ENTERING PUBLIC STREETS, AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO CLEAN STREETS, ALLAY DUST, AND TO TAKE WHATEVER MEASURES ARE NECESSARY TO INSURE THAT ALL ROADWAYS AND ON SITE PARKING LOTS/FIRE LANES ARE MAINTAINED IN A CLEAN, MUD AND DUST-FREE CONDITION AT ALL TIMES.

4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE BLUE STAKE CENTER TWO WORKING DAYS PRIOR TO ANY EXCAVATION. THE UNDERGROUND UTILITY LOCATIONS AS SHOWN HEREON ARE BASED ON THE BEST INFORMATION AVAILABLE FROM UTILITY RECORDS AND OTHER DATA AS SUPPLIED TO THIS DESIGN CIVIL ENGINEER. THERE MAY BE OTHER UNDERGROUND UTILITY LINES, SERVICE LINES AND STRUCTURES PRESENT IN THE SUBJECT AREA. CONTRACTOR SHALL INCLUDE IN HIS BID THE COST OF HIRING AN UNDERGROUND UTILITY LOCATING SERVICE FOR THE PURPOSE OF LOCATING ALL UNDERGROUND UTILITIES. CONTRACTOR WILL COORDINATE WITH THE OWNER AND ARCHITECT TO DETERMINE WHETHER SAID UTILITIES ARE TO BE ABANDONED OR PROTECTED FROM DAMAGE.

5. THE DESIGN CIVIL ENGINEER MAKES NO REPRESENTATION OR GUARANTEE REGARDING THE EARTHWORK QUANTITIES OR THAT THE EARTHWORK FOR THIS PROJECT WILL BALANCE DUE TO THE VARYING FIELD CONDITIONS, CHANGING, SOIL TYPES, ALLOWABLE CONSTRUCTION TOLERANCES AND CONSTRUCTION METHODS. PRIOR TO BIDDING THE WORK, THE CONTRACTOR SHALL THOROUGHLY SATISFY HIMSELF AS TO THE ACTUAL CONDITIONS, EARTHWORK QUANTITIES AND REQUIREMENTS OF THE WORK AND EXCESS OR DEFICIENCY THEREIN, ACTUAL OR RELATIVE.

6. THE CONTRACTOR SHALL ADJUST ALL EXISTING AND NEW CLEANOUTS, WATER VALVE BOXES, MANHOLES, GAS VALVE BOXES, IRRIGATION BOXES, ETC. IN THE CONSTRUCTION AREA TO FINISH GRADE PER THE APPLICABLE MAG STANDARD DETAIL. ALL VALVE BOXES, MANHOLES, ETC. IN CONCRETE PAVEMENT AREAS SHALL BE ISOLATED FROM THE CONCRETE PAVEMENT WITH EXPANSION JOINTS.

7. ALL NEW UNDERGROUND FACILITIES/UTILITIES SHALL BE INSTALLED WITH A DETECTABLE UNDERGROUND LOCATION DEVICE. INSTALL A #18 INSULATED TRACER WIRE SECURELY ATTACHED TO EACH UTILITY AT 8-FEET ON CENTER. 12" OF TRACER WIRE SHALL BE ACCESSIBLE ABOVE GRADE AT THE TERMINATION AND SHALL BE SECURELY ATTACHED AT THAT POINT. THE CONTRACTOR SHALL INCLUDE ALL COSTS ASSOCIATED WITH THIS REQUIREMENT IN THEIR BID.

8 THE CONTRACTOR SHALL MAKE NO CLAIMS AGAINST THE OWNER OR THE DESIGN CIVIL ENGINEER REGARDING ALLEGED INACCURACY OF CONSTRUCTION STAKES SET BY THE DESIGN CIVIL ENGINEER UNLESS ALL SURVEY STAKES SET BY THE DESIGN CIVIL ENGINEER ARE MAINTAINED INTACT AND CANNOT BE VERIFIED AS TO THEIR ORIGIN. ANY REMEDIAL WORK REQUIRED TO CORRECT ANY ITEM OF IMPROPER CONSTRUCTION WORK IN THIS DEVELOPMENT SHALL BE PERFORMED AT THE SOLE EXPENSE OF THE RESPONSIBLE CONTRACTOR OR SUBCONTRACTOR.

BENCH MARK:

GDACS BENCHMARK #163. MARICOPA COUNTY 3" GLENDALE BRASS CAP IN HANDHOLE, DOWN 0.6', STAMPED "N397."

ELEVATION = 1128.07 (NAVD88 DATUM)

CERTIFICATION:

"I HEREBY CERTIFY THAT THIS DESIGN IS BASED ON A SITE VISIT OR ACCURATE FIELD DATA WHICH HAS BEEN CHECKED IN THE FIELD WITHIN 180 DAYS PRIOR TO SUBMISSION FOR CITY APPROVAL.

BY: ____________ DATE: ______

AS-BUILT CERTIFICATION:

I HEREBY CERTIFY THAT THE "RECORD DRAWING" MEASUREMENTS AS SHOWN HEREON WERE MADE UNDER MY SUPERVISION OR AS NOTED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR/ENGINEER ____________ DATE

REGISTRATION NUMBER ____________

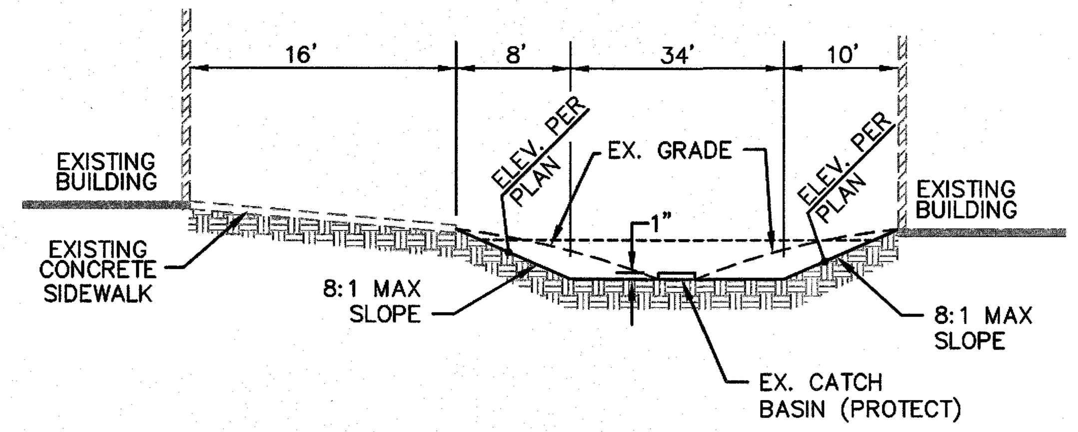
COVER SHEET

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

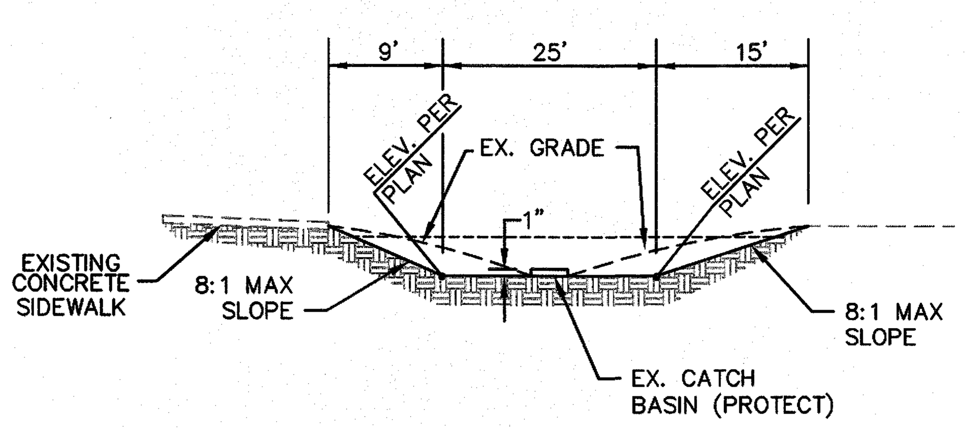
DRAINAGE CORRECTIONS AT GLENDALE CHALLENGER MIDDLE SCHOOL

DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	1	6	C-1
DATE: 8-10-16			

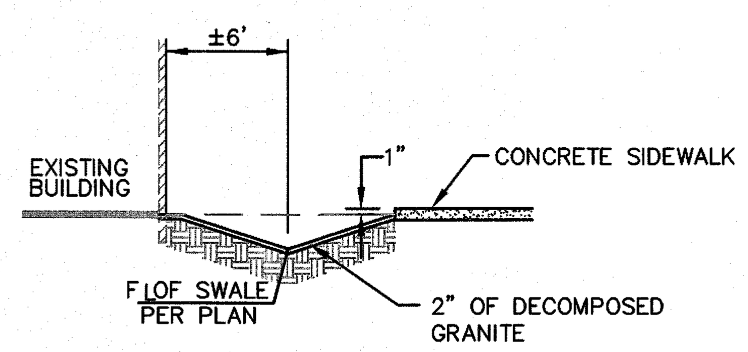
151004CR1.DWG



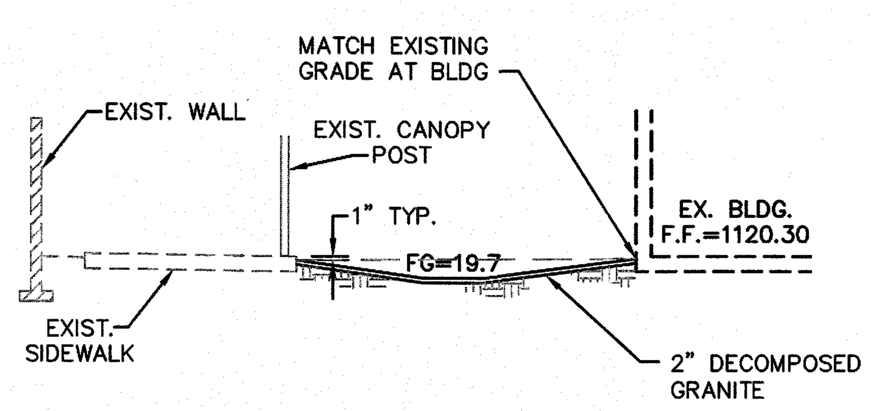
SECTION A-A
NOT TO SCALE



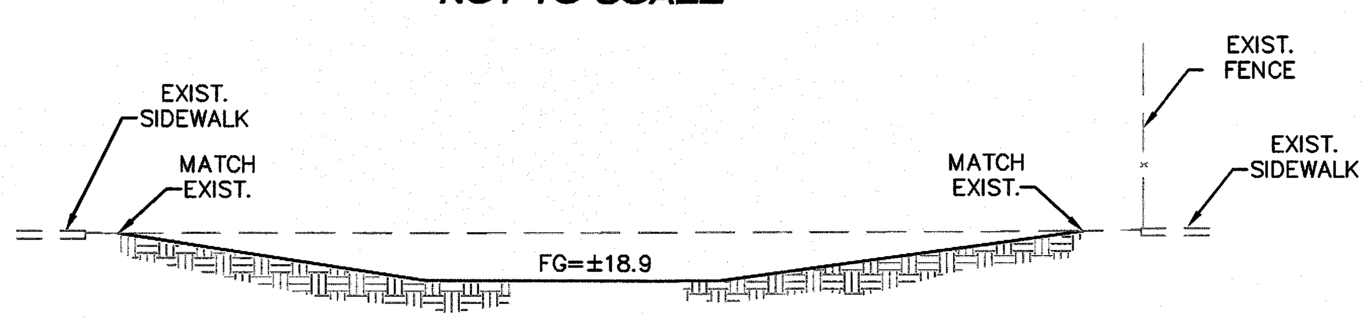
SECTION B-B
NOT TO SCALE



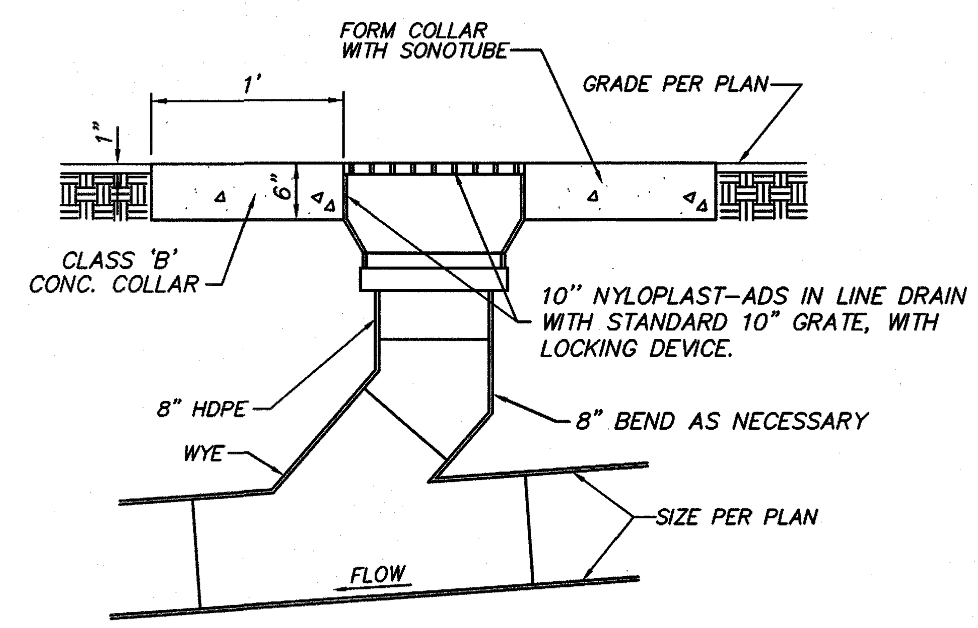
SECTION C-C
NOT TO SCALE



SECTION D-D
NOT TO SCALE

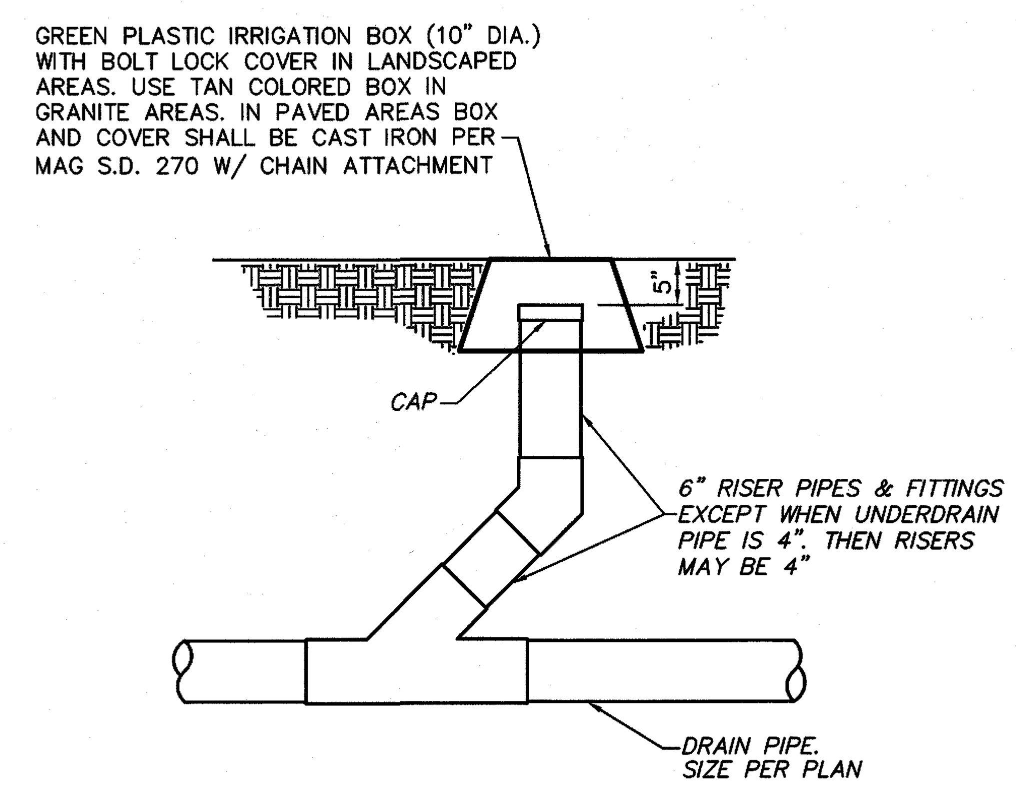


SECTION E-E
NOT TO SCALE

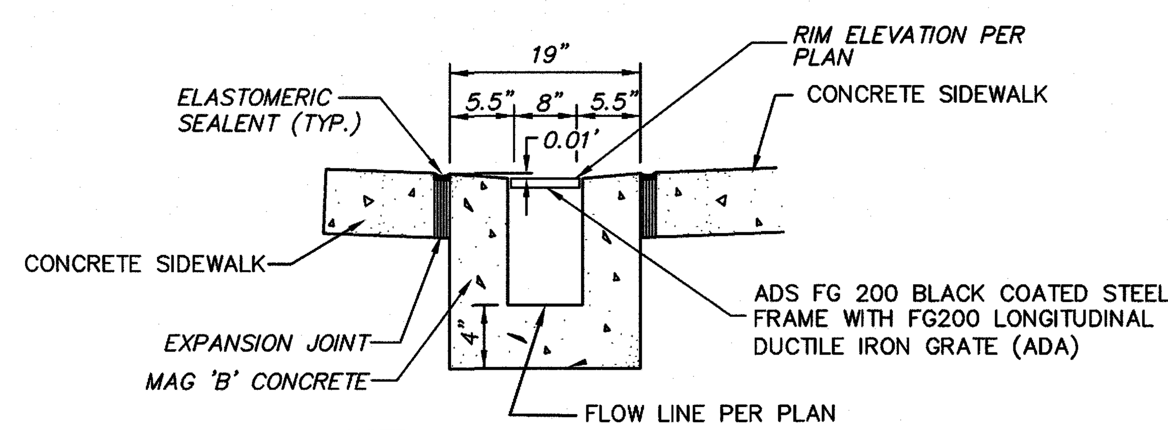


INSTALL 2 LAYERS OF MIRAFI 100X FABRIC BENEATH GRATE. GENERAL CONTRACTOR TO REMOVE AFTER CONSTRUCTION IS COMPLETE.

AREA DRAIN
NOT TO SCALE



STORM DRAIN CLEANOUT
NOT TO SCALE



NOTE:
CONCRETE ADJACENT TO GRATE SHALL BE APPROXIMATELY 1/8" HIGHER THAN THE PROPOSED RIM ELEVATION.

TRENCH DRAIN DETAIL
NOT TO SCALE

EXPIRES 9-30-16

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

DES. DRO	DRN. JCW	CKD. DRO	JOB NO. 1510-04

LEGEND

BC 1120.45	EXISTING BACK OF CURB ELEVATION
G 1119.94	EXISTING GUTTER ELEVATION
P 1120.50	EXISTING PAVEMENT ELEVATION
C 1120.18	EXISTING CONCRETE ELEVATION
SW 1120.51	EXISTING SIDEWALK ELEVATION
TW 1125.39	TOP OF WALL ELEVATION
PL 1120.34	EXISTING PLANTER ELEVATION
FL 1119.53	EXISTING FLOWLINE ELEVATION
NG 1121.32	EXISTING GROUND ELEVATION
TB 1119.95	EXISTING TOP OF BERM ELEVATION
TS 1119.73	EXISTING TOE OF SLOPE ELEVATION
FF 1120.70	EXISTING FINISH FLOOR ELEVATION
DG 1120.30	EXISTING DECOMPOSED GRANITE
	EXISTING COLUMN
	EXISTING AREA DRAIN
	EXISTING DRY WELL
FDC	EXISTING FIRE DEPARTMENT CONNECTION
FH	EXISTING FIRE HYDRANT
WMB	EXISTING WATER METER BOX
WV	EXISTING WATER VALVE
ICV	EXISTING CHECK VALVE
EB	EXISTING ELECTRIC BOX
RD	EXISTING ROOF DRAIN
	EXISTING SIGN
SSCO	EXISTING SANITARY SEWER CLEANOUT
BFP	EXISTING BACKFLOW PREVENTER
--IRRG--	EXISTING WATER LINE PIPE & SIZE
-- E --	EXISTING GAS LINE
--COMM--	EXISTING COMMUNICATION LINE
	EXISTING STORM DRAIN LINE
	EXISTING TREE

Call at least two full working days before you begin excavation.
ARIZONA 811
Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348) In Maricopa County: (602) 263-1100

NOTES, LEGEND, AND DETAILS SHEET

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

DRAINAGE CORRECTIONS AT
GLENDALE CHALLENGER MIDDLE SCHOOL

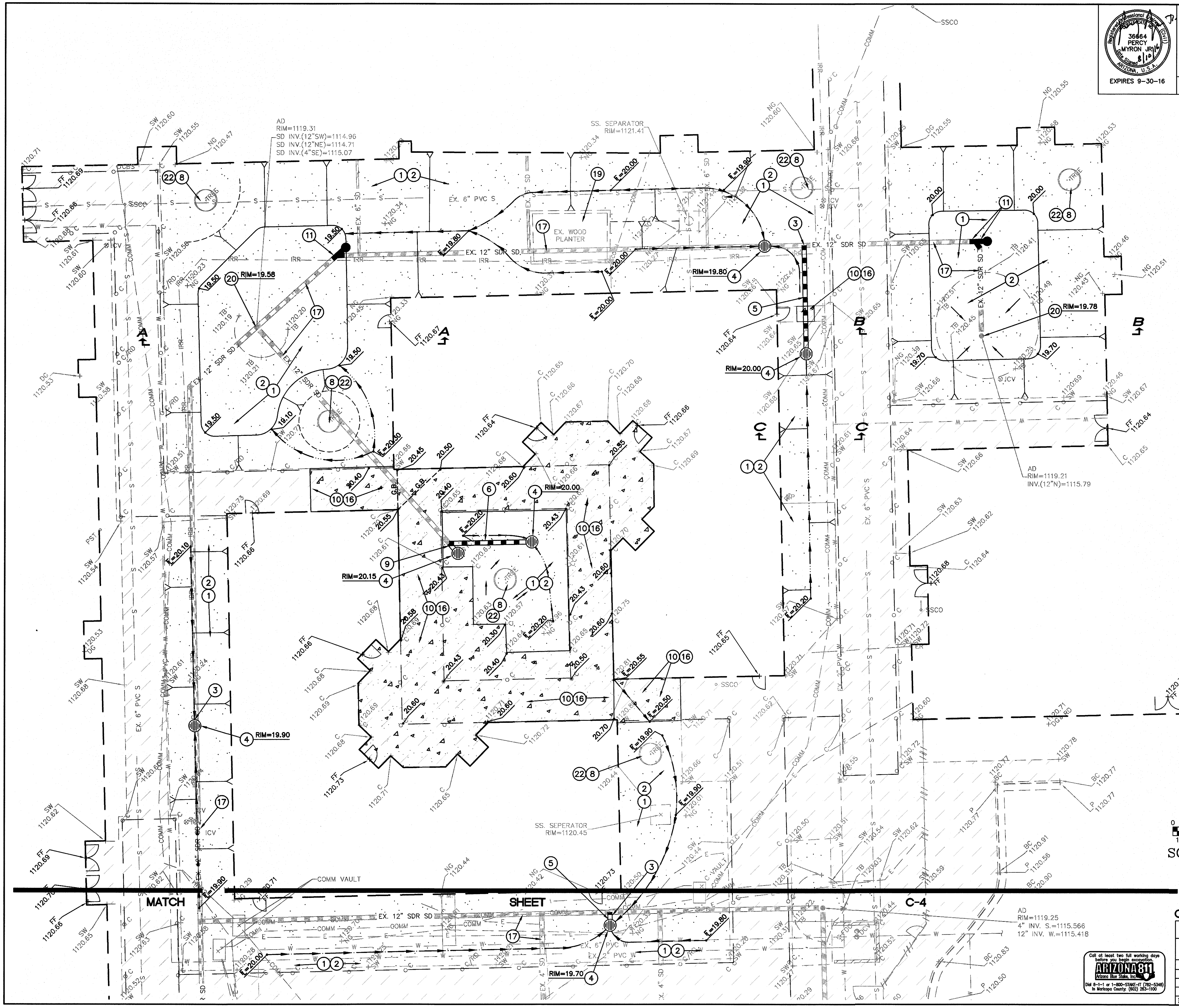
DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	2	6	C-2
DATE: 8-10-16			

151004GR2.DWG

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

36664 PERCY MYRON JR. ARIZONA, U.S.A.
EXPIRES 9-30-16

DES. DRO	DRN. JCW	CKD DRO	JOB NO. 1510-04



GRADING AND DRAINAGE CONSTRUCTION NOTES:

1. REGRADE EXISTING LANDSCAPE AREA TO FINISH GRADE ELEVATIONS INDICATED.
2. CAP ALL SPRINKLER IRRIGATION LATERALS AND HEADS, REMOVE TURF AND INSTALL 2" OF DECOMPOSED GRANITE (1/4" MINUS MADISON GOLD).
3. CONNECT TO EXISTING PVC STORM DRAIN PIPE WITH INSERTA-TEE OR APPROVED EQUAL.
4. INSTALL NEW AREA DRAIN (SEE DETAIL SHEET C-2).
5. INSTALL 10" PVC DRAINAGE PIPE (ASTM D3034, SDR-35).
6. INSTALL 12" PVC DRAINAGE PIPE (ASTM D3034, SDR-35).
7. INSTALL TRENCH DRAIN (SEE DETAIL ON SHEET C-2).
8. PROTECT EXISTING TREE FROM DAMAGE. MODIFY GRADING SO THE ROOTS DO NOT GET DAMAGED.
9. REMOVE EXISTING AREA DRAIN AND CONNECT TO EXISTING 12" PVC PIPE. FIELD VERITY LOCATION AND ELEVATION
10. INSTALL NEW CONCRETE SIDEWALK (MAG STANDARD DETAIL 230) MAXIMUM CONTROL JOINT SPACING SHALL BE 10' ON CENTER. JOINTS SHALL HAVE 1/2" RADIUS TO MATCH EXISTING SIDEWALKS
11. REMOVE EXISTING 12"-90° BEND OR 45° BEND AND INSTALL WYE AND CLEANOUT (SEE DETAIL ON SHEET C-2).
12. CONNECT TO EXISTING 6" PVC PIPE WITH NEW 6" WYE.
13. INSTALL 6" PVC DRAINAGE PIPE (ASTM D3034, SDR-35).
14. CONNECT TO EXISTING PVC PIPE WITH NEW WYE AND CLEANOUT.
15. REPAIR OR REPLACE GRANITE IRRIGATION AND LANDSCAPING DISTURBED BY THE NEW STORM DRAIN INSTALLATION AND GRADING.
16. SAWCUT AND REMOVE EXISTING CONCRETE SIDEWALK.
17. HYDROVAC ALL EXISTING STORM DRAIN LINES TO REMOVE DIRT AND DEBRIS FROM ALL CATCH BASINS AND DRYWELLS.
18. INSTALL 4" PVC DRAINAGE PIPE (ASTM D3034, SDR-35).
19. EXISTING PLANTER TO REMAIN. PROTECT FROM DAMAGE.
20. ADJUST EXISTING AREA DRAIN TO FINISH GRADE SHOWN.
21. POTHOLE AND FIELD VERIFY ELEVATION AND LOCATION OF EXISTING UTILITY LINES PRIOR TO CONSTRUCTION. PROTECT FROM DAMAGE.
22. CONVERT EXISTING SPRINKLER IRRIGATION VALVE THAT SERVED THE AREA, TO A DROP IRRIGATION VALVE. PROVIDE WATER TO EXISTING TREES WITH POLY-TUBING AND 4 EMITTERS TO EACH TREE.

NOTE:

SPRAY AREA WHERE LANDSCAPING IS BEING CONVERTED FROM TURF TO DECOMPOSED GRANITE WITH TWO APPLICATIONS OF TURF KILLER PRIOR TO PLACEMENT OF GRANITE.

Call at least two full working days before you begin excavation. ARIZONA 811 Arizona Blue Stake, Inc. Dial 8-1-1 or 1-800-STAKE-IT (782-5348) In Maricopa County: (602) 263-1100

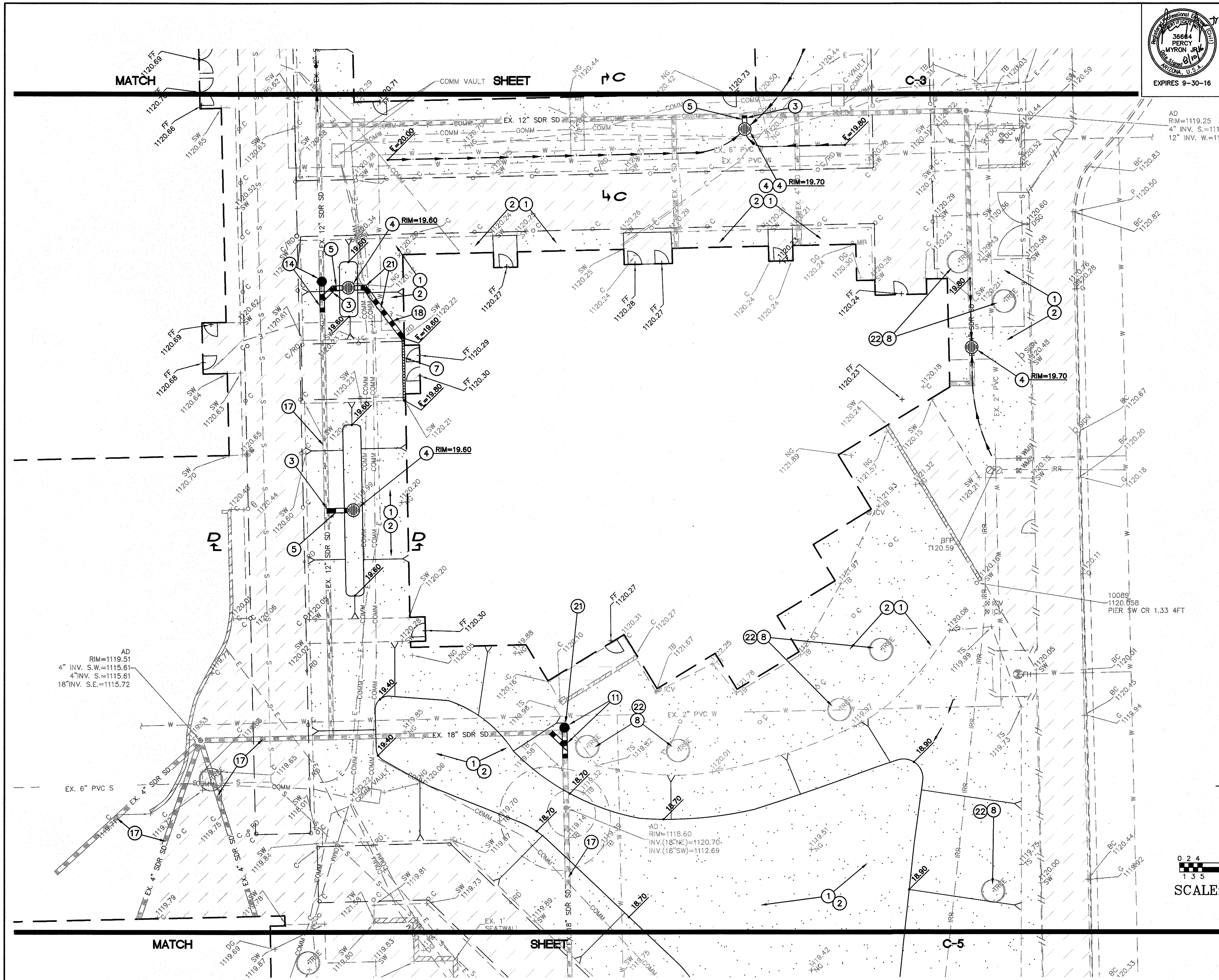
GRADING AND DRAINAGE PLAN

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

DRAINAGE CORRECTIONS AT GLENDALE CHALLENGER MIDDLE SCHOOL

DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	3	6	C-3
DATE: 8-10-16			

151004GR2.DWG



EXPIRES 9-30-16

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

DES. DRO | DRN. JCW | CKD DRO | JOB NO. 1510-04

GRADING AND DRAINAGE CONSTRUCTION NOTES:

1. REGRADE EXISTING LANDSCAPE AREA TO FINISH GRADE ELEVATIONS INDICATED.
2. CAP ALL SPRINKLER IRRIGATION LATERALS AND HEADS, REMOVE TURF AND INSTALL 2" OF DECOMPOSED GRANITE (1/4" MINUS MADISON GOLD).
3. CONNECT TO EXISTING PVC STORM DRAIN PIPE WITH INSERTA-TEE OR APPROVED EQUAL.
4. INSTALL NEW AREA DRAIN (SEE DETAIL SHEET C-2).
5. INSTALL 10" PVC DRAINAGE PIPE (ASTM D3034, SDR-35).
6. INSTALL 12" PVC DRAINAGE PIPE (ASTM D3034, SDR-35).
7. INSTALL TRENCH DRAIN (SEE DETAIL ON SHEET C-2).
8. PROTECT EXISTING TREE FROM DAMAGE. MODIFY GRADING SO THE ROOTS DO NOT GET DAMAGED.
9. REMOVE EXISTING AREA DRAIN AND CONNECT TO EXISTING 12" PVC PIPE. FIELD VERITY LOCATION AND ELEVATION
10. INSTALL NEW CONCRETE SIDEWALK (MAG STANDARD DETAIL 230) MAXIMUM CONTROL JOINT SPACING SHALL BE 10' ON CENTER. JOINTS SHALL HAVE 1/2" RADIUS TO MATCH EXISTING SIDEWALKS
11. REMOVE EXISTING 12"-90° BEND OR 45° BEND AND INSTALL WYE AND CLEANOUT (SEE DETAIL ON SHEET C-2).
12. CONNECT TO EXISTING 6" PVC PIPE WITH NEW 6" WYE.
13. INSTALL 6" PVC DRAINAGE PIPE (ASTM D3034, SDR-35).
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15. REPAIR OR REPLACE GRANITE IRRIGATION AND LANDSCAPING DISTURBED BY THE NEW STORM DRAIN INSTALLATION AND GRADING.
16. SAWCUT AND REMOVE EXISTING CONCRETE SIDEWALK.
17. HYDROVAC ALL EXISTING STORM DRAIN LINES TO REMOVE DIRT AND DEBRIS FROM ALL CATCH BASINS AND DRYWELLS.
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21. POTHOLE AND FIELD VERIFY ELEVATION AND LOCATION OF EXISTING UTILITY LINES PRIOR TO CONSTRUCTION. PROTECT FROM DAMAGE.
22. CONVERT EXISTING SPRINKLER IRRIGATION VALVE THAT SERVED THE AREA, TO A DROP IRRIGATION VALVE. PROVIDE WATER TO EXISTING TREES WITH POLY-TUBING AND 4 EMITTERS TO EACH TREE.

NOTE:

SPRAY AREA WHERE LANDSCAPING IS BEING CONVERTED FROM TURF TO DECOMPOSED GRANITE WITH TWO APPLICATIONS OF TURF KILLER PRIOR TO PLACEMENT OF GRANITE.

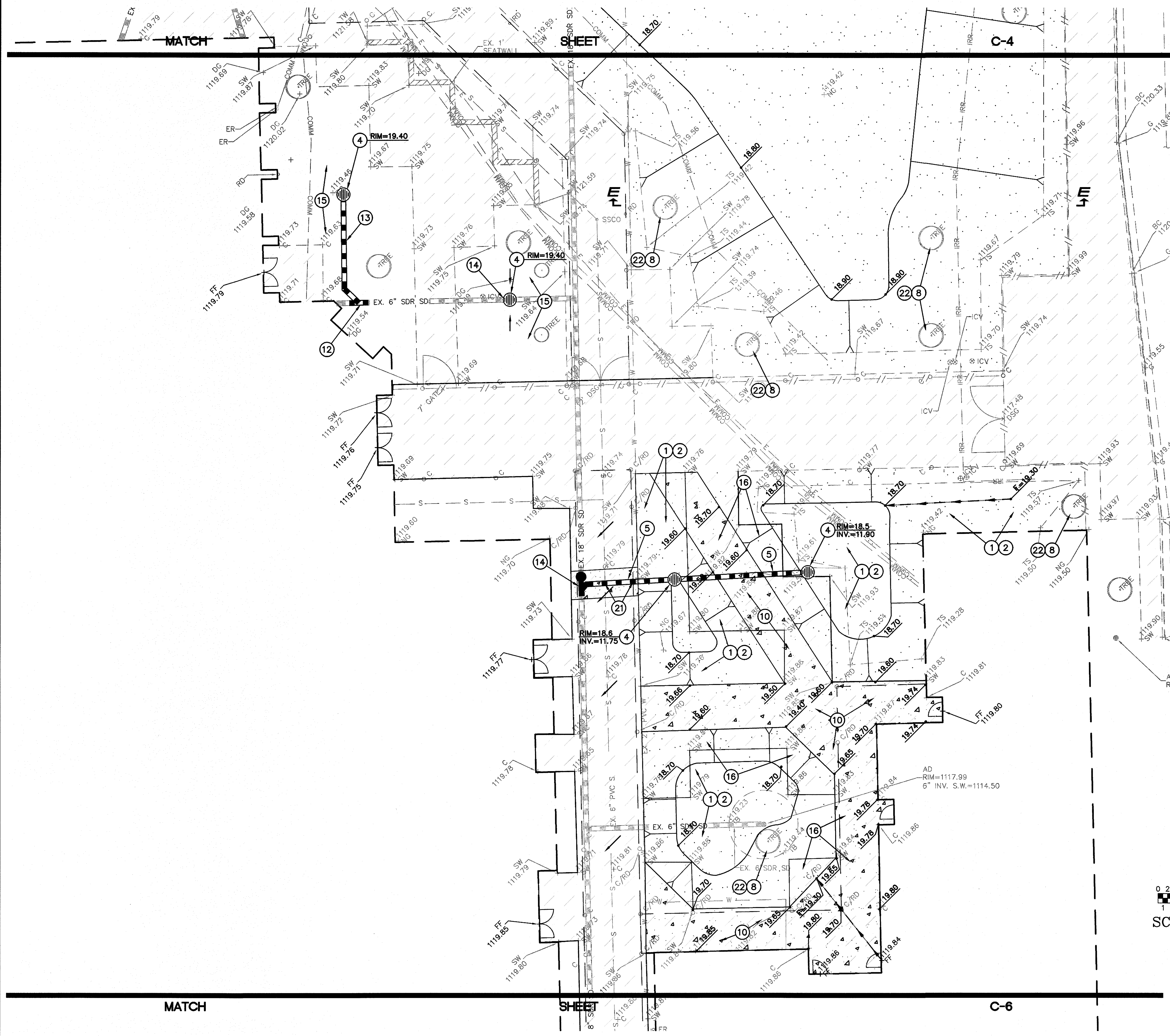
GRADING AND DRAINAGE PLAN

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

DRAINAGE CORRECTIONS AT GLENDALE CHALLENGER MIDDLE SCHOOL

DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	4	6	C-4
DATE: 8-10-16			

1510-04GR3.DWG



HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

36654 PERCY MYRON JR. 8/10/16 ARIZONA, U.S.A.
EXPIRES 9-30-16

DES. DRO	DRN. JCW	CKD DRO	JOB NO. 1510-04

GRADING AND DRAINAGE CONSTRUCTION NOTES:

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0 2 4 10
1 3 5 20
SCALE: 1"=10'

Call at least two full working days before you begin excavation.
ARIZONA 811
Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348) In Maricopa County: (602) 263-1100

GRADING AND DRAINAGE PLAN

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

DRAINAGE CORRECTIONS AT GLENDALE CHALLENGER MIDDLE SCHOOL

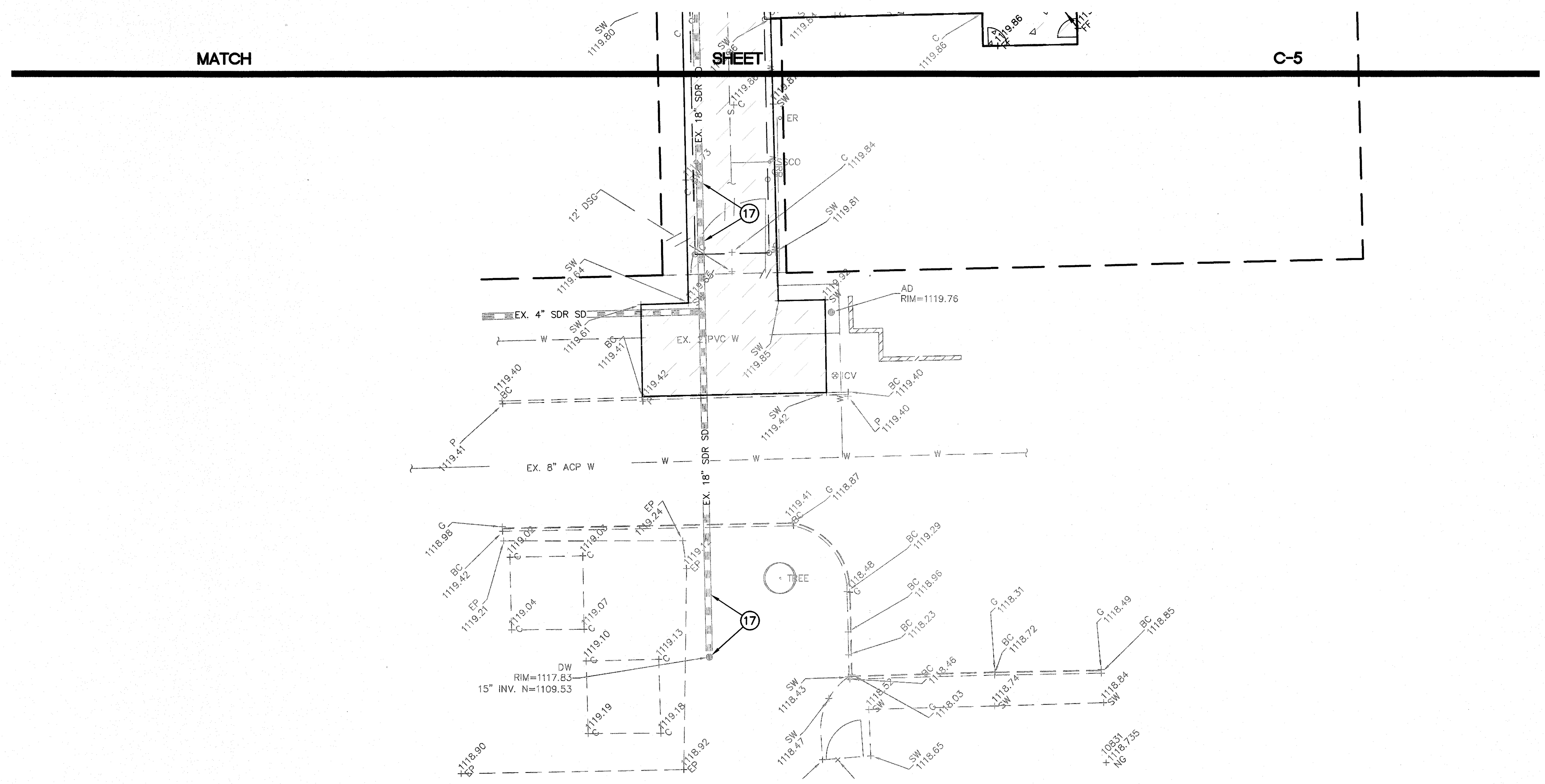
DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	5	6	C-5
DATE: 8-10-16			

1510-04GR4.DWG

EXPIRES 9-30-16

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

DES. DRO	DRN. JCW	CKD. DRO	JOB NO. 1510-04



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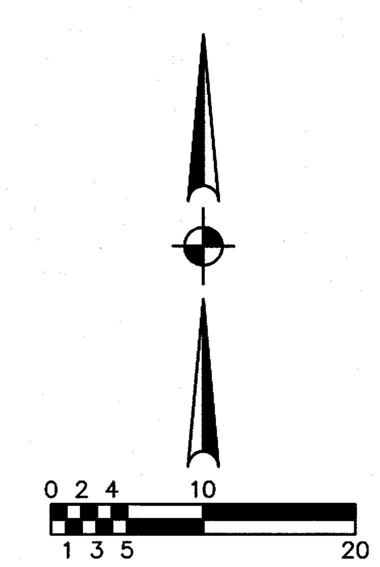

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GRADING AND DRAINAGE PLAN

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

DRAINAGE CORRECTIONS AT GLENDALE CHALLENGER MIDDLE SCHOOL

DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	6	6	C-6
DATE: 8-10-16			

151004GR5.DWG

STORM WATER MANAGEMENT PLAN
FOR THE
DRAINAGE CORRECTIONS
AT
CHALLENGER MIDDLE SCHOOL

SITE ADDRESS: 6905 W. MARYLAND AVENUE
GLENDALE, ARIZONA 85303

FOR

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40 (OWNER)

7301 N. 58TH AVENUE
GLENDALE, ARIZONA 85303
PHONE: (623) 842-8100
CONTACT: GREG GILLIAM

36654
PERCY
MYRON JR.
ARIZONA, U.S.A.
EXPIRES 9-30-16

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

DES. DRO	DRN. JCW	CKD. DRO	JOB NO. 1510-04

PROJECT DESCRIPTION

A. PROPOSED CONSTRUCTION ACTIVITY:
THIS PROJECT CONSISTS OF CONSTRUCTING NEW SIDEWALK, REMOVING AND REPLACING EXISTING SIDEWALK. CONSTRUCTION OF NEW RETENTION BASIN AND LANDSCAPING ON AN EXISTING MIDDLE SCHOOL CAMPUS. SOIL DISTURBING ACTIVITIES WILL INCLUDE CLEARING, GRADING, TRENCHING AND BACKFILLING FOR UTILITIES, CONCRETE INSTALLATION AND LANDSCAPING.

B. SEQUENCE OF CONSTRUCTION ACTIVITY:
THE SEQUENCE OF EVENTS IS ANTICIPATED TO BE AS FOLLOWS:
1) CLEARING AND GRUBBING
2) ROUGH GRADING
3) INSTALLATION OF UTILITIES
4) FINAL GRADING
5) CONCRETE AND IMPROVEMENTS
6) LANDSCAPING IMPROVEMENTS

C. AREA OF SOIL DISTURBANCE:
SOIL: SILTY SAND
ERODABILITY: MODERATE
IT IS ESTIMATED THAT THE TOTAL AREA OF SOIL DISTURBANCE IS APPROXIMATELY 2.42 ACRES.

D. RUN-OFF COEFFICIENTS:
THE ESTIMATED RUN-OFF COEFFICIENTS FOR THE PROJECT ARE AS FOLLOWS:
1) PRE-DEVELOPMENT RUN-OFF COEFFICIENT = 0.80
2) POST-DEVELOPMENT RUN-OFF COEFFICIENT = 0.81

E. QUALITY OF SITE STORM WATER DISCHARGE:
PRIMARY POLLUTANT: SITE SOIL
IT IS NOT ANTICIPATED THAT ANY HAZARDOUS MATERIALS WILL TYPICALLY BE CONTAINED WITHIN STORM WATER DISCHARGE. THE EXCEPTION TO THIS WOULD BE ANY FUELS OR LUBRICANTS LEAKED FROM VEHICLES OR EQUIPMENT AND ANY FERTILIZERS OR HERBICIDES USED DURING THE LANDSCAPE IMPROVEMENTS.

F. RECEIVING BODY OF WATER:
THE ULTIMATE RECEIVING BODY OF WATER WHICH WOULD RECEIVE ANY STORM WATER IN EXCESS OF THAT CONTAINED WITHIN THE PROPOSED AND EXISTING RETENTION BASINS, IS SALT RIVER.

G. GRADING AND DRAINAGE PLAN:
THE GRADING AND DRAINAGE PLAN AS PREPARED BY HESS-ROUNTREE, INC., PROJECT #1510-04 SHALL BE CONSIDERED A PART OF THE STORMWATER MANAGEMENT PLAN, AND ALL FINAL GRADING AND IMPROVEMENTS SHALL BE IN ACCORDANCE WITH THAT PLAN

H. NO WATER BODIES ARE ON SITE.

EROSION AND SEDIMENT CONTROLS

A. IMMEDIATELY FOLLOWING CLEARING AND GRUBBING, AND AS PART OF THE INITIAL ROUGH GRADING, ALL RETENTION BASINS SHALL BE CUT TO GRADE AND PERIMETER BERMS CONSTRUCTED. THE BASINS AND BERMS SHALL CONSTITUTE THE REQUIRED SEDIMENT BASINS. GRADES SHALL BE CUT (OR BERMING OR STRAW BALES SHALL BE PROVIDED) TO ASSURE THAT RUNOFF IS CONVEYED TO THE BASINS.

B. A STABILIZED CONSTRUCTION ENTRANCE CONSISTING OF A MINIMUM OF 6" OF 1"-3" COARSE AGGREGATE SHALL BE INSTALLED AS SHOWN. ALL CONSTRUCTION TRAFFIC SHALL ENTER THROUGH THIS ENTRANCE. THE STABILIZED CONSTRUCTION ENTRANCE SHALL BE GRADED OR REPLACED WHEN IT BECOMES SATURATED OR MATTED WITH SITE SOILS. THE PAVED STREET ADJACENT TO THE SITE ENTRANCE SHALL BE SWEPT ON A REGULAR BASIS TO REMOVE ANY EXCESS MUD OR DIRT TRACKED FROM THE SITE.

C. ANY DISTURBED AREAS WHERE CONSTRUCTION HAS PERMANENTLY OR TEMPORARILY CEASED SHALL BE STABILIZED TO PREVENT EROSION. AN ACCEPTABLE STABILIZATION METHOD IS HYDROSEEDING. AREAS WHICH WILL BE REDISTURBED WITHIN 21 DAYS DO NOT HAVE TO BE STABILIZED.

D. THE RETENTION BASINS WHICH ARE SIZED TO CONTAIN THE 100-YR STORM EVENT SHALL ALSO ACT AS THE REQUIRED SEDIMENT BASINS FOR THE PROJECT AND SHALL BE INSPECTED ON A MONTHLY BASIS AND AFTER EVERY HEAVY RAINFALL. NO FLOOD WATER AND THUS NO SEDIMENT CARRIED BY FLOOD WATER ESCAPES THESE BASINS. AS SUCH SEDIMENT SHALL BE REMOVED FROM THE BASINS AS NECESSARY TO MAINTAIN 100% OF THE REQUIRED CAPACITY OF THE BASIN DURING CONSTRUCTION.

NOTE:

ALL BUBBLER BOXES, AREA DRAINS, CATCH BASINS, TRENCH DRAINS, ETC. SHALL HAVE TWO LAYERS OF MIRAFI 100X FABRIC INSTALLED BENEATH THE GRATE. FABRIC SHALL NOT BE REMOVED UNTIL PAVING AND LANDSCAPING ARE COMPLETE.

THESE PLANS HAVE BEEN SUBMITTED TO THE FOLLOWING UTILITY COMPANIES AND THE WORK CONTAINED IN THESE PLANS HAS BEEN APPROVED BY THESE COMPANIES WITHIN THEIR AREA OF INTEREST. THE SIZE AND LOCATIONS, AS SHOWN OF THE GAS, TELEPHONE AND POWER LINES, AND CONNECTIONS AGREE WITH THE INFORMATION CONTAINED IN THE UTILITY COMPANY'S RECORDS. WHERE THE WORK TO BE DONE CONFLICTS WITH ANY OF THESE UTILITIES, THE CONFLICTS WILL BE RESOLVED AS SPECIFIED IN THE SPECIAL PROVISIONS AND/OR AS OTHERWISE NOTED ON THESE PLANS. CONFLICTS ARISING DURING THE COURSE OF CONSTRUCTION FROM UNFORSEEN CIRCUMSTANCES SHALL BE REPORTED TO THE INTERESTED UTILITY COMPANY AND BE RESOLVED BY THEM AND THE DESIGN ENGINEER.

	CO. REPRESENTATIVE CONTACTED	DATE SUBMITTED
U S SPRINT COMMUNICATIONS	COLIN SWORD	.
COX COMMUNICATIONS	TRAFFIC MANAGEMENT CENTER - DV 64	.
SALT RIVER PROJECT DISTRICT	SYLVIA ALVARADO	.
S R V W U A	SUZANA ORTEGA	.
ARIZONA PUBLIC SERVICE	VIRGINIA NISKALA	.
QWEST COMMUNICATIONS	CONFLICT LIAISON DEPARTMENT	.
EL PASO NATURAL GAS COMPANY	DENNIS SEGARS	.
KINDER MORGAN	D. TARANGO	.
SOUTHWEST GAS COMPANY	G. LOPEZ	.

ACREAGE

GROSS SITE AREA =19.79 ACRES
NET SITE AREA =19.43 ACRES
CONSTRUCTION AREA =2.42 ACRES

STORMWATER MANAGEMENT CONTROL

A. THE CONTRACTOR, TOGETHER WITH THE OWNER AS COPERMITTEES, SHALL SUBMIT A NOTICE OF INTENT AT LEAST TWO (2) DAYS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO THE EPA.

B. THE CONTRACTOR SHALL OBTAIN A DUST CONTROL PERMIT FROM THE MARICOPA COUNTY HEALTH DEPARTMENT AND SHALL WATER THE SITE AT AN ADEQUATE FREQUENCY TO MINIMIZE AIRBORNE PARTICLES.

C. THE CONTRACTOR SHALL MAINTAIN A COPY OF THE STORMWATER POLLUTION PREVENTION PLAN AND ALL RECORDS AT THE CONSTRUCTION SITE.

D. THE CONTRACTOR SHALL INSPECT THE CONSTRUCTION SITE AT LEAST ONCE EVERY SEVEN (7) DAYS AND WITHIN TWENTY-FOUR (24) HOURS OF A RAINFALL OF 0.5" OR MORE. THE CONTRACTOR SHALL PREPARE A REPORT DOCUMENTING THEIR FINDINGS ON THE CONDITIONS OF THE CONTROLS AND ANY STABILIZED AREAS. THE CONTRACTOR SHALL MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY TO CORRECT ANY OBSERVED SEDIMENT OR EROSION PROBLEMS.

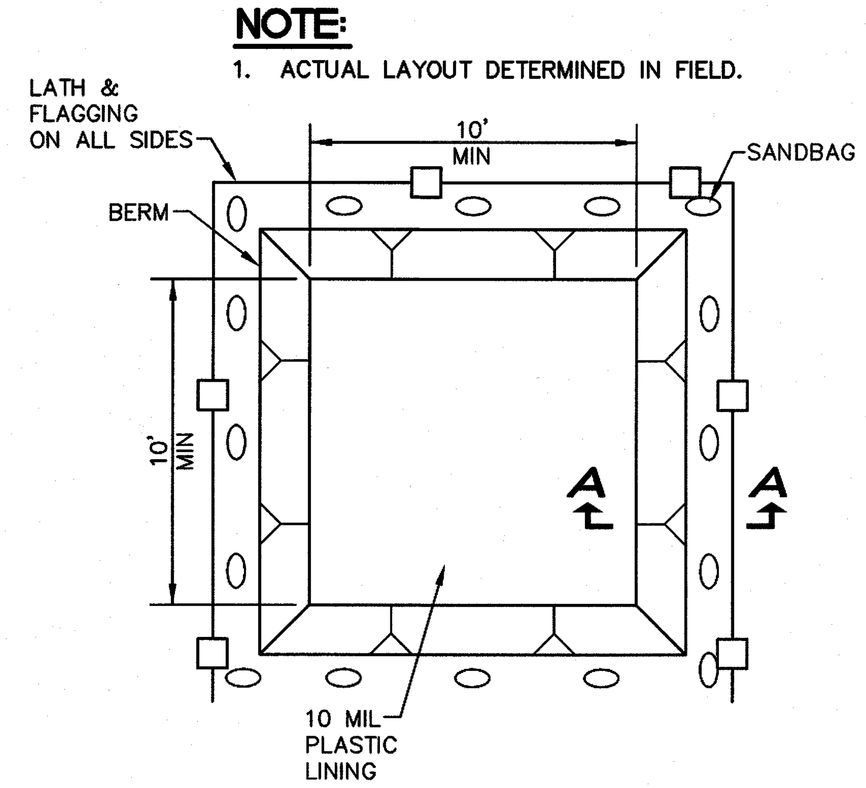
E. PERMANENT LANDSCAPING AND PLACEMENT OF FINAL COVER MATERIALS SHALL OCCUR AS SOON AS PRACTICAL AFTER COMPLETION OF GRADING.

F. THE CONTRACTOR, TOGETHER WITH THE OWNER, SHALL FILE A NOTICE OF TERMINATION WITH THE EPA AFTER COMPLETION OF ALL CONSTRUCTION AND LANDSCAPING ACTIVITIES.

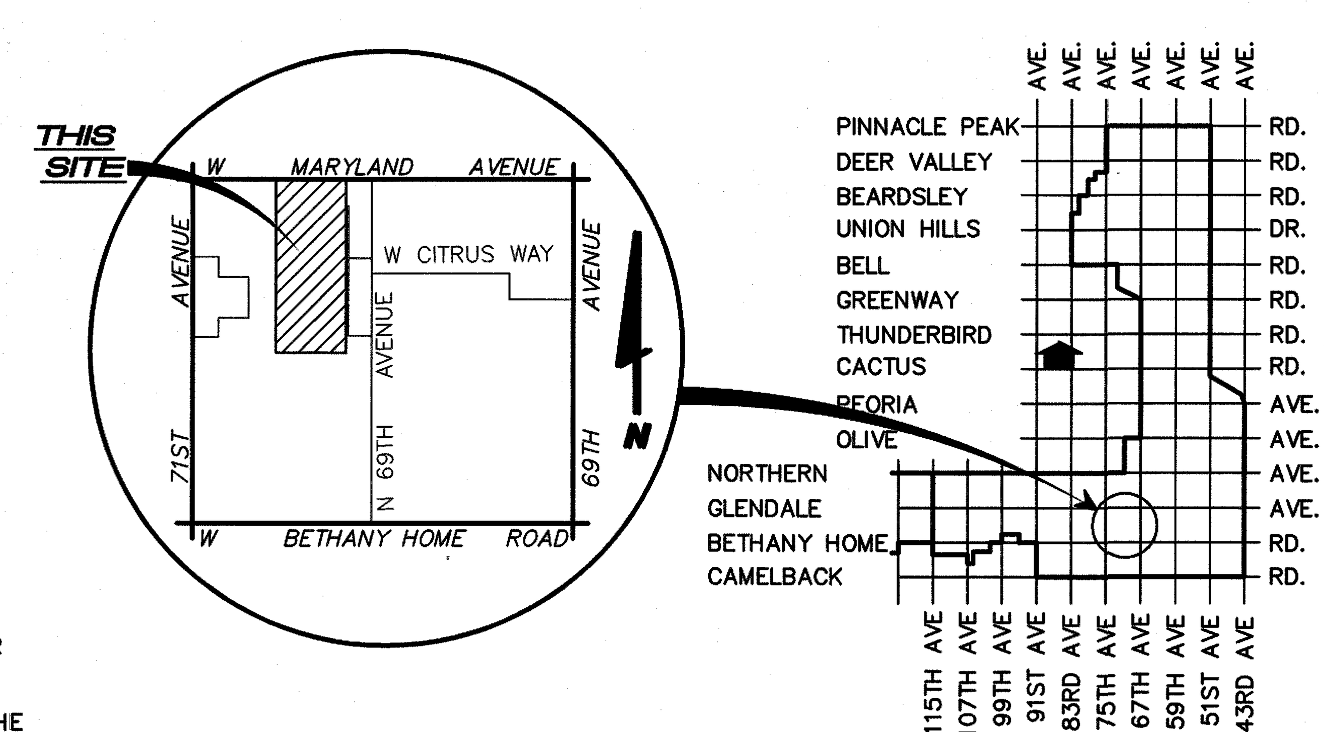
G. THE TERMS & CONDITION OF THIS PERMIT WILL BE MET.

NOTE:

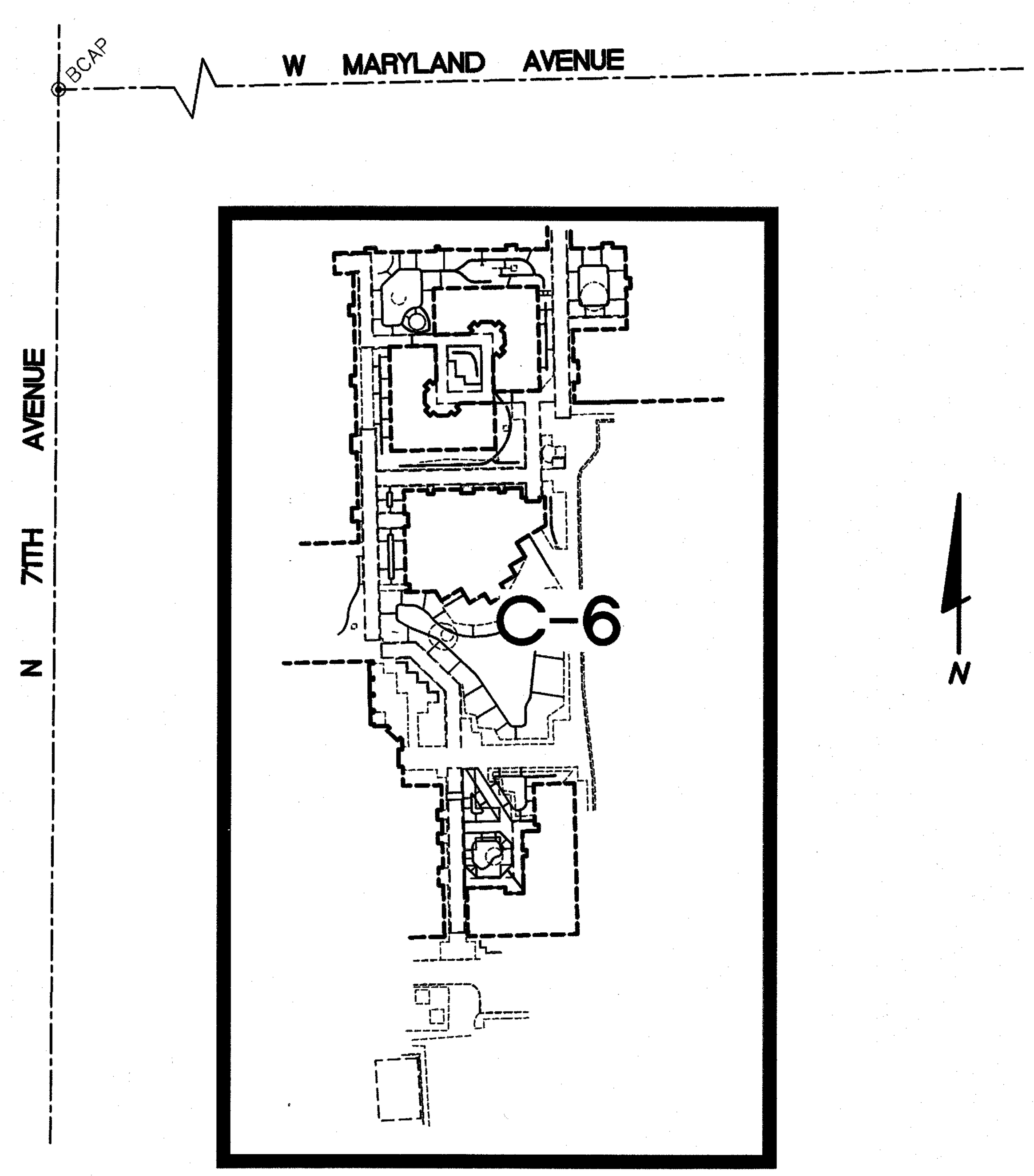
1. ACTUAL LAYOUT DETERMINED IN FIELD.



CONCRETE WASHOUT (BMP-99)
NOT TO SCALE



VICINITY MAP
NOT TO SCALE



SHEET INDEX MAP
NOT TO SCALE

OWNER/DEVELOPER:

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
7301 NORTH 58TH AVENUE
GLENDALE, ARIZONA 85303
PHONE: (623) 842-8100
CONTACT: GREG GILLIAM

ENGINEER:

HESS-ROUNTREE, INC.
9831 S. 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044
PHONE: (480) 496-0244
FAX: (480) 496-0094
CONTACT: PERCY MYRON JR., P.E.

SHEET INDEX:

PLANS ACCEPTANCE

THE CITY OF GLENDALE ACCEPTS THESE PLANS FOR CONSTRUCTION, AS BEING IN GENERAL COMPLIANCE WITH PLAN PREPARATION REQUIREMENTS OF THE CITY. RESPONSIBILITY FOR THE COMPLETENESS AND ACCURACY OF THE PLANS AND RELATED DESIGNS RESIDES WITH THE ENGINEER AND THE ENGINEERING FIRM OF RECORD.

LAND DEVELOPMENT ENGINEER DATE

TRANSPORTATION ENGINEER DATE

RECORD DRAWING

I CERTIFY THAT THE LOCATIONS, ELEVATIONS, DEPTHS, AND RECORD DRAWING COMMENTS ACCURATELY REFLECT THE EXISTING FIELD CONDITIONS AND MATERIALS ACTUALLY USED DURING CONSTRUCTION. THIS CERTIFICATION IS BASED ON INFORMATION OBTAINED UNDER BY DIRECT SUPERVISION AND IS CORRECT AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

NAME ______ DATE ______

REGISTRATION NO. ______ EXP.DATE ______

REVD BY: ______
ENGINEERING DEPARTMENT

REVIEWED BY:

LAND DEVELOPMENT ENGINEER DATE

DRYWELL CERTIFICATION

I CERTIFY THAT ALL DRYWELLS HAVE BEEN REGISTERED WITH AND CONFORM TO ALL REQUIREMENTS OF THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ).

NAME ______ DATE ______

COMPANY ______

GENERAL NOTES FOR STORM WATER POLLUTION PREVENTION:

A. A COPY OF THE CONTRACTOR'S NOI AND TWO (2) COPIES OF THE REVIEWED AND SIGNED SWPPP MUST BE RECEIVED BY THE CITY'S DEVELOPMENT SERVICES CENTER PRIOR TO ANY PERMIT BEING ISSUED. A COPY OF THE APPROVED GRADING AND DRAINAGE PLAN, TOGETHER WITH A COPY OF THE NOTICE OF INTENT (NOI) AND THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP), SHALL BE MAINTAINED ON THE SITE AND AVAILABLE FOR REVIEW. THOSE ELEMENTS OF THE GRADING AND DRAINAGE PLAN PERTINENT TO OR REFERENCED ON THE SWPPP SHALL BE CONSIDERED A PART OF THE SWPPP. ALL STORM WATER POLLUTION PREVENTION PLANS SHALL FOLLOW THE DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY, ARIZONA, VOLUME III, EROSION CONTROL.

B. THE CITY'S REVIEW OF ALL AZPDES SUBMITTALS INCLUDING NOI, NOT & SWPPP IS INTENDED AS REVIEW ONLY, AND DOES NOT CONSTITUTE APPROVAL OF THE METHODS OR PLANS FOR MANAGING THE STORM WATER AND PROTECTING THE WATERS OF THE UNITED STATES. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ENSURING THAT ALL REQUIREMENTS OF THE CLEAN WATER ACT ARE ADHERED TO.

C. THE CITY'S ENGINEERING DIVISION SHALL BE NOTIFIED 48 HOURS BEFORE ANY ON-SITE AND/OR OFF-SITE CONSTRUCTION BEGINS. PHONE: 623-390-3630.

D. THE OPERATOR SHALL OBTAIN A DUST CONTROL PERMIT FROM MARICOPA COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES AND PERFORM MEASURES TO PREVENT EXCESS DUST.

E. THE OPERATOR SHALL PERFORM, AT A MINIMUM, A VISUAL INSPECTION OF THE CONSTRUCTION SITE ONCE EVERY MONTH AND WITHIN 24 HOURS OF RAINFALL GREATER THAN OR EQUAL TO ONE-HALF INCH. THE OPERATOR SHALL PREPARE A REPORT DOCUMENTING HIS/HER FINDINGS ON THE CONDITIONS OF THE SWPPP CONTROLS AND NOTE ANY EROSION PROBLEMS.

F. THE OPERATOR'S REPORT IS TO BE SUBMITTED TO THE CITY'S INSPECTOR FOR REVIEW. FACILITIES SHALL BE MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING. IN ADDITION, ALL TEMPORARY SILTATION CONTROLS SHALL BE MAINTAINED IN A SATISFACTORY CONDITION UNTIL SUCH TIME THAT CLEARING AND/OR CONSTRUCTION IS COMPLETED, PERMANENT DRAINAGE FACILITIES ARE OPERATIONAL, AND THE POTENTIAL FOR EROSION HAS PASSED.

G. THE OPERATOR SHALL AMEND THIS PLAN AS NECESSARY DURING THE COURSE OF CONSTRUCTION TO RESOLVE ANY PROBLEM AREAS, WHICH BECOME EVIDENT DURING THE CONSTRUCTION AND/OR DURING RAINFALLS. ALL CHANGES TO THE SWPPP MUST CONFORM TO THE DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY-VOLUME III, EROSION CONTROL.

H. THE PERMIT TEE SHALL FILE A NOTICE OF TERMINATION (NOT) AFTER COMPLETION OF CONSTRUCTION AND PLACEMENT OF FINAL LANDSCAPE MATERIALS. A COPY OF THE NOT IS TO BE SUBMITTED TO THE CITY'S ENGINEERING DIVISION TO CLOSE THE SWPPP PERMIT.

I. THE PERMIT TEE SHALL SAVE ALL RECORDS, INCLUDING THE NOI, SWPPP, NOT, AND INSPECTION REPORTS, ON FILE FOR MINIMUM OF THREE YEARS FROM THE DATE OF FILING THE NOT.

J. THE IMPLEMENTATION OF THESE PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE FACILITIES IS THE RESPONSIBILITY OF THE PERMIT TEE/CONTRACTOR UNTIL ALL CONSTRUCTION IS APPROVE AND THE NOT IS SUBMITTED TO THE CITY'S ENGINEERING DIVISION.

K. THE FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES IN SUCH A MANNER AS TO INSURE THAT SEDIMENT-LADEN WATER DOES NOT ENTER THE CITY'S DRAINAGE SYSTEM OR VIOLATE APPLICABLE WATER STANDARDS. THE FACILITIES SHOWN MUST BE INSTALLED AND IN OPERATION PRIOR TO ANY GRADING OR LAND CLEARING

LEGEND:

CATCH BASIN
AREA DRAIN OR IN LINE DRAIN
CONCRETE WASHOUT
STORM DRAIN PIPE
DRAINAGE DIRECTION

ARIZONA PUBLIC SERVICE-ELECTRICAL SOUTHWEST GAS CORPORATION - GAS SALT RIVER PROJECT - IRRIGATION SALT RIVER PROJECT - ELECTRICAL QWEST COMMUNICATIONS - CABLE TV (OTHER) **AGENCIES ALSO REQUIRING PERMITS WHEN INVOLVED ARE: MARICOPA COUNTY HIGHWAY DEPT., A.D.O.T., CITY OF PHOENIX, CITY OF PEORIA, SANTA FE RAILROAD, EL PASO NATURAL GAS, & MARICOPA COUNTY FLOOD CONTROL DISTRICT.	PLANS SUBMITTED TO (NAME)	PLANS REVIEWED BY (NAME)	PERMIT RECEIVED DATE

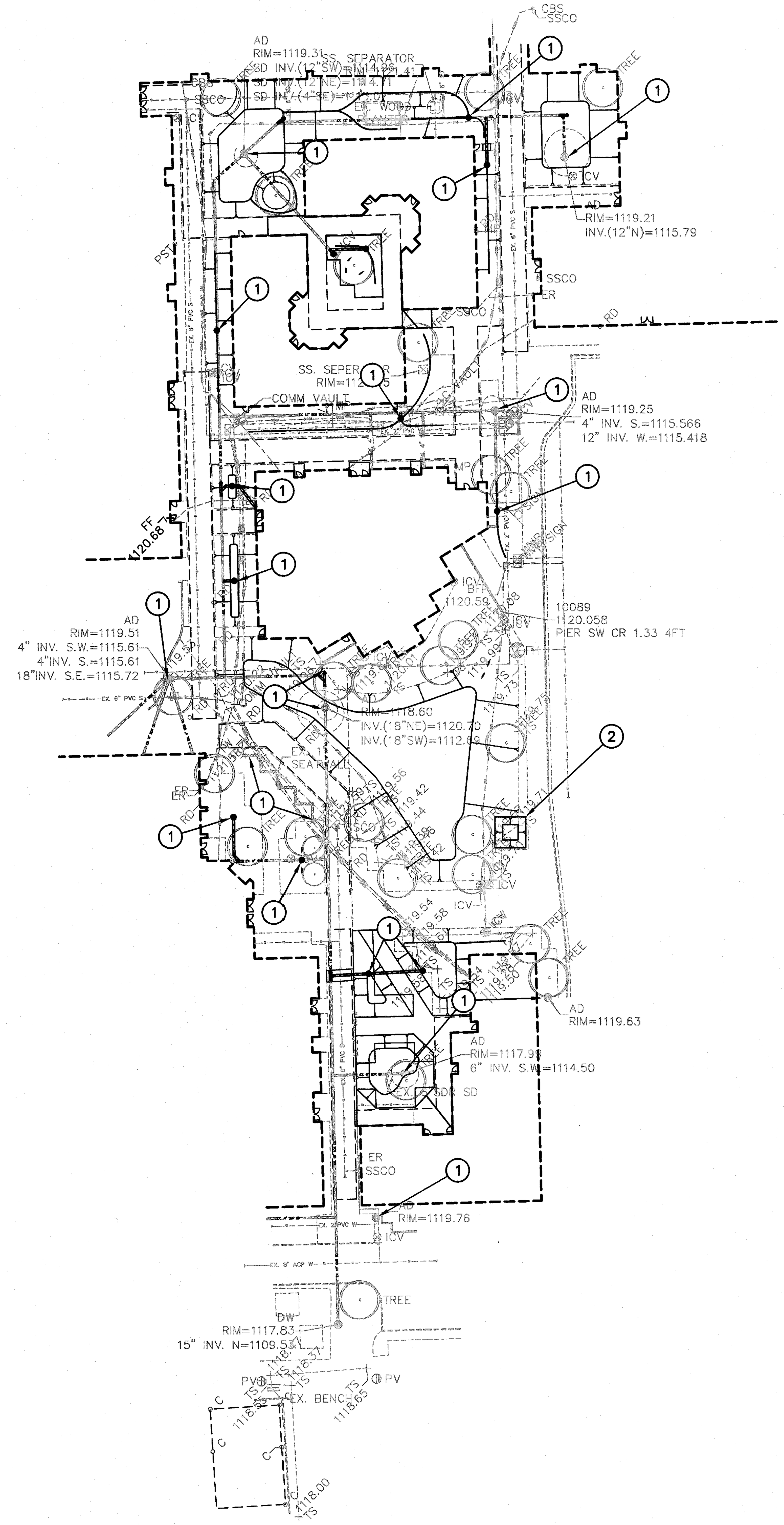
COVER SHEET

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

DRAINAGE CORRECTIONS AT
GLENDALE CHALLENGER MIDDLE SCHOOL

DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	1	2	C-7
DATE: 8-10-16			

1510-04SWM1.DWG



36664
PERCY
MYRON JR.
ARIZONA, U.S.A.
EXPIRES 9-30-16

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

DES. DRO	DRN. JCW	CKD DRO	JOB NO. 1510-04

CONSTRUCTION NOTES:

1. INSTALL MIRAFI FABRIC INLET PROTECTION (BMP-69).
2. INSTALL CONCRETE WASHOUT BASIN (BMP-69). EXACT LOCATION OF INSTALLATION PER CONTRACTOR

0 10 20 40 80

SCALE: 1"=40'

STORM WATER MANAGEMENT PLAN

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

DRAINAGE CORRECTIONS AT GLENDALE CHALLENGER MIDDLE SCHOOL

DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	2	2	C-8
DATE: 8-10-16			

151004SW2.DWG

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36664
PERCY
MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 02 21 13

CONSTRUCTION STAKING

Construction staking shall be performed by a licensed Surveyor acceptable to the Architect. Staking will be paid from the Construction Staking Allowance in the Contract.

Stakes: A minimum one set of construction grade stakes or "blue-tops" if possible of the following kind and at the stated interval shall be set. Blue-tops shall be set for all finish grading, sidewalk, curbing, concrete valley gutters, paving subgrade and A.B.C. and shall be left in place until checked and certified by the Civil Engineer.

1. Field staking control.
2. Two site benchmarks.
3. Mark out demo/sawcuts.
4. Rough grading cut and fill for onsite: at 50-foot intervals and grade breaks.
5. Concrete sidewalk: line and grade at 25-foot intervals and grade breaks.
6. Storm drain: 25-foot intervals and grade breaks.
7. As-builts finish grade.
8. Storm drain area drains/catch basins: location and elevation.
9. Prepare and submit as-built drawings to Contractor for submittal.
10. Office computer calculation for above staking.

END OF SECTION

Registered Professional Engineer (Civil)
CERTIFICATE NO. 36664
PERCY MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 31 01 00

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Perform earthwork as shown on the Drawing and as specified herein.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Procure necessary permits or certificates required by City of Phoenix, State of Arizona and Maricopa County. Comply with applicable federal, state and local ordinances, including MAG Standard Specifications and Details. Owner to pay for permits.

B. Layout of all Work under this Section shall be made by a licensed Engineer/Surveyor acceptable to the Architect.

C. General Contractor shall give the Work his personal supervision. In his absence, he shall leave a responsible representative in charge who shall have the authority to receive and execute orders from the Architect and/or his representative.

1.03 PROJECT/SITE CONDITIONS

A. Environmental Requirements: No fill materials shall be placed, spread or rolled during unfavorable weather conditions. When the Work is interrupted by rain, fill operations shall not be resumed until it can be shown to the Civil Engineers/Architect's satisfaction that the moisture content and density of the previously placed fill are as specified.

B. Visit the site. Examine and note conditions as to the character and extent of Work involved.

PART 2 PRODUCTS

2.01 FILL

A. Cleaned onsite soils may be used for fills in all areas of the site.

B. Fill materials shall be approved by the Geotechnical Engineer and Civil Engineer and shall have low swell potential and be free of organic or deleterious material.

C. Imported fill of low or non-expansive soils shall conform with the following requirements:

Maximum Percent Passing No. 200 Sieve	15 percent
Maximum Particle Size	6 inches (1 inch in landscape or turf areas)
Maximum Swell Potential Within exterior concrete slabs	1.5 percent *

*Based on a sample which is remolded to 95% of the ASTM D698 maximum dry density at a moisture content of 2 percent below optimum, placed under a surcharge load of 100 psf and wetted.

PART 3 EXECUTION

3.01 PREPARATION

A. Existing Utilities:
   1. Where existing utilities not shown on the Drawings are encountered, support, shore up, protect same and immediately notify Engineer and General Contractor. Allow entrance, opportunity and ample time for measures necessary for continuance and/or relocation of such services.
   2. Where noted on Drawings, cut and cap all street connections encountered in the excavating along curb line and mark location so they can subsequently be located and reconnected as required.

B. Protection:
   1. Keep all excavations, pits, trenches, etc. entirely free from water.
   2. Protect excavations from rain or water from any source during construction. Use suitable pumping equipment or other means as required by conditions. Continue pumping as necessary until completion of project or until released by Engineer.
   3. Conduct Work in an orderly manner so as not to create a nuisance. Dirt shall not be permitted to accumulate on streets or sidewalks nor to be washed into sewers.
   4. During construction operations and after building construction, buildings shall be protected from surface water run-off and drainage from surrounding heights. Run-off water shall be diverted around buildings and construction operations.

C. Layout:
   1. Maintain all bench marks, control monuments and stakes, whether newly established by Surveyor or previously existing. Protect from damage and dislocation. If necessary to disturb existing bench marks, have Surveyor reestablish in a safe place.
   2. If any discrepancies are found by Surveyor between the Drawings and actual conditions at the site, Engineer reserves the right to make such minor adjustments in Work specified as necessary to accomplish the intent of the contract Documents, without increased cost to Owner.

3.02 EXCAVATABILITY

A. The excavatability of site materials is difficult to evaluate based only on the exploration equipment used during the geotechnical design report. Therefore, the Geotechnical Engineer recommends that the Contractor evaluate the excavatability of site materials by performing test excavations with the size and type of equipment that Contractor plans on using at the site.

B. The near surface and underlying soils can probably be removed with conventional excavating equipment. Deeper excavations may be slower and more difficult to accomplish due to caving and presence of oversized material. Caving should be expected in the non-cohesive granular soils encountered. OSHA requires all excavations over five feet in depth, in which personnel are to enter, be either braced or sloped in accordance with OSHA regulations.

3.03 WORKABILITY

A. Wetting site soils such that moisture contents are at or above optimum could result in some soil pumping under dynamic loadings such as heavy construction equipment driving over the area. In the building area, some pumping is not detrimental to foundation or floor slabs provided the specified percent compaction is achieved. However, in flexible pavement areas where pumping has occurred, and in building areas where severe pumping has damaged subgrade conditions, the area shall be allowed to dry until soils are workable without pumping or the wetted areas removed and replaced with drier site soils.

3.04 GRADING

A. General Contractor shall provide personal supervision for the Work. Leaving a responsible representative in charge, when absent, who shall have the authority to receive and execute instructions from the Architect or his representative.

B. Grading tolerance shall be +0.00 feet and -0.10 feet.

C. The following requirements are for site grading under, within and extending five feet beyond the sidewalks, exterior concrete slabs, and concrete fire lanes.

D. Strip the entire site of all existing fill zones, any backfill zones and any unstable soils. During stripping observe the surface for evidence of buried debris, vegetation or disturbed materials which will require additional removal. If encountered, these materials shall be removed. Areas steeper than 5H to 1V should be benched and any depressions widened to accommodate compaction equipment.

E. Widen any resulting depressions as necessary to accommodate compaction equipment and provide a level base for placing fill.

F. Prepare the ground surface in fill areas and in areas cut to grade by scarifying, moisture conditioning and compacting the exposed surface soils to a minimum 10-inch depth. Moisture conditioning and compaction shall meet requirements under Section 3.07, Compaction.

G. Moisture condition and place engineering fill material required to elevate areas to specified subgrade elevations.

H. Placing, Spreading and Compacting Fill Materials: Fill materials shall be placed and compacted in horizontal lifts of thickness compatible with the compaction equipment used. Each layer shall be spread evenly, moisture conditioned and compacted per Section 3.7, Compaction. The Contractor shall widen any depressions as necessary to accommodate compaction equipment and provide a level base for placing fill. Compaction of each layer shall be continuous over its entire area and the compaction equipment shall make sufficient trips to insure that the required density has been obtained. No lift shall be placed until the previous lift has been approved. Fill operation shall be continued until the fill has been brought to the finished slopes and elevations shown on the Drawings. Imported fill shall conform to the requirements previously defined.

I. Compacted subgrade shall be maintained in a moist state and shall not be allowed to significantly dry prior to placing more fill or base course.

3.05 EXCAVATION

A. Excavation consists of removal and disposal of materials encountered to obtain required subgrade elevations.

B. Excavation for foundations and footings shall have clean vertical walls, all corners squared up. Keep entire excavation free from any loose material. Excavation shall conform to dimensions and elevations indicated with allowance for erection of forms, shoring and inspection of footings.

C. Material to be excavated shall be non-classified and shall include all earth or other materials encountered in excavating and grading. Where material encountered within the limits of Work is considered unsuitable by the Architect, such material shall be excavated below the grade shown on the Drawings as directed, and replaced with suitable material.

D. Earth forms for footings may be permitted provided the earth is suitable and self-supporting as approved by the Architect or Geotechnical Engineer. Earthbank forms for foundation walls will not be permitted.

E. Unauthorized excavation consists of materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect. Under footing, foundation bases, or retaining walls, fill unauthorized excavations by extending the indicated bottom elevations of footing or base at the excavation bottom, without altering required top elevation. Clean concrete fill may be used to bring elevations to proper position, only when acceptable to the Architect. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavations, unless otherwise directed by the Architect. Costs for testing, if required, shall be borne by the Contractor.

F. Stockpile satisfactory materials where directed, until required for backfill or fill. Locate and retain materials away from edge of excavations, even though such excavations are sheeted and braced to prevent such material falling or sliding into the excavations.

G. Maintain sides and slops of excavations in a safe condition until completion of backfilling, by scaling, benching, shelving or bracing. Take precautions to prevent slide or cave-ins.

3.06 BACKFILLING

A. Place backfill about the buildings and structures as far as practical, as the Work of construction progresses. Backfilling against concrete work shall be done only when approved and directed. Backfill shall be deposited in layers of not more than six inches (6") in depth, and for the full width of the cross section. The material shall be carefully watered during placing by means of a fine spray or other approved method, so that each layer shall be thoroughly and uniformly wetted as directed by the Architect. The moisture content of all the material shall be carefully controlled at all times, and shall be checked at proper intervals to insure correct moisture content for compaction specified.

Each layer of fill material shall be compacted by hand and machine tampers to the density required in Section 3.07 COMPACTION when forming subgrade for concrete areas or supporting concrete floor slabs or supporting building footings.

J. Backfilling of trenches shall progress as rapidly as the construction and testing of the Work will permit. In back-filling pipe trenches, approved fill shall first be compacted on both sides of the pipe in eight inch (8") layers to a depth of one foot over the top of the pipe. The remainder of the trenches shall be backfilled in compacted one-foot layers, except that fill in trenches in paved areas shall be compacted in six inch (6") layers to required grade.

3.07 COMPACTION

Compaction of cleaned exposed soil, imported soils, each lift of backfill, subbase fill, imported fill and base course materials shall be accomplished to the following density criteria:

Material	Percent Compaction (ASTM D698)
Cleaned exposed soil, imported soils, backfill and subbase fill:	
Below concrete sidewalk/slabs	90 max
Below pavement sections	95 min
Top soil in playfields and landscape areas	85-90 min
Miscellaneous Backfill not under buildings, concrete or paved areas	90 min

Compaction of clean, exposed site soils or fills of cleaned site soils within sidewalks and exterior concrete slab areas shall be accomplished with soils uniformly mixed at a moisture content of optimum to optimum plus three percent (+3%).

Compaction of imported soils within sidewalks and exterior concrete slab areas shall be accomplished with soils uniformly mixed at a moisture content of optimum plus or minus three percent (±3%).

Natural undisturbed soils or compacted soils subsequently disturbed or removed by construction operations shall be replaced with materials compacted as specified above.

3.08 FINISH GRADING

A. Perform finish grading required as indicated or reasonably inferred to permit installation of Work of others as shown on Drawings. After final clean-up of exterior and removal of trash and construction of the buildings, the site shall be graded to slopes and elevations as indicated on the Drawings and as directed by the Architect. Additional material required for finish grading shall be of topsoil quality, provided, placed and graded by the Contractor. Lawn areas around walks shall provide good slope drainage away from buildings as indicated. Rake indicated site and lawn areas smooth and level to a tolerance of plus or minus 0.1 foot from elevations indicated.

B. Existing clean site soils free of debris and rocks over 1 inch in diameter may be used for fills in landscape areas.

3.09 FIELD QUALITY CONTROL

A. Test: Field density tests shall be made by an approved independent soils testing laboratory, as defined herein, or at the request of the Architect and paid for with the testing allowance. When these tests indicate that the density of any area(s) is below the required density, that particular area(s) shall be reworked until the required density has been obtained.

B. Restore any damage to adjacent properties, street and the like, caused by operations of this Section to original condition without additional cost to Owner.

3.10 CLEANING

A. Conduct Work in an orderly and workmanlike manner and so as not to create a nuisance. Dirt shall not be permitted to accumulate on streets or sidewalks nor to be washed into sewers.

B. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

3.11 AS-BUILT DRAWINGS

A. The Surveyor shall provide certified, signed and sealed as-builts for all finish grade elevations indicated on the Drawings on 4 mil mylar and AutoCAD disk (2011 version or later). The Contractor shall schedule the Work to allow the Surveyor to obtain the as-builts. This Work will not be accepted until as-builts are approved by the Design Civil Engineer and City of Glendale.

END OF SECTION

Registered Professional Engineer (Civil)
CERTIFICATE NO. 36664
PERCY MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 32 16 00

CONCRETE CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Installation of concrete curbs, gutters, sidewalks, and driveways as shown on the Drawings and as specified herein.

1.02 REFERENCE STANDARDS

A. MAG Specifications Section 340: Concrete curb, gutter, sidewalk, driveways and alley entrances.

B. City of Glendale and MAG Standard Details.

1.03 SUBMITTALS

A. Mix design to Architect a minimum of seven (7) days prior to start of construction.

B. Tests: Submit three certified copies of test results, samples and suppliers certification that materials conform to specified criteria.

1.04 QUALITY ASSURANCE

A. Contractor shall obtain, at his expense, all necessary construction permits and shall coordinate all necessary inspections with City of Glendale.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete Curb, Gutter (where not next to driveway) and Sidewalk:

Concrete: 2,500 psi (28 day strength), MAG Section 725

B. Concrete Driveway and Curb and Gutter (where next to driveway):

Concrete: 4,000 psi (28 day strength), MAG Section 725

PART 3 EXECUTION

3.01 CONSTRUCTION METHODS FOR CONCRETE CURB, GUTTER, SIDEWALK AND DRIVEWAY

A. Execute Work in accordance with MAG Specifications Section 340 and MAG Details and City of Glendale specifications and details.

B. Sawcut existing pavements and concrete joined by new construction to a true line with straight vertical edges free from irregularities.

C. Construct and compact true to grades and line shown on the Drawings.

D. Curb machines may not be used.

E. Do not place material displaced in the construction on the base and/or surfacing material already in place on the roadway nor the excavated material in such a manner as to interfere with access to property or traffic flow in the street.

3.02 TESTING

A. Inspection and testing will be performed by an independent testing agency employed and paid for in accordance with Section 01 43 26.

B. Provide free access to Work and cooperate with appointed firm.

C. Submit 3 copies of proposed mix design of each class of concrete including water/cement/strength and all supporting data to testing agency and Architect for review a minimum seven (7) days prior to commencement of Work.

D. Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.

E. Four (4) concrete test cylinders will be taken for every 100 or less cubic yards of each class of concrete placed. Make and cure concrete compressive strength test specimens in accordance with ASTM C31. Construct storage box of sufficient size and design to provide protection required by paragraph 7(a).

F. One (1) additional test cylinder will be taken during cold weather concreting, and be cured on job site under same conditions as concrete it represents.

G. One (1) slump test will be taken in accordance with ASTM C-143 of each set of compressive strength test cylinders taken.

H. Where concrete is placed by pumping, tests shall be taken at the truck before concrete is placed in the pump.

I. Tests to be performed by testing agency personnel in accordance with ASTM C39.

3.03 CLEANING

A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

END OF SECTION

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36664
PERCY
MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/

SECTION 32 71 00

STORM DRAIN SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Storm Drain Construction as shown on the Drawings and as specified herein.

1.02 SUBMITTALS

A. General: Submittal requirements are specified in Section 01300 - Submittals.

B. Quality Control Submittals:
   1. Storm drainage pipe, fittings, cleanouts, etc.
   2. Area drains, catch basins
   3. Dry well
   4. Oil grease interceptor

1.03 PROJECT/SITE CONDITIONS

A. Visit the site. Examine and note conditions as to the character and extent of Work involved.

1.04 QUALITY ASSURANCE

A. Contractor shall obtain all necessary construction permits and shall coordinate all necessary inspections with the City of Glendale. Owner to pay for permits.

B. Construction staking shall be performed by a State of Arizona licensed Surveyor acceptable to the Architect and Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. As specified on the Drawings and as allowed per MAG Specifications and City of Glendale codes and requirements and as indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Failure to observe this requirement constitutes a waiver to subsequent claims to the contrary and holds Contractor responsible for correction(s) Architect may require. Commencement of Work will be construed as acceptance of subsurfaces.

B. Coordination with other work: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.02 STORM DRAIN CONSTRUCTION

A. Storm drain construction shall conform to the applicable requirements of MAG Specifications, Section 601, Trench Excavation, Backfilling and Compaction, Section 745, P.V.C. Sewer Pipe and Fittings and Section 603, Installation for High Density Polyethylene Pipe. Backfill and compaction shall be performed per Specifications, Section 02200, Earthwork, except as modified below.

B. Storm drain pipe shall consist of installing P.V.C. or H.D.P.E. storm drain pipe to the alignment and grades indicated on the Drawings.

C. Granular bedding will be required from four inches (4") below the bottom of the pipe to one foot (1') above the pipe. All clean dirt spoils generated from the installation of the storm drain lines shall be removed from the site and disposed of legally.

3.03 CATCH BASINS, AREA DRAINS, DRYWELLS AND OIL/GREASE INTERCEPTOR

A. Catch Basins, area drains, Bubbler Boxes, Drywells and oil/grease interceptors shall be installed per the details on the Drawings and per the MAG Standard Details as indicated on the Drawings.

3.04 "AS-BUILT" DRAWINGS

A. The Contractor's Surveyor shall provide as-builts for all site storm drain lines (outside building areas). The Contractor shall schedule the Work to allow the Surveyor to obtain as-builts for the actual locations and elevations of the completed storm drain line including location, invert elevation and rim elevation of all catch basins, area drains, cleanouts, bends, etc. As-builts shall be provided on 4 mil mylars, certified, sealed and signed by the Surveyor. Mylar and Auto CADD 2011 disk as-builts shall be submitted to the Design Civil Engineer, Owner, and City for review and approval. Project is not accepted until all parties listed above approve as-built Drawings.

3.05 CLEANING

A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of legally away from premises. Leave Work in clean condition.

END OF SECTION

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36664
PERCY
MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 33 70 00

DECOMPOSED GRANITE

DECOMPOSED GRANITE

The Work under this item shall consist of installing a 2 inch compacted thickness of decomposed granite at the locations as indicated on the plans. The Work shall conform to MAG Specifications Section 430.4 except that no 10-mm black polyethylene liner will be required. Two applications of pre-emergent (one prior to placement of granite and one after placement) will be required.

Granite shall conform to MAG Specifications Section 702.4 and have a size of 1/4 inch minus. Color shall be Madison Gold to match the existing granite at the site.

END OF SECTION

MENSENDICK STRUCTURAL

Glendale Elementary School District SFB Projects: Construction Cost Estimates

BRG:	Project:	Scope: Updated 9/1/16	Cost Estimate:
070440106-9999-010-BRG	Mensendick Structural		
	Phase 1	Temporary bracing of non-structural CMU walls - 55 panels	$ 192,500.00
		Estimated Phase 1 Subtotal	**$ 192,500.00**
	Phase 2	Installation of masonry control joints/repair CMU	$ 80,000.00
		Securing of decorative wythe of CMU	$ 60,000.00
		Repair of CMU surround the stair stepped cracks	$ 100,000.00
		Install helical piers	$ 400,000.00
		Grout injection of slab	$ 100,000.00
		Repair of the cracked CMU and rusted reinforcing	$ 250,000.00
		Riddle blockfill of new masonry, reseal with 10 year weatherization warranty and coating of Drylok extreme at exposed footing	$ 200,000.00
		Remove turf and irrigation against building and replace with decomposed granite from face of wall to 5'-0" away from building	$ 52,000.00
		Estimated Phase 2 Subtotal	**$ 1,242,000.00**
		Estimated Total Repair:	**$ 1,434,500.00**

SPS+ ARCHITECTS
Robert L Pian, AIA
William R Pittenger, RA, CSI
Mark A Davenport, AIA, LEED AP
Herb W Schneider, FAIA
Howell Lewis Shay, AIA

August 26, 2016

Mr. Greg Gilliam
Director of Maintenance & Operations
Glendale Elementary School District #40
Support Services
7015 W. Maryland Avenue
Glendale, AZ 85303

RE: Glendale Elementary School District #40
SFB Corrections at Mensendick School – Additional Services Request
SPS+ Architects Fee Proposal 1535M.1
GESD Purchase Order 3602080
SFB Project # 070440106-9999-010-BRG

Dear Mr. Gilliam:

Thank you for the opportunity to work with you on your SFB Corrections at the above referenced School. We understand this will be an SFB funded project using Building Renewal Grants. Thank you in advance for your consideration of our additional services request.

Additional Services Scope of work:
Structural remediation in accordance with the attached coversheet from our structural engineer Bixler and associates. Please see below for an executive summary:

- Structural: Recommend to make repairs to cmu and interior slabs for aesthetic and functionality reasons. Weatherization/Structural: please see below. This includes painting at areas of repair.
- Weatherization project conditions: There was a significant amount of damage discovered for the reinforcing steel near the bottom of the walls. When you add the moisture conditions present, the amount of cracking, the fact that basically all the holes that had reinforcing, the reinforcing was approximately 33% to 66% rusted. In essence, at all those cracks along grade, the CMU face shells are basically delaminated, so the old 8" wall is now 5-6" or 4" at that point and then obviously the wall that is not close to current code now, is much worse. The engineer is unable to perform calculations without knowing to what extent the steel has delaminated. Therefore, I concur with the engineer and recommend to move forward with these repairs as soon as possible and brace immediately. In addition to civil projects that may be happening at these sites, we recommend removing grass and irrigation within 5 feet of the buildings.

Fee Proposal: $73,875
Fee includes Architectural and Structural services for the following:

- o Coordination of immediate implementation of wall bracing.
- o Construction documents and construction administration utilizing a district procured contractor of the scope of work described above and attached.
- o Special structural inspections during construction administration.
- o Reimbursable expenses for printing, travel, etc.

Please let me know if you have any comments regarding our proposal. We are anticipating this proposal being approved at the September 7th, 2016 SFB board meeting.

Sincerely,

SPS+ ARCHITECTS, LLP

Mark Davenport, AIA, LEED AP BD&C
Partner

enclosure

Cc: Mike Barragan, David Kennon, Terry Tower, Jennifer Bowen

August 23, 2016

Mark Davenport AIA, CEFPI, LEED AP, BD+C
SPS+ ARCHITECTS LLP
8681 E. Via de Negocio
Scottsdale, AZ 85258

Re: William Jack / Don Mensendick Elementary School
Glendale, AZ

Dear Mr. Davenport:

Per your request, we visited William Jack / Don Mensendick Elementary School on several occasions. I have reviewed the reports from Speedie and Associates, which are attached at the end of this report, along with pictures from our site visit during the CMU removal to investigate the reinforcing and typical pictures of the types of cracking along the buildings. We also reviewed the existing plans of the buildings which we have received. The purpose of this report is to review the conditions of the existing buildings along with the reports prepared by other consultants, and to recommend a plan of action going forward on the best course of action to remedy the deficient areas.

The buildings are typically steel and wood framed roofs bearing on wood posts with CMU exterior walls and concrete spread footings.

Based on the surface penetrating radar investigations Speedie and Associates performed of the walls, the vertical reinforcing appears to be randomly installed in the additions to each of the classrooms but was missing from the existing walls that were part of the original construction. Some of the additions had the reinforcing installed in what appears to be correct while other areas were sporadic. Probably about 50% of the additions were installed properly while the others were deficient in some manner. The readings from the original and the additional slab-on-grade seemed to indicate that there was not any reinforcing in the slab and no ties tying the new to the existing.

Based on the soils investigations performed by Speedie and Associates, there does not appear to be a specific cause of the masonry distress due to the soils themselves, except the fact that the soil is very moist. The moisture fluctuations in the soils will have a tendency to cause continuous movement which will induce stresses on the buildings and sometimes resulting in cracks in the CMU. My understanding is that there is currently a project in place that will solve or reduce the amount of moisture in the soil and will divert the water away from the walls.

From our review of the CMU demolition, and our cursory review of the buildings in general, we discovered numerous cracks and some rusted reinforcing.

From the four holes that were opened up to expose the reinforcing, we found rusted and deteriorated vertical and horizontal reinforcing in approximately half of the locations we inspected. The degree of rust varied from minor in some areas to significant in others. The soil was moist in these areas as well.

.

From our visual inspection, we noticed several cracks; too many to document them all. They basically fell into four general categories:

1. There were several areas where there are shrinkage cracks most likely due to insufficient or improper locations of masonry control joints or improperly installed masonry control joints (see photographs 1, 6, and 9 on building 1, photos 2 and 6 on building 5, photo 2, 4, 10 and 11 on building 7 and photo photos 3, 4, and 9 on building 10, photo 1 on building 11, photo 8 on building 12, photo 3 on building 15, photos 3, 4 and 5 on building 17, photos 4, 5 and 6 on building 18, photo 1 on building 21 and photo 2 on building 22). While these are not structural in nature, they will affect the water tightness of the building, and therefore I recommend that new masonry control joints be installed, and for the CMU in these areas to be tuck pointed and repaired or replaced as applicable. There were approximately 15-20 locations throughout the school where this occurred.

2. There were several areas where there was an added wythe of CMU probably for aesthetic reasons however it does not appear to be attached to the CMU and has a crack along the side of the added wythe (see photo 10 on building 1, photo 1 on building 4, photos 1 and 8 on building 5, photos 1, 5, 6, 15 and 16 on building 7, photos, 5, 6, and 7 on building 9, photos 1, 4 and 5 on building 15, photos 1, 2 and 4 on building 16, photos 1, 6, 7 and 8 on building 17, photo 3 on building 18 and photo 3 on building 22). I would recommend drilling and epoxying some anchors into the supporting wythe to stabilize to stabilize the extra wythe. This probably occurs in approximately 20 locations.

3. There were several areas where there were there are stair stepped cracks in the CMU walls of the buildings. It is apparent by the inspection of the walls and the current slopes in the interior slabs that the additions to the original construction have settled at some time. This may have occurred during or

shortly after construction. There is also some stair stepped cracks in the original construction. The geotech report does not appear to indicate anything that would be a cause for concern or continued settlement. So it is most likely that the moisture in the soil has caused some foundation movements that have caused the cracking in the CMU and the sloping of the interior extension of these slabs. These issues at this point at most of the locations appear to be non-structural and can be repaired by properly installing repointing and repairing the CMU along with the ongoing project to solve the moisture problem in the soil. However, since this is a serviceability issue, one of the other options would be to install helical piers below the exterior walls and jack them back up to their original placement. Then the slab could be raised as required by grout or foam injection. These repairs would be quite costly, but could be done to make the buildings more functional (see photos 2, 3, 4, 5 and 8 on building 1, photos 1, 2 and 3 on building 2, photo 2 on building 3, photo 3 on building 4, photo 3, 4, 5 and 7 on building 5, photos 1, 2 and 8 on building 9, photo 2 on building 10, photo 1 on building 14, photo 2, 4 and 6 on building 15, photo 3 on building 16, photo 2 on building 17, and photos 1 and 2 on building 18). This would be acceptable in all areas where this occurs except for buildings 12 which has significant stair stepped cracking and actually has settled approximately one inch. This building should have helical piers installed below the footings and to jack them back into place and then pressure inject grout below slab to raise the slab back in place; then repoint and repair the CMU, adding some additional vertical reinforcing and grout to help stiffen the walls. The typical repairs would occur in approximately 20 locations.

4. The remaining photos appear to be related to moisture and the rusting of the reinforcing in the CMU. Since reinforcing when it rusts can grow to over 400% of its original size, it appears that the reinforcing has rusted and expanded and has cracked the CMU. This causes the face shells to delaminate and then the CMU is essentially reduced in size and therefore reduced in strength. There is no real way to determine the loss in strength without knowing the exact thickness of the delaminated CMU. But this is a very old building that does not comply with the current building codes, and additionally, there is reduced strength in the existing wall. The reduction in strength could easily range from 33% - 90%. Therefore, the CMU walls should be braced immediately until the repairs are complete. In addition, there is no real way to eliminate moisture from entering into the cracks in the CMU and to continue to make the condition worse. There is no easy or accurate way to determine the extents of the rusting in the CMU without removing the face shells and investigating the reinforcing as we did in those four locations. The repair for these locations would be extremely expensive, but would entail removing the CMU at the cracked locations and then removing and replacing the rusted reinforcing with new reinforcing, grout and CMU. This would need to be done in an explorative manner where you start at each of the cracks and then you expand outward until you get to undamaged CMU and reinforcing. Therefore, there is no real way to determine the extents, but due to the moisture conditions and the amount of cracking, I would not be surprised if 20%-33% of the length of the walls are damaged at grade in this manner.

If the decision is to repair the school, then this should start immediately, and we should brace the CMU walls until the repairs are completed. Without knowing the extent of the damage, it is extremely difficult to determine how the walls will perform as the reinforcing continues to rust and the walls continue to worsen.

While it is extremely difficult to provide any budgetary numbers due to the uncertainty of the full scope and amount of damage, we estimate the following corresponding to the item numbers above:

1)	Temporary Bracing of CMU Walls:	$80,000
2)	Installation of masonry control joints and repair of damaged CMU:	$80,000
3)	Securing of the decorative wythe of CMU:	$60,000
4)	Repair of the CMU surrounding the stair stepped cracks:	$100,000
5)	Install helical piers:	$400,000
6)	Grout injection of slab:	$100,000
7)	Repair of the cracked CMU and rusted reinforcing:	$250,000

Please understand that this report represents a professional opinion based upon the results of our limited observations, and past experience with similar conditions. Our study was strictly limited to visual observations as stated above. This report is not intended to be a complete or comprehensive study of the structure. We have not reviewed, nor have we been asked to review, the capacity of the existing structure per the current code. Our work has been performed in accordance with generally accepted principles and practices of structural engineering.

We cannot be responsible for any future changes in the condition of the structure. No warranty is provided, either expressed or implied.

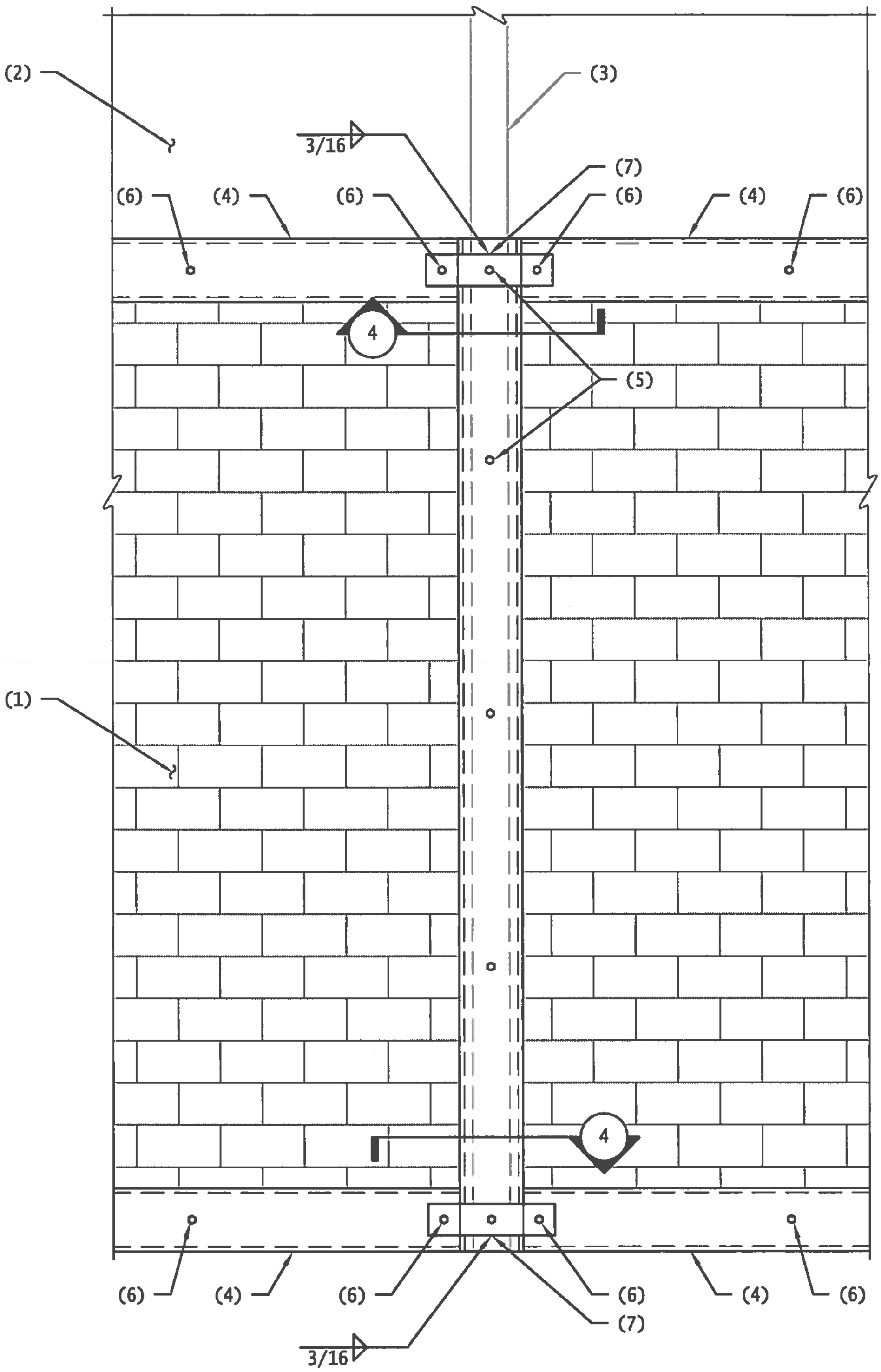
If there are any additional concerns or questions, please feel free to contact our office. Thank you for the opportunity to assist you on this project.

Sincerely,

David Bixler

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID
BIXLER
Date Signed 8/26/16
ARIZONA U.S.A.
Expires 06/30/2019

David Bixler, PE, SE President
David Bixler & Associates, PLLC



NOTES:
1. EXISTING MASONRY WALL.
2. EXISTING WINDOW OPENING.
3. EXISTING WOOD COLUMN.
4. C6x8.2 CONT.
5. 1/2"Ø x 4" EMBED LAG SCREWS @ 24"O.C.
6. 1/2"Ø x 6" EMBED EPOXY BOLTS @ 24"O.C.
7. 1/4"x3"x1'-0" STEEL PLATE.

3 ELEVATION

N.T.S.

DAVID BIXLER & ASSOCIATES

David Bixler & Associates
Stuctural Engineering
8360 East Raintree Drive, Suite 110
Scottsdale, Arizona 85260
Office: (480) 219-2886 Fax: (480) 588-8584
www.dbaaeng.com

DON MESSENDICK SCHOOL
5535 NORTH 67TH AVENUE
GLENDALE, AZ 85301

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID
BIXLER
DATE SIGNED 8/31/16
ARIZONA, U.S.A.
Expires 6/30/19

DRAWN BY:	ERB
CHECKED BY:	WDB
JOB NO:	16.098
PRINTED:	08.31.2016

SSK1

NOTES:
1. EXISTING MASONRY WALL.
2. EXISTING WOOD COLUMN.
3. C6x8.2 CONT.
4. 1/2"Ø x 4" EMBED LAG SCREWS @ 24"O.C.
5. 1/2"Ø x 6" EMBED EPOXY BOLTS @ 24"O.C.
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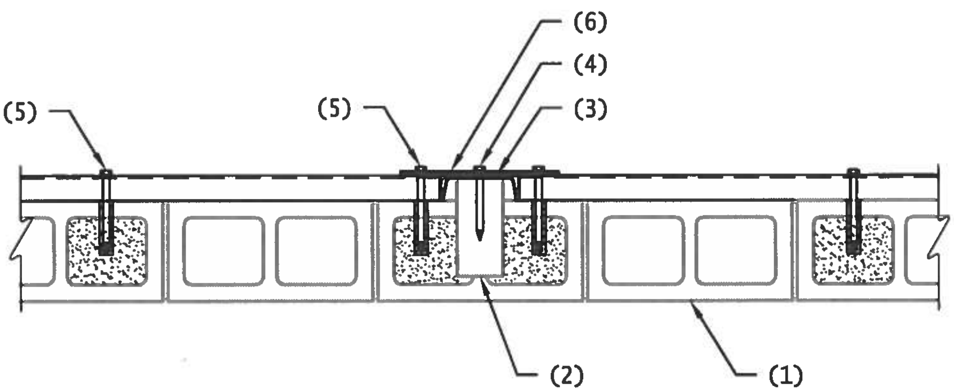

4 SECTION

N.T.S.

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SSK2

STRUCTURAL CALCULATIONS FOR MENSENDICK AND JACK ELEMENTARY SCHOOL WALL REPAIRS

DBAA Job No. 16.098

August 31, 2016

PREPARED FOR:

Jennifer Bowen, Director of Design

SPS+ Architects LLP

Jbowen@spsplusarchitects.com

480.544.5851

Registered Professional Engineer (Structural)
CERTIFICATE NO.
46644
W. DAVID
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PREPARED BY:

DAVID BIXLER & ASSOCIATES
STRUCTURAL ENGINEERING
8360 E. RAINTREE DR., SUITE 110
SCOTTSDALE, AZ 85260
PHONE: (480) 219-2886
david.bixler@dbaaeng.com
www.dbaaeng.com

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title: MASON WECK
Engineer:
Project Descr:

Project ID:

Printed 31 AUG 2016, 2:20PM

File = \\dbaa-sv2\projects\16096 Challenger Middle School\Engineering\16096 challenger.ec6
ENERCALC, INC. 1983-2016, Build:6.16.6.7, Ver:6.16.6.7

Steel Beam

Lic. # : KW-06009174 Licensee : DAVID BIXLER AND ASSOCIATES

Description : cahnnel over column

TO BRACE CHANNEL CONN ONLY
NO LOADS ROLLUP
ON CHANNELS

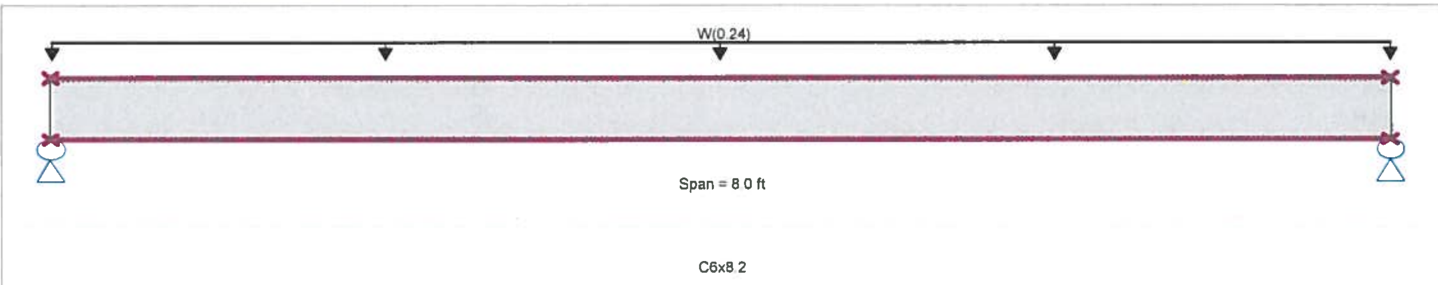
CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Minor Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : W = 0.030 ksf, Tributary Width = 8.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.821 : 1**	**Maximum Shear Stress Ratio =**	**0.068 : 1**
Section used for this span	**C6x8.2**	Section used for this span	**C6x8.2**
Ma : Applied	1.152 k-ft	Va : Applied	0.5760 k
Mn / Omega : Allowable	1.403 k-ft	Vn/Omega : Allowable	8.518 k
Load Combination	+D+0.60W+H	Load Combination	+D+0.60W+H
Location of maximum on span	4.000ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	1.103 in	Ratio =	86 >=0.0
Max Upward Transient Deflection	0.000 in	Ratio =	0 >=0.0
Max Downward Total Deflection	0.669 in	Ratio =	143 >=0.0
Max Upward Total Deflection	0.000 in	Ratio =	0 >=0.0

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mny	Mny/Omega	Cb	Rm	Va Max	Vny	Vny/Omega
+D+H													
Dsgn. L = 8.00 ft	1		0.000				2.34	1.40	1.00	1.00	-0.00	14.22	8.52
+D+L+H													
Dsgn. L = 8.00 ft	1		0.000				2.34	1.40	1.00	1.00	-0.00	14.22	8.52
+D+Lr+H													
Dsgn. L = 8.00 ft	1		0.000				2.34	1.40	1.00	1.00	-0.00	14.22	8.52
+D+S+H													
Dsgn. L = 8.00 ft	1		0.000				2.34	1.40	1.00	1.00	-0.00	14.22	8.52
+D+0.750Lr+0.750L+H													
Dsgn. L = 8.00 ft	1		0.000				2.34	1.40	1.00	1.00	-0.00	14.22	8.52
+D+0.750L+0.750S+H													
Dsgn. L = 8.00 ft	1		0.000				2.34	1.40	1.00	1.00	-0.00	14.22	8.52
+D+0.60W+H													
Dsgn. L = 8.00 ft	1	0.821	0.068	1.15		1.15	2.34	1.40	1.00	1.00	0.58	14.22	8.52
+D+0.70E+H													
Dsgn. L = 8.00 ft	1		0.000				2.34	1.40	1.00	1.00	-0.00	14.22	8.52
+D+0.750Lr+0.750L+0.450W+H													
Dsgn. L = 8.00 ft	1	0.616	0.051	0.86		0.86	2.34	1.40	1.00	1.00	0.43	14.22	8.52
+D+0.750L+0.750S+0.450W+H													
Dsgn. L = 8.00 ft	1	0.616	0.051	0.86		0.86	2.34	1.40	1.00	1.00	0.43	14.22	8.52
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 8.00 ft	1		0.000				2.34	1.40	1.00	1.00	-0.00	14.22	8.52
+0.60D+0.60W+0.60H													
Dsgn. L = 8.00 ft	1	0.821	0.068	1.15		1.15	2.34	1.40	1.00	1.00	0.58	14.22	8.52
+0.60D+0.70E+0.60H													

Steel Beam

Description : cahnnel over column

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 8.00 ft	1		0.000				2.34	1.40	1.00	1.00	-0.00	14.22	8.52

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	1.1153	4.023		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.960	0.960
Overall MINimum	0.432	0.432
+D+H		
+D+L+H		
+D+Lr+H		
+D+S+H		
+D+0.750Lr+0.750L+H		
+D+0.750L+0.750S+H		
+D+0.60W+H	0.576	0.576
+D+0.70E+H		
+D+0.750Lr+0.750L+0.450W+H	0.432	0.432
+D+0.750L+0.750S+0.450W+H	0.432	0.432
+D+0.750L+0.750S+0.5250E+H		
+0.60D+0.60W+0.60H	0.576	0.576
+0.60D+0.70E+0.60H		
D Only		
Lr Only		
L Only		
S Only		
W Only	0.960	0.960
E Only		
H Only		

VISION

Our vision is to be recognized throughout the Southwest as the leader in structural engineering.

COMMITMENT

We are committed to
- technological leadership
- innovative and cost-effective solutions
- quality work
- client satisfaction.

VALUES

Our team delivers

integrity

service

collaboration

quality

efficiency

August 23, 2016

Mark Davenport AIA, CEFPI, LEED AP, BD+C
SPS+ ARCHITECTS LLP
8681 E. Via de Negocio
Scottsdale, AZ 85258

**Re: William Jack / Don Mensendick Elementary School
Glendale, AZ**

As per your request, we visited the site on several occasions and have reviewed the reports from Speedie and Associates, and have attached them to the end of this report along with pictures from our site visit during the CMU removal to investigate the reinforcing and typical pictures of the types of cracking along the buildings. We have also reviewed the existing plans of the buildings which we received. The purpose of this report is to review the conditions of the existing buildings along with the reports prepared by other consultants and to recommend a plan of action going forward on the best course of action to remedy the deficient areas.

The buildings are typically steel and wood framed roofs bearing on wood posts with cmu exterior walls and concrete spread footings.

Based off of the surface penetrating radar investigations Speedie and Associates performed of the walls the vertical reinforcing appears to be randomly installed in the additions to each of the classrooms but was missing from the existing walls that were part of the original construction. Some of the additions had the reinforcing installed in what appears to be correct while other areas were sporadic. Probably about 50% of the additions were installed properly while the others were deficient in some manner. The readings from the original and the additional slab–on-grade seemed to indicate that there was not any reinforcing in the slab and no ties tying the new to the existing.

Based on the soils investigations performed by Speedie and Associates, there does not appear to be a specific cause of the masonry distress due to the soils themselves, except the fact that the soil is very moist. The moisture fluctuations in the soils will have a tendency to cause continuous movement which will induce stresses on the buildings and sometimes resulting in cracks in the cmu. My understanding is that there is currently a project in place that will solve or reduce the amount of moisture in the soil and will divert the water away from the walls.

From our review of the cmu demolition and our cursory review of the buildings in general, we discovered numerous cracks and some rusted reinforcing.

From the four holes that were opened up to expose the reinforcing, we found rusted and deteriorated vertical and horizontal reinforcing in approximately half of the locations we inspected. The degree of rust varied from minor in some areas to significant in others. The soil was moist in these areas as well.

.

From our visual inspection we noticed several cracks and too many to document all of them however. They basically fell into four general categories;

1. There were several areas where there are shrinkage cracks most likely due to insufficient or improper locations of masonry control joints or improperly installed masonry control joints (see photographs 1, 6, and 9 on building 1, photos 2 and 6 on building 5, photo 2, 4, 10 and 11 on building 7 and photo photos 3, 4, and 9 on building 10, photo 1 on building 11, photo 8 on building 12, photo 3 on building 15, photos 3, 4 and 5 on building 17, photos 4, 5 and 6 on building 18, photo 1 on building 21 and photo 2 on building 22). While these are not structural in nature they will affect the water tightness of the building and therefore I recommend that new masonry control joints be installed and for the cmu in these areas to be tuck pointed and repaired or replaced as applicable. There were approximately 15-20 locations throughout the school where this occurred.

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start at each of the cracks and then you expand outward until you get to undamaged cmu and reinforcing. Therefore, there is no real way to determine the extents, but due to the moisture conditions and the amount of cracking, I would not be surprised if 20%-33% of the length of the walls are damaged at grade in this manner.

If the decision is to repair the school, then this should start immediately, and we should brace the cmu walls until the repairs are completed. Without knowing the extent of the damage, it is extremely difficult to determine how the walls will perform as the reinforcing continues to rust and the walls continue to worsen.

While it is extremely difficult to provide any budgetary numbers due to the uncertainty of the full scope and amount of damage, we estimate the following corresponding to the item numbers above;

1) Installation of masonry control joints and repair of damaged cmu:	$80,000
2) Securing of the decorative wythe of cmu:	$60,000
3) Repair of the cmu surrounding the stair stepped cracks:	$100,000
4) Install helical piers:	$400,000
5) Grout injection of slab:	$100,000
6) Repair of the cracked cmu and rusted reinforcing:	$250,000

Please understand that this report represents a professional opinion based upon the results of our limited observations, and past experience with similar conditions. Our study was strictly limited to visual observations as stated above. This report is not intended to be a complete or comprehensive study of the structure. We have not reviewed, nor have we been asked to review, the capacity of the existing structure per the current code. Our work has been performed in accordance with generally accepted principles and practices of structural engineering.

We cannot be responsible for any future changes in the condition of the structure. No warranty is provided, either expressed or implied.

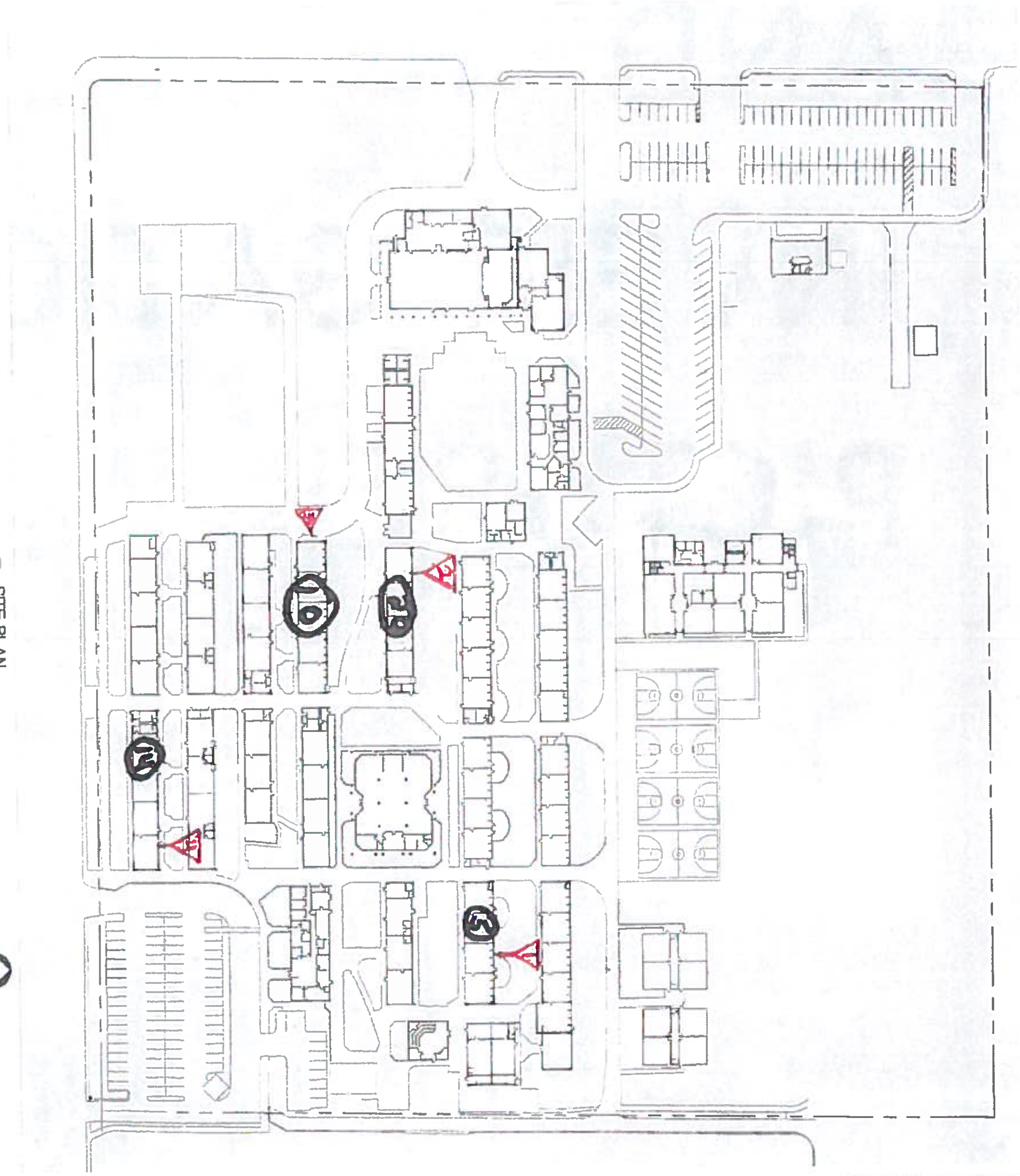
If there are any additional concerns or questions please feel free to contact our office. Thank you for the opportunity to assist you on this project.

Sincerely,

David Bixler

David Bixler, PE, SE President
David Bixler & Associates, PLLC

CMU REMOVAL AND INVESTIGATION PICTURES



1 SITE PLAN

WILLIAM C. JACK ELEMENTARY SCHOOL/
DON MENSENDICK SCHOOL

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
5535 NORTH 67TH AVENUE, GLENDALE, AZ 85301

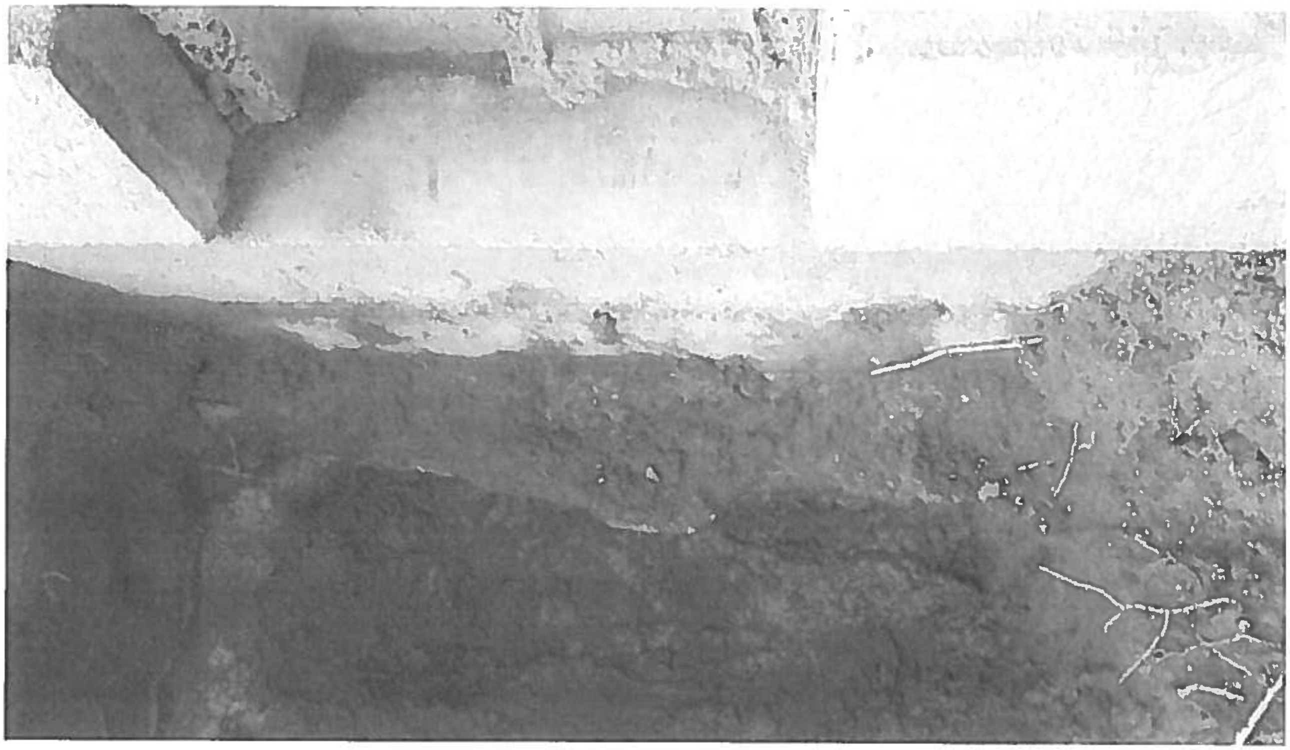
SITE PLAN

SPS+ ARCHITECTS

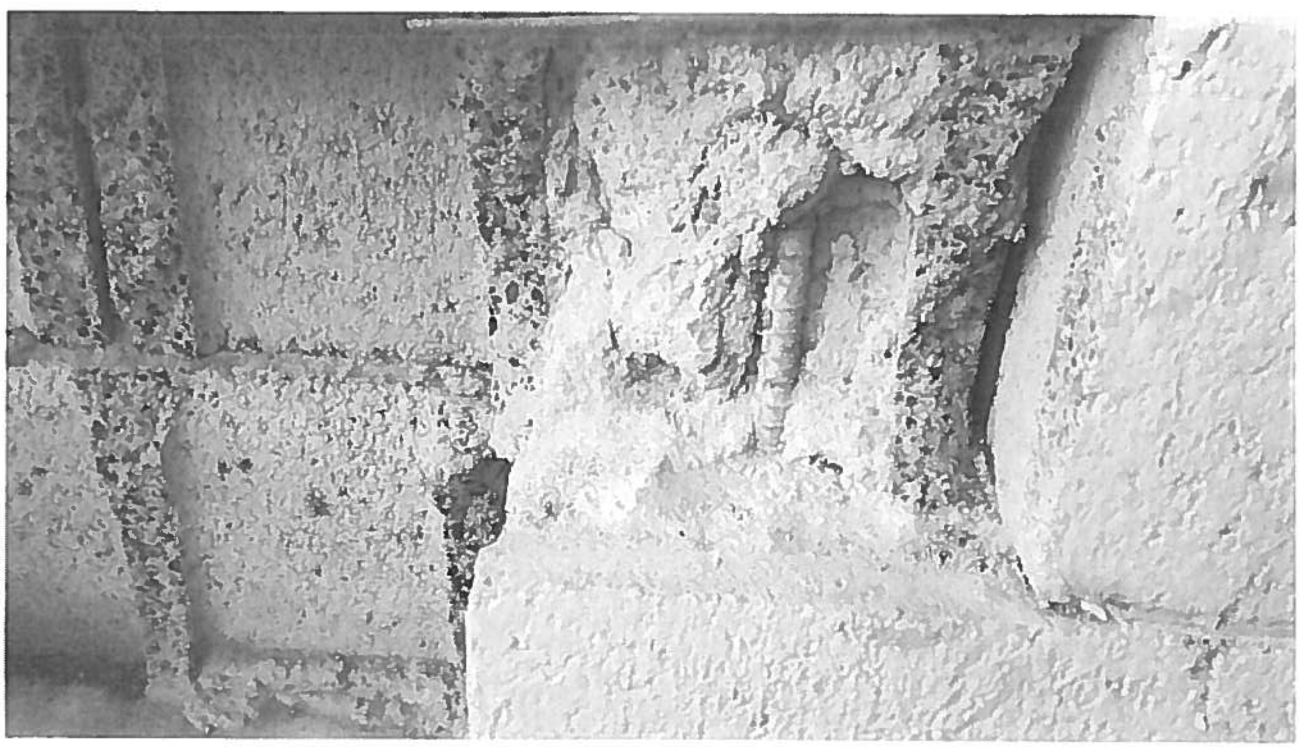
PRELIMINARY NOT FOR CONSTRUCTION

A100

MENSENDICK - MARKER #1

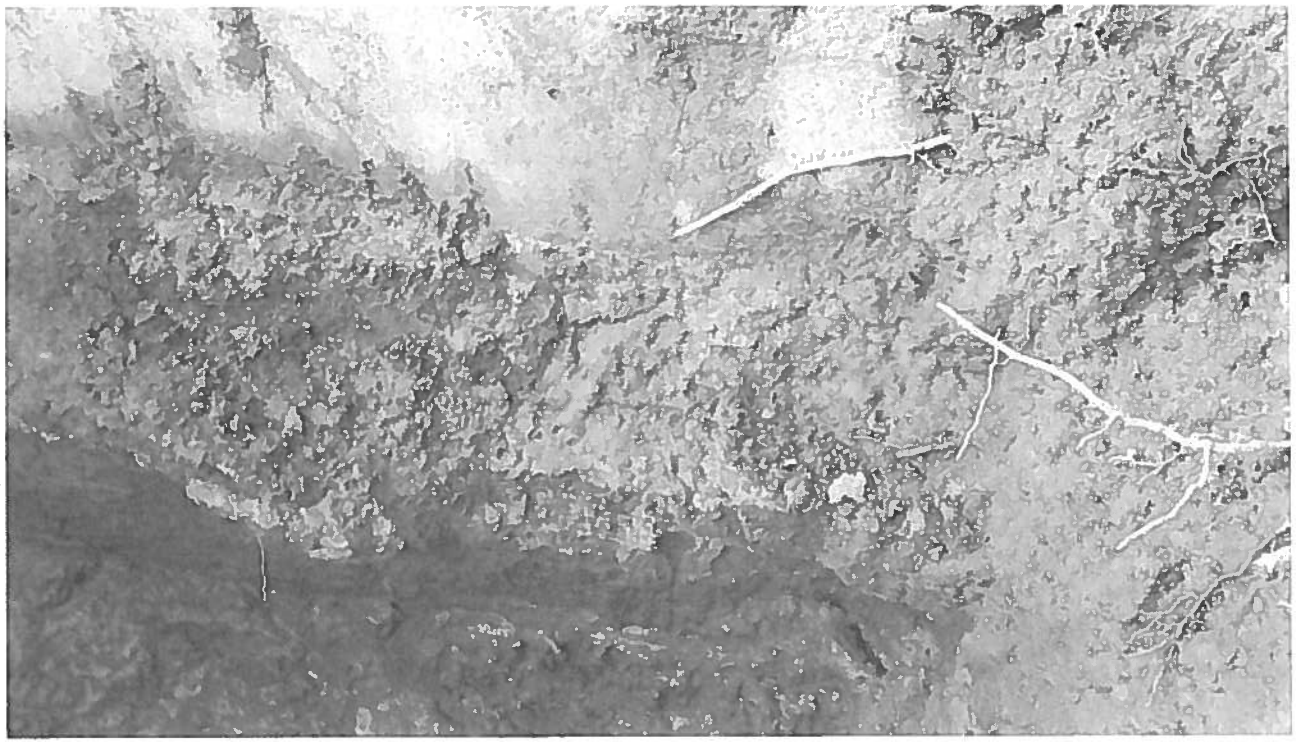


PICTURE NO. 1



PICTURE NO. 2

MENSENDICK - MARKER #1



PICTURE NO. 3

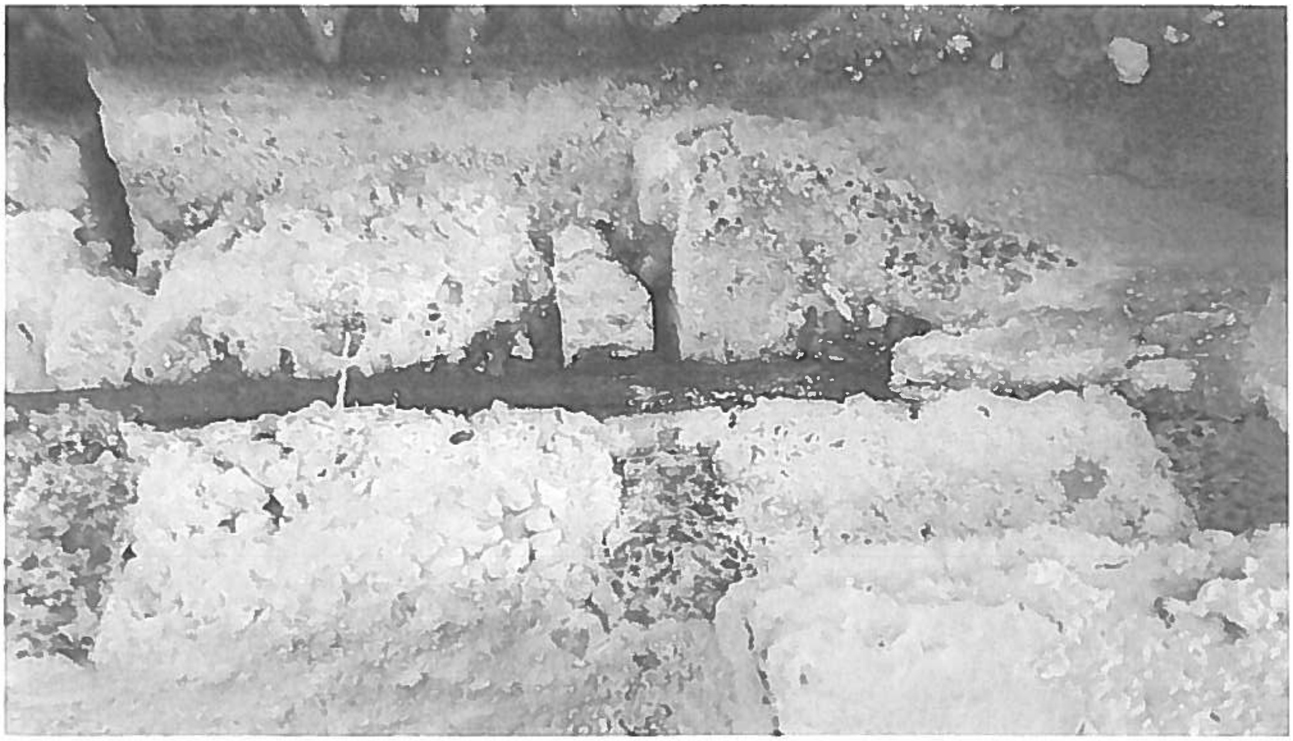
PICTURE NO. 4

MENSENDICK - MARKER #2

PICTURE NO. 1

PICTURE NO. 2

MENSENDICK - MARKER #2



PICTURE NO. 3

PICTURE NO. 4

MENSENDICK - MARKER #3

PICTURE NO. 1

PICTURE NO. 2

MENSENDICK - MARKER #3

PICTURE NO. 3

PICTURE NO. 4

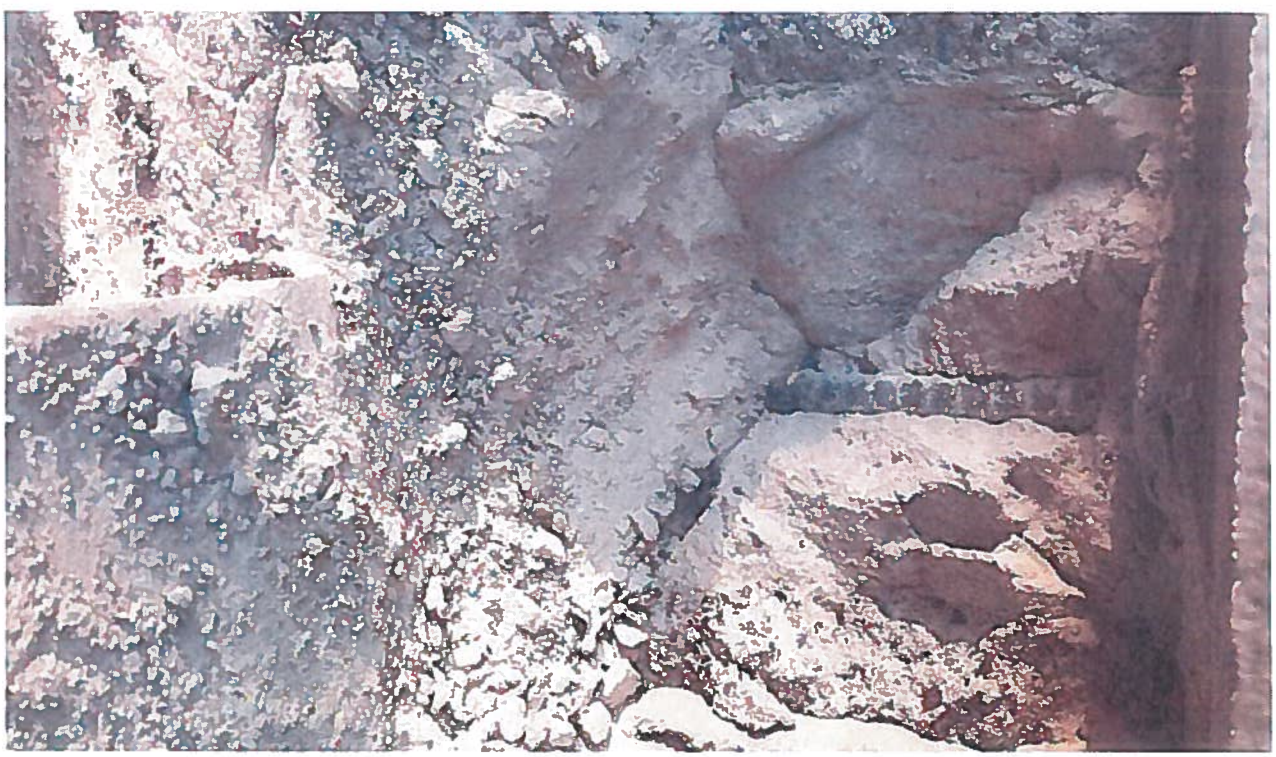
MENSENDICK - MARKER #3

PICTURE NO. 5

PICTURE NO. 6

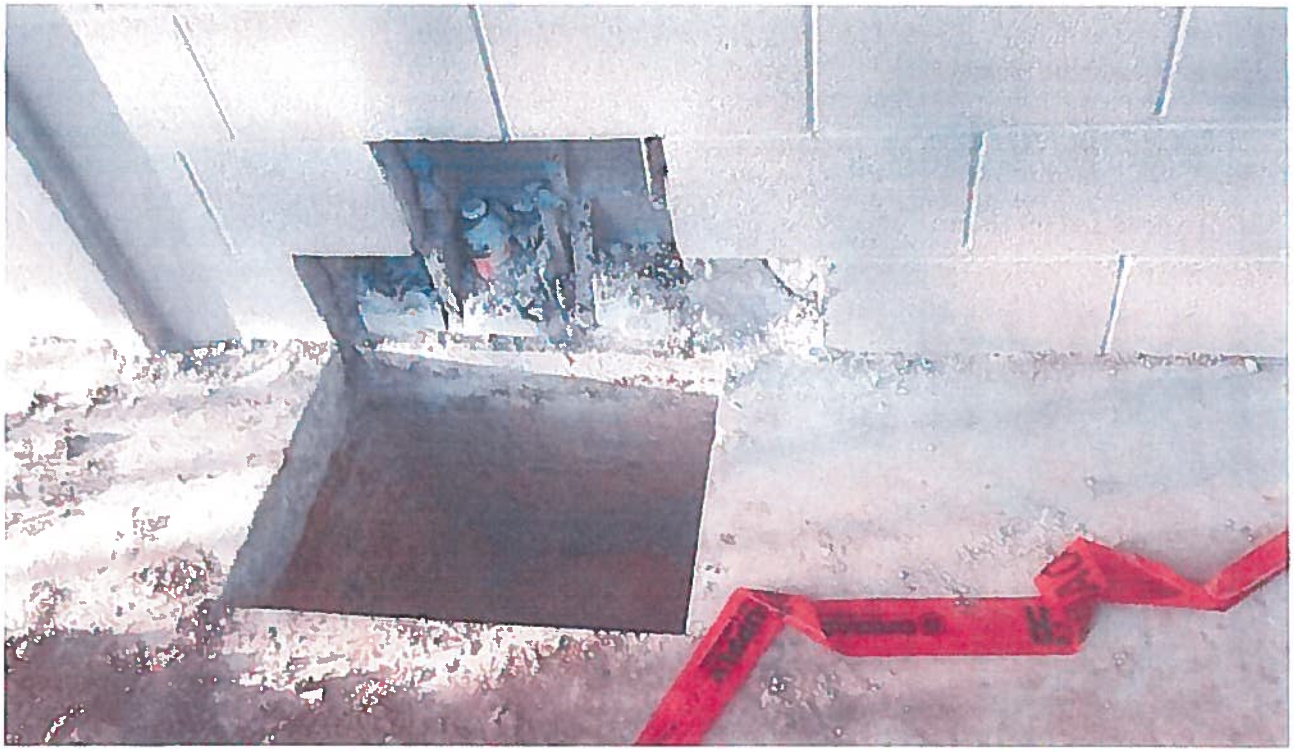
MENSENDICK - MARKER #4

PICTURE NO. 1



PICTURE NO. 2

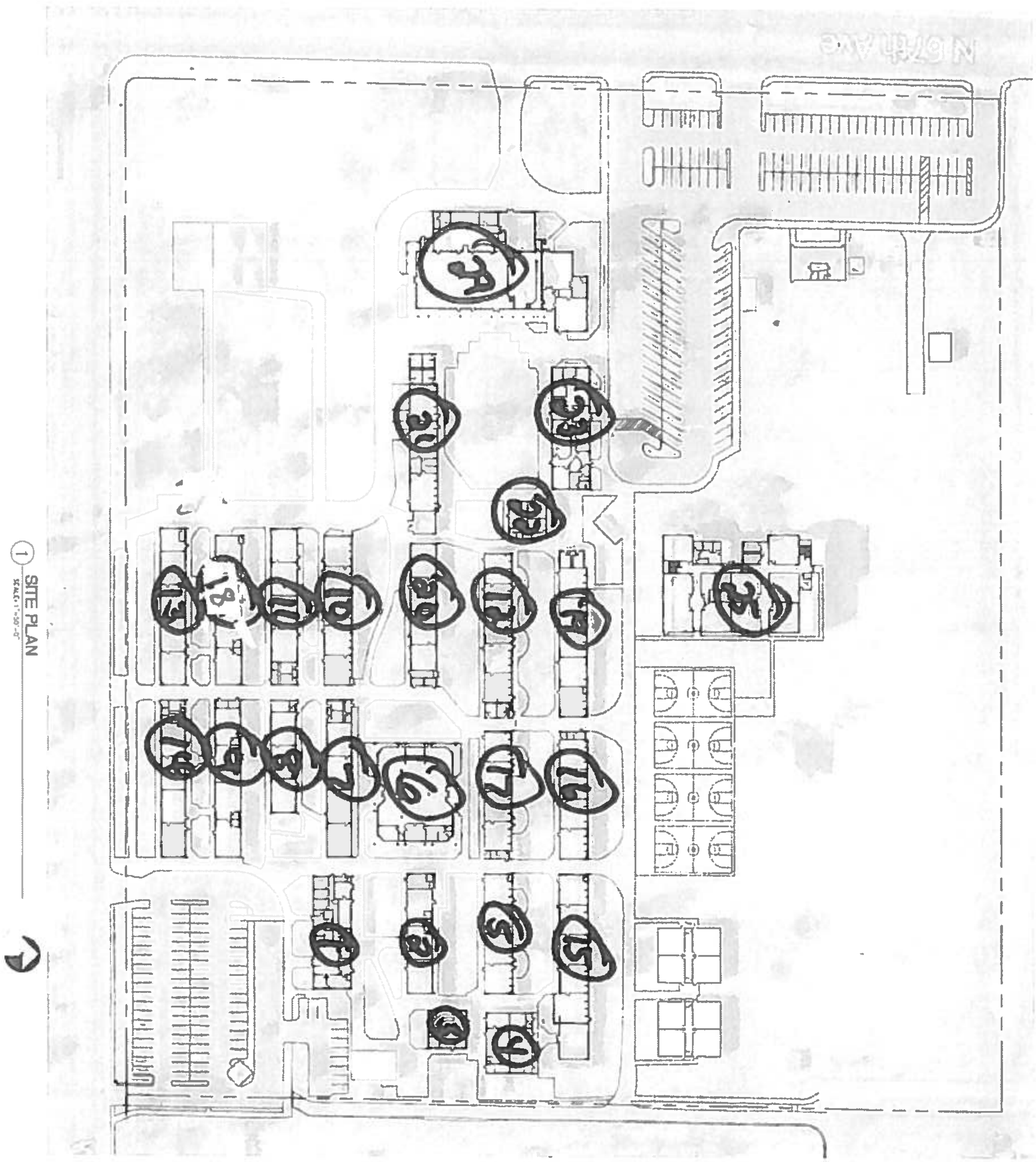
MENSENDICK - MARKER #4



PICTURE NO. 3

PICTURE NO. 4

SITE INVESTIGATION PICTURES



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SITE PLAN

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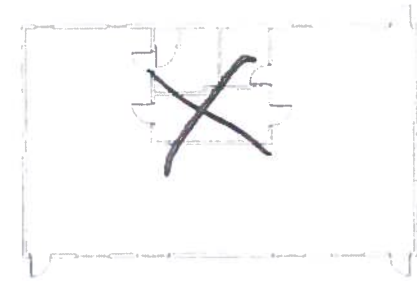
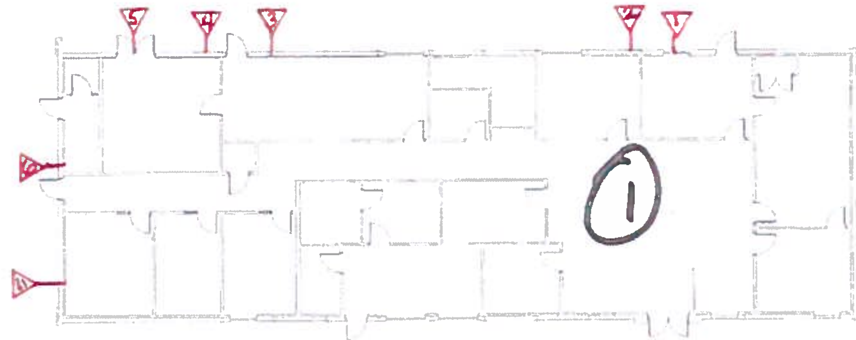
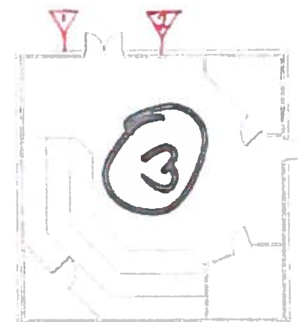
A100



5 HEAD START BUILDING FLOOR PLAN



3 JACK BUILDING M FLOOR PLAN



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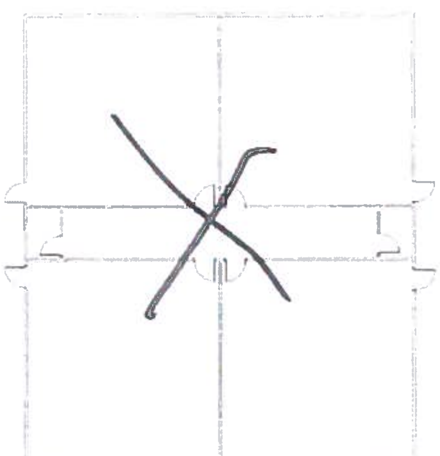
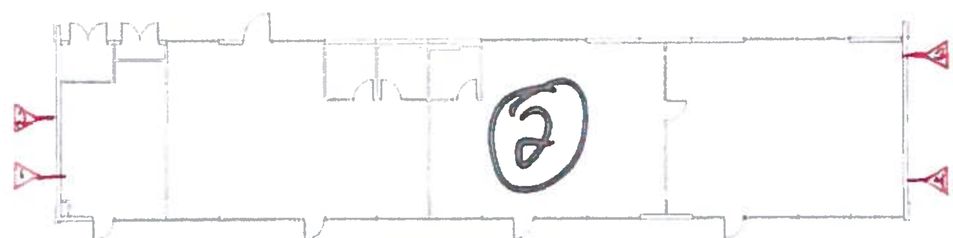


4 JACK BUILDING N FLOOR PLAN



1 JACK BUILDING K FLOOR PLAN

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TEL 480 991 0800
FAX 480 991 2623
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JACK BUILDING K-N FLOOR PLANS

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JOB NO.
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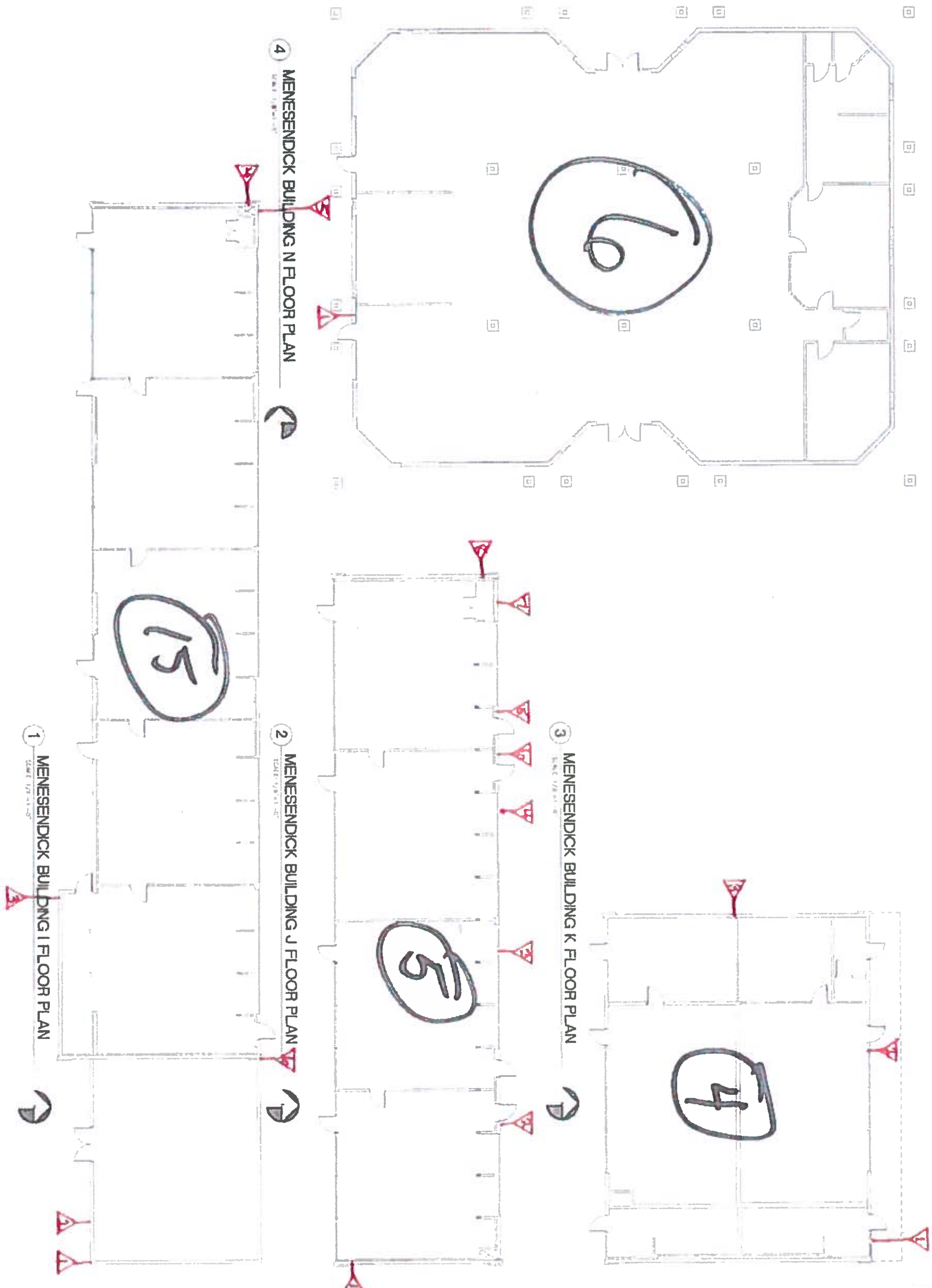
A208



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MEDSENDICK BUILDING I-K + N FLOOR PLANS

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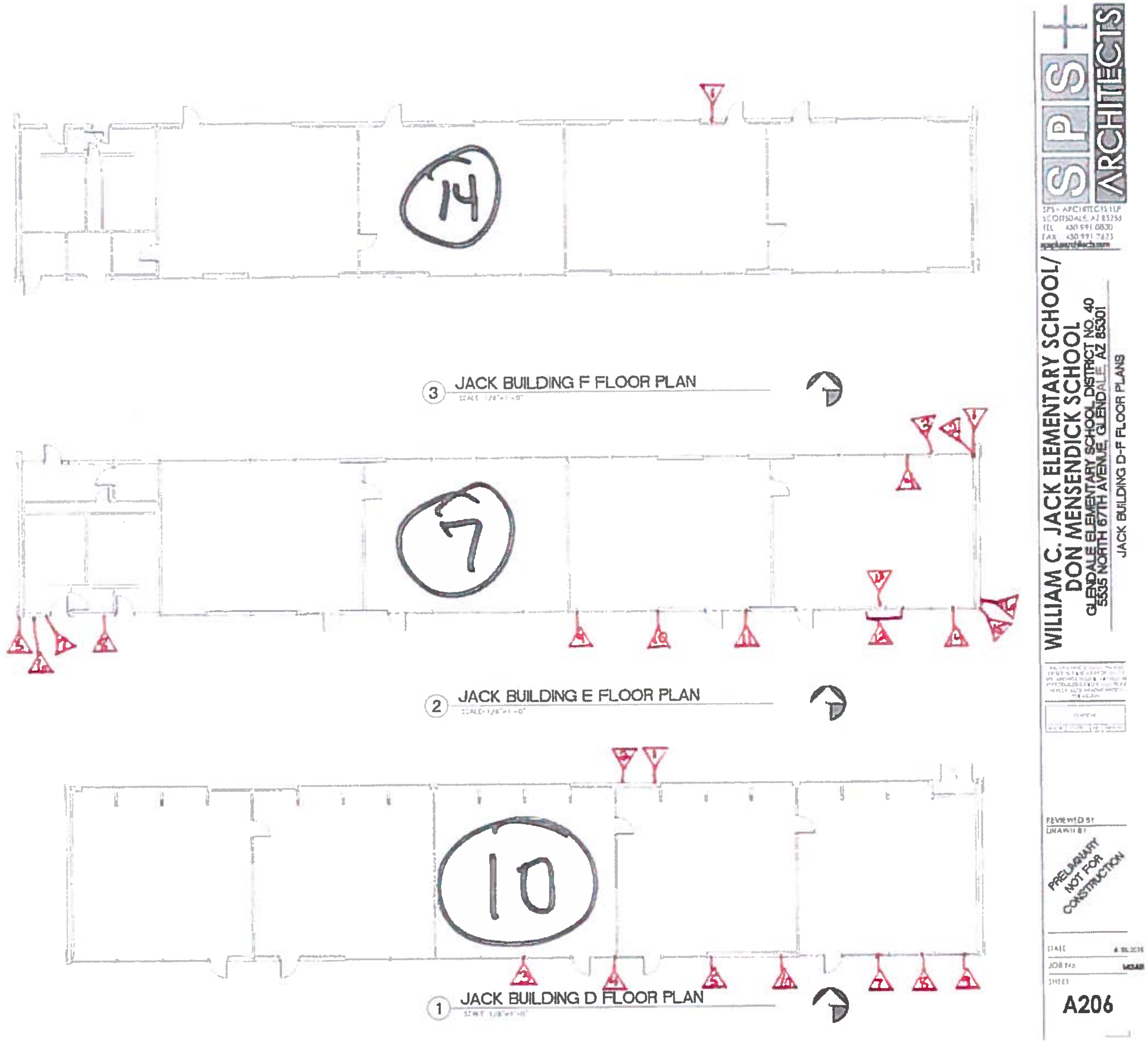
A202


14
3 JACK BUILDING F FLOOR PLAN
7
2 JACK BUILDING E FLOOR PLAN
10
1 JACK BUILDING D FLOOR PLAN
SPS+ ARCHITECTS
WILLIAM C. JACK ELEMENTARY SCHOOL/
DON MENSENDICK SCHOOL
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JACK BUILDING D-F FLOOR PLANS
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A206

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JACK BUILDING G, H + J FLOOR PLANS

SPS+ ARCHITECTS

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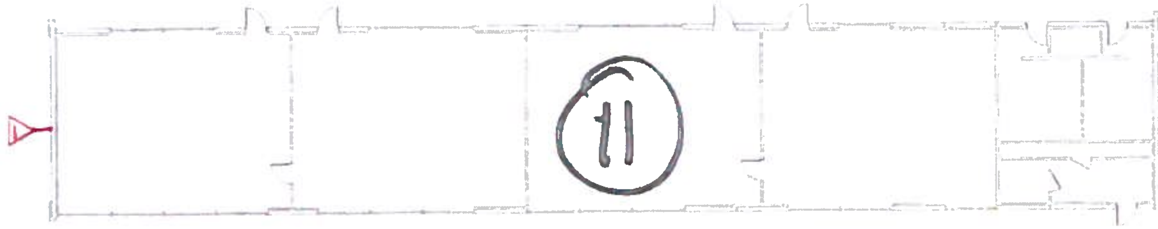
A207



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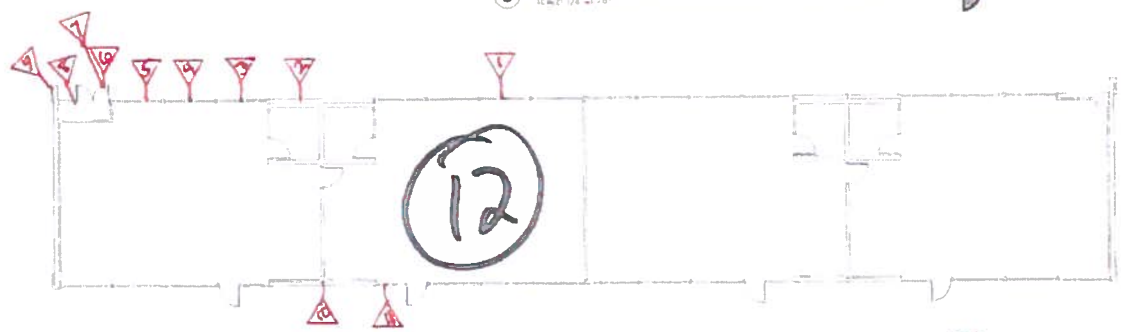

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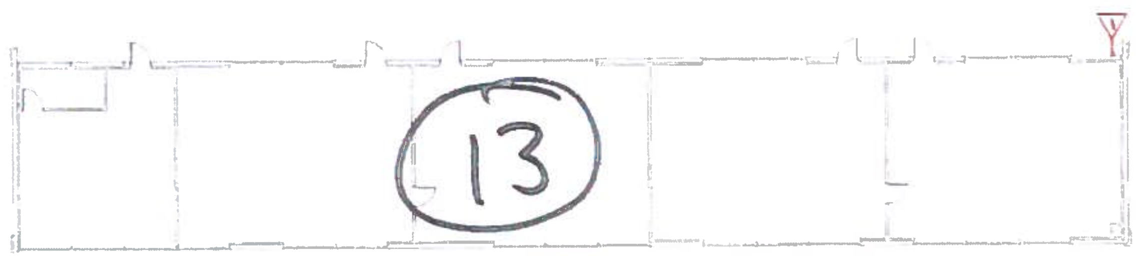

1 JACK BUILDING A FLOOR PLAN

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JACK BUILDING A-C FLOOR PLANS

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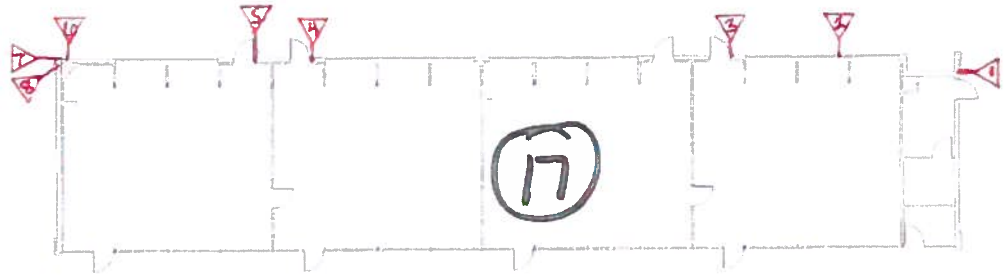
A205



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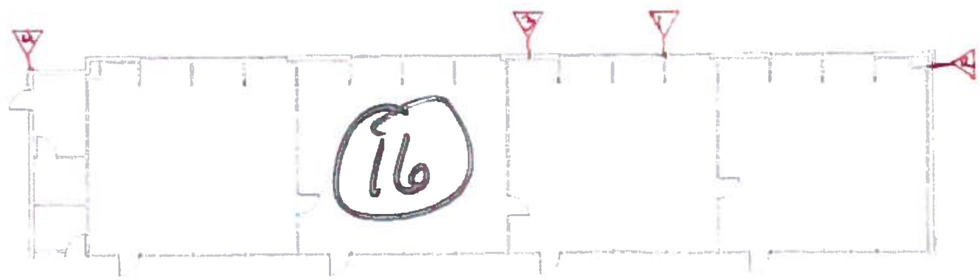

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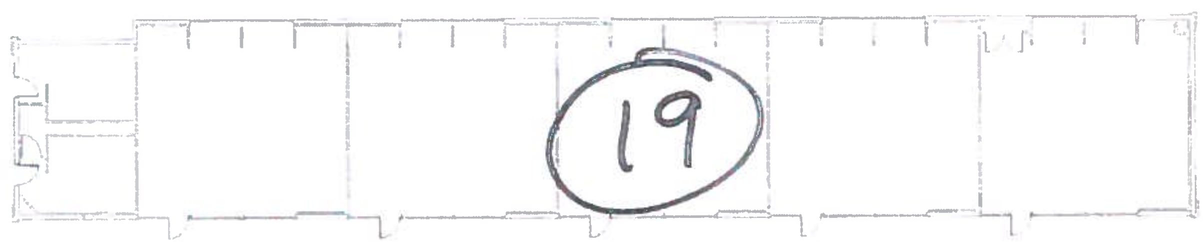

1 MENESENDICK BUILDING E FLOOR PLAN

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SCOTTSDALE AZ 85258
TEL 480 991 0800
FAX 480 991 2623
spsplusarchitects.com

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MEDSENDICK BUILDING E, G + H FLOOR PLANS

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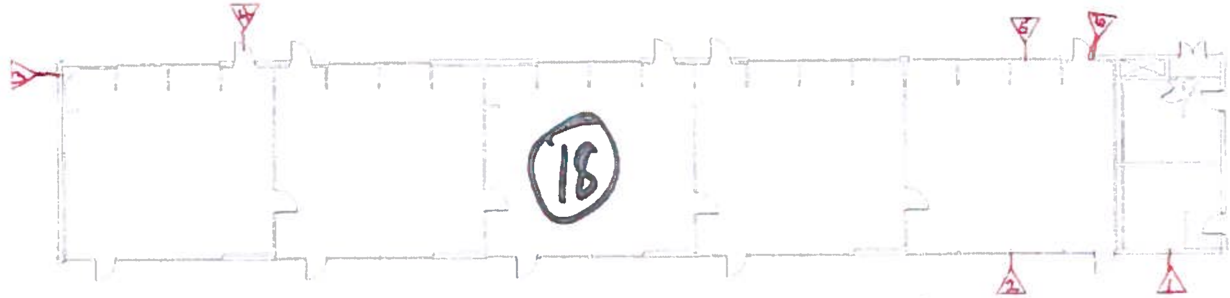

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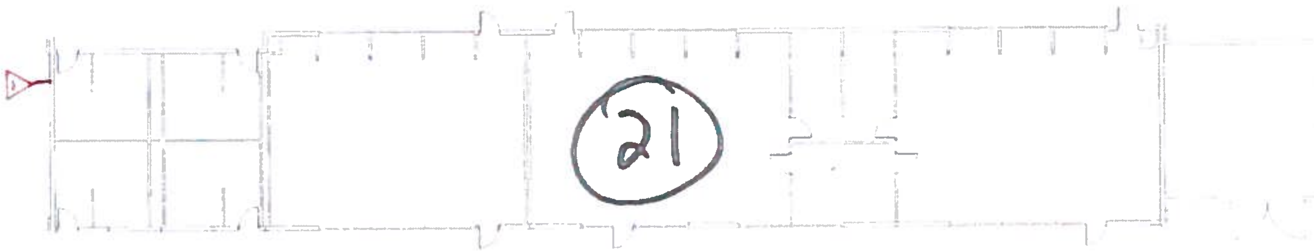

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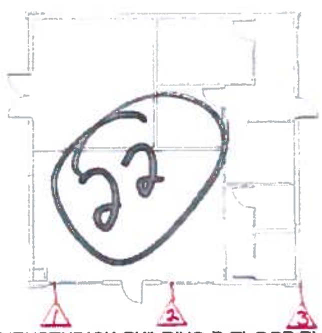

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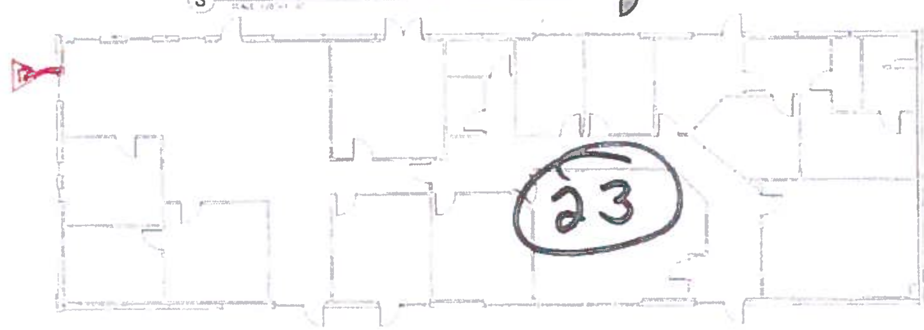

1 MENSENDICK BUILDING A FLOOR PLAN

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MENSENDICK BUILDING A - D FLOOR PLANS

PRELIMINARY NOT FOR CONSTRUCTION

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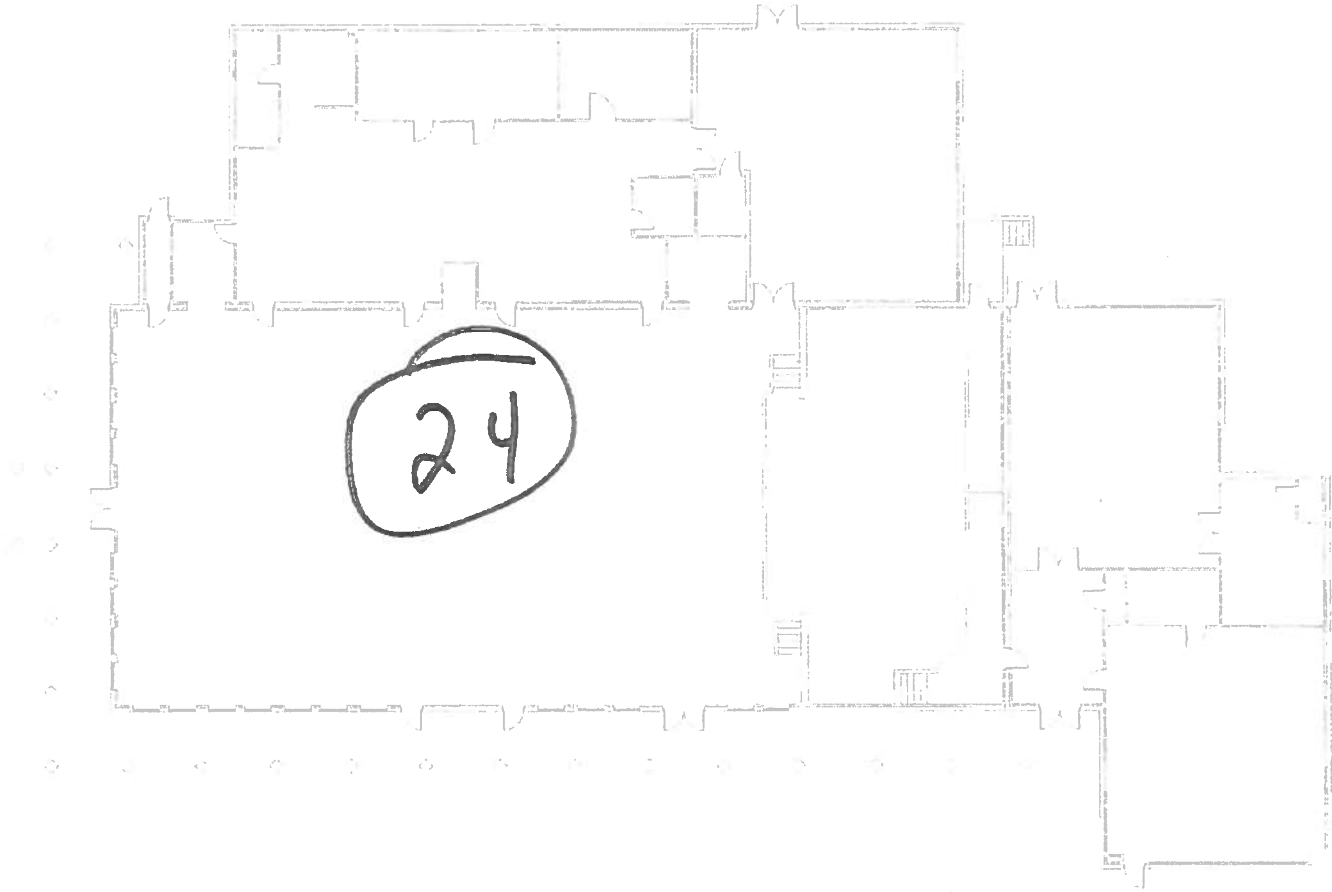

1 MENESENDICK BUILDING M FLOOR PLAN

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MEDSENDICK BUILDING M FLOOR PLAN

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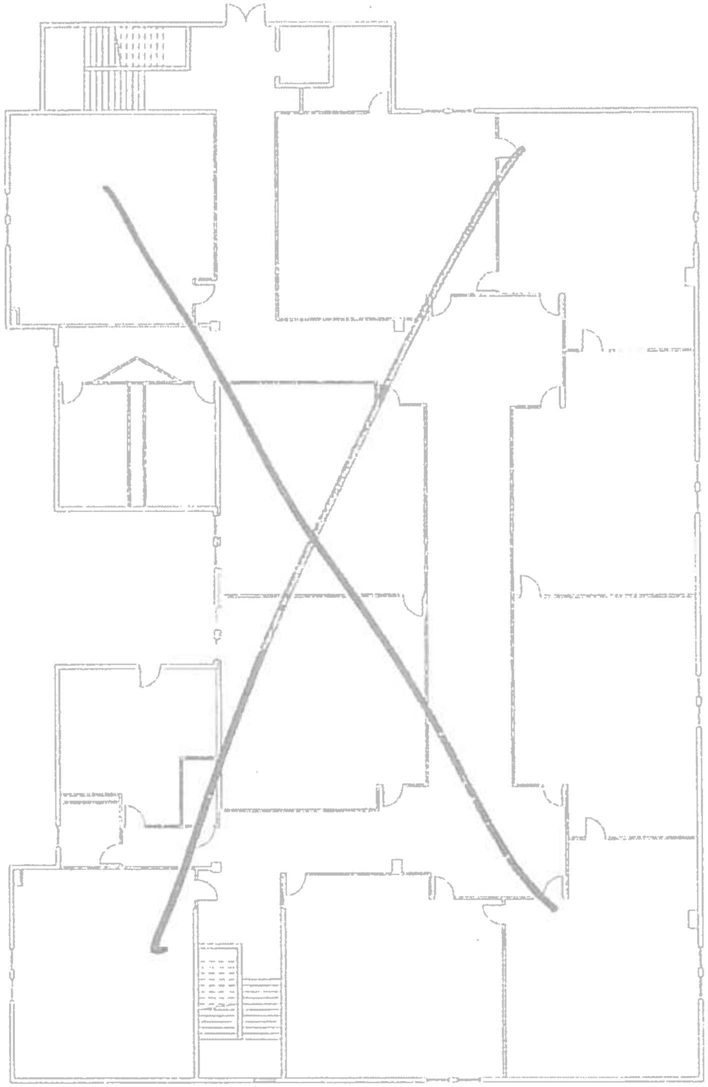
JOB No. 14348
SHEET

A203



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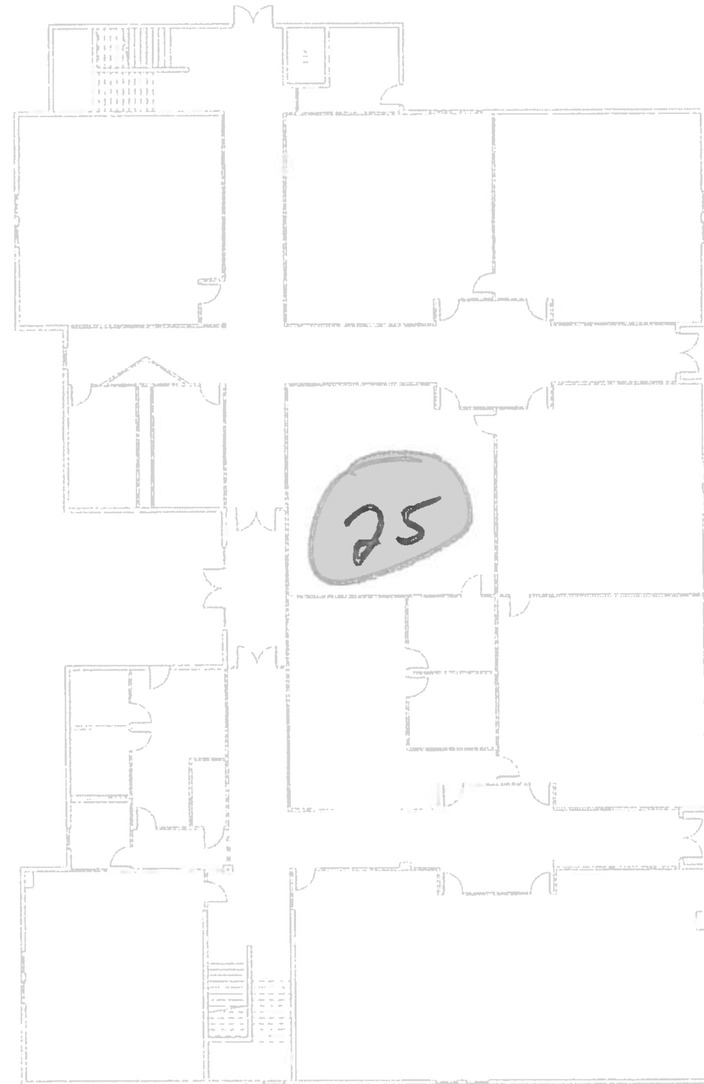
SCALE: 1/8" = 1'-0"



1 MENESENDICK BUILDING O FIRST FLOOR PLAN

SCALE: 1/8" = 1'-0"

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FAX 480 991 2623
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MENSENDICK BUILDING O FLOOR PLANS

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SHEET

A204

DON MENSENDICK SCHOOL – BUILDING 1

7

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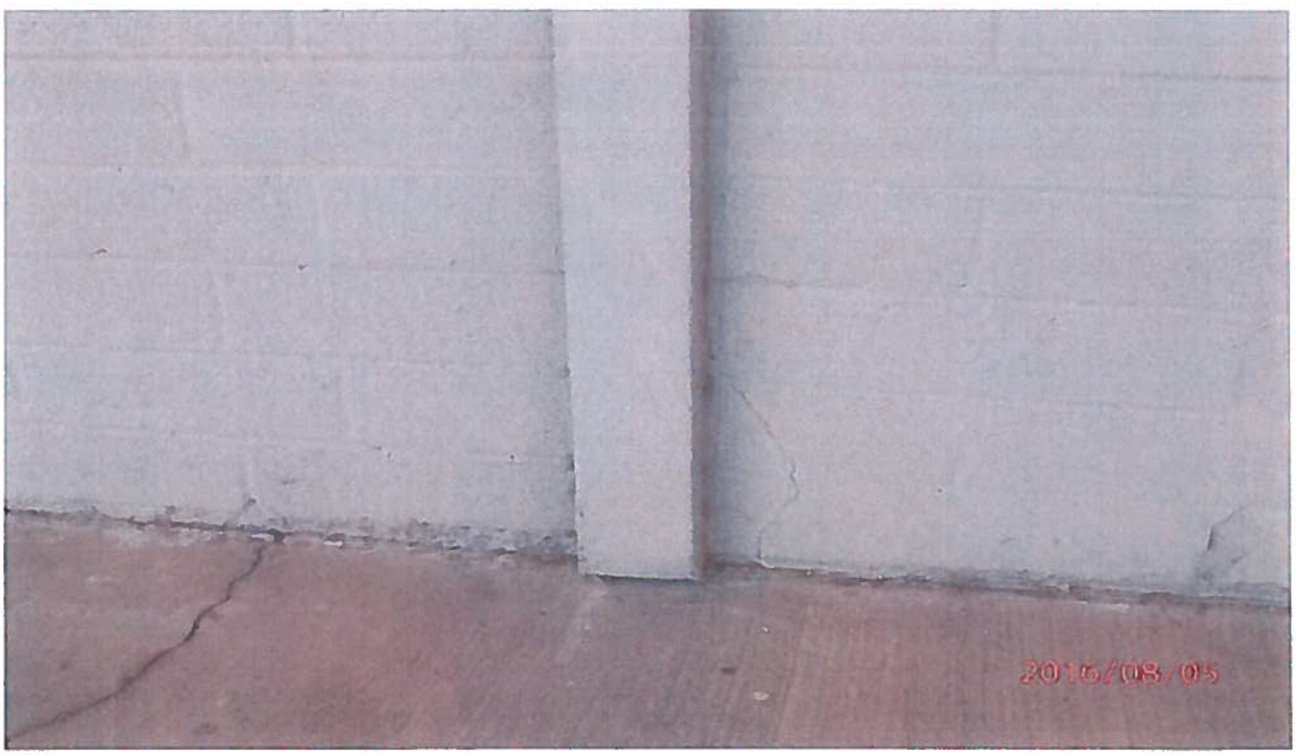

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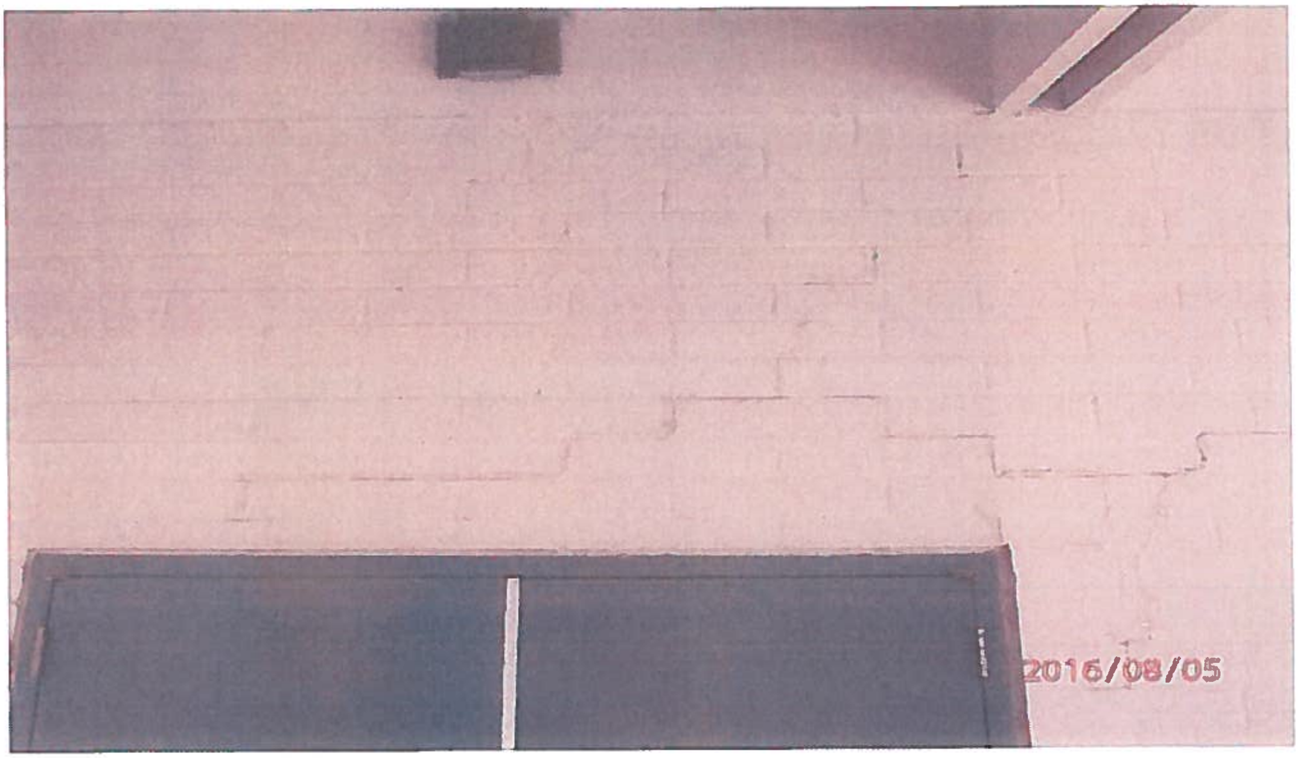
DON MENSENDICK SCHOOL – BUILDING 1

MARKER NO. 3

MARKER NO. 4

DON MENSENDICK SCHOOL – BUILDING 1



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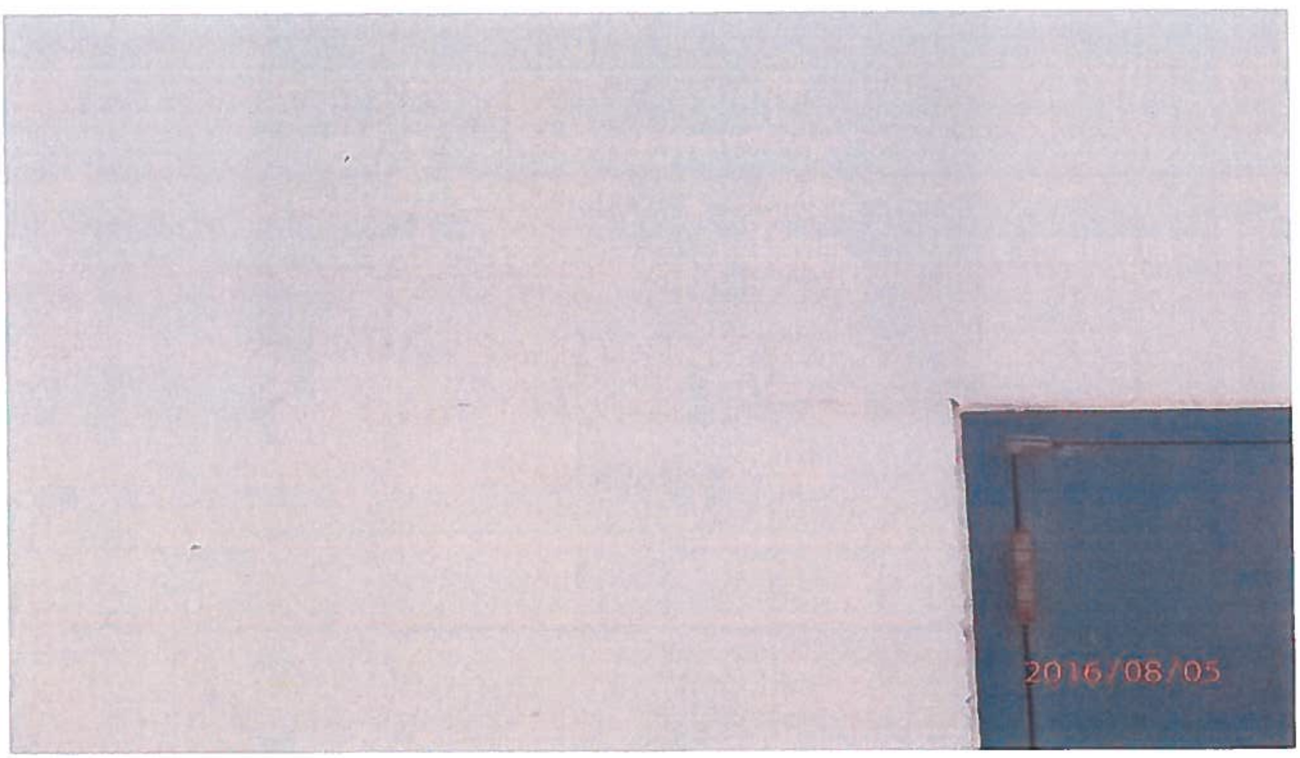

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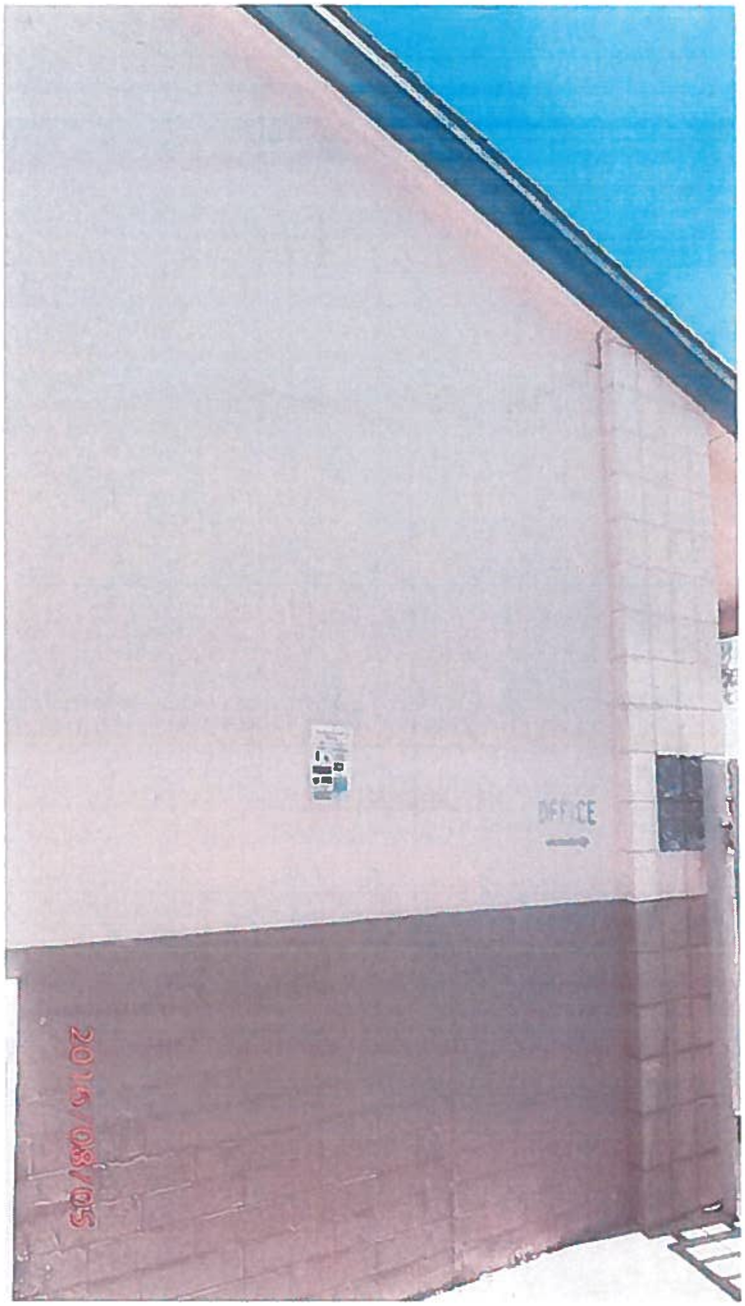

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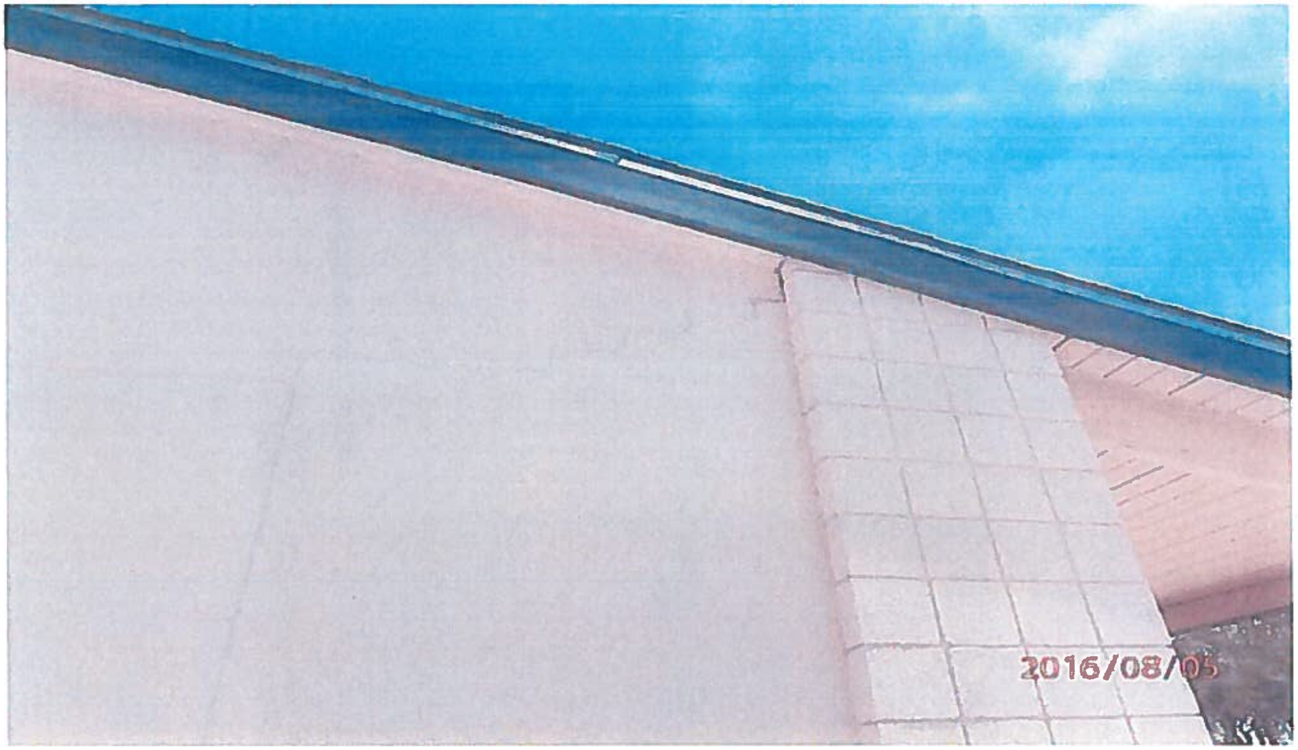


MARKER NO. 8

DON MENSENDICK SCHOOL – BUILDING 1

MARKER NO. 9

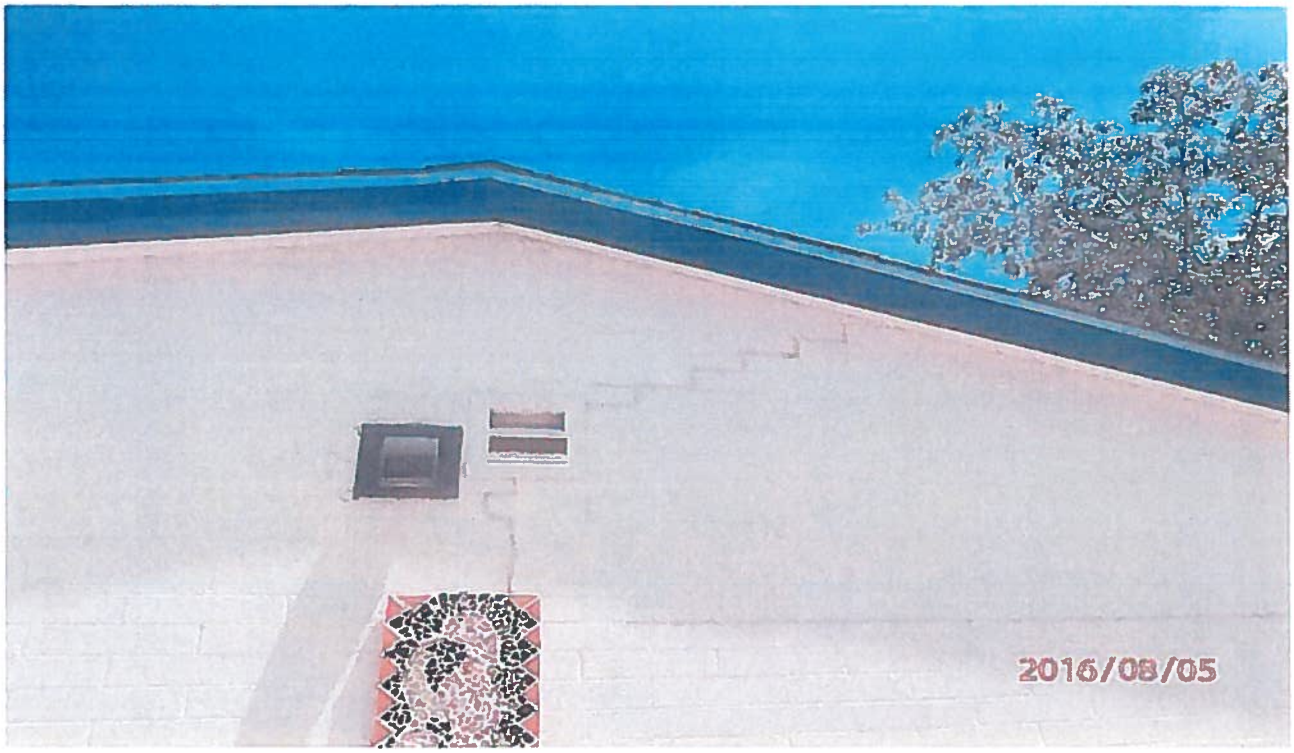
DON MENSENDICK SCHOOL – BUILDING 1

MARKER NO. 10

DON MENSENDICK SCHOOL – BUILDING 2

MARKER NO. 1

DON MENSENDICK SCHOOL – BUILDING 2



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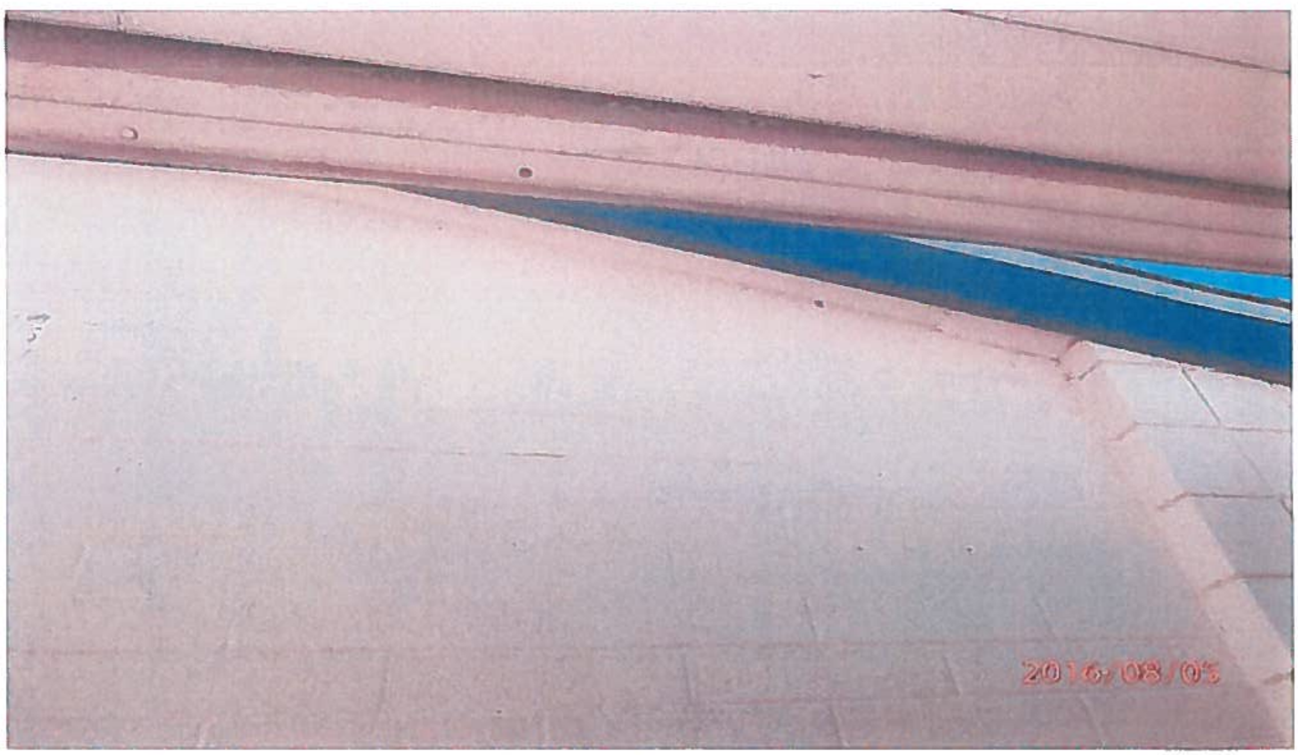

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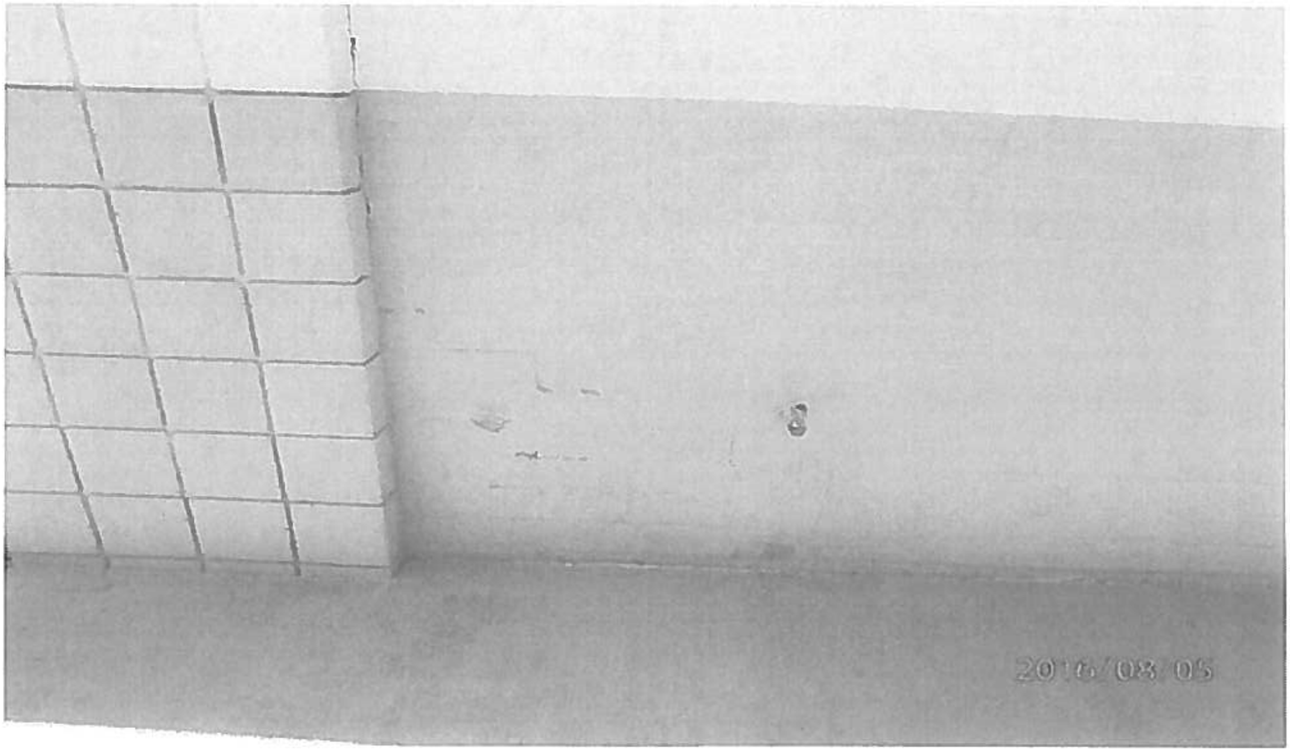

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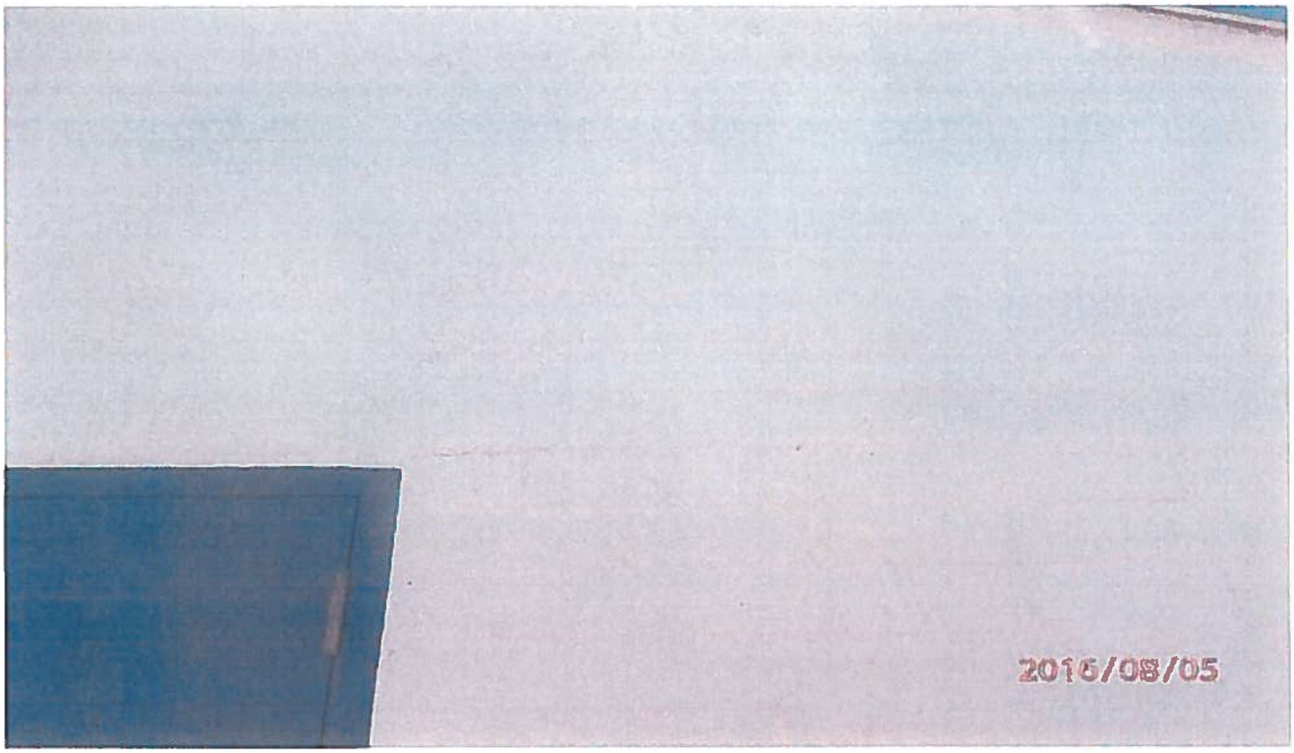
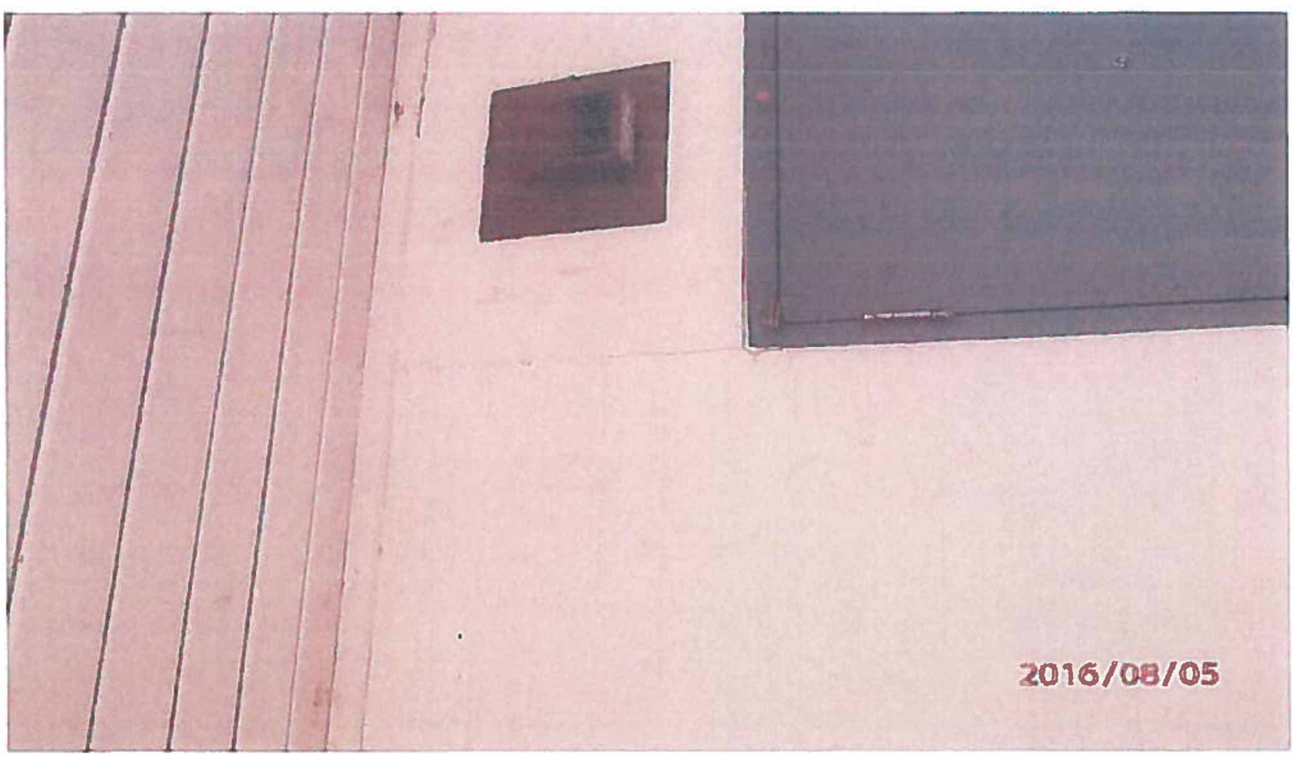


MARKER NO. 1

MARKER NO. 2

DON MENSENDICK SCHOOL – BUILDING 4

MARKER NO. 1



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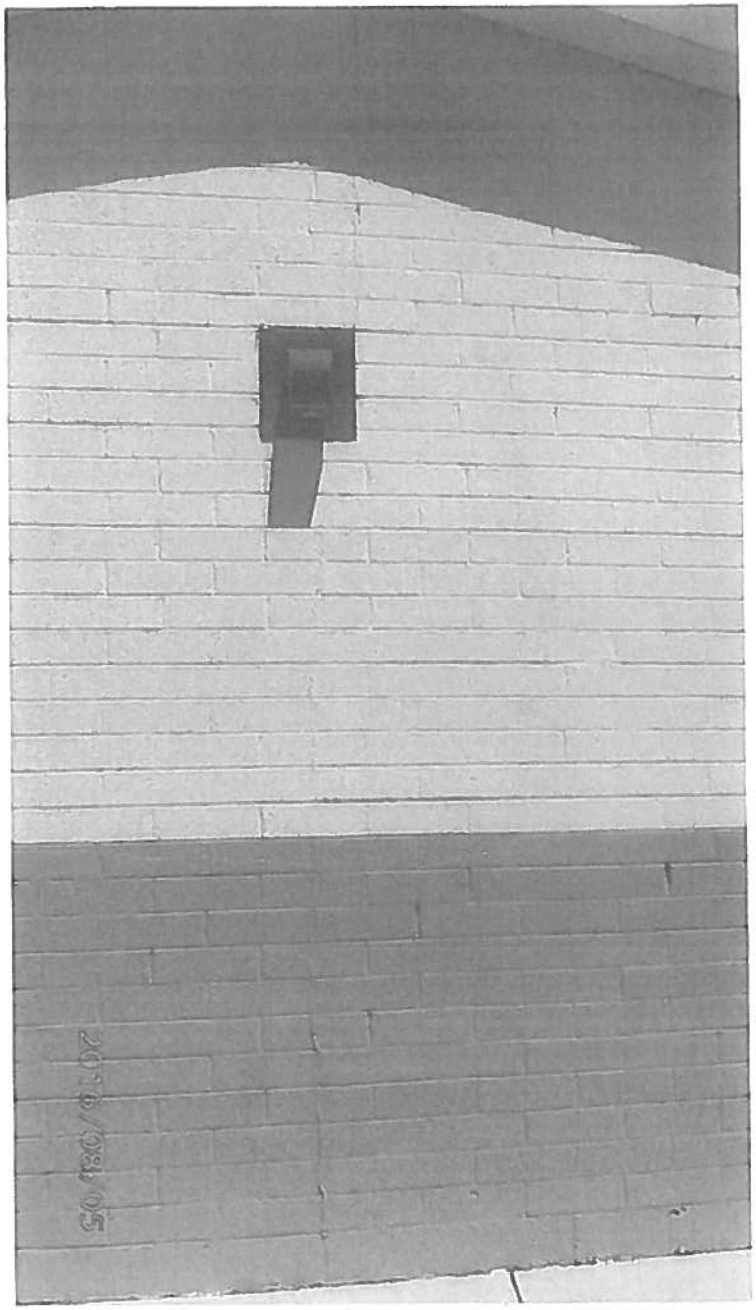

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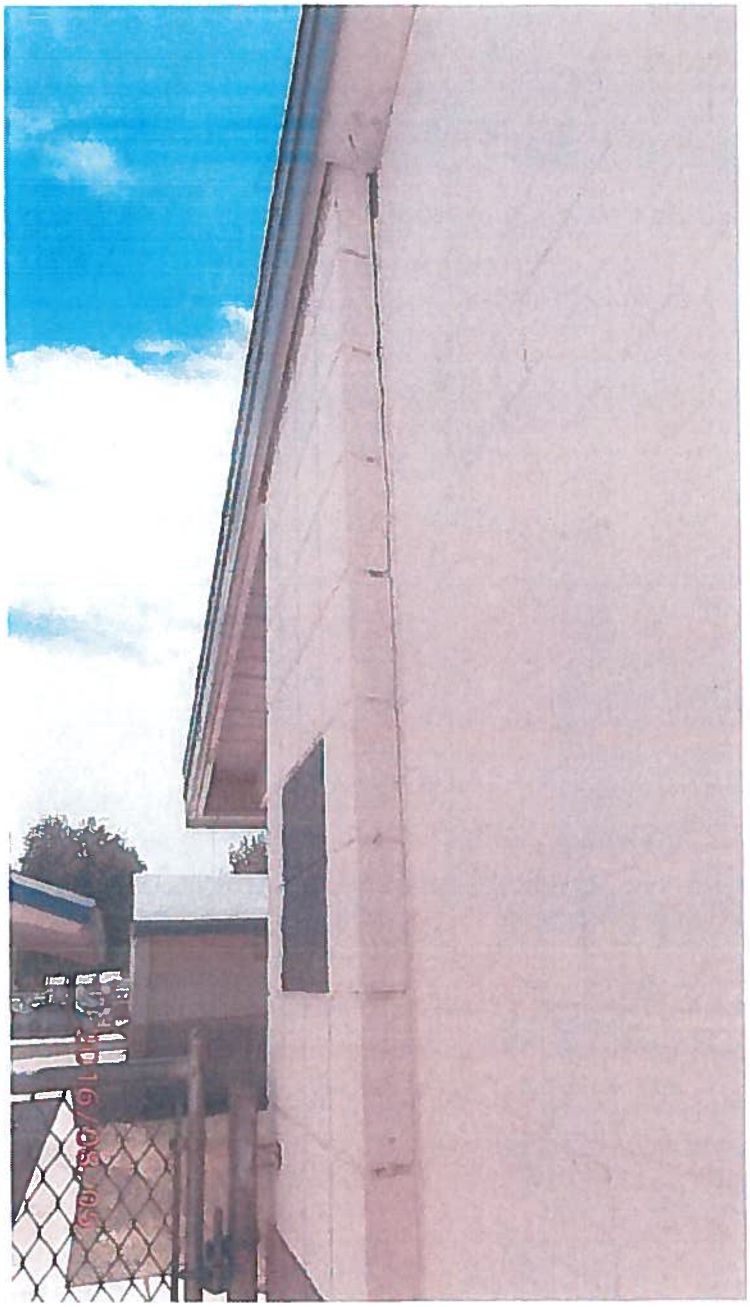

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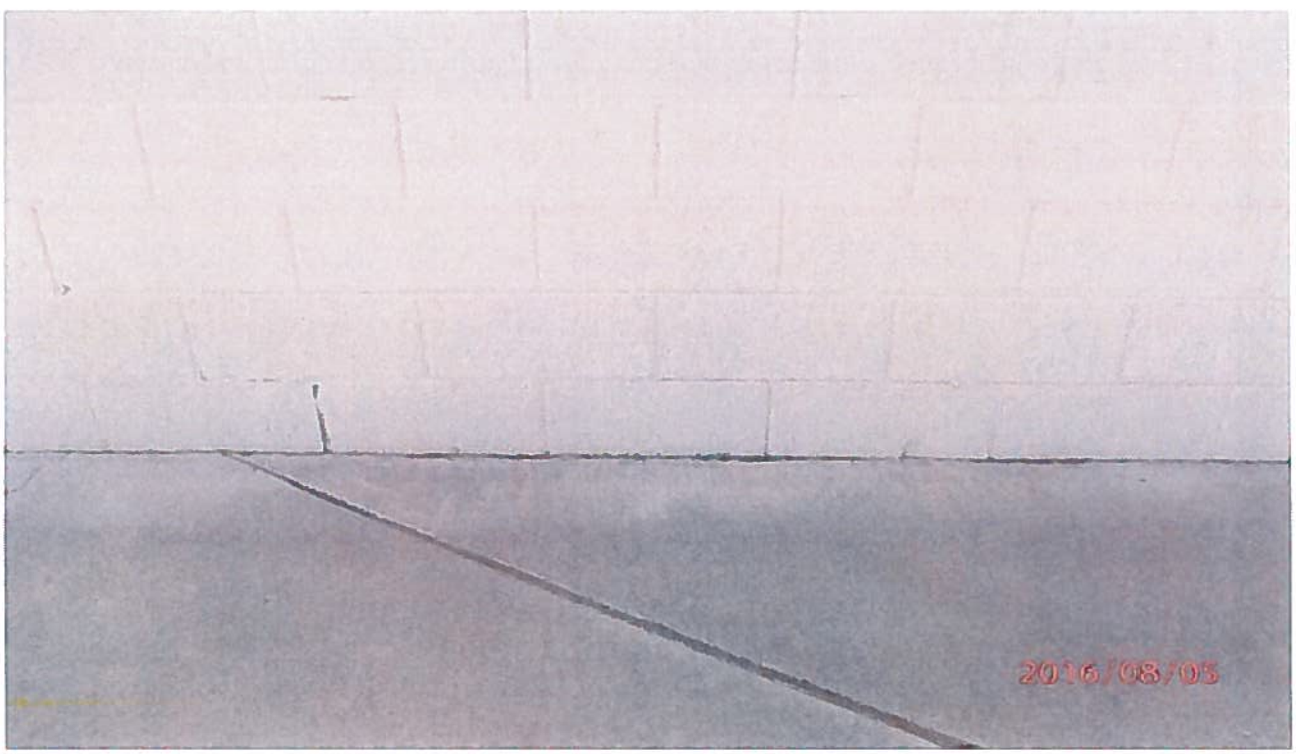
MARKER NO. 2



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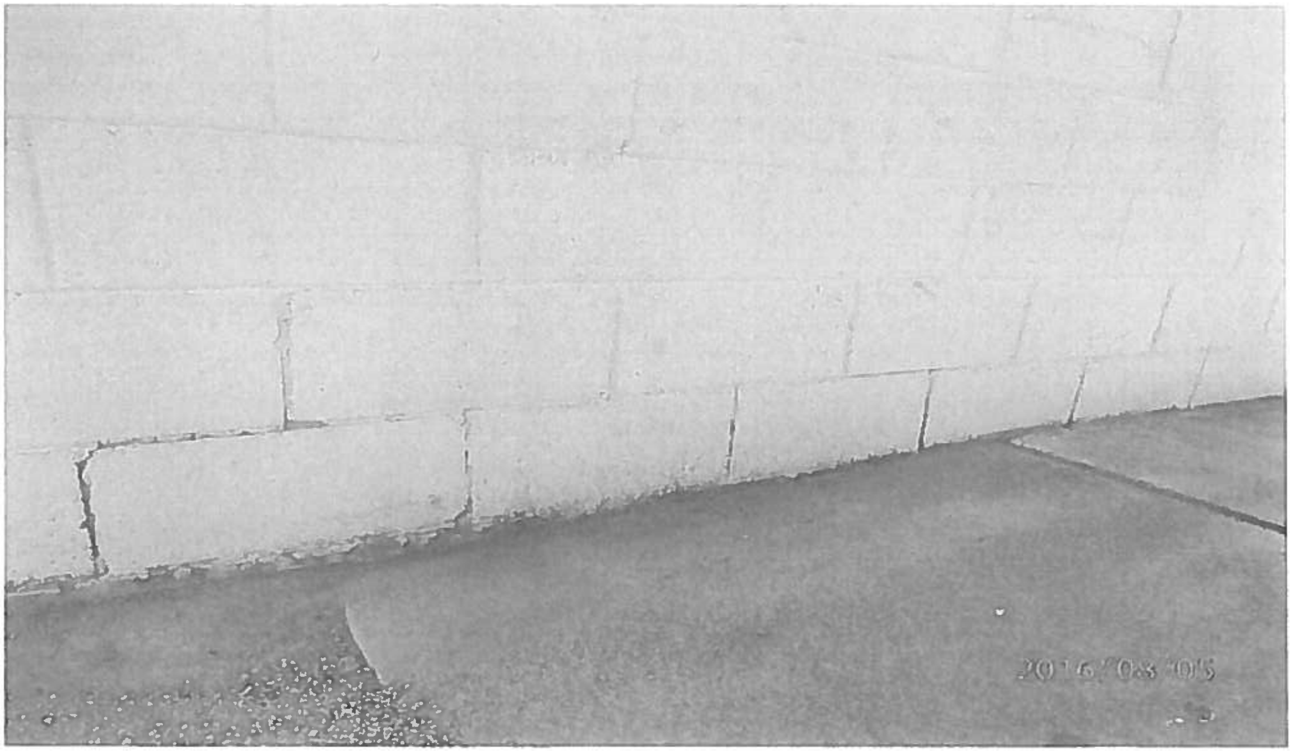

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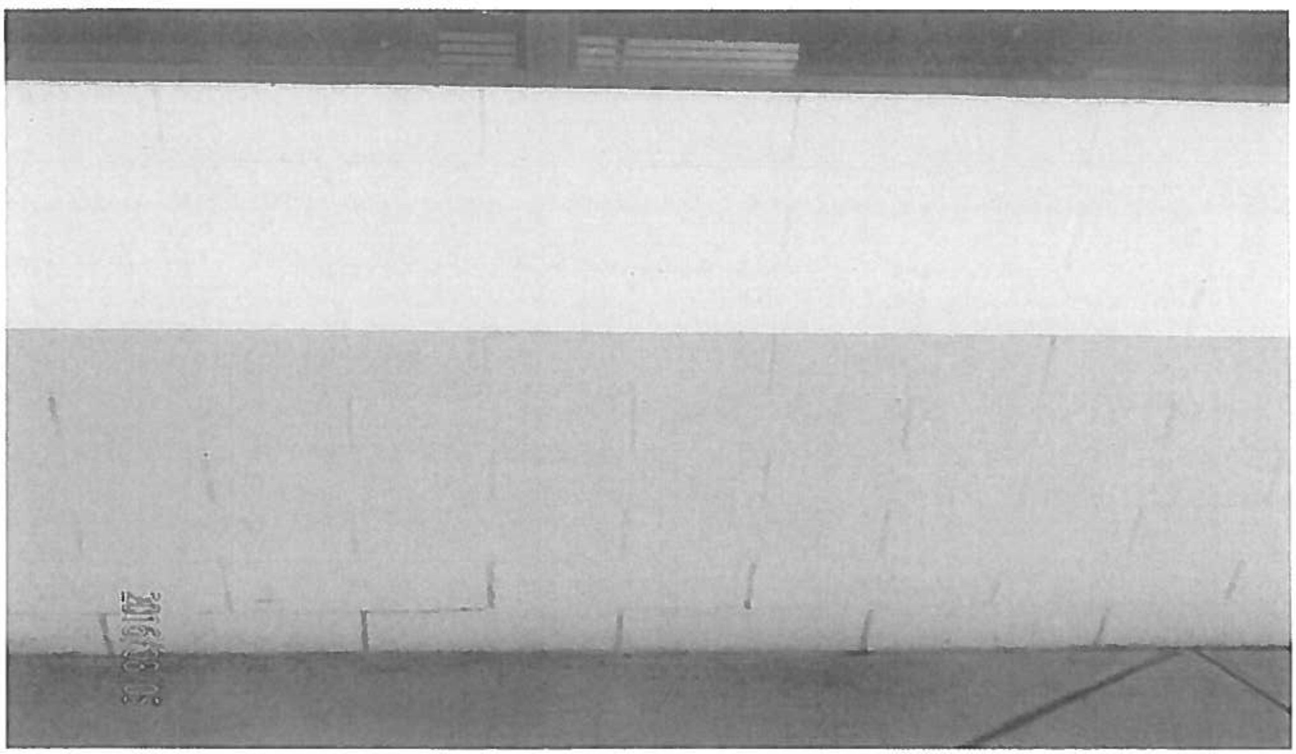

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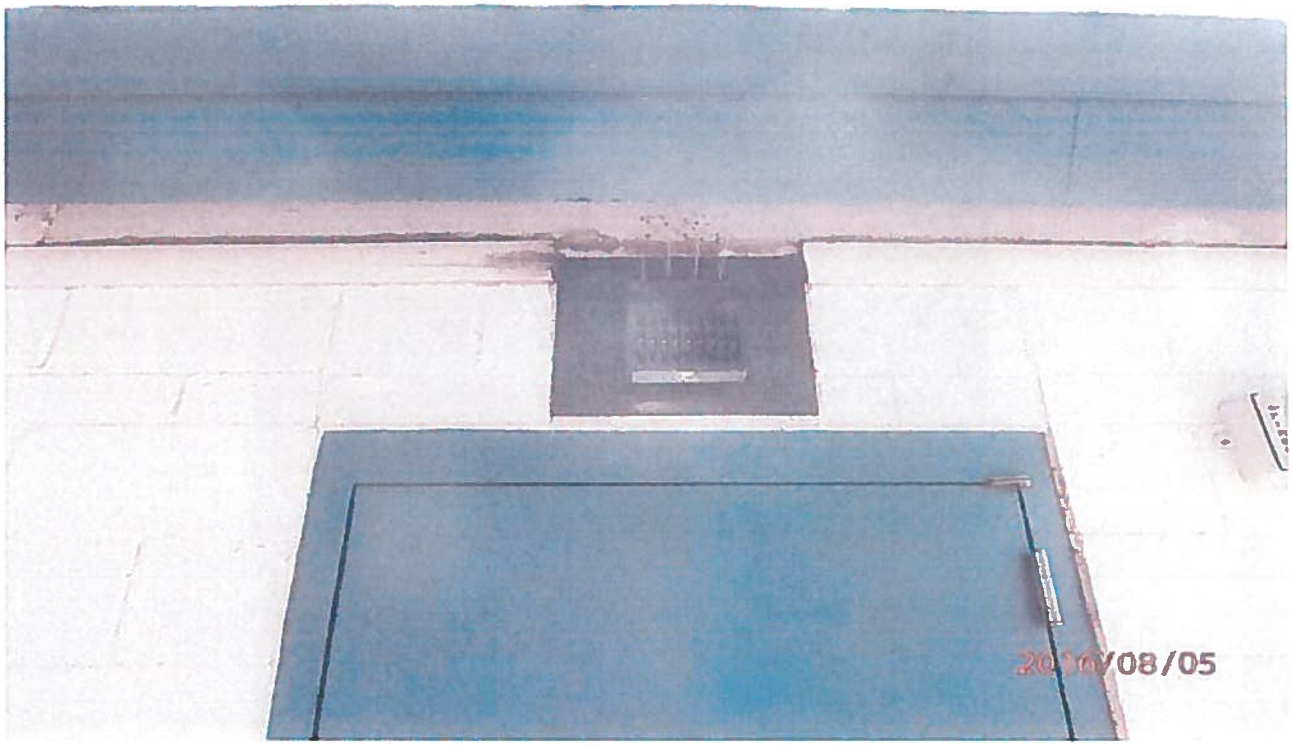

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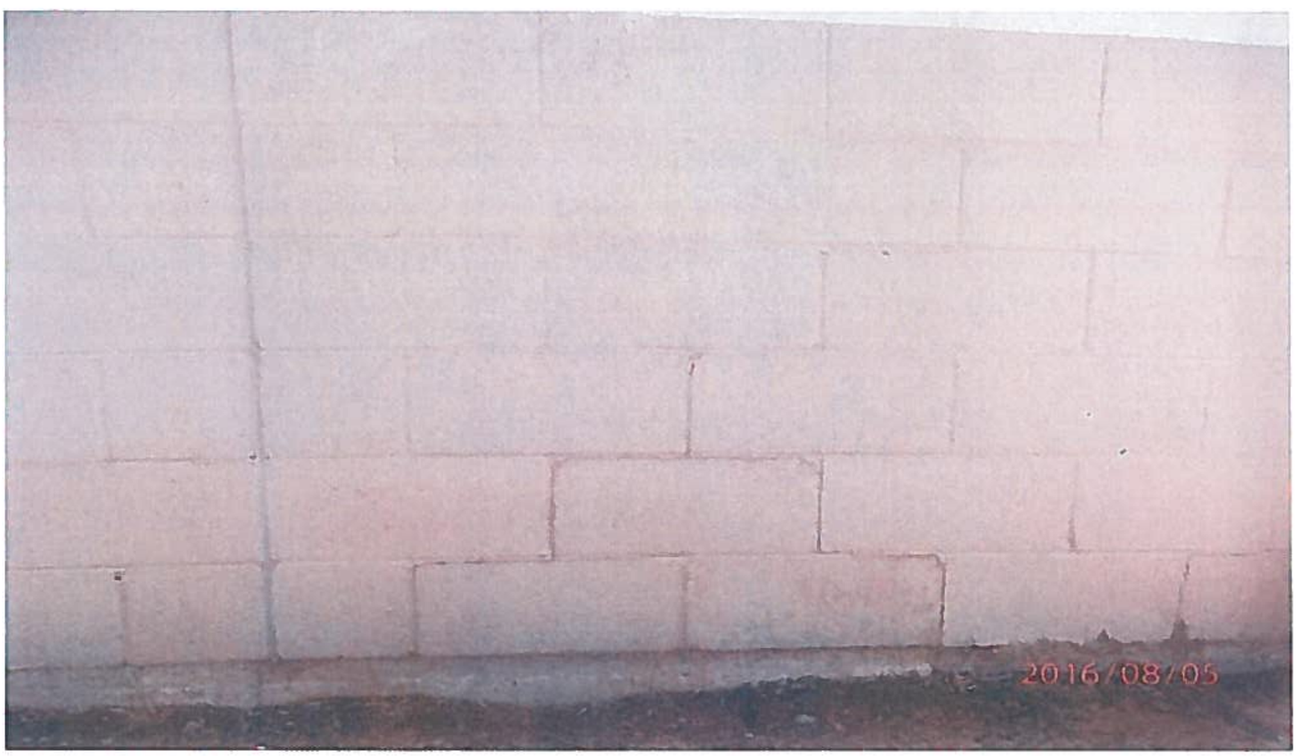

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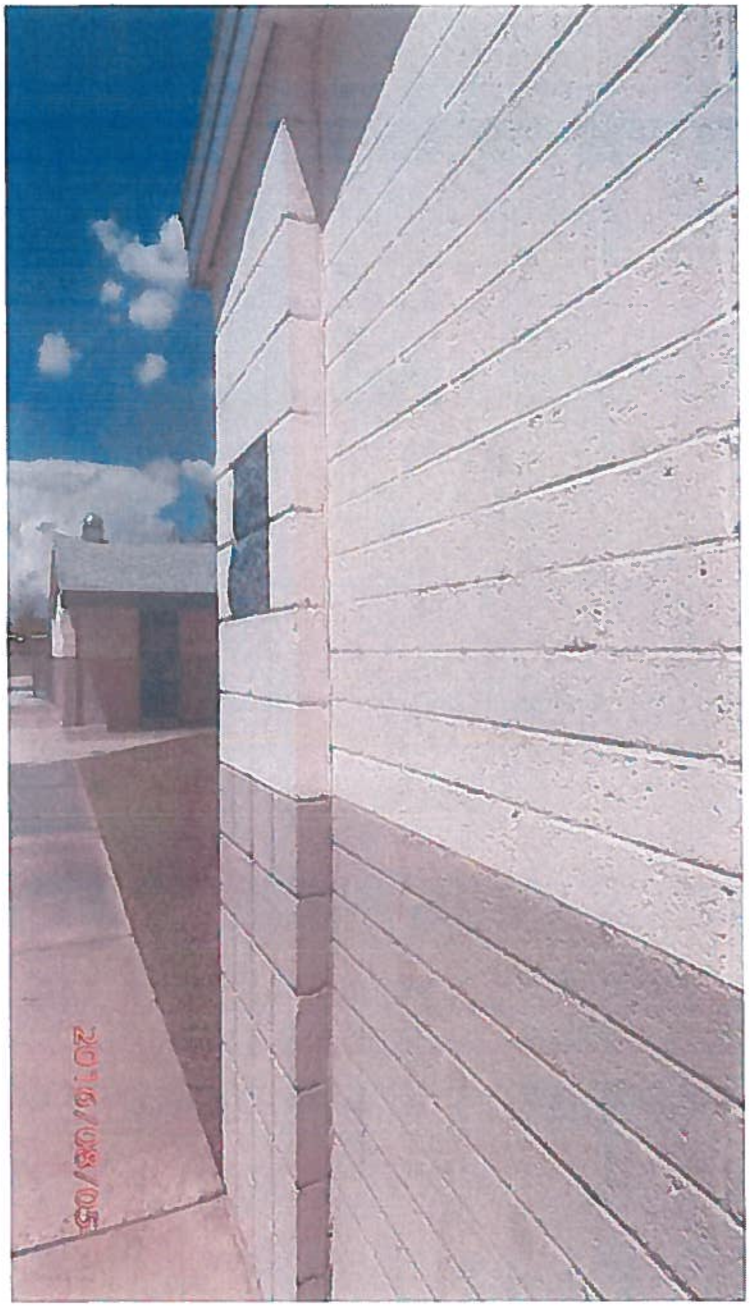


MARKER NO. 8

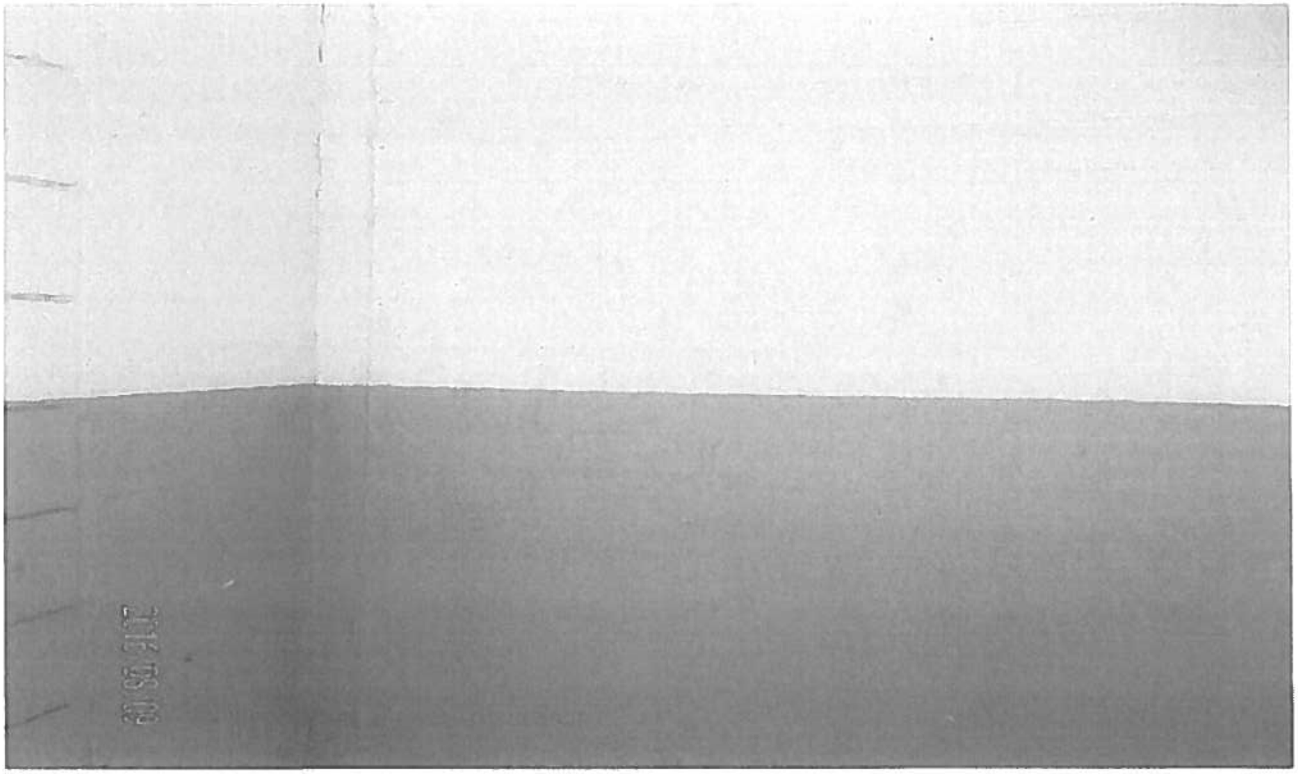
DON MENSENDICK SCHOOL – BUILDING 6

MARKER NO. 1

DON MENSENDICK SCHOOL – BUILDING 7

MARKER NO. 1

DON MENSENDICK SCHOOL – BUILDING 7



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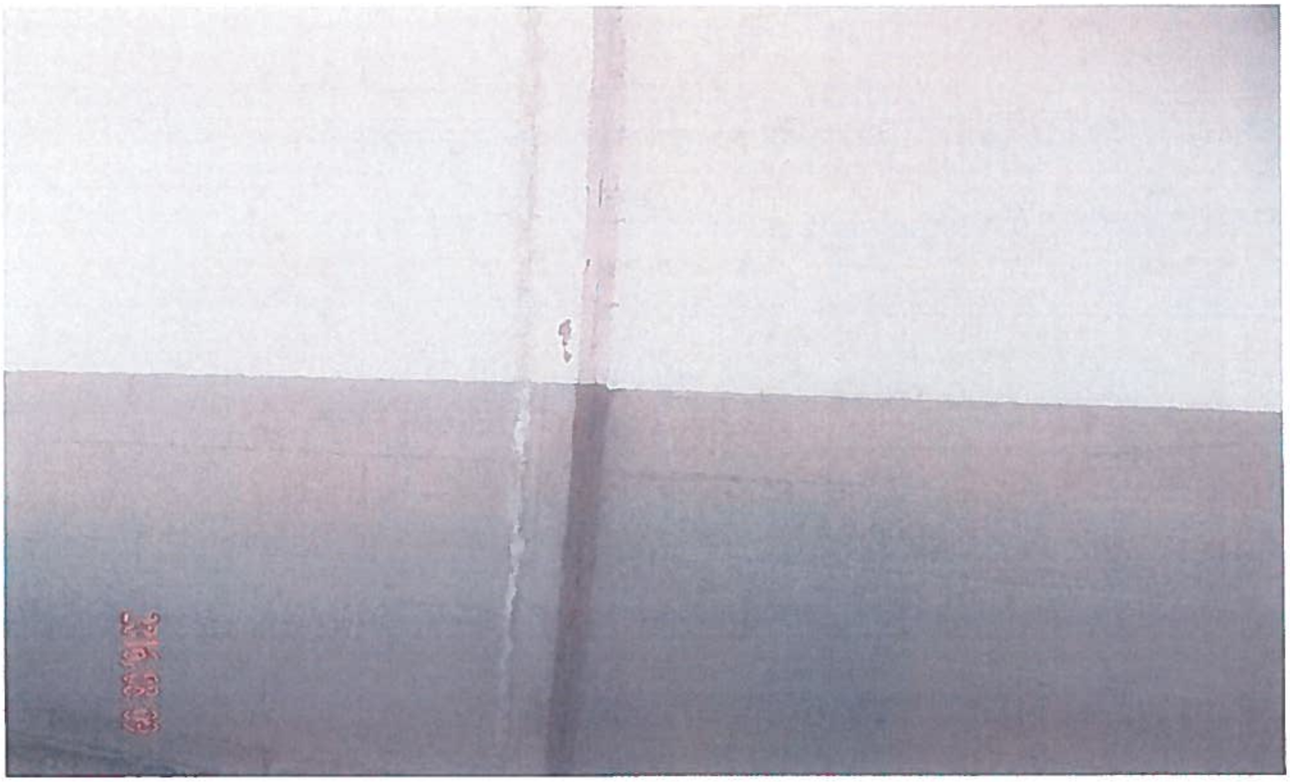

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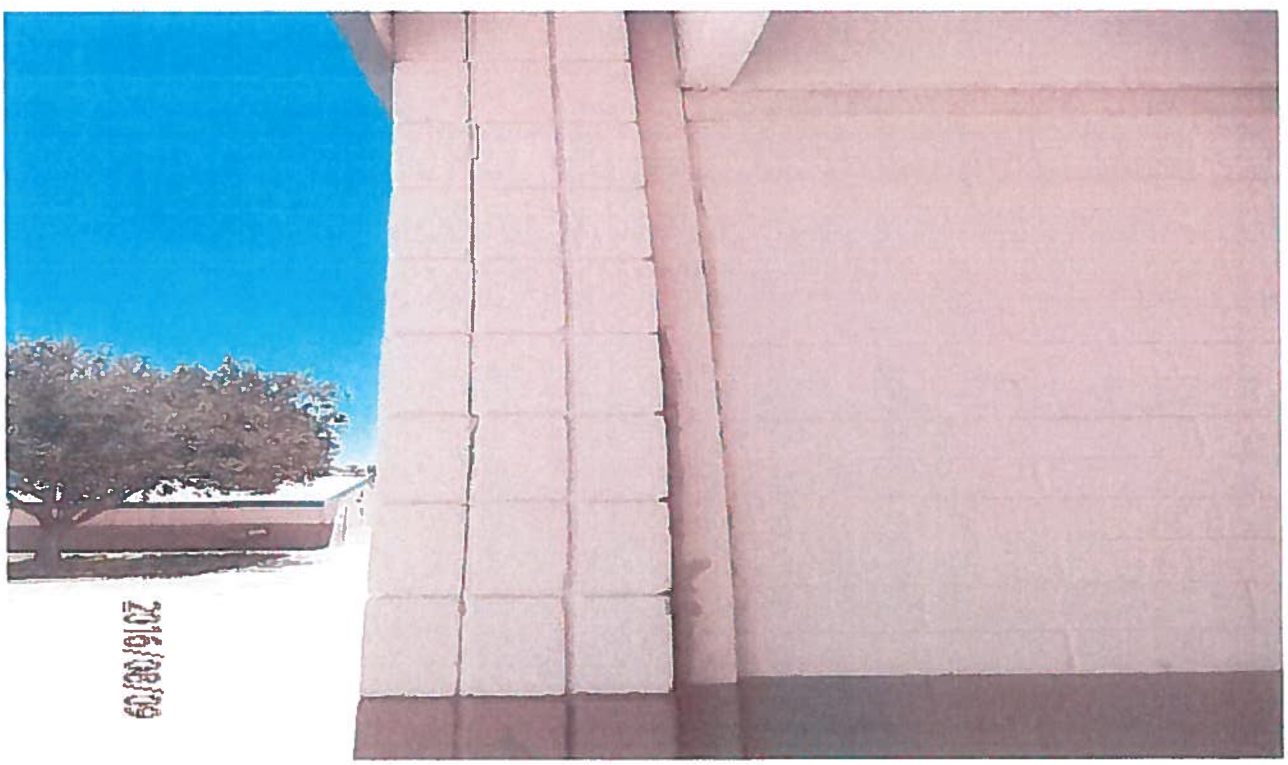

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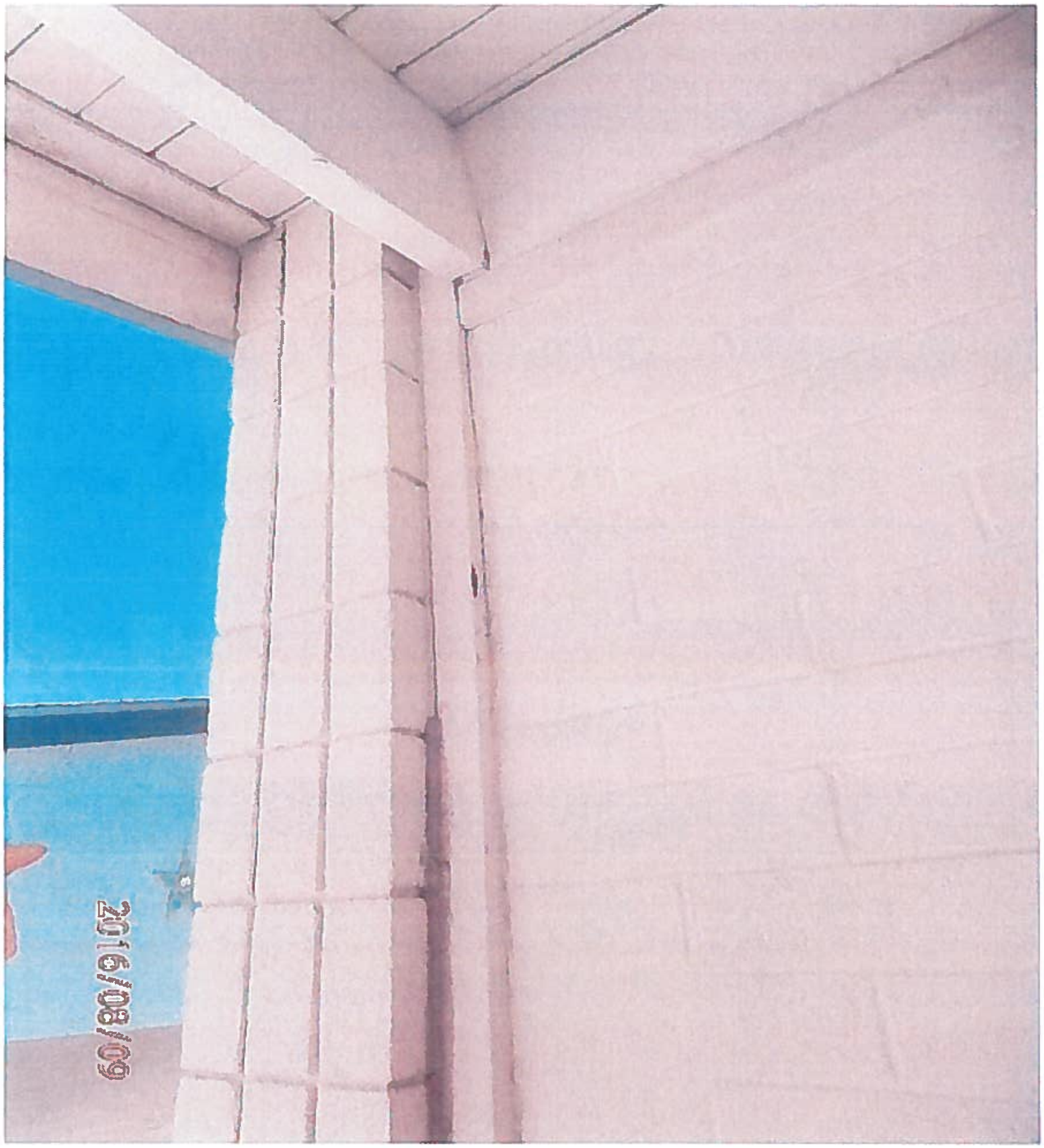

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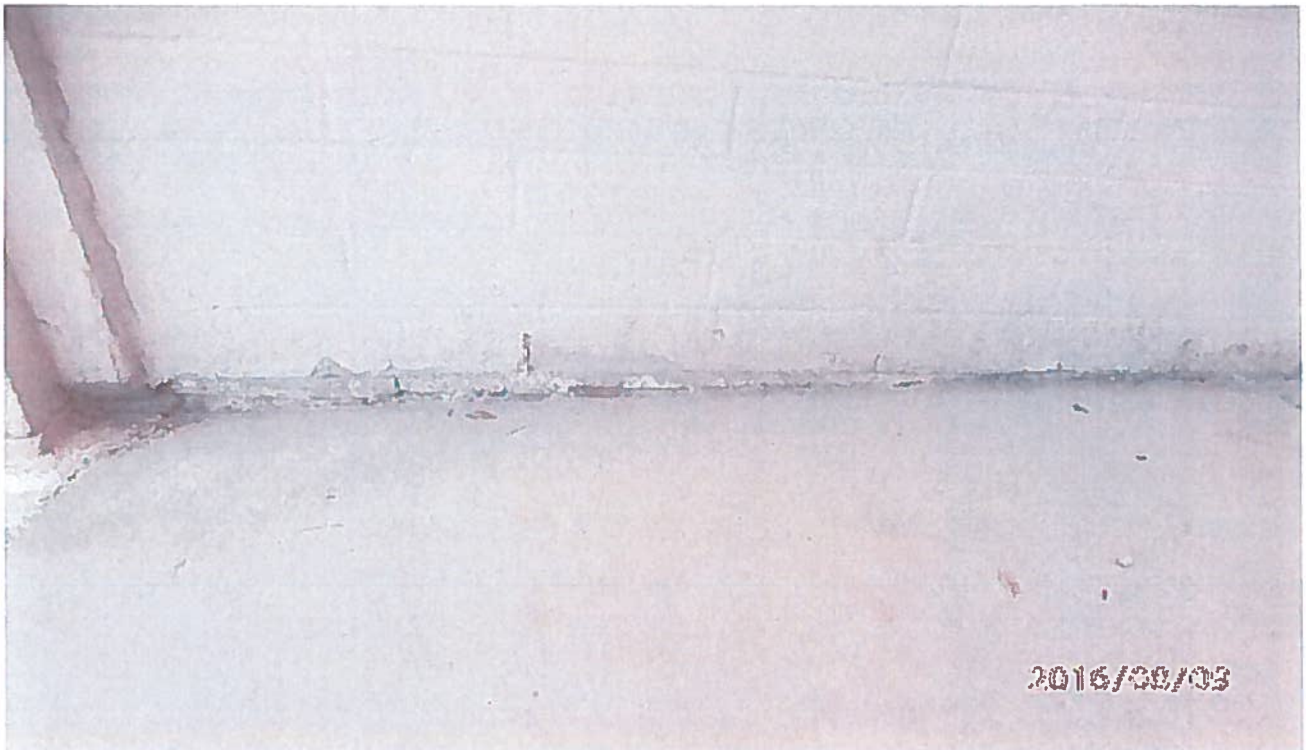

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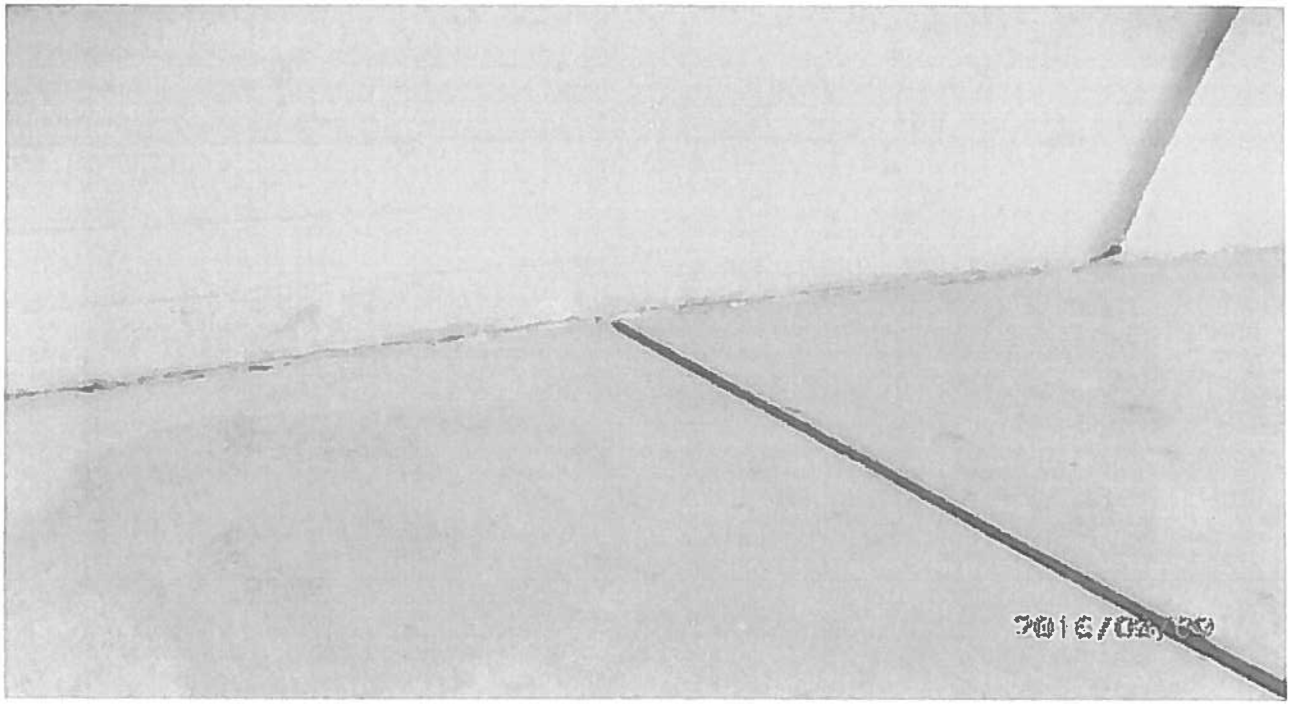

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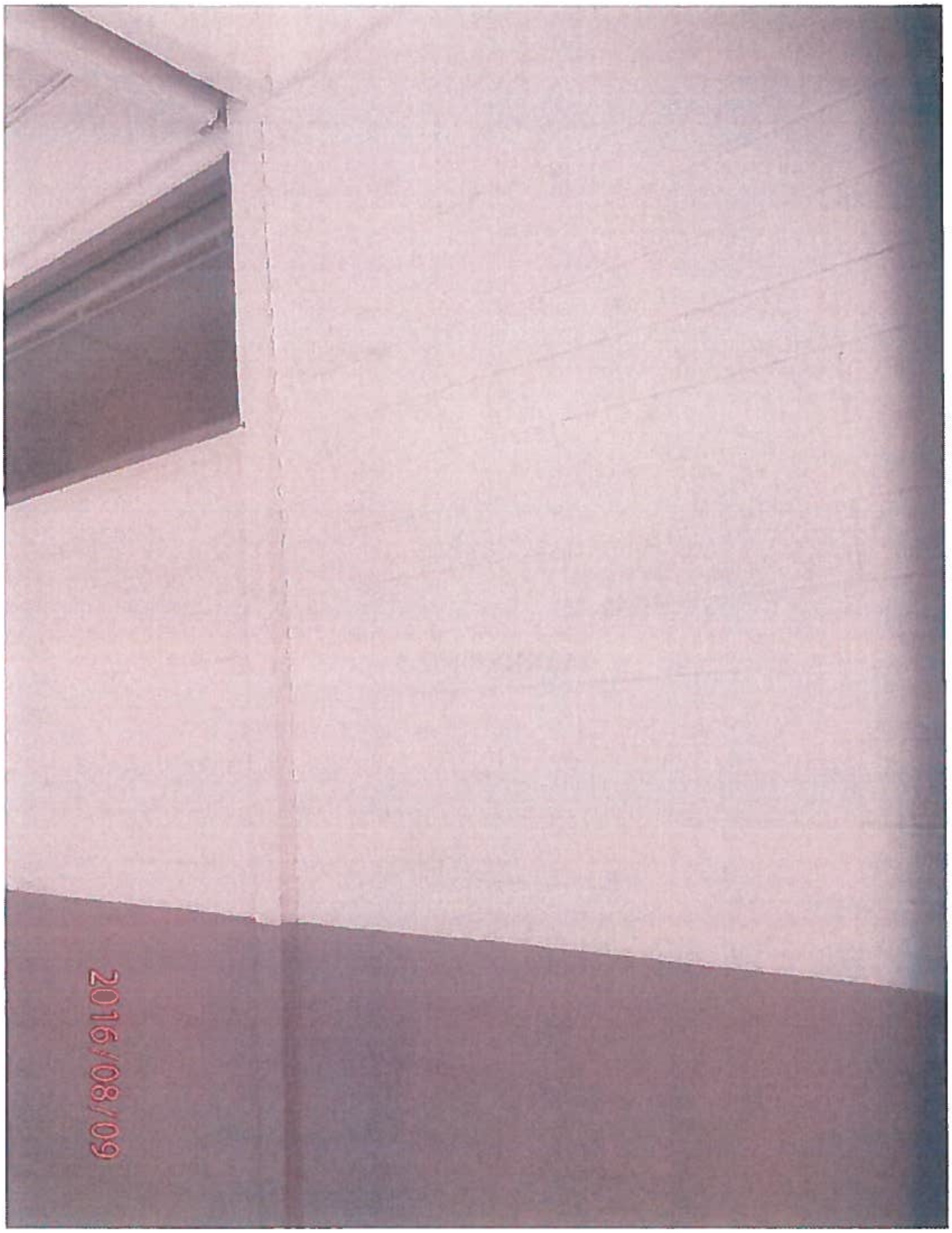
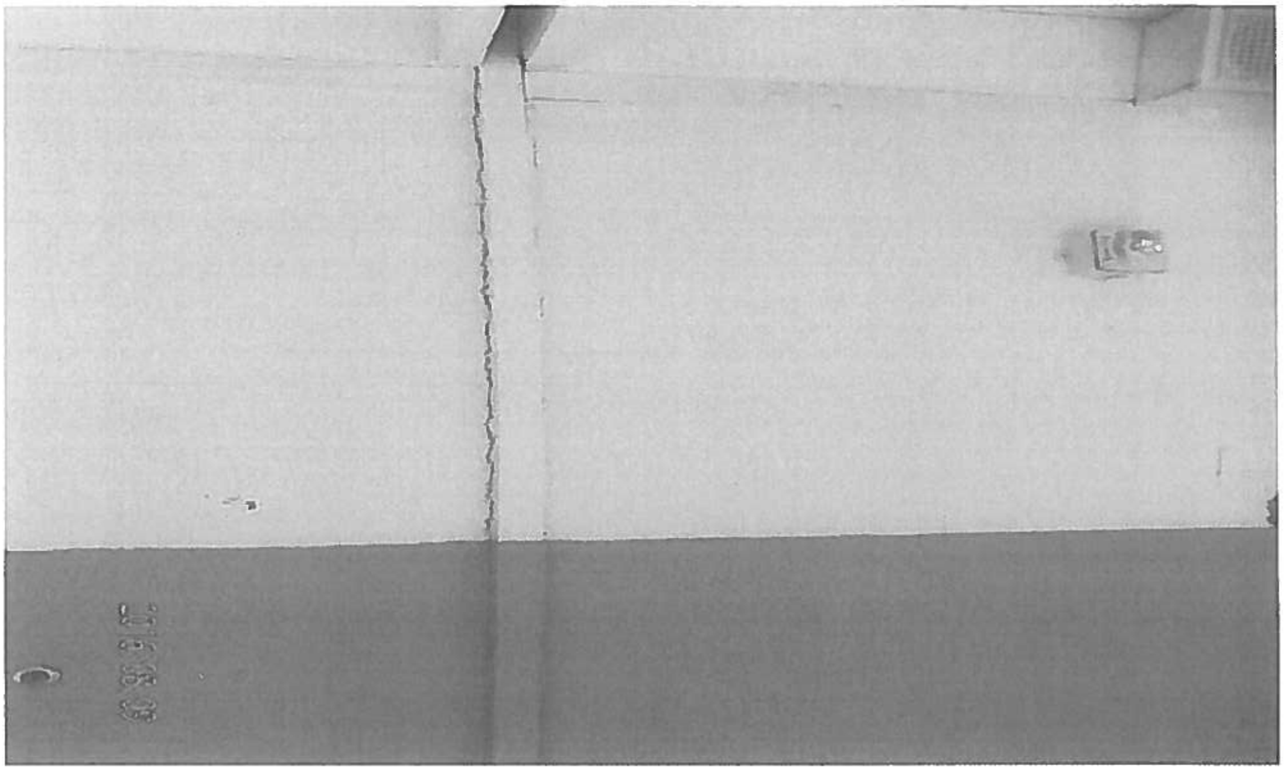


MARKER NO. 10

DON MENSENDICK SCHOOL – BUILDING 7



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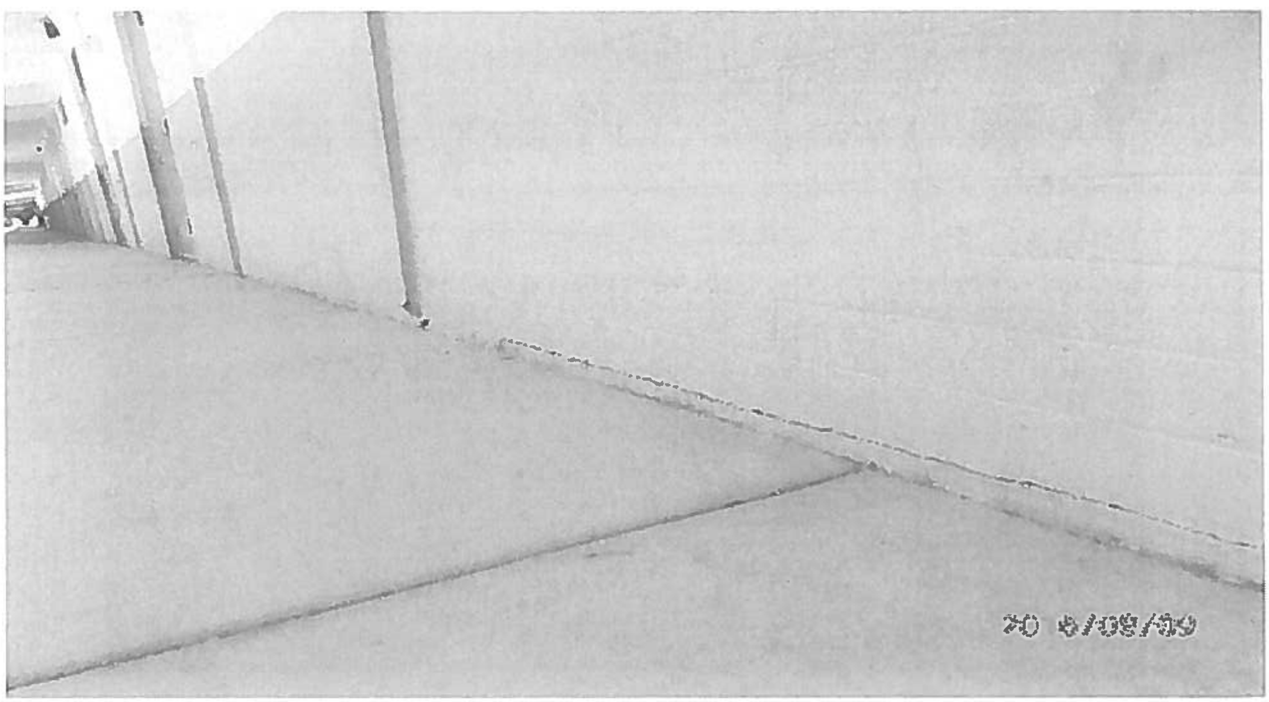

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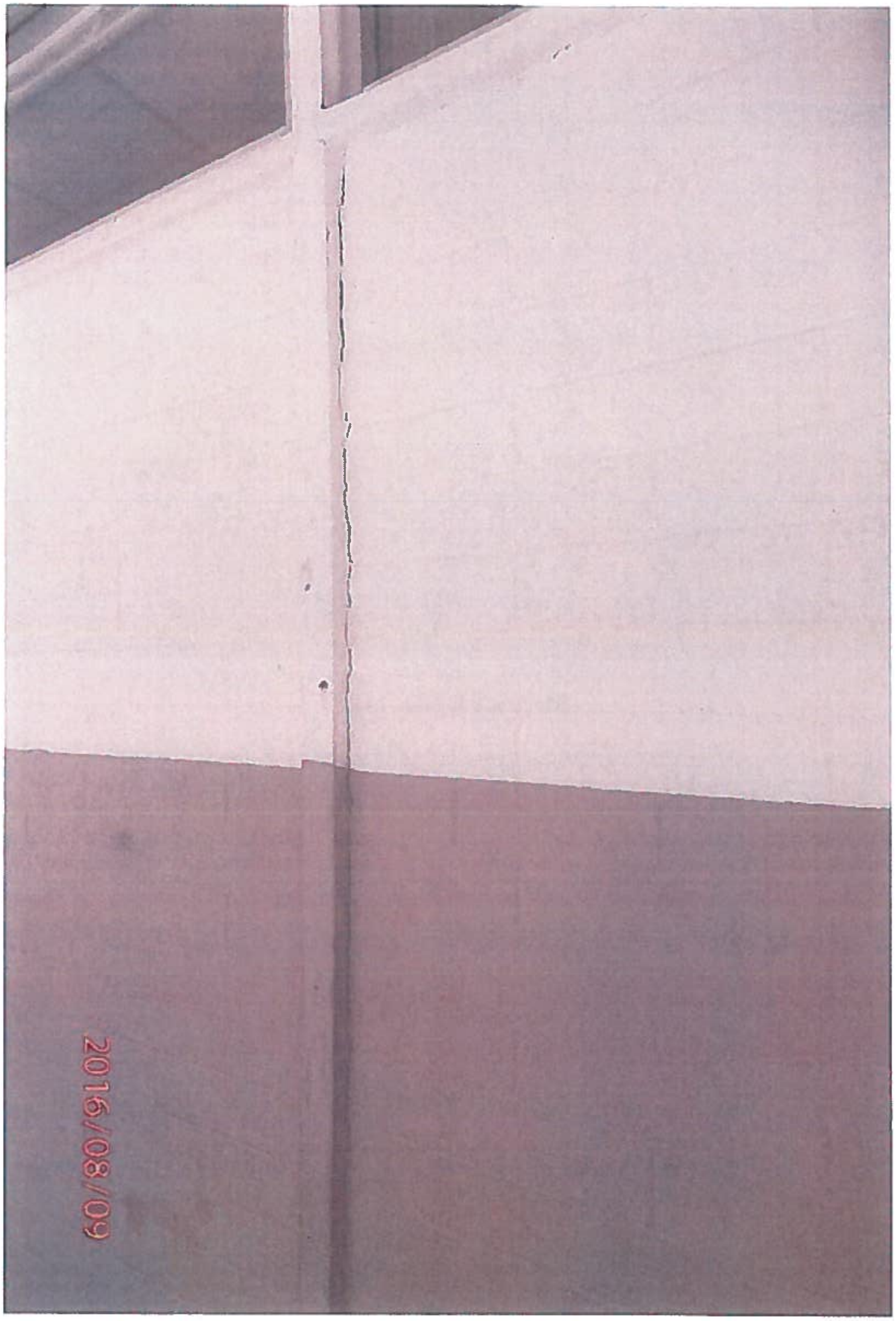

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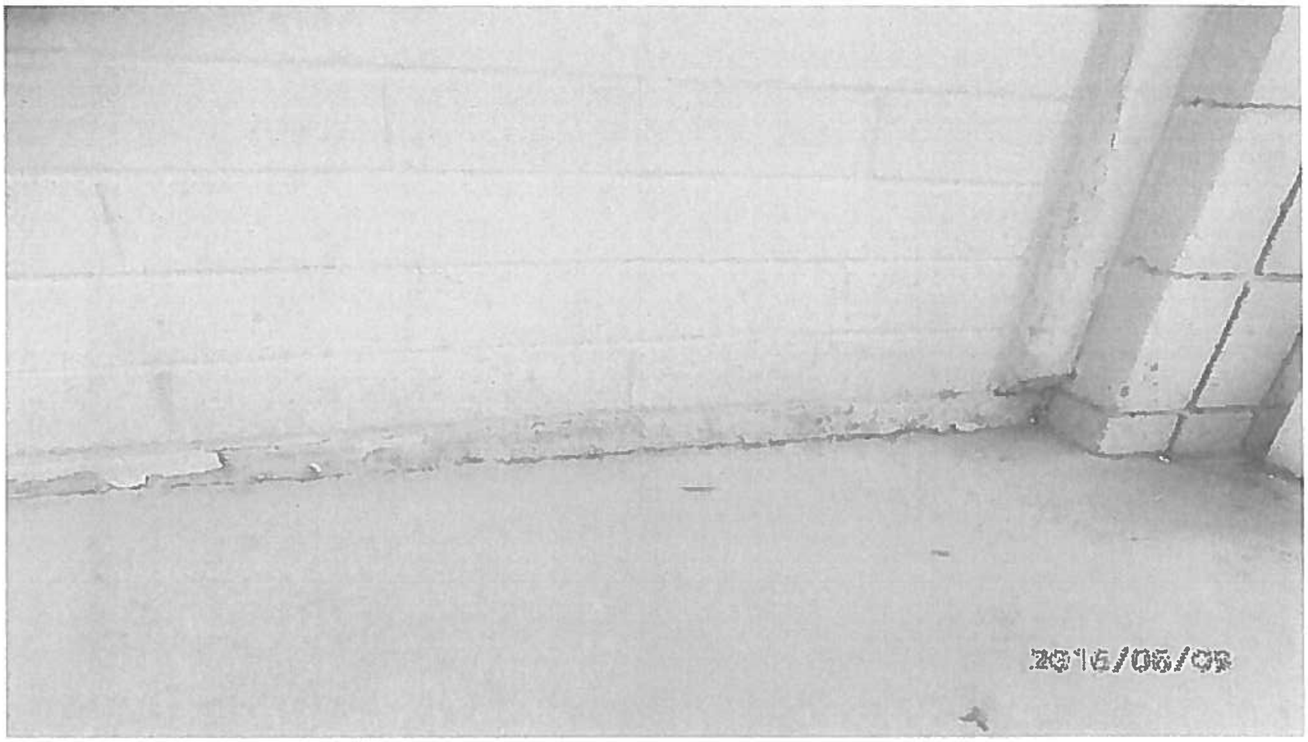

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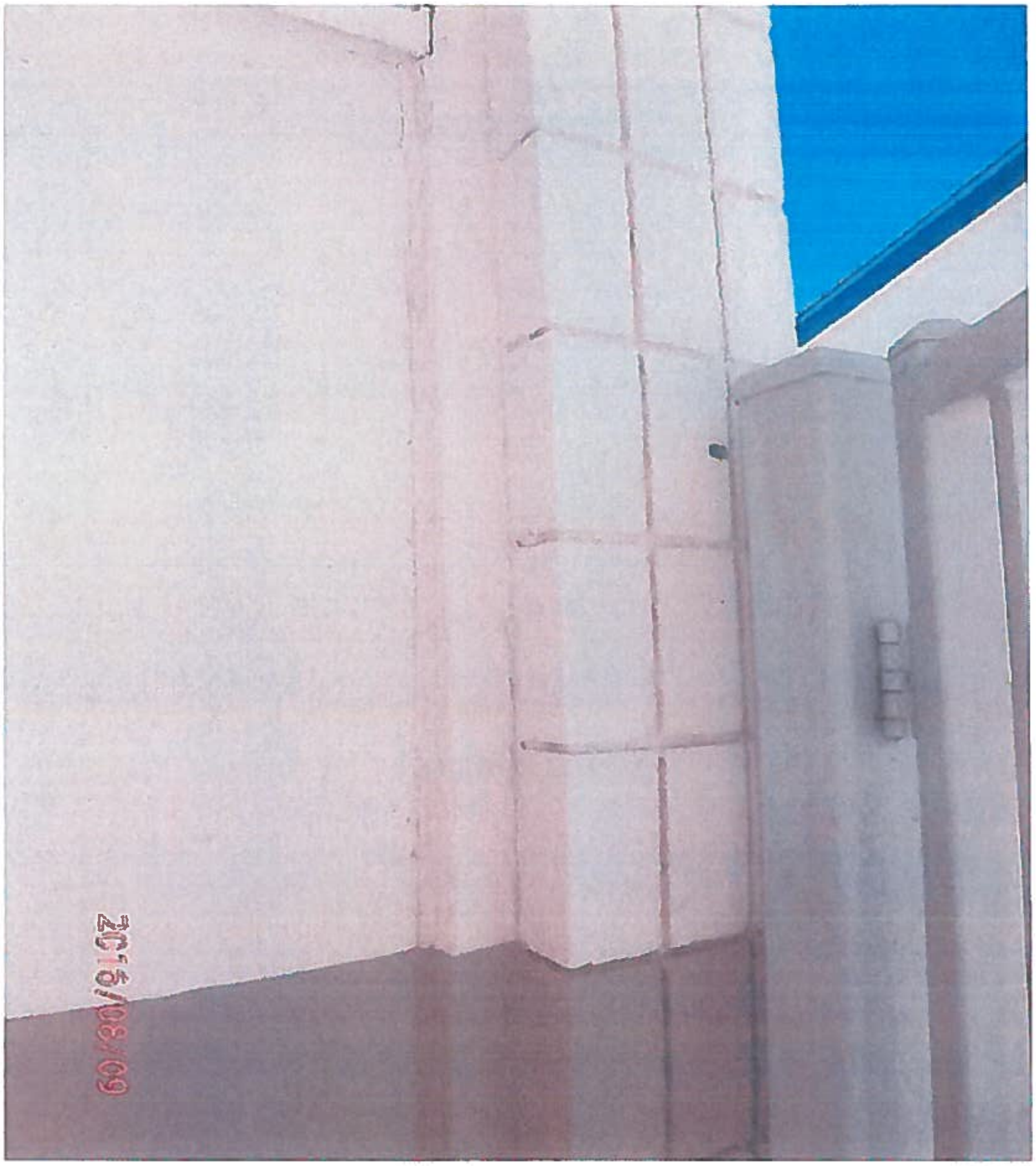

MARKER NO. 15

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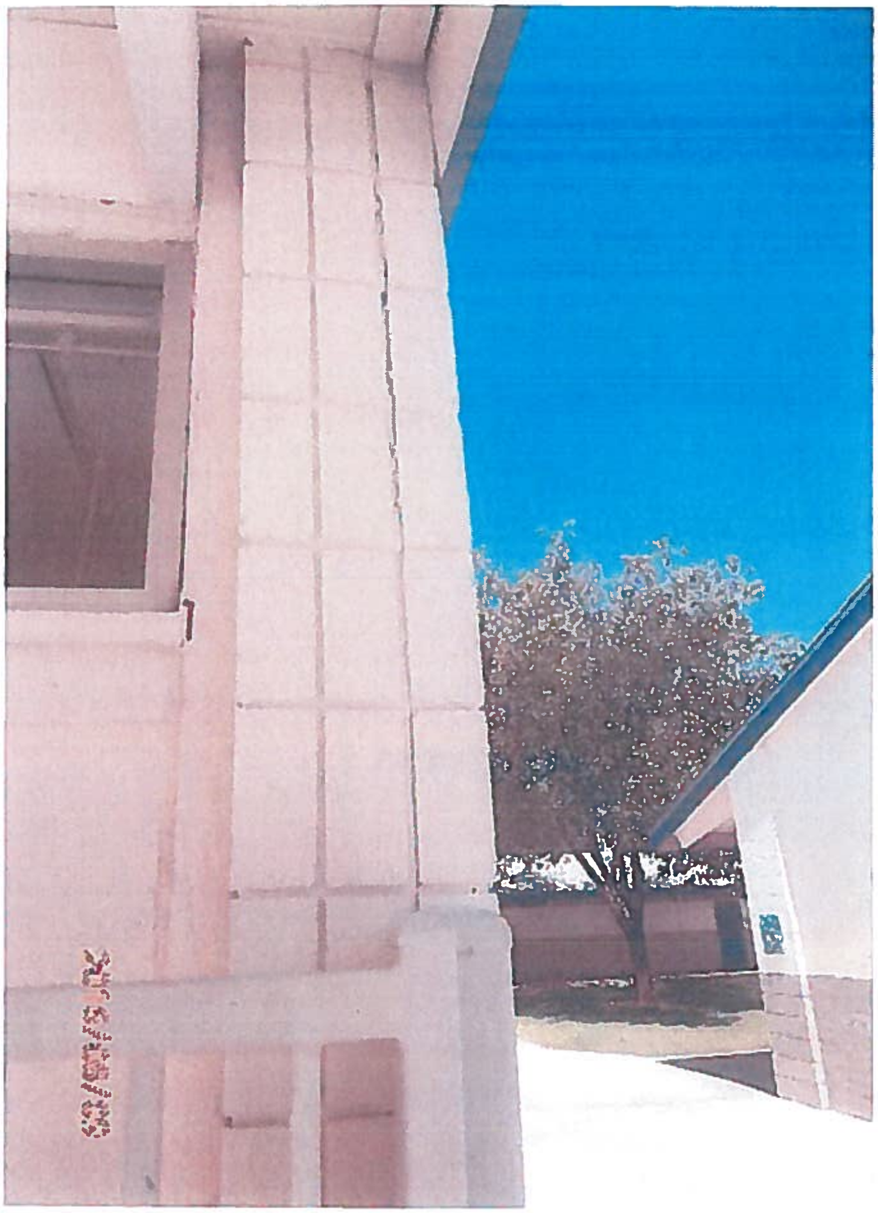
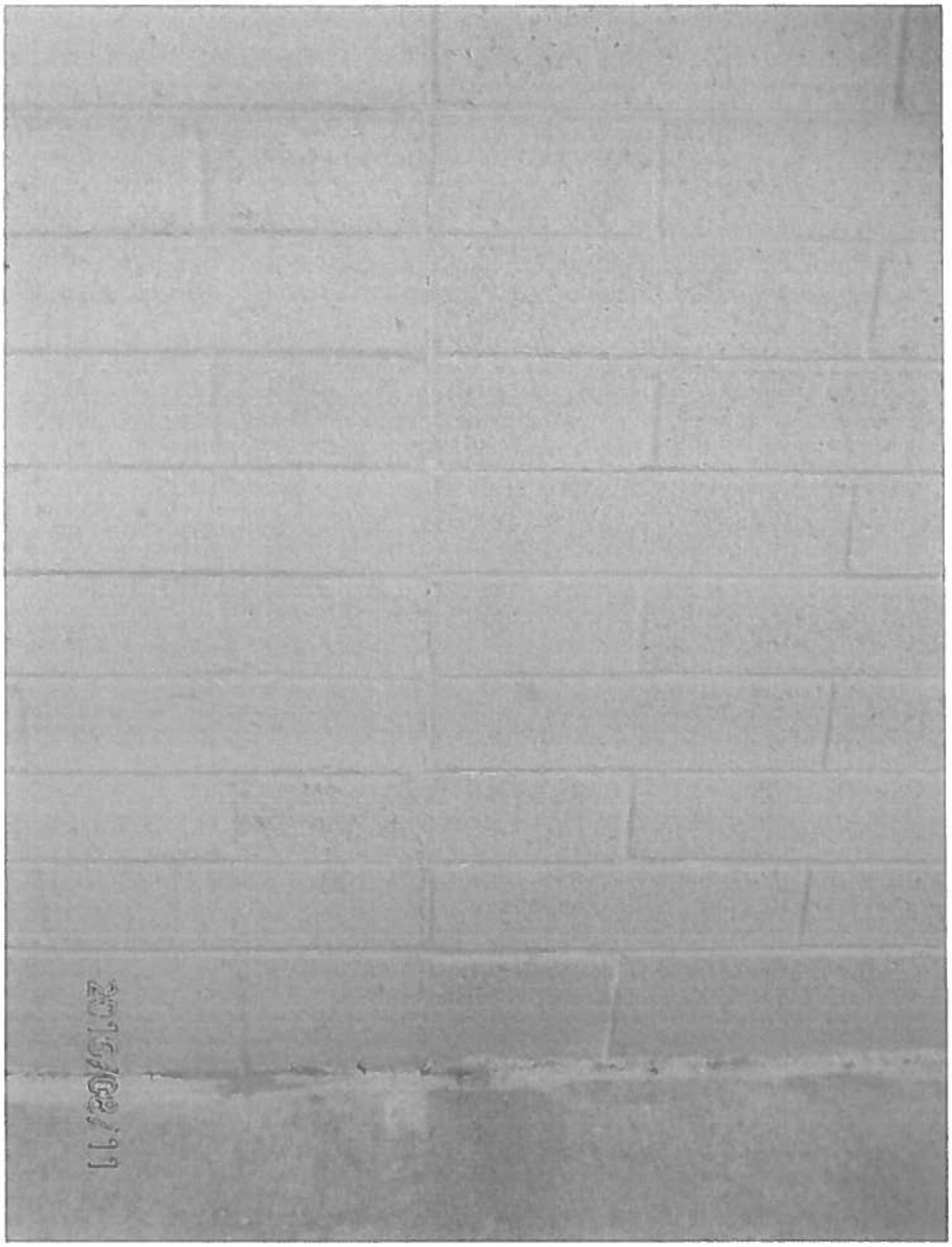


MARKER NO. 16

DON MENSENDICK SCHOOL – BUILDING 8

MARKER NO. 1

DON MENSENDICK SCHOOL – BUILDING 8



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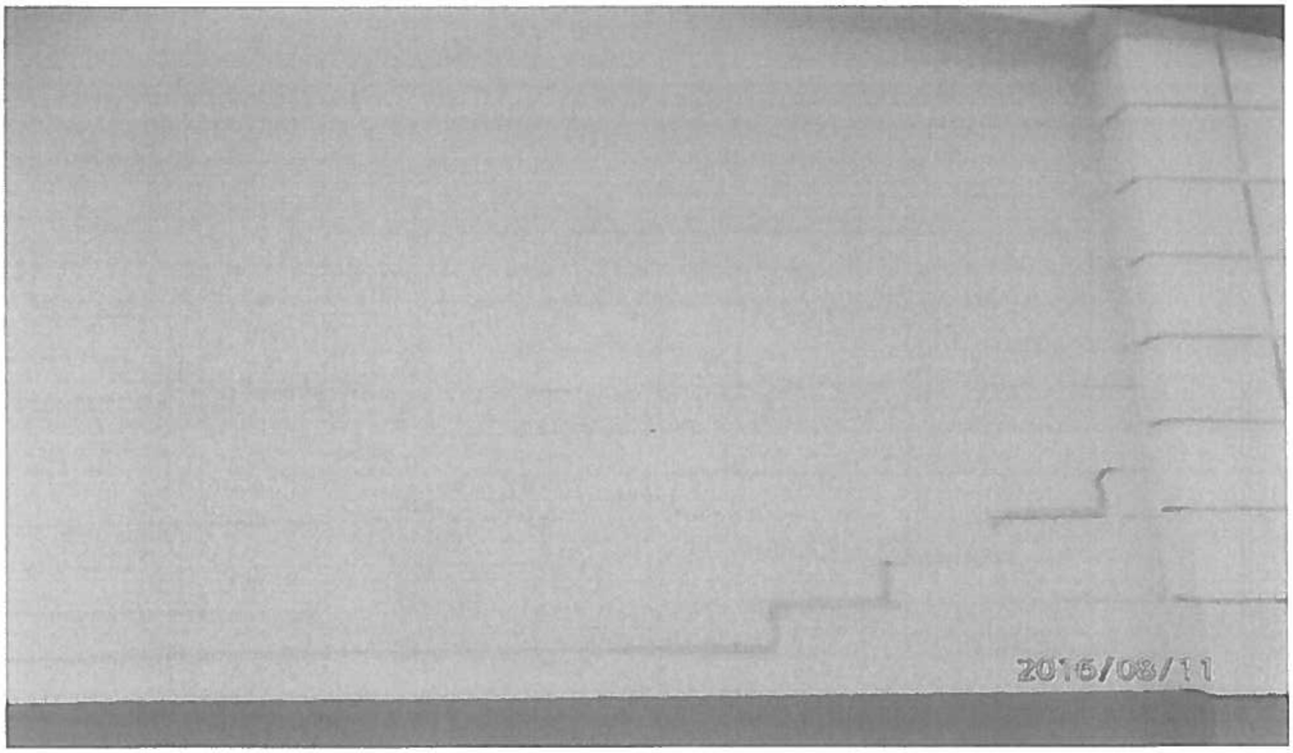
DON MENSENDICK SCHOOL – BUILDING 9



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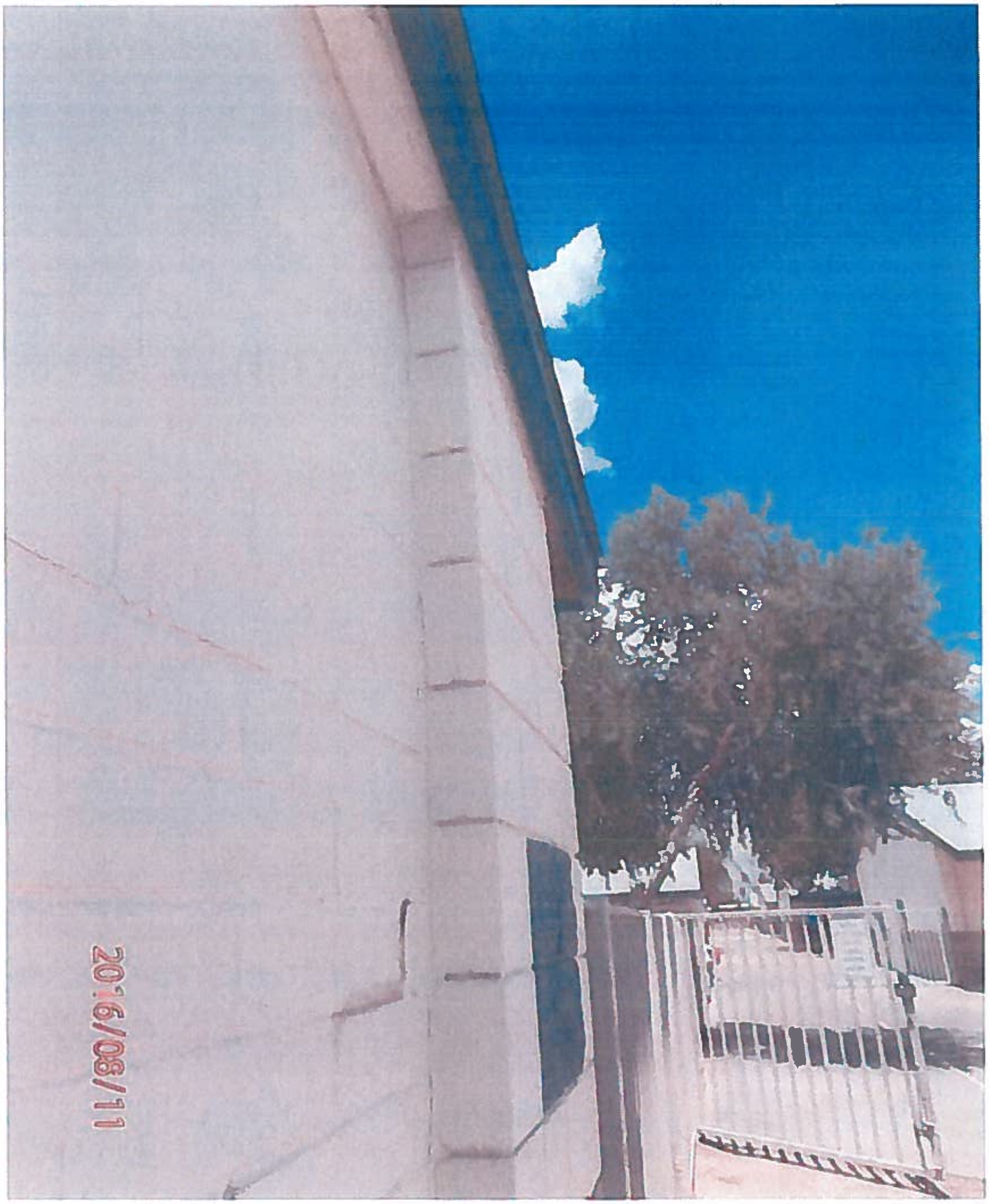

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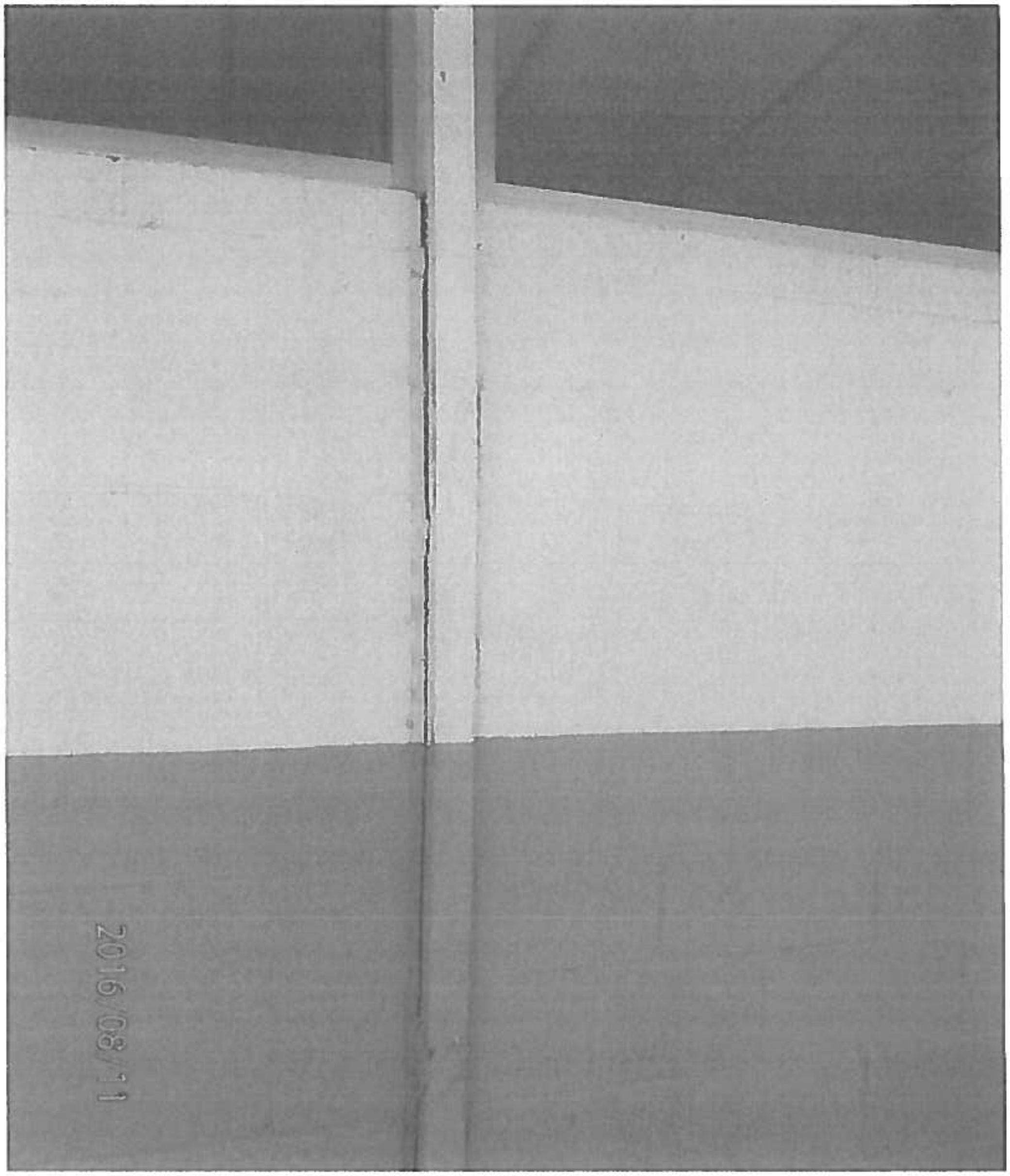

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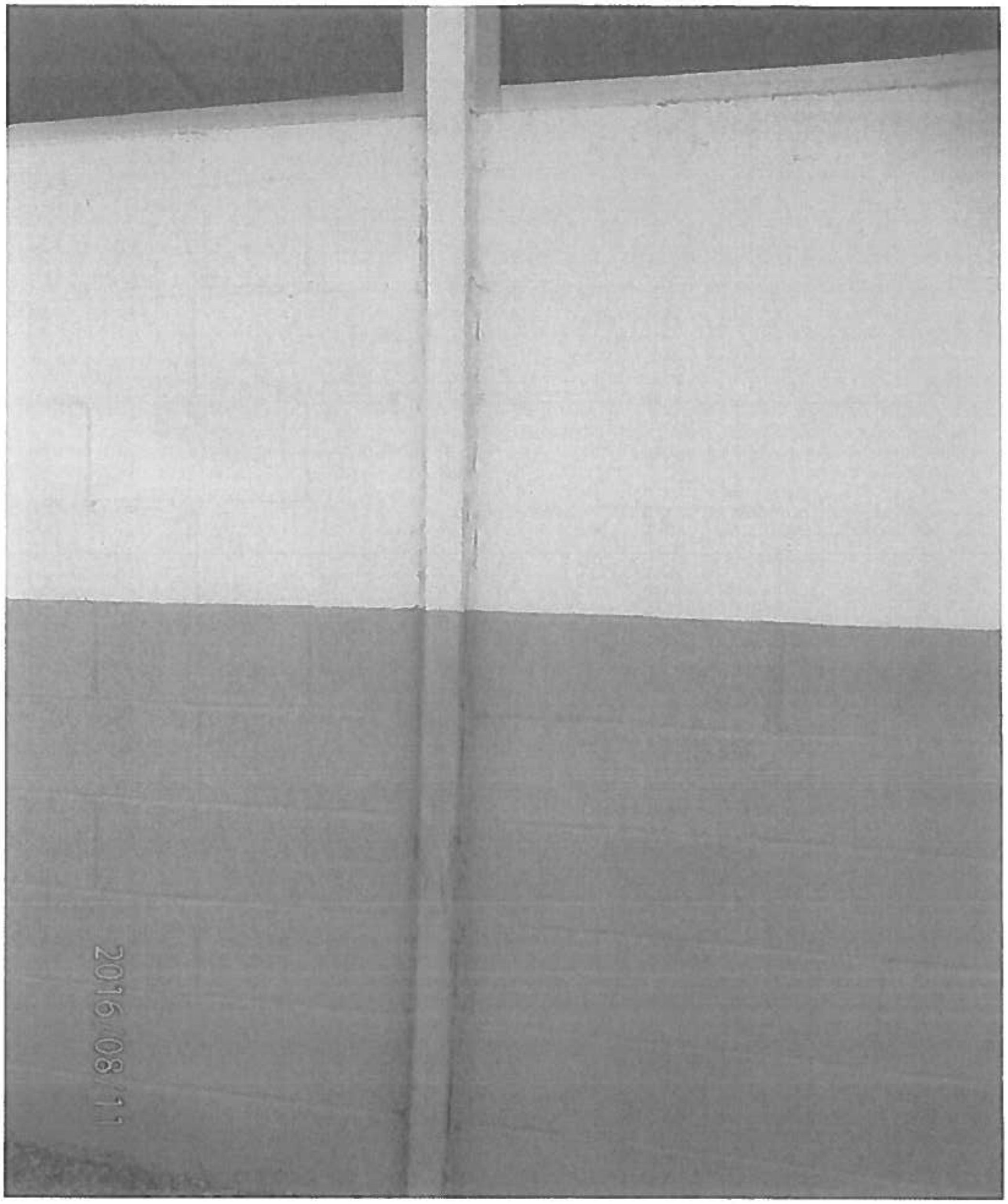

MARKER NO. 4

DON MENSENDICK SCHOOL – BUILDING 9

MARKER NO. 5

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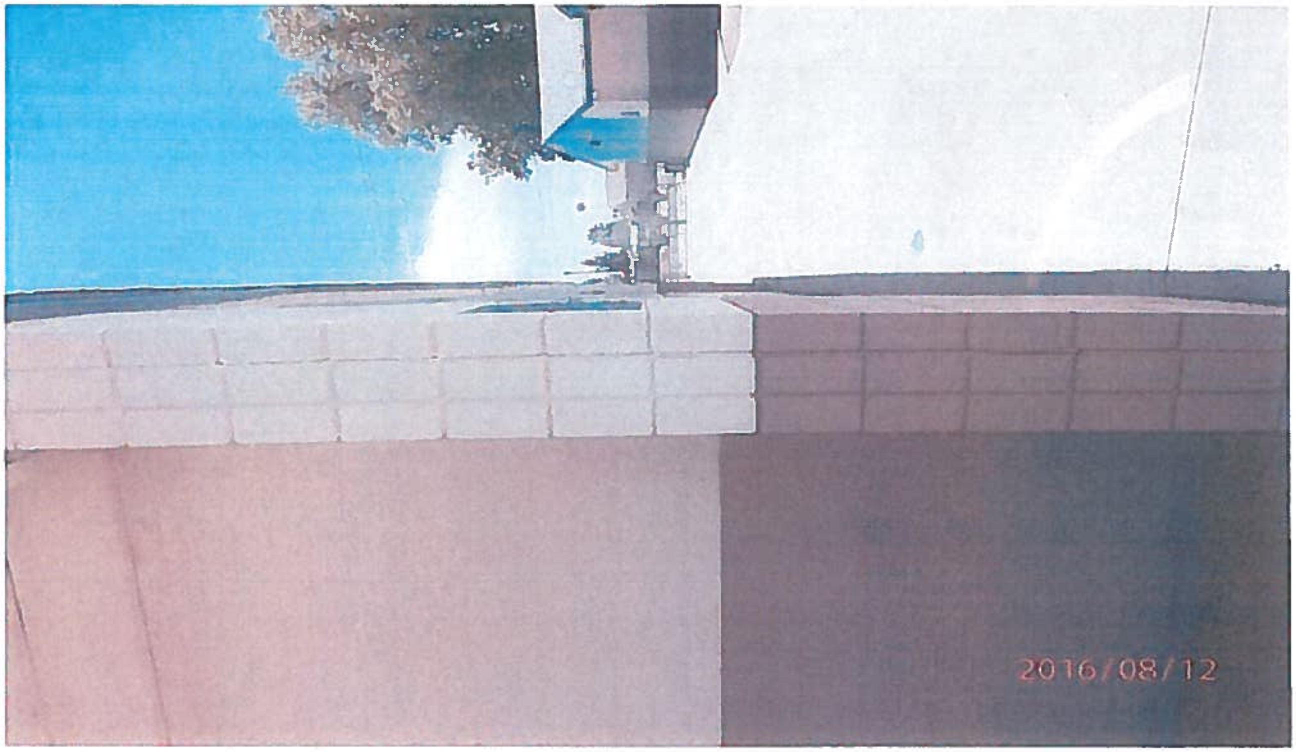

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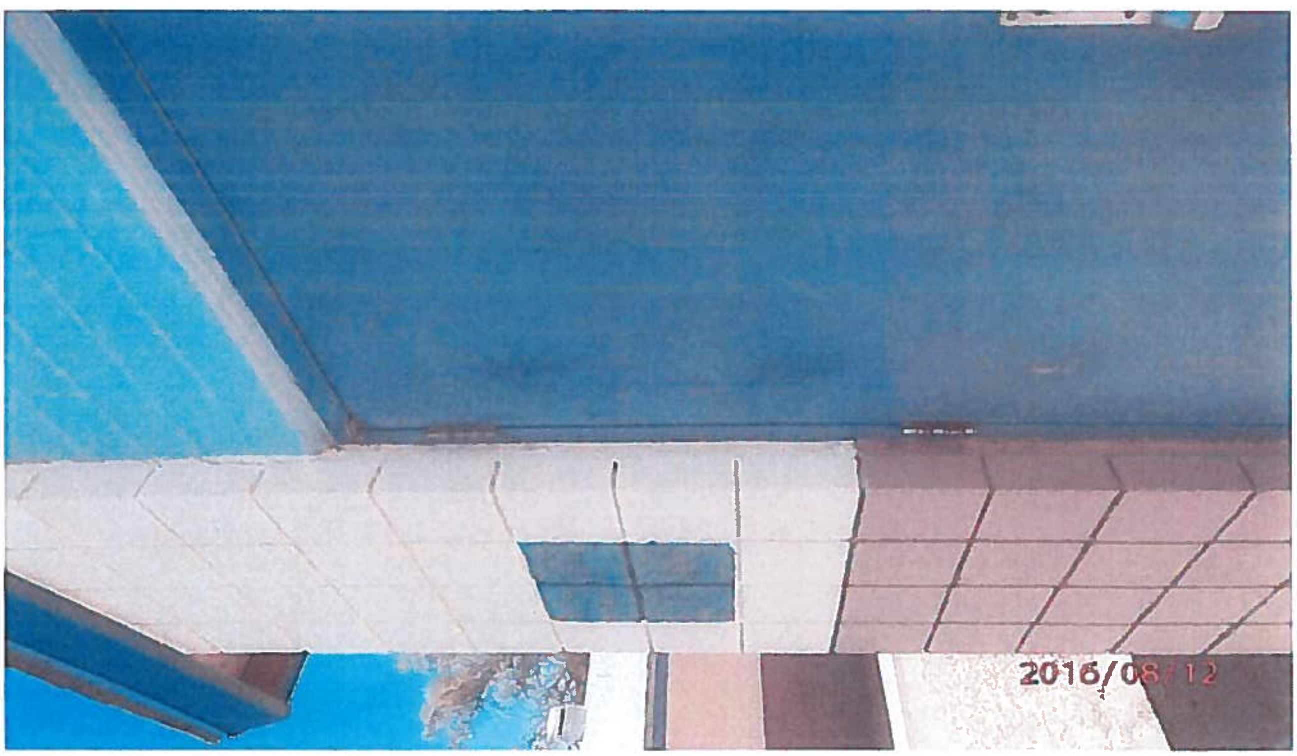

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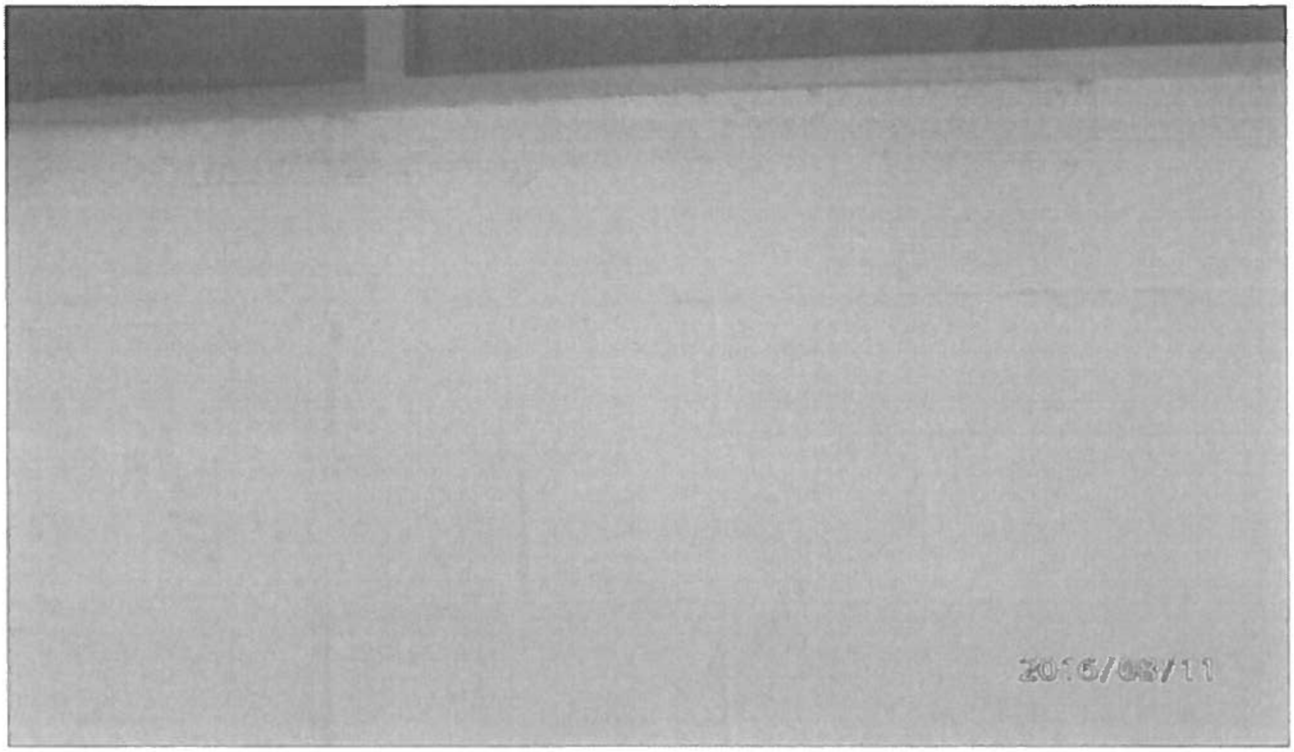

MARKER NO. 8

MARKER NO. 9

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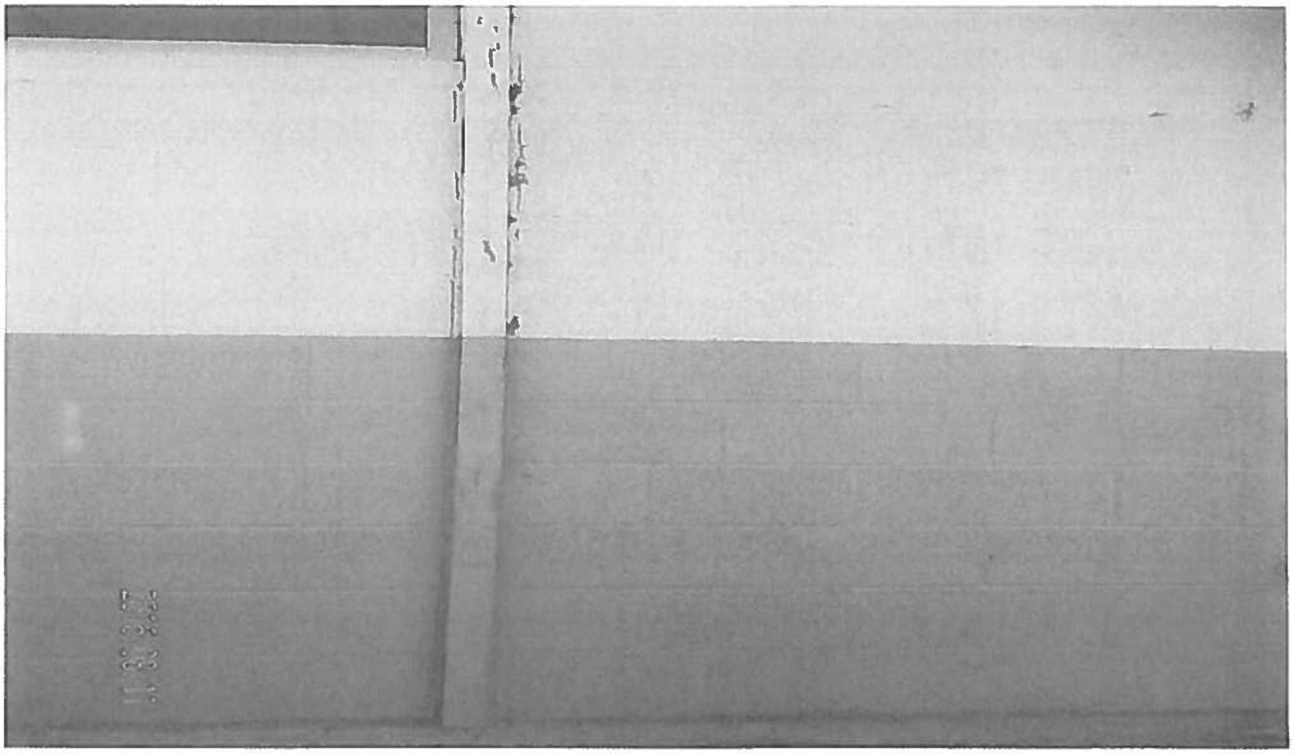

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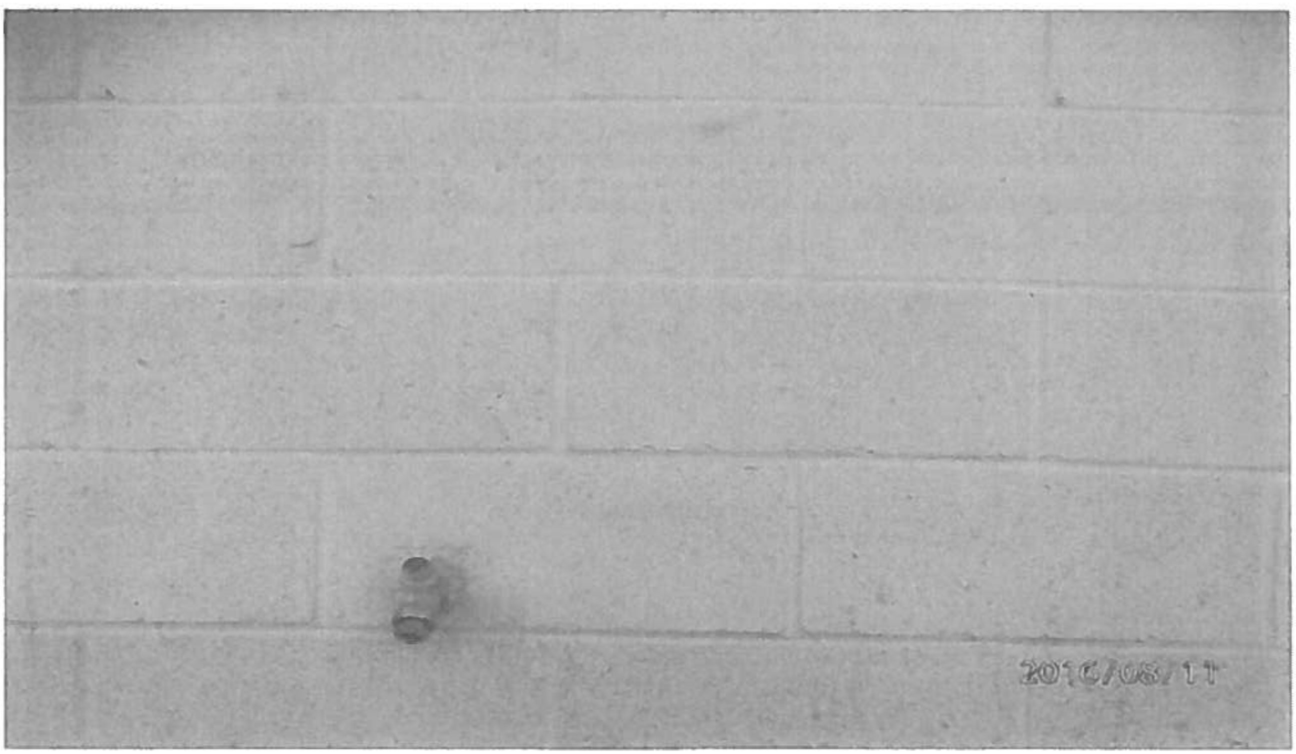

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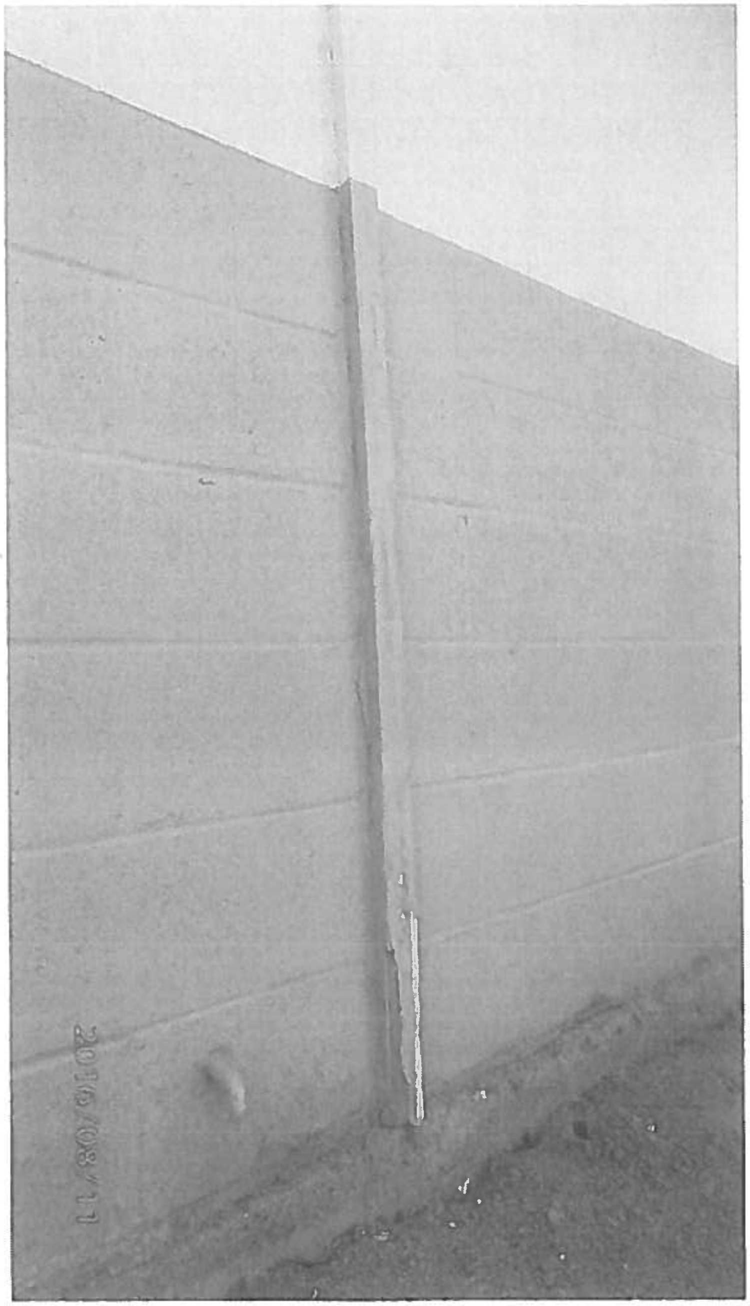


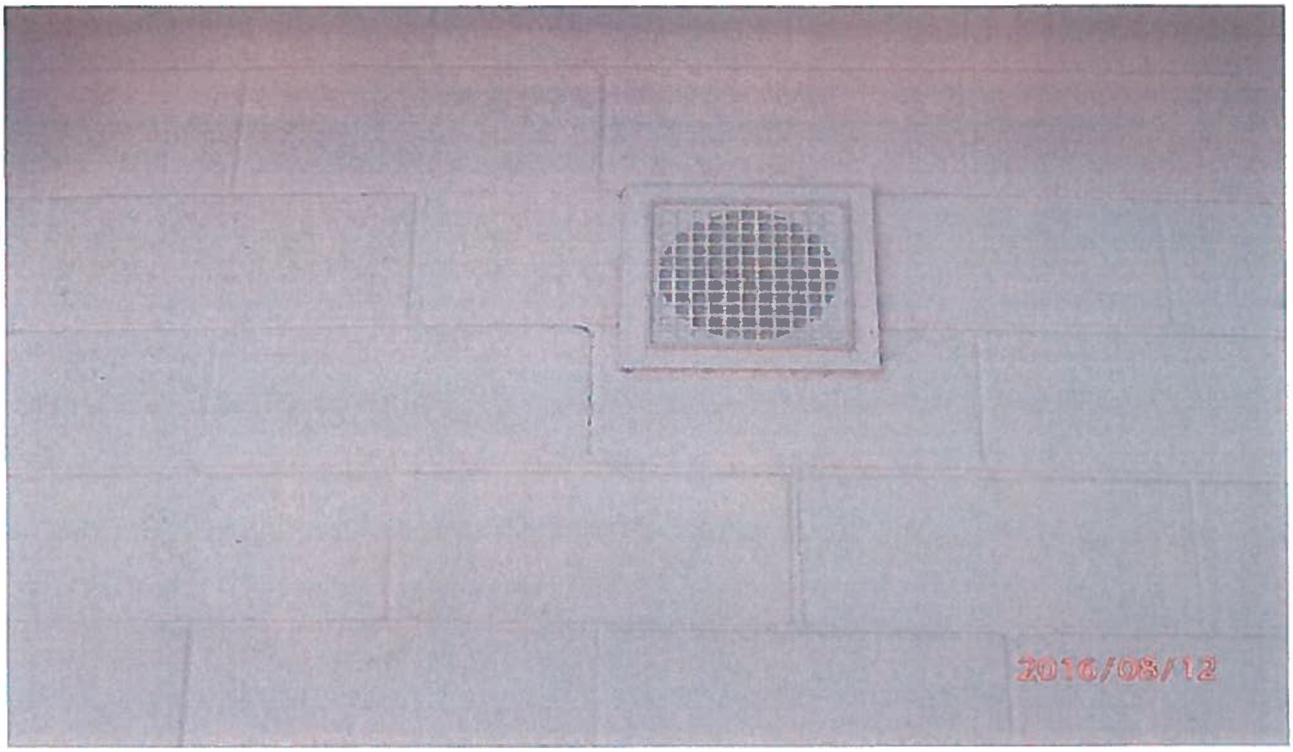
MARKER NO. 12

DON MENSENDICK SCHOOL – BUILDING 9

MARKER NO. 13

MARKER NO. 14

DON MENSENDICK SCHOOL – BUILDING 10



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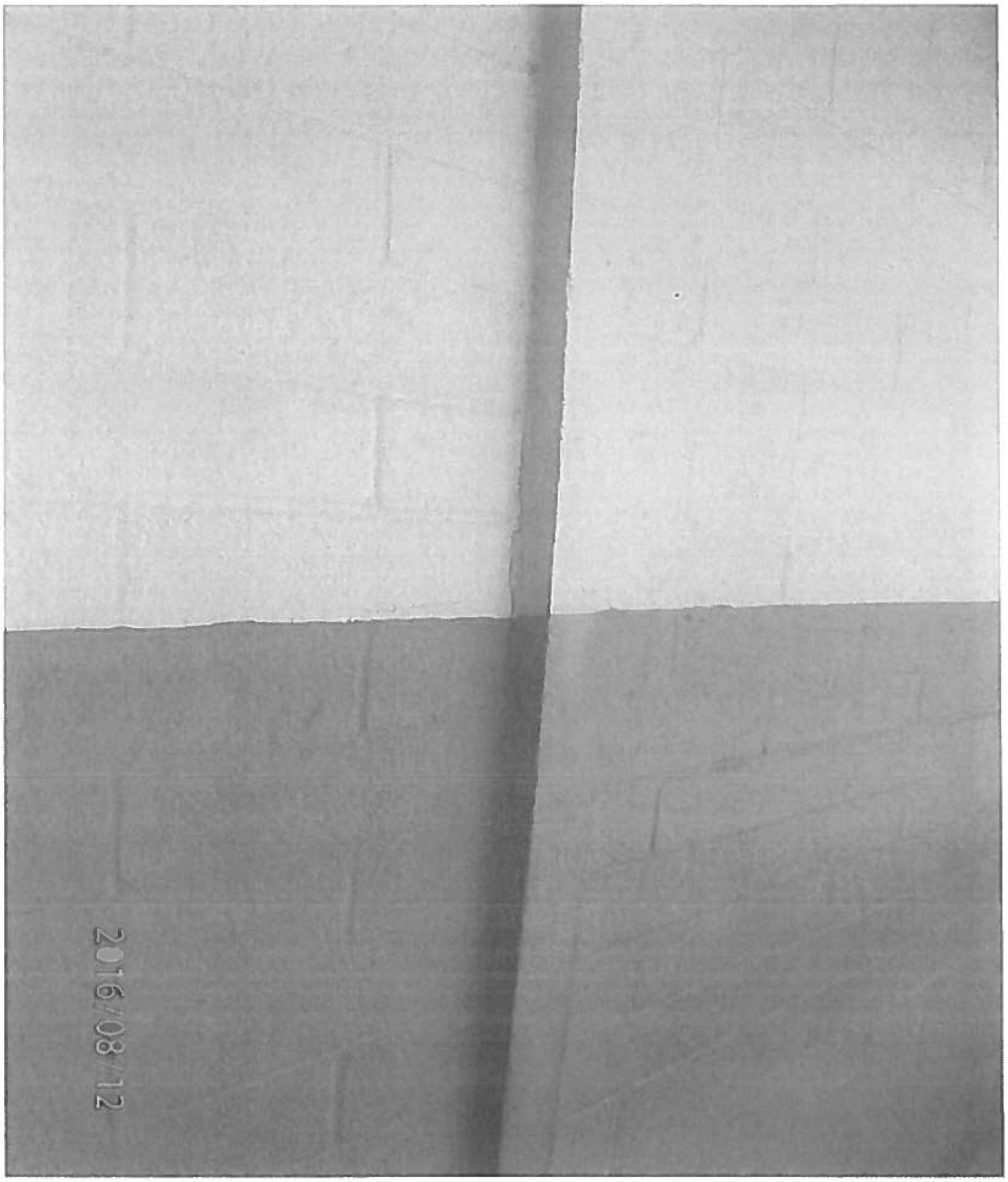

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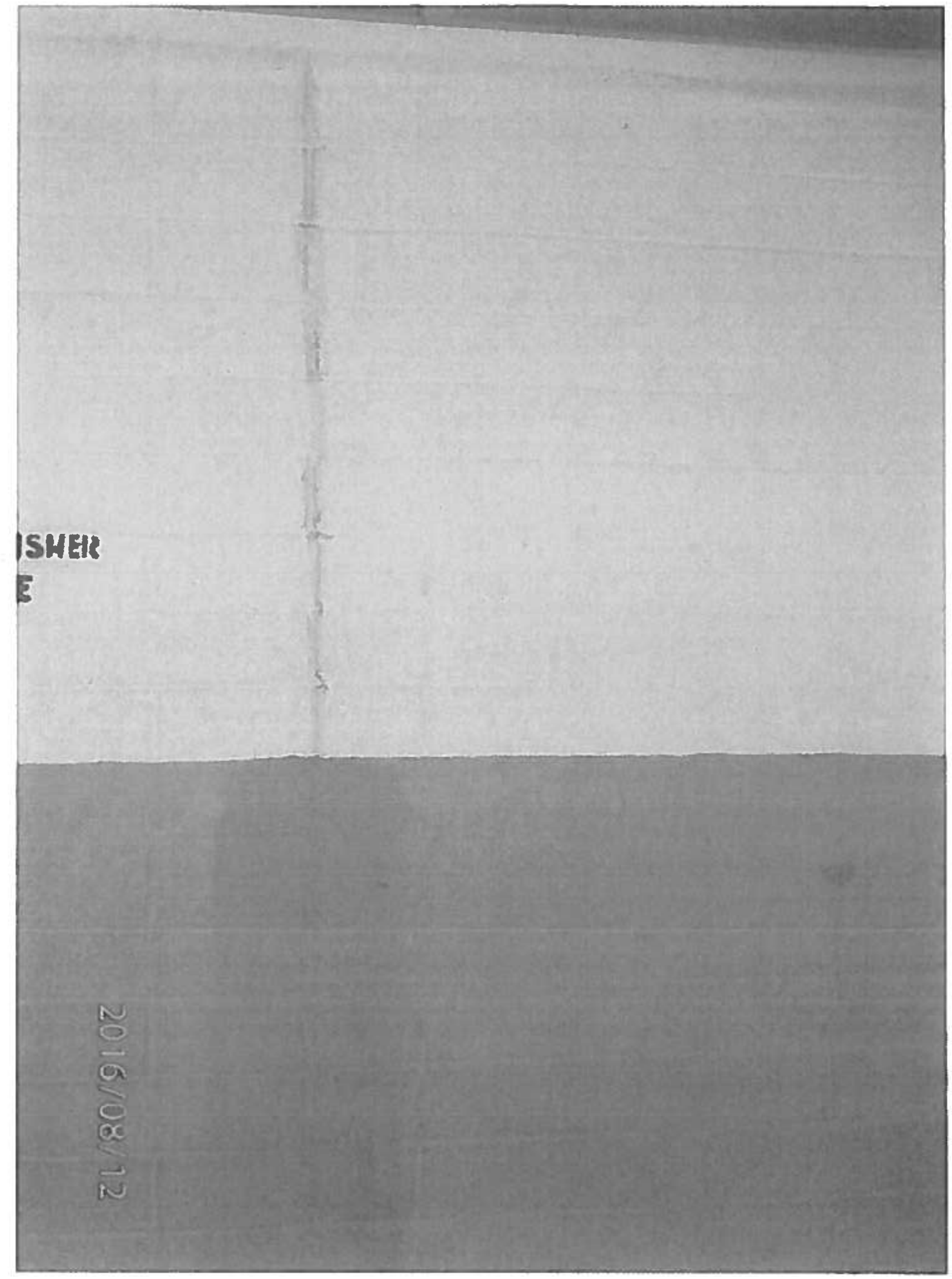


MARKER NO. 4

DON MENSENDICK SCHOOL – BUILDING 10

MARKER NO. 5

MARKER NO. 6

DON MENSENDICK SCHOOL – BUILDING 10

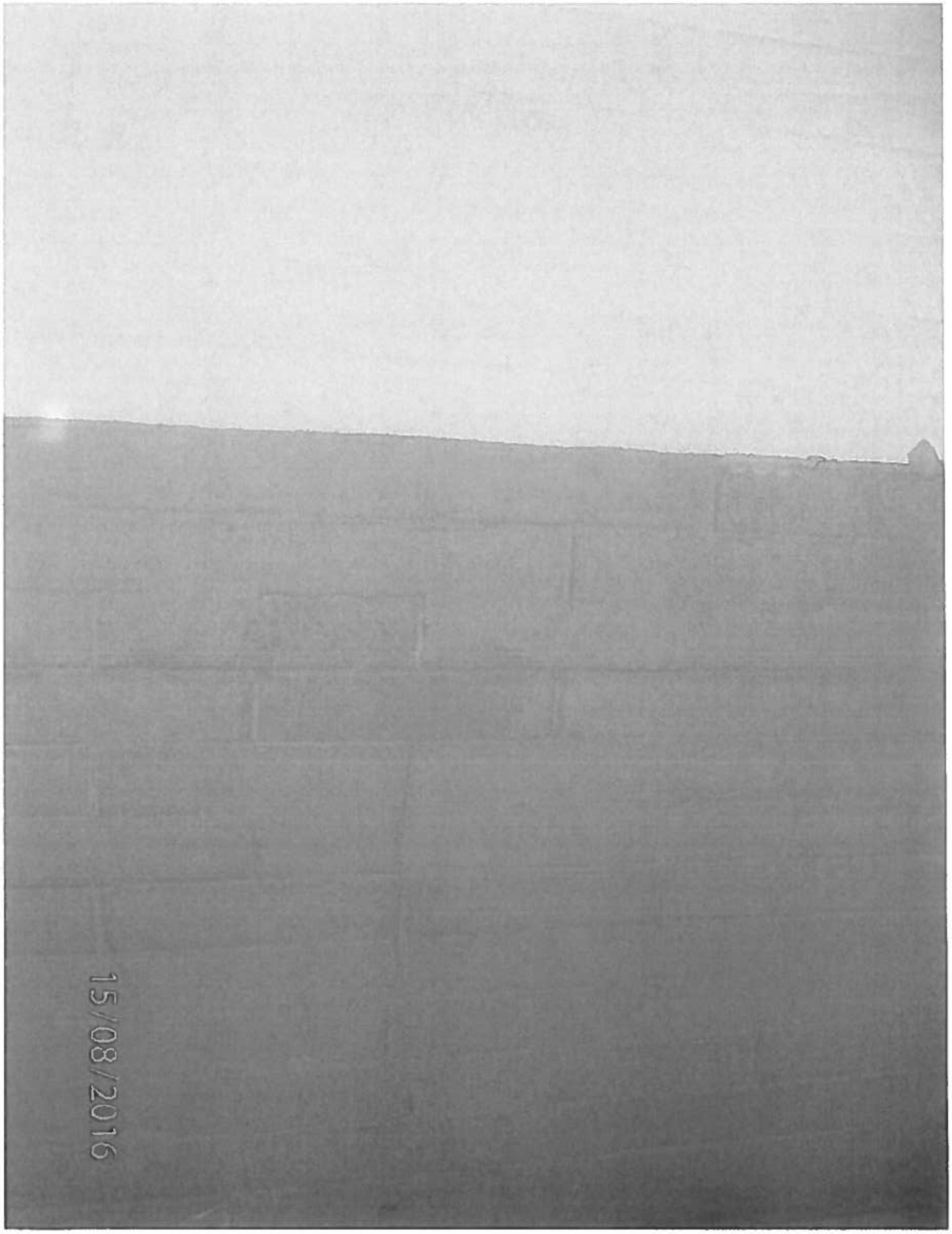
MARKER NO. 7

MARKER NO. 8

DON MENSENDICK SCHOOL – BUILDING 10

MARKER NO. 9

DON MENSENDICK SCHOOL – BUILDING 11



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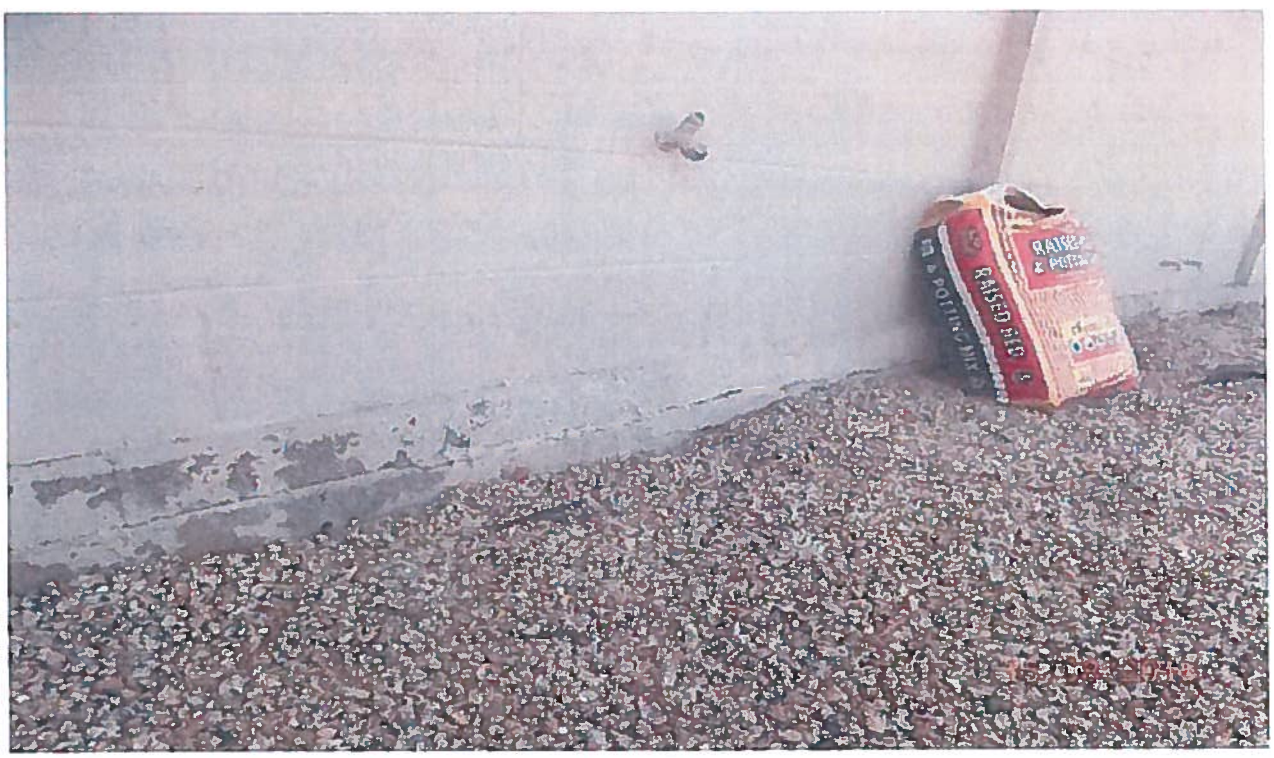
DON MENSENDICK SCHOOL – BUILDING 12

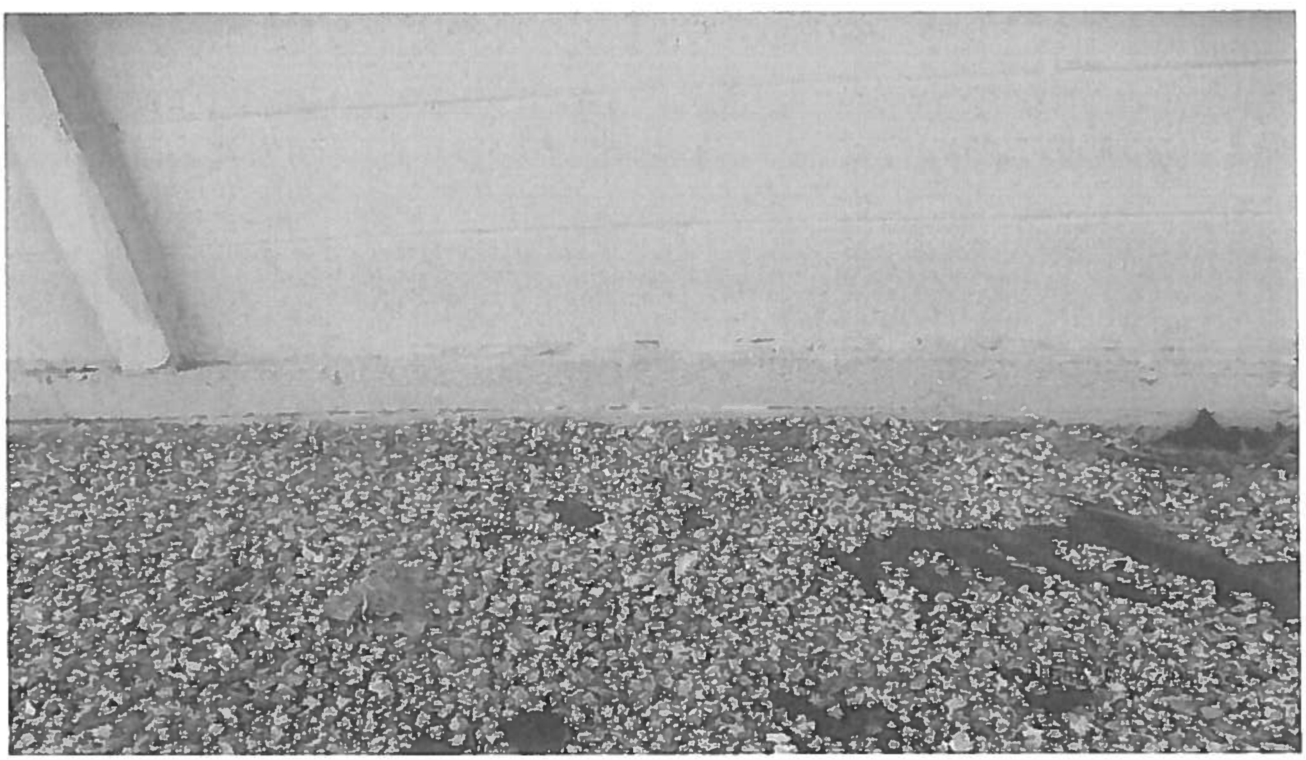
MARKER NO. 1



MARKER NO. 2

DON MENSENDICK SCHOOL – BUILDING 12

MARKER NO. 3



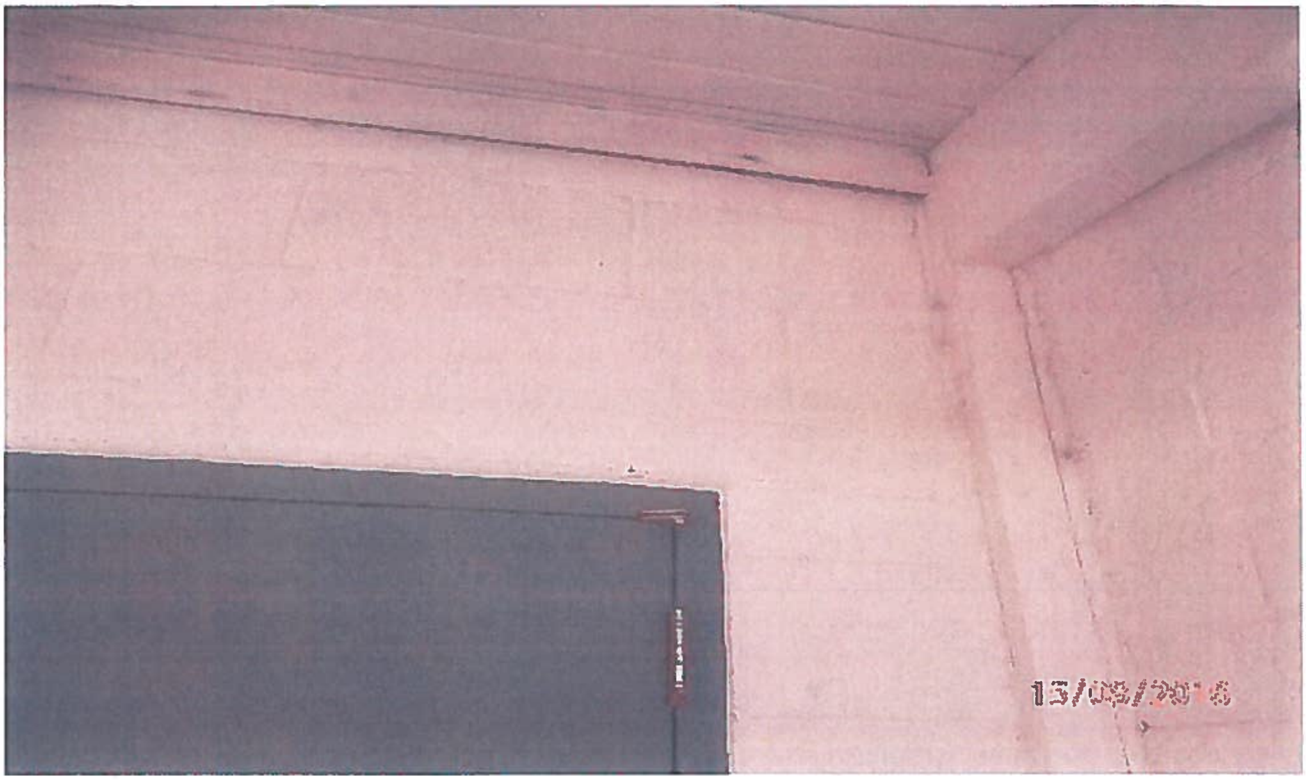
MARKER NO. 4

DON MENSENDICK SCHOOL – BUILDING 12

MARKER NO. 7

MARKER NO. 8

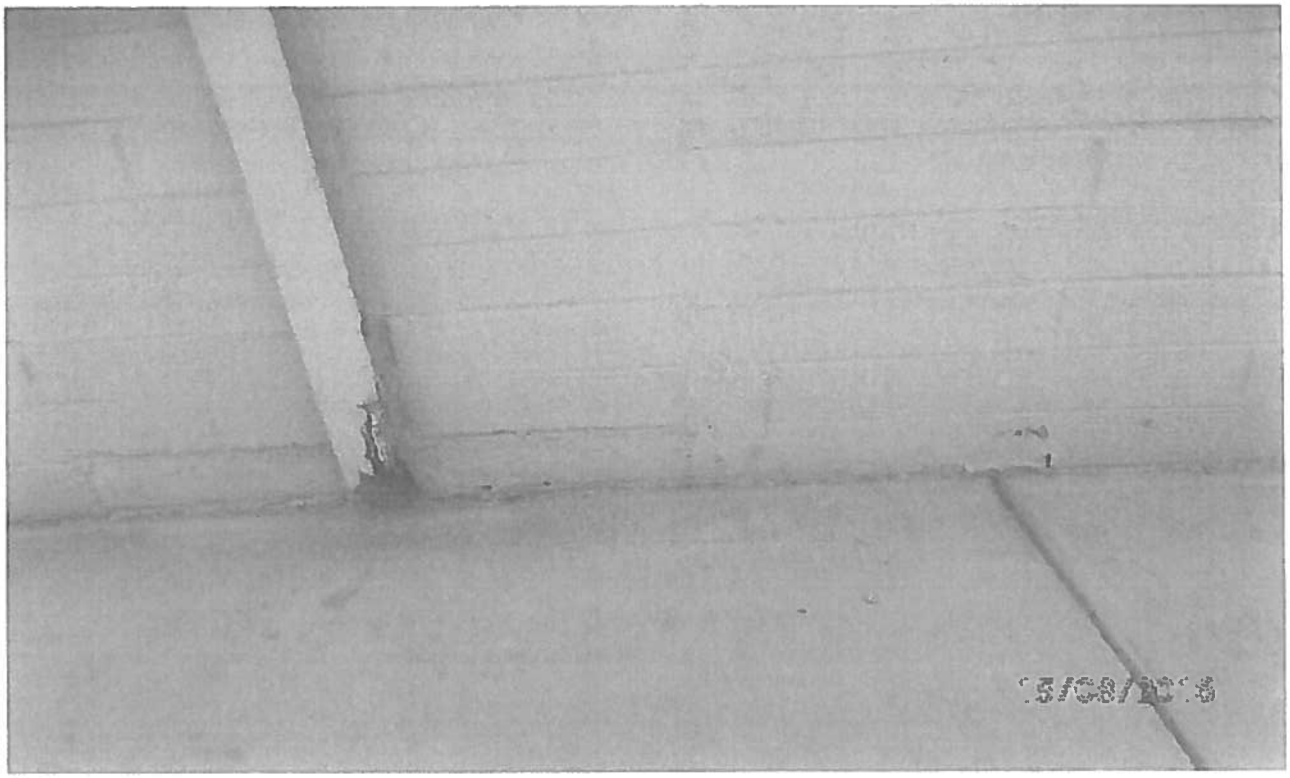
DON MENSENDICK SCHOOL – BUILDING 12



MARKER NO. 9

MARKER NO. 10

DON MENSENDICK SCHOOL – BUILDING 12



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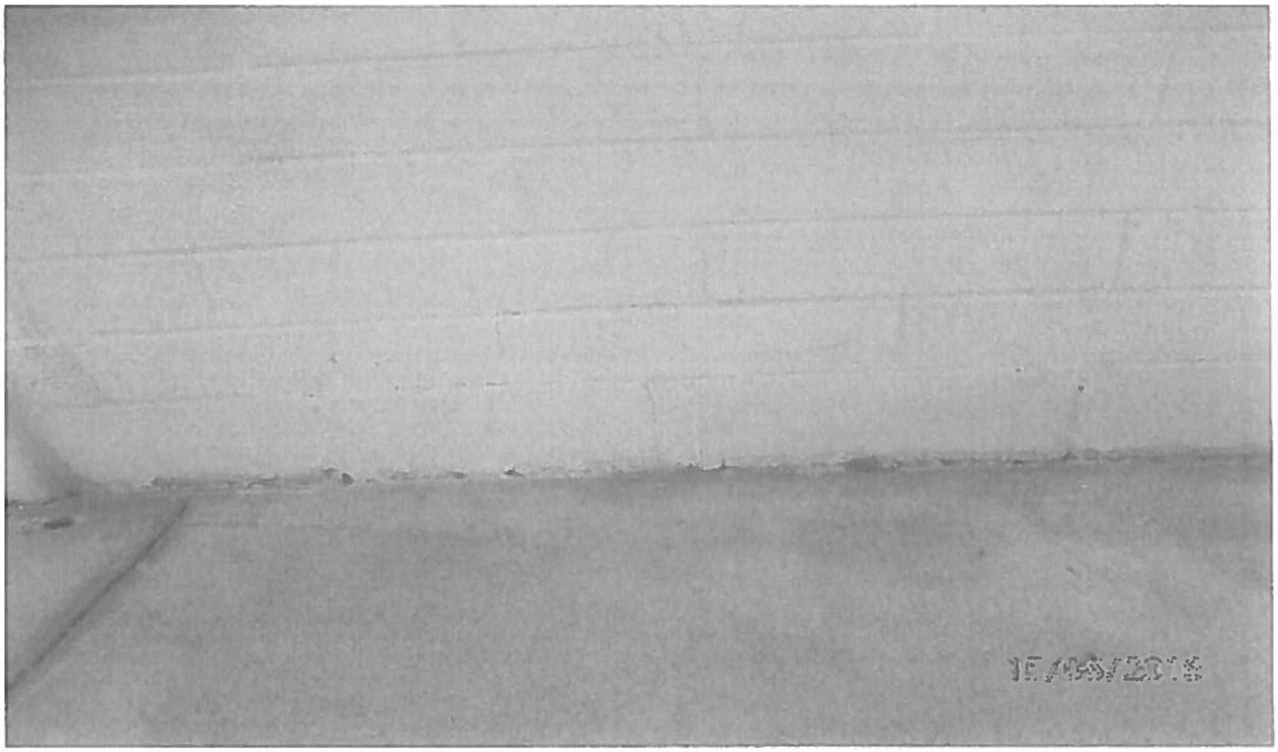

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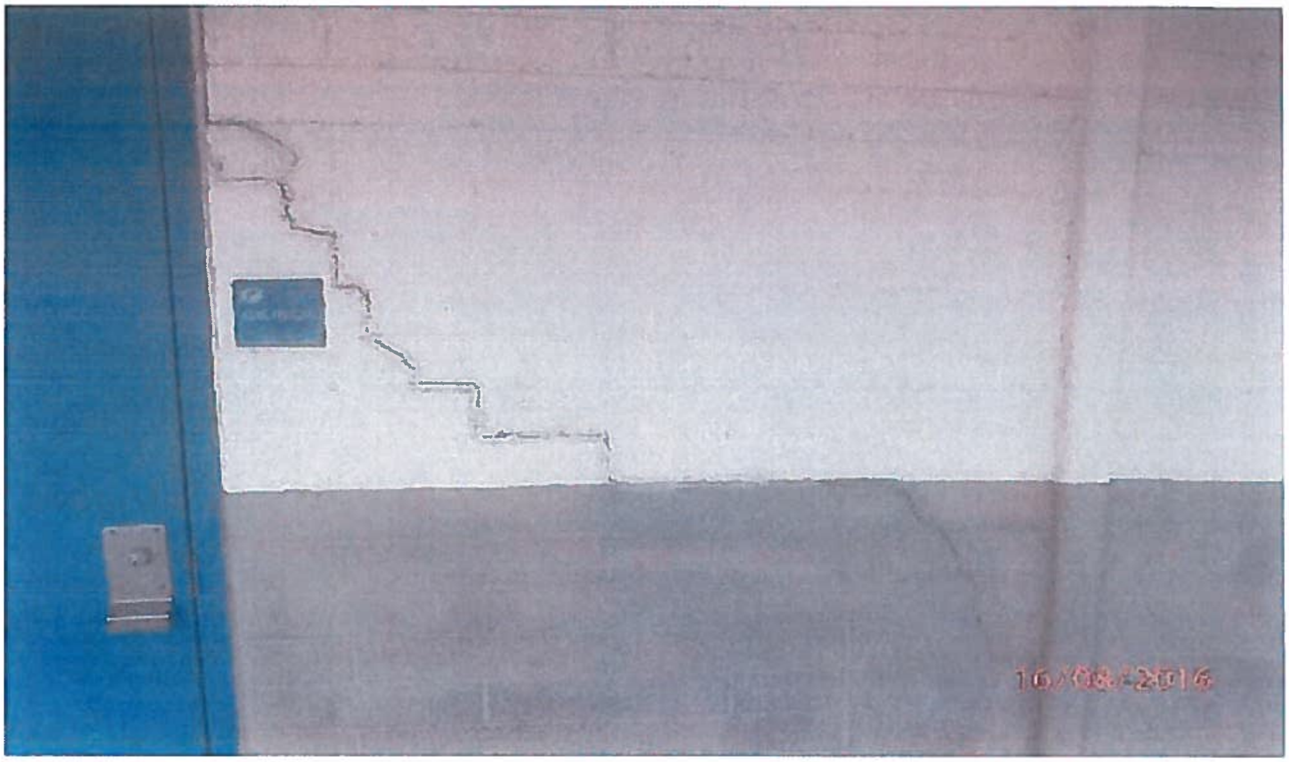

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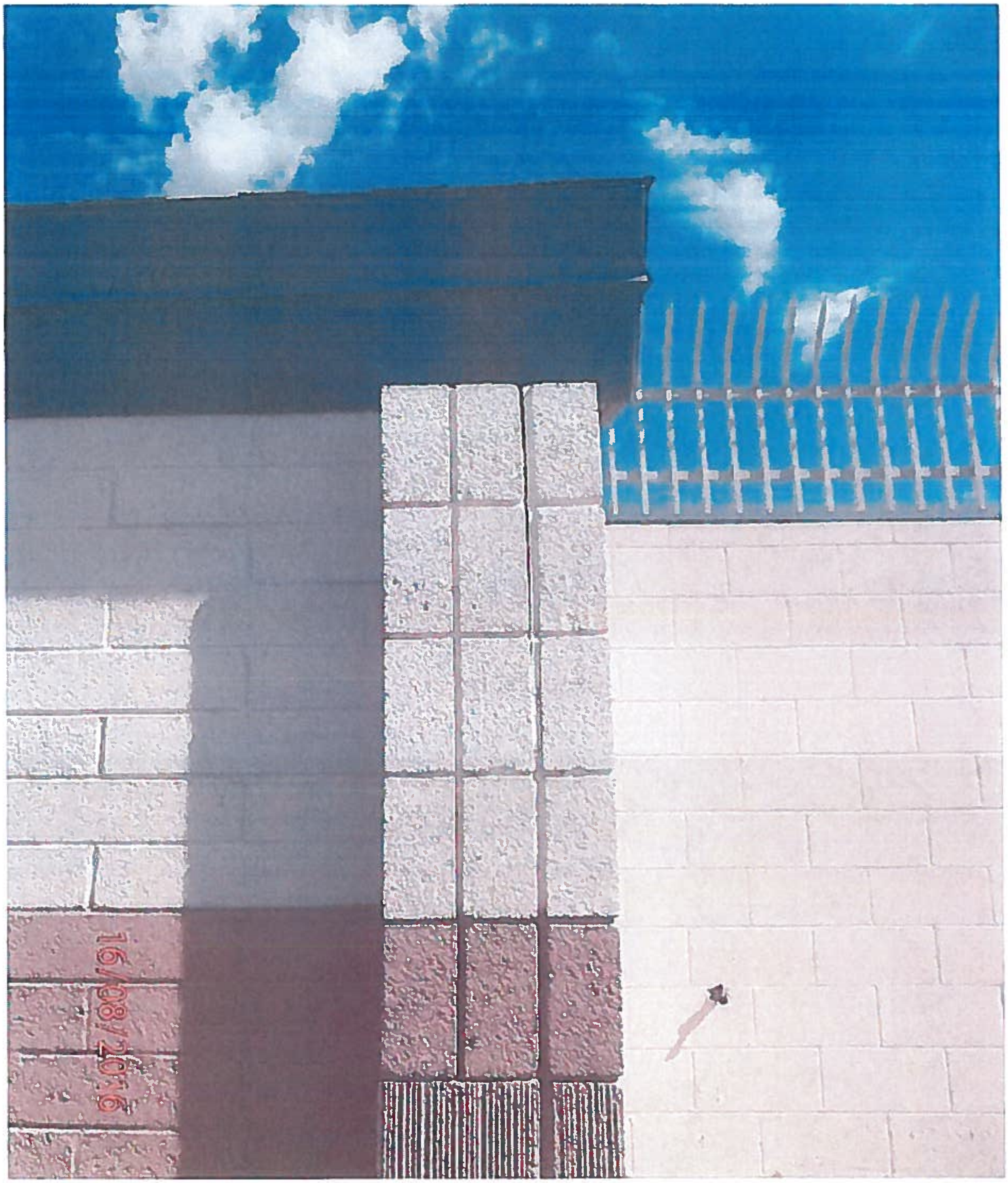

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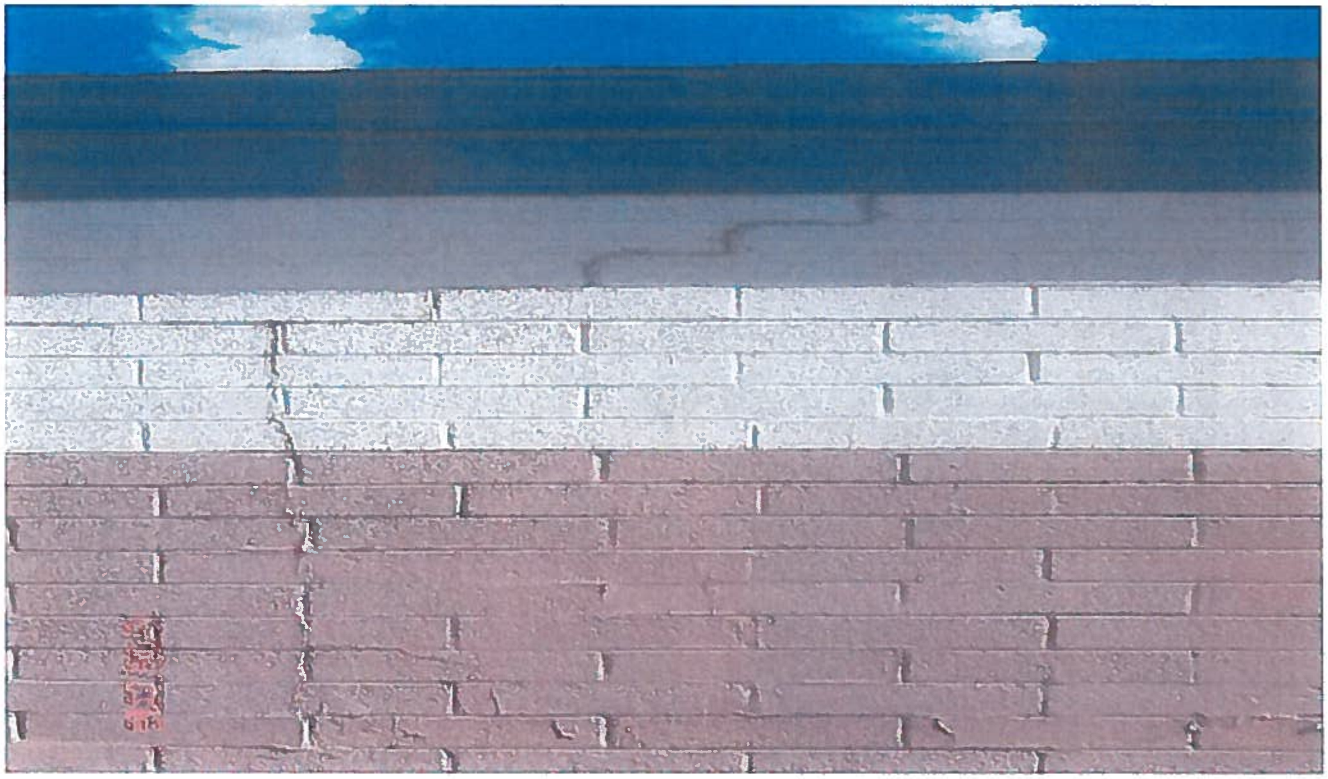

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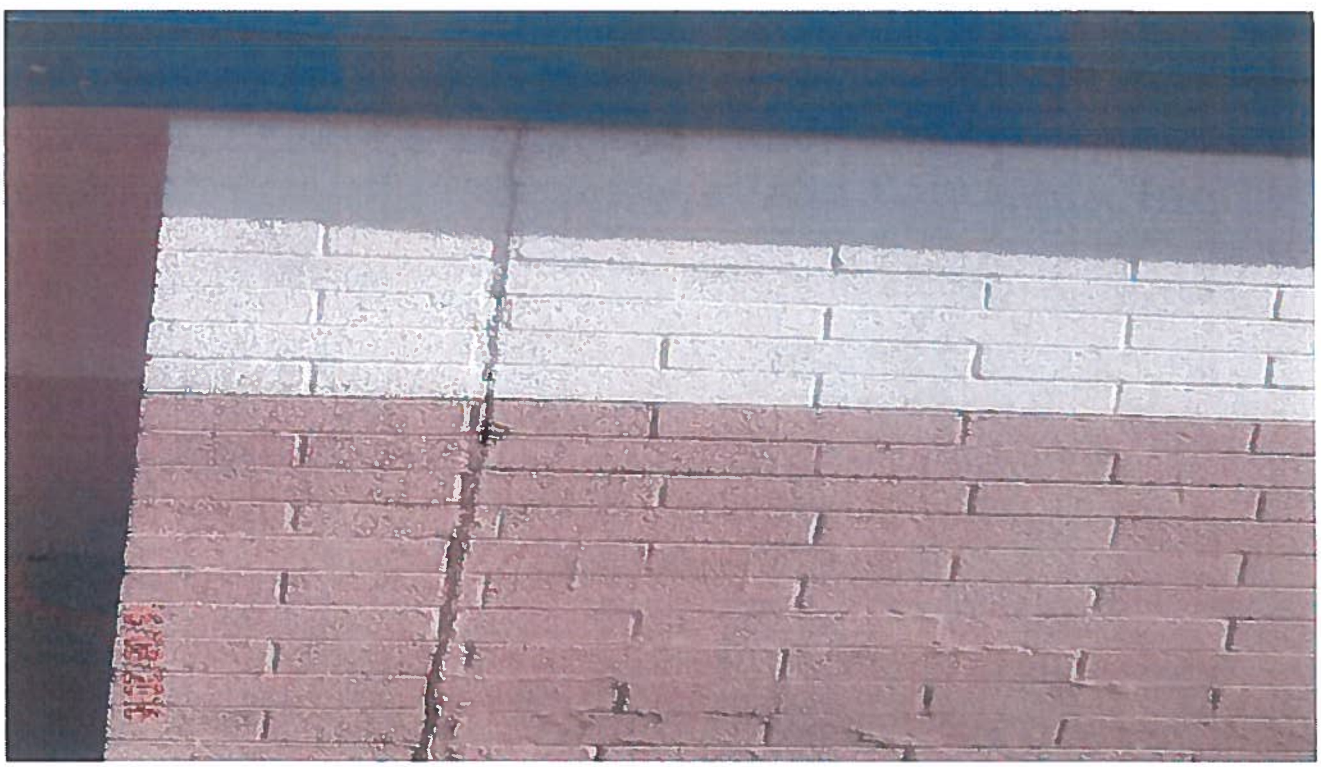

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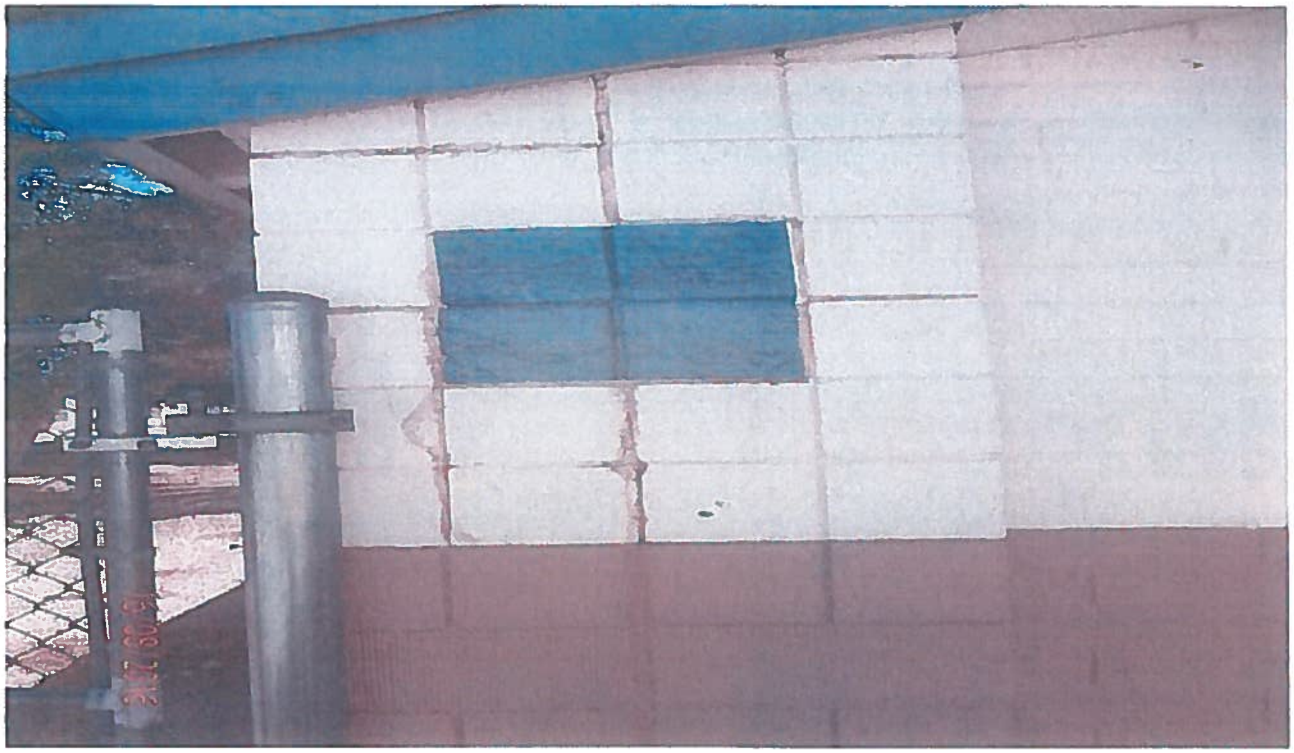


MARKER NO. 4

MARKER NO. 5

DON MENSENDICK SCHOOL – BUILDING 15

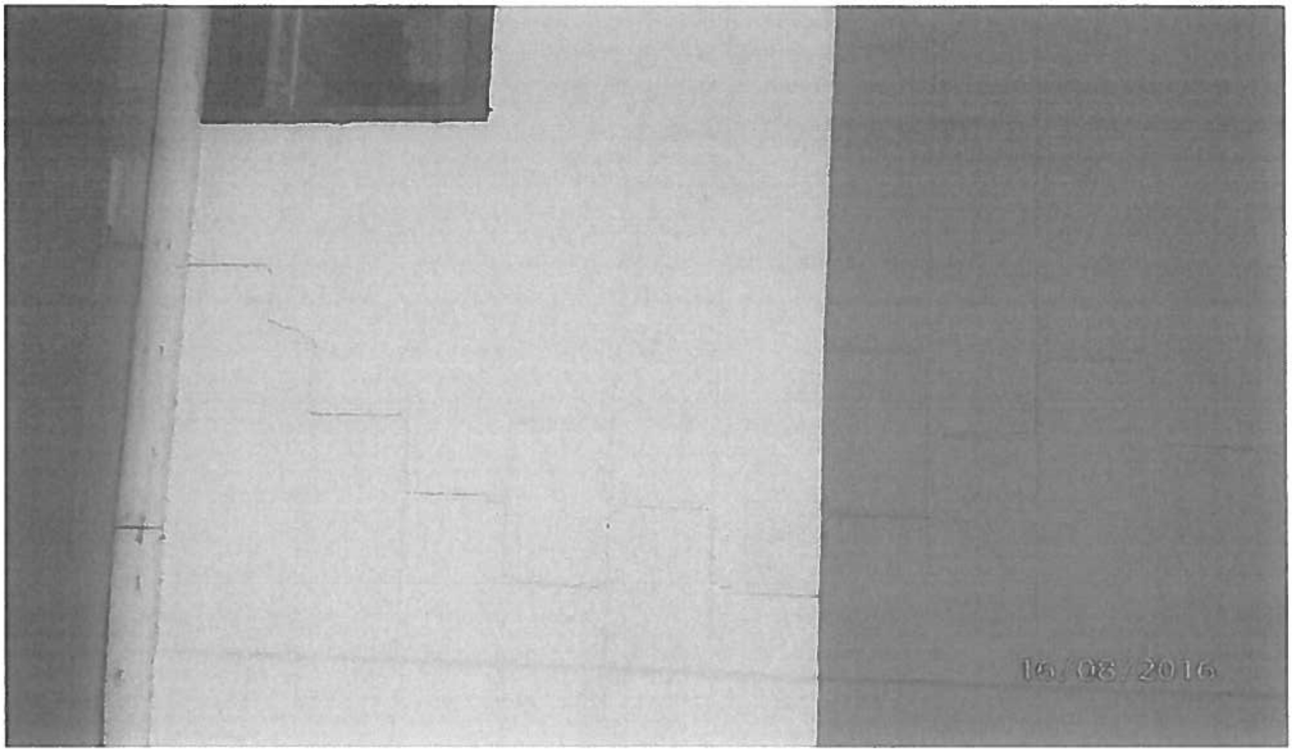
MARKER NO. 6

DON MENSENDICK SCHOOL – BUILDING 16

MARKER NO. 1

MARKER NO. 2

DON MENSENDICK SCHOOL – BUILDING 16



MARKER NO. 3

DON MENSENDICK SCHOOL – BUILDING 16

MARKER NO. 4

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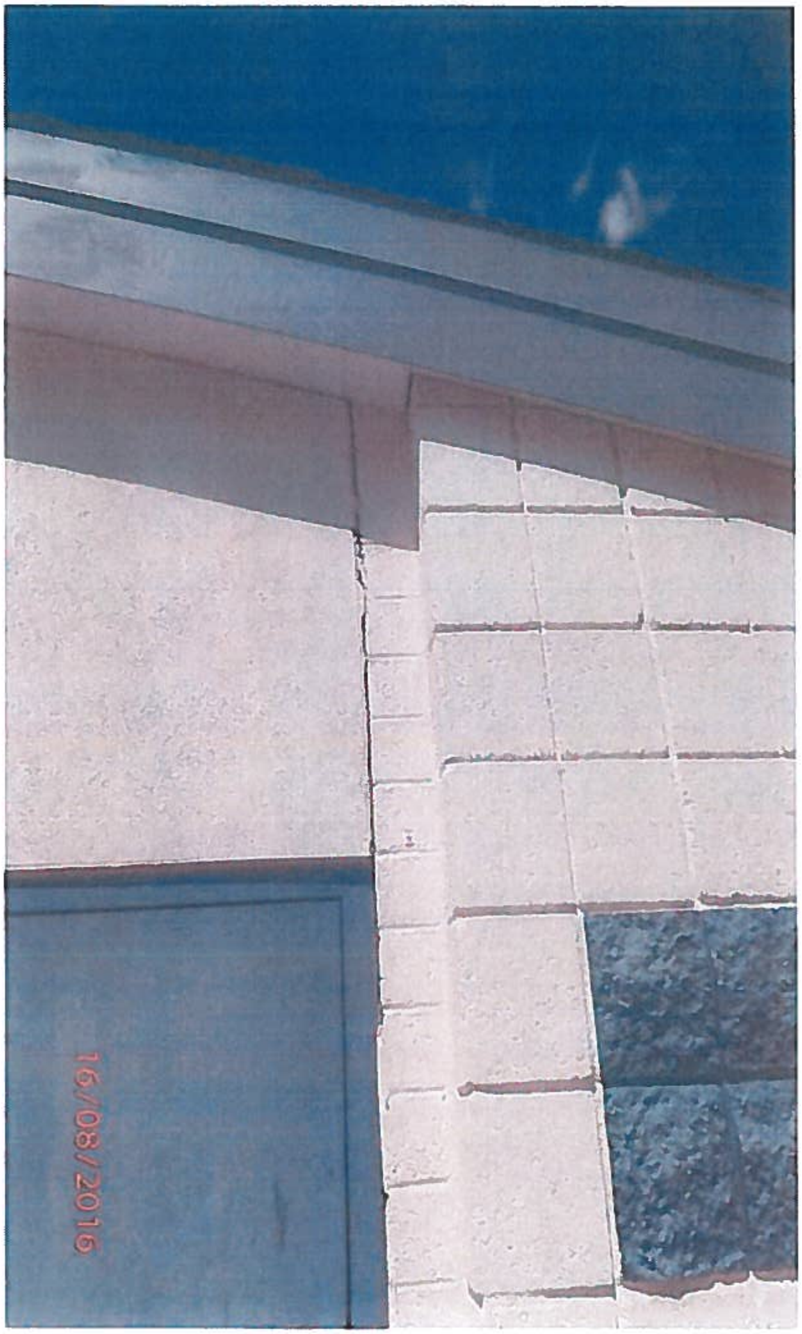


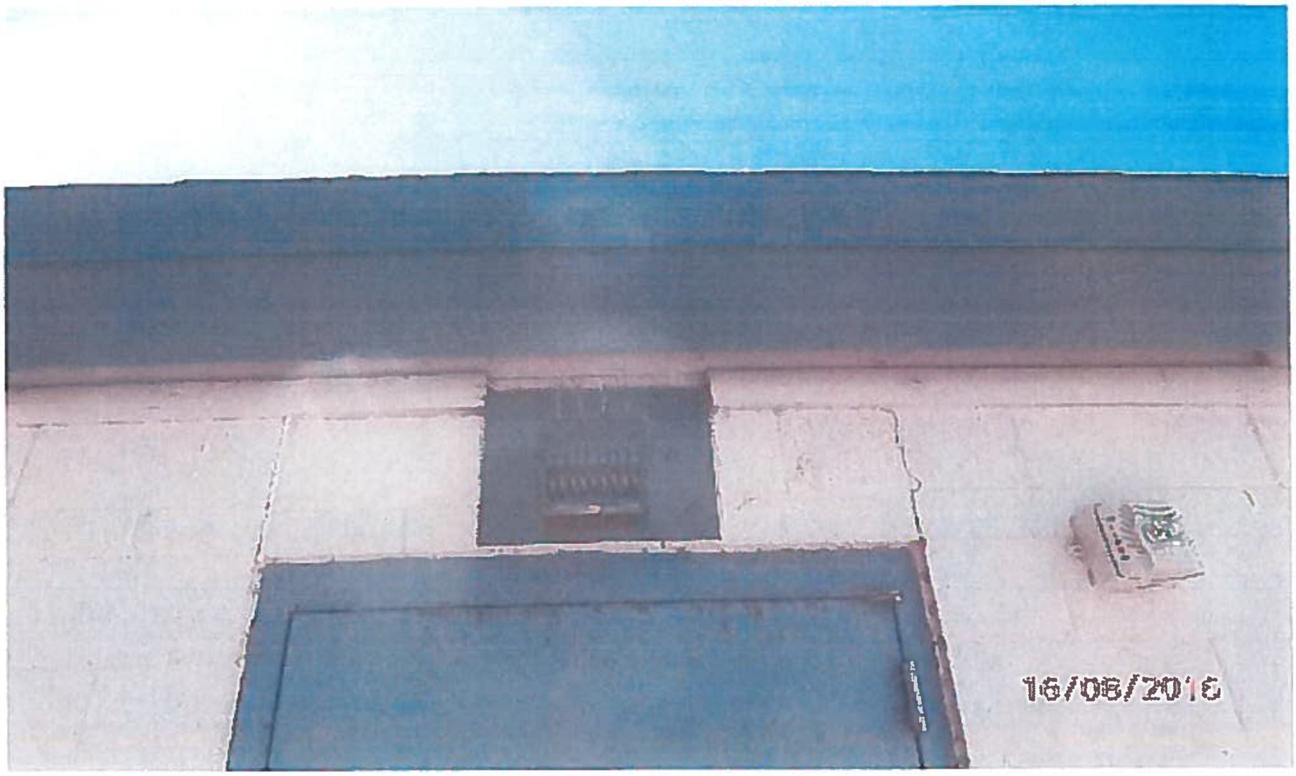
MARKER NO. 1

DON MENSENDICK SCHOOL – BUILDING 17

MARKER NO. 2

MARKER NO. 3

DON MENSENDICK SCHOOL – BUILDING 17



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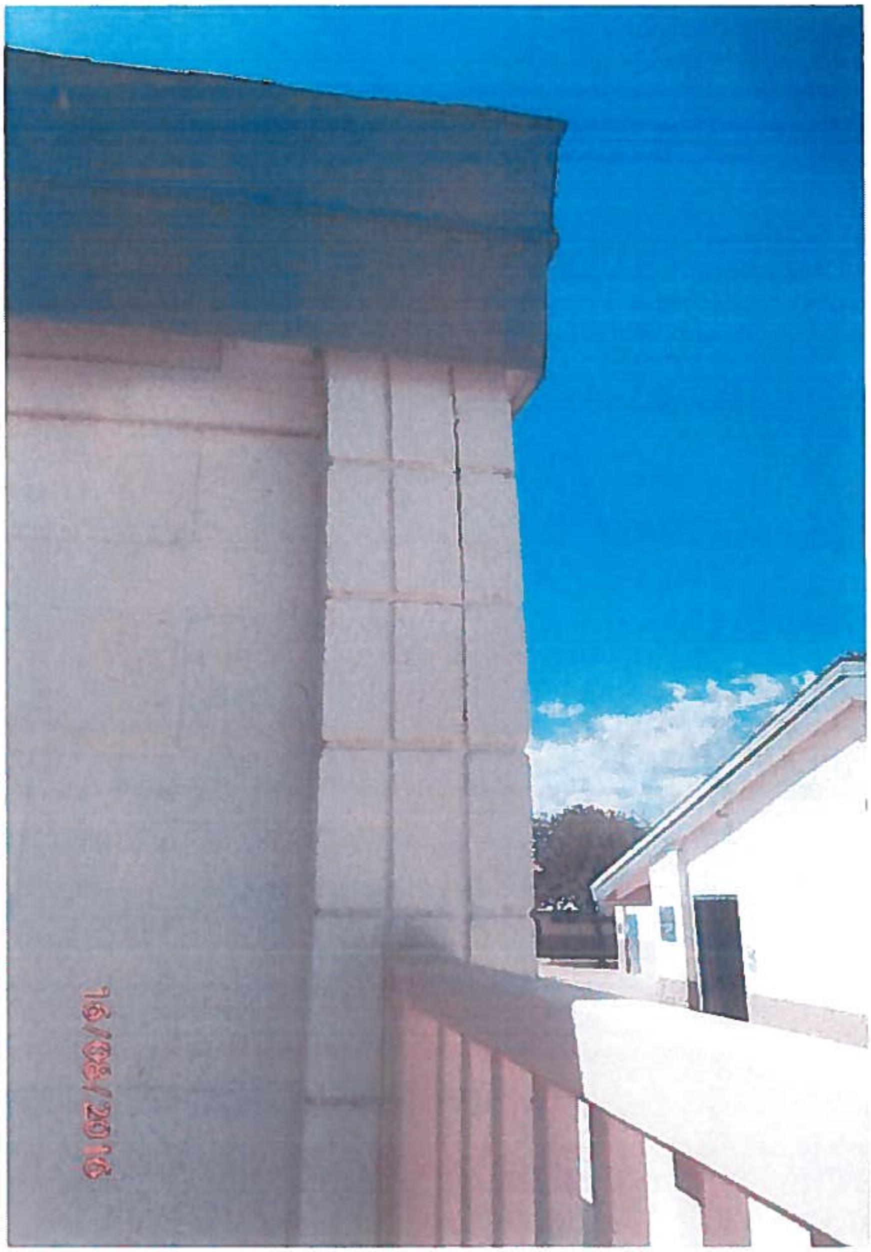

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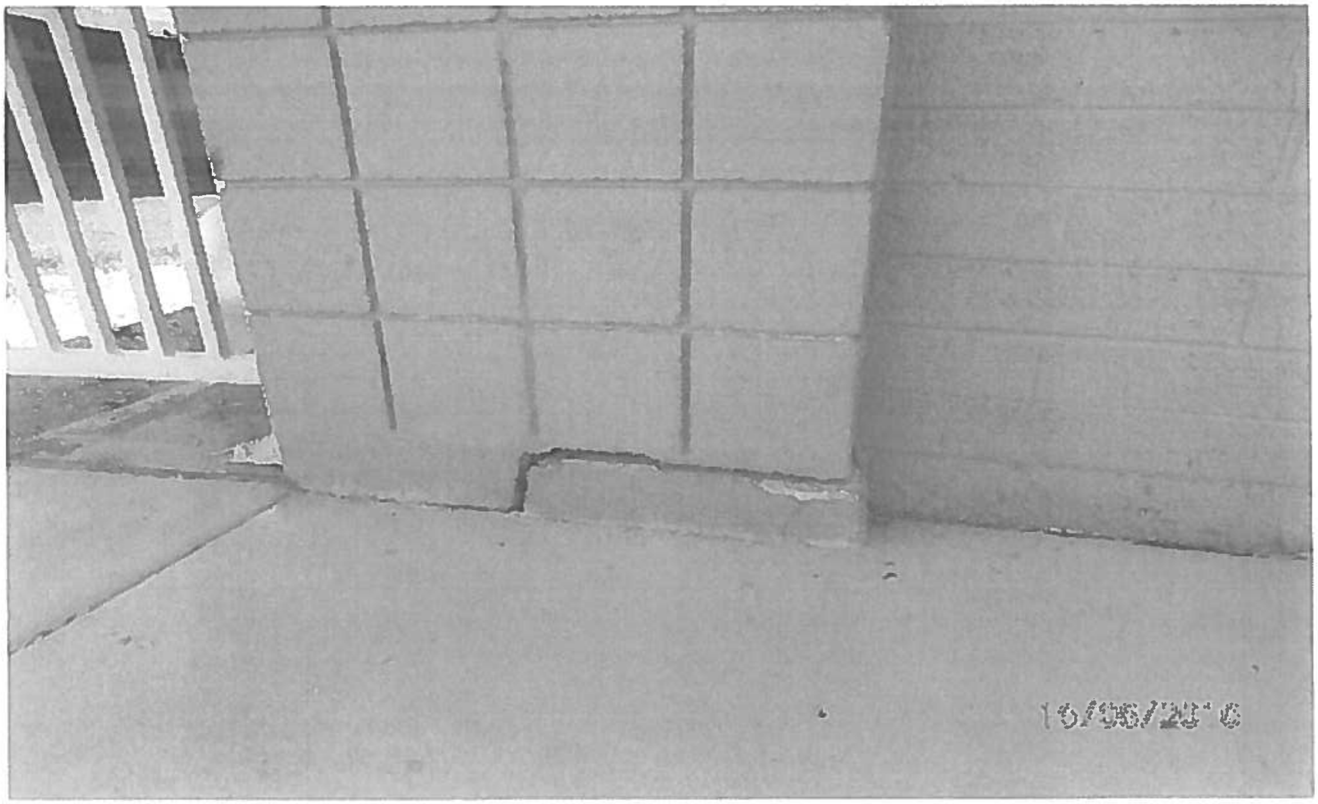
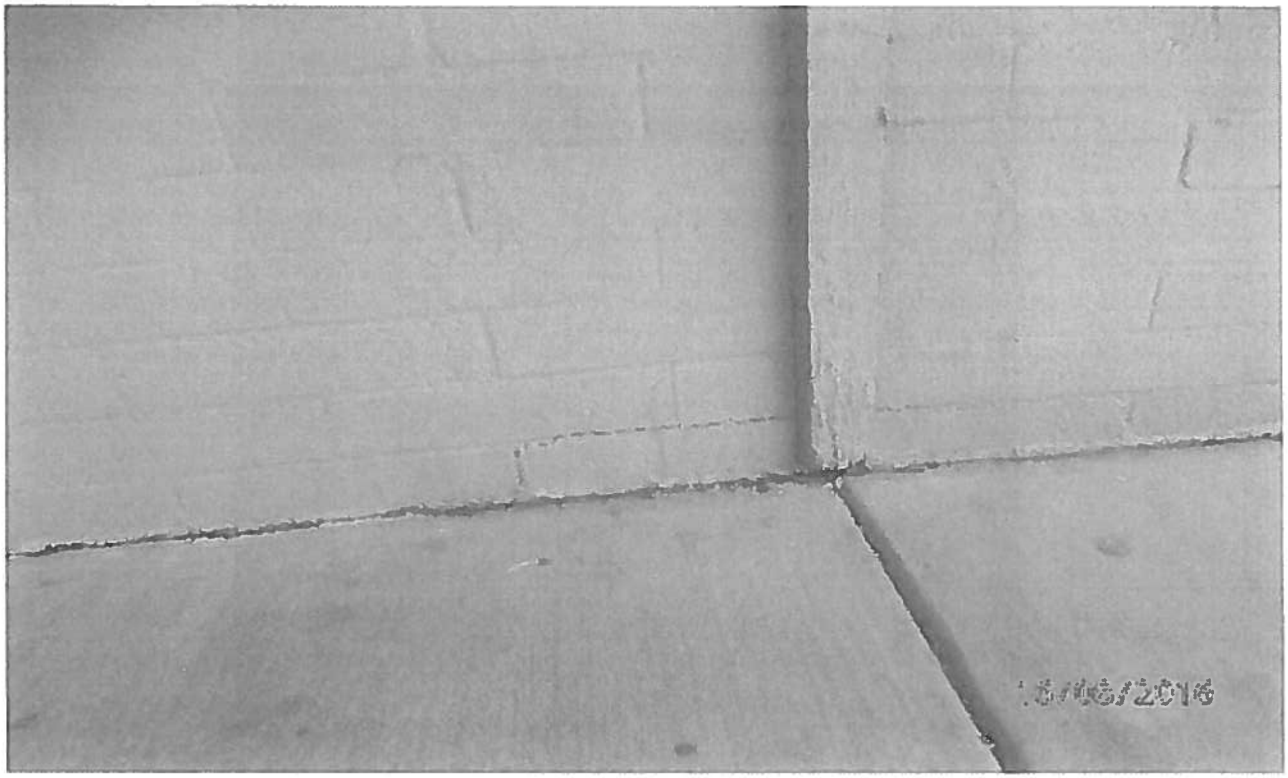


MARKER NO. 7

DON MENSENDICK SCHOOL – BUILDING 17

MARKER NO. 8

DON MENSENDICK SCHOOL – BUILDING 18



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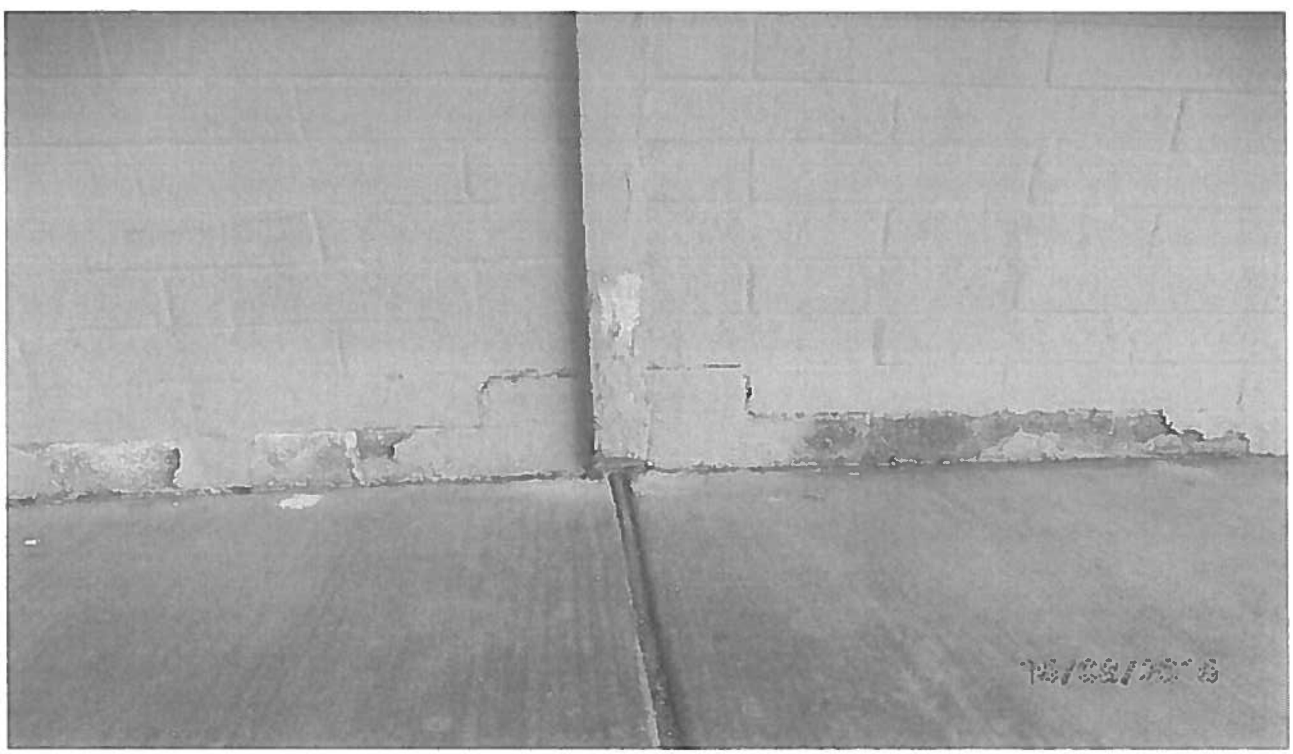

MARKER NO. 2

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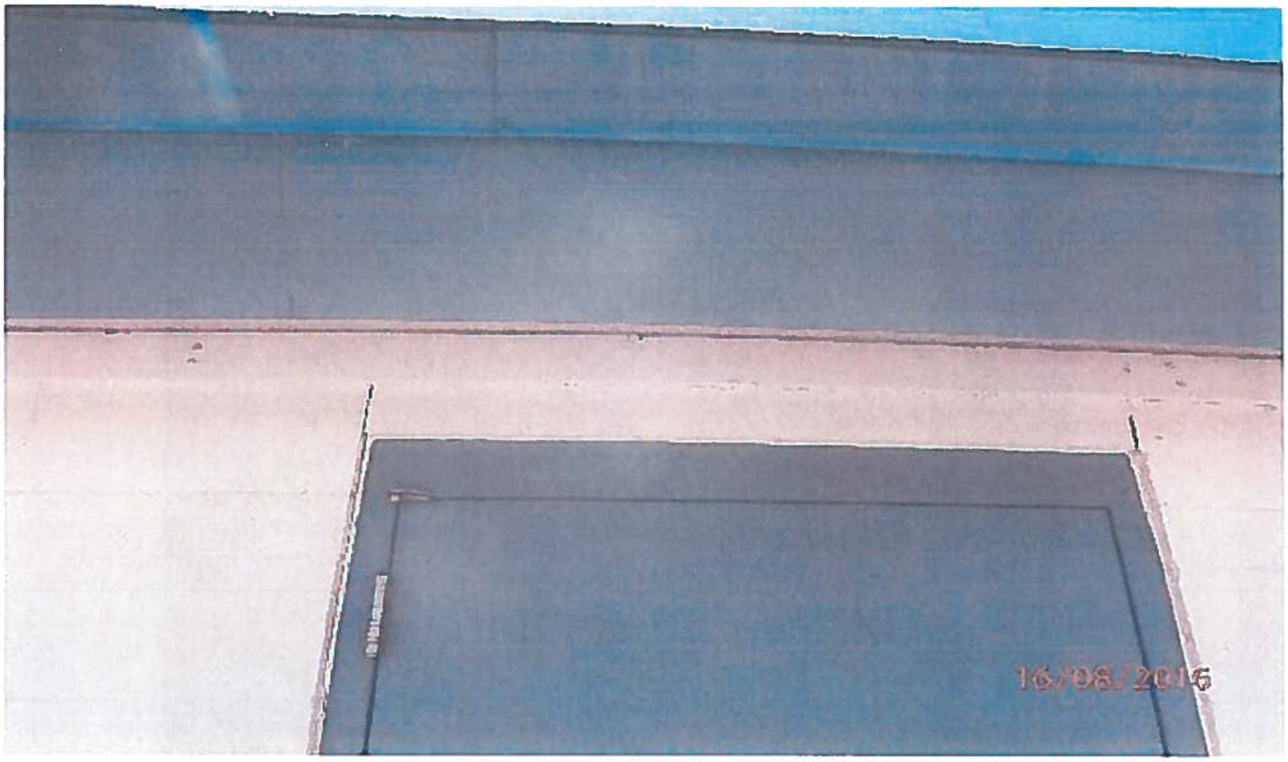
MARKER NO. 3

DON MENSENDICK SCHOOL – BUILDING 18



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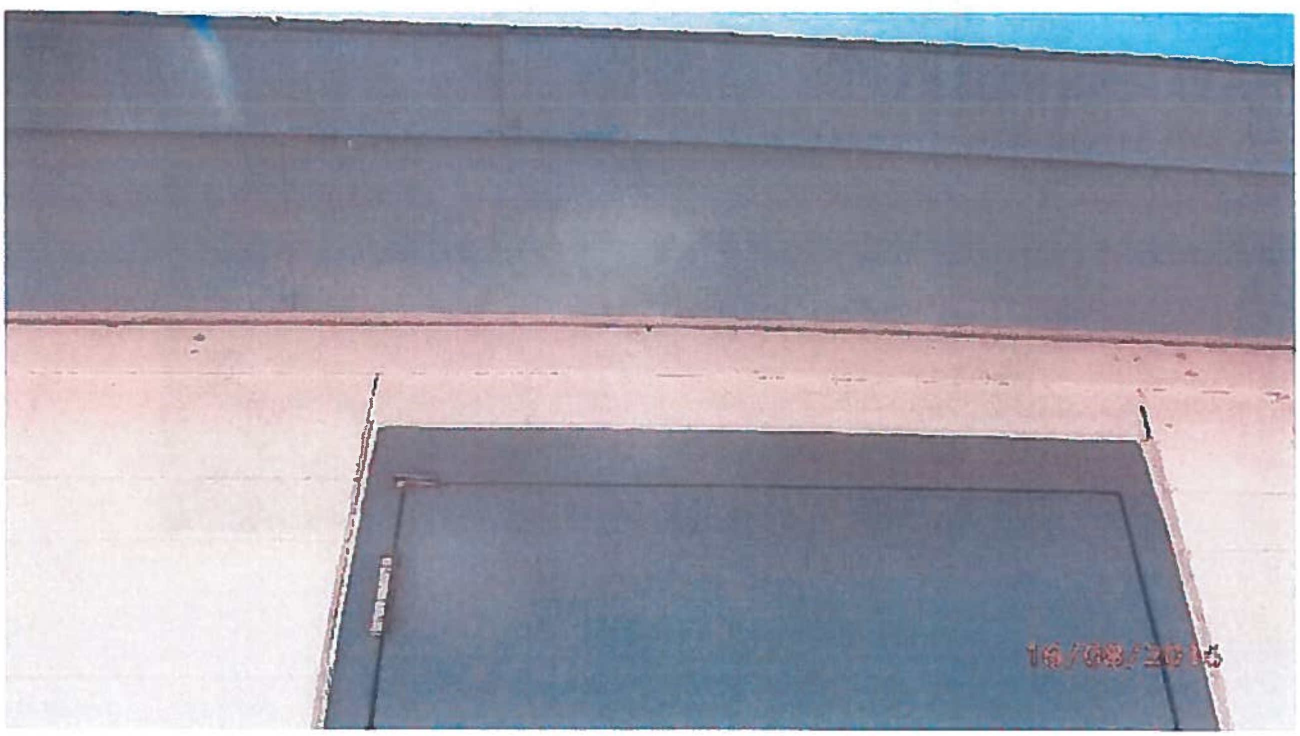
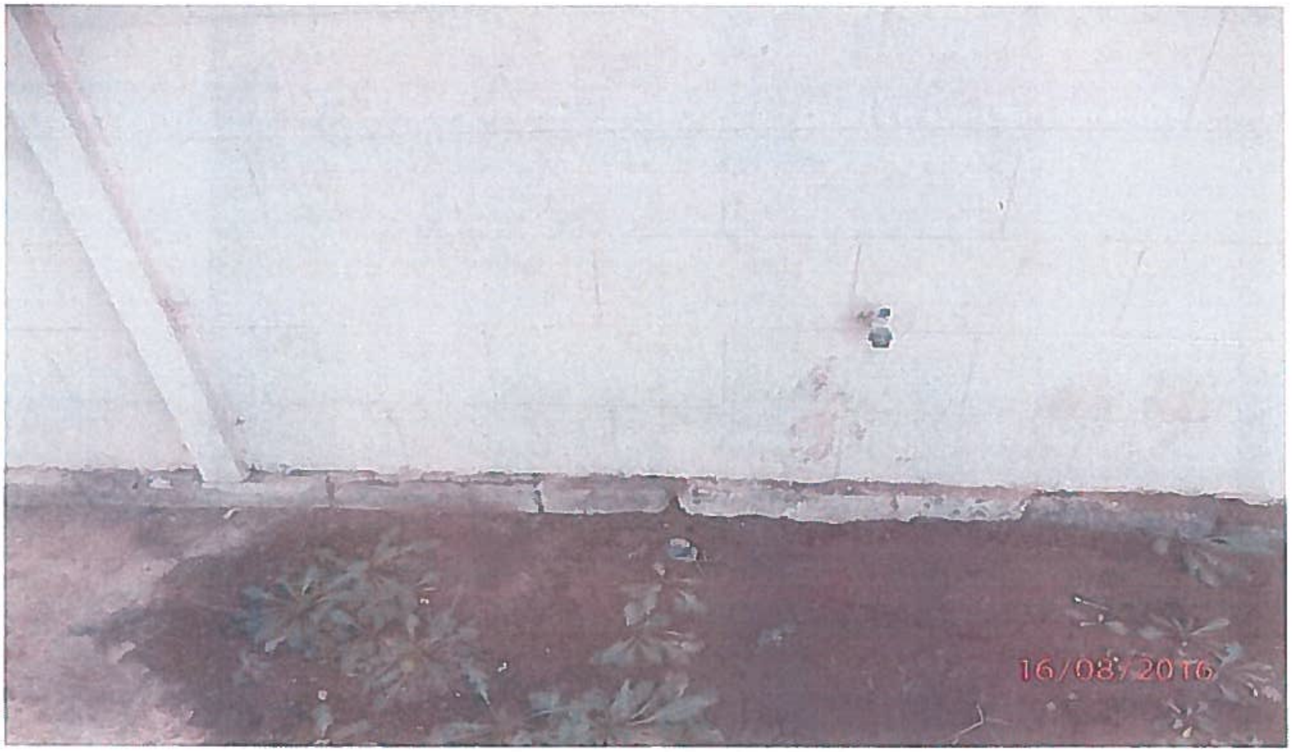


MARKER NO. 5

DON MENSENDICK SCHOOL – BUILDING 18

MARKER NO. 6

DON MENSENDICK SCHOOL – BUILDING 20



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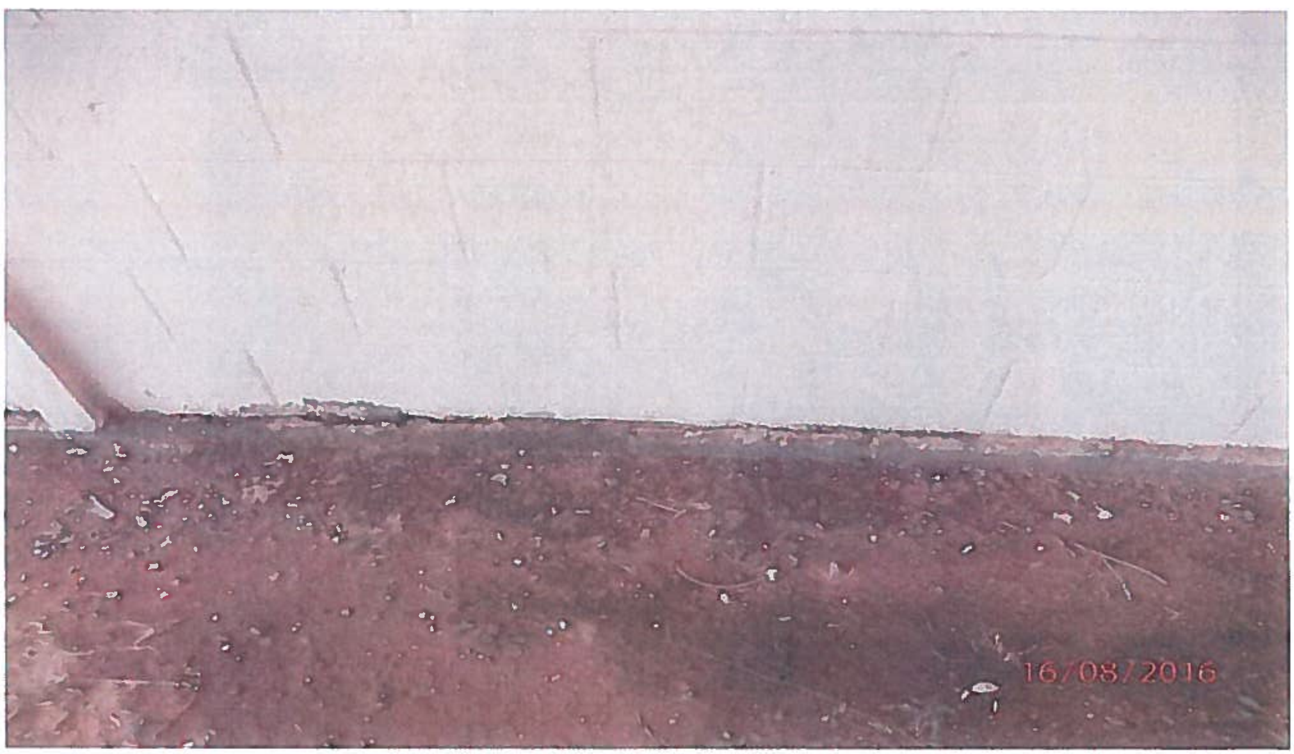

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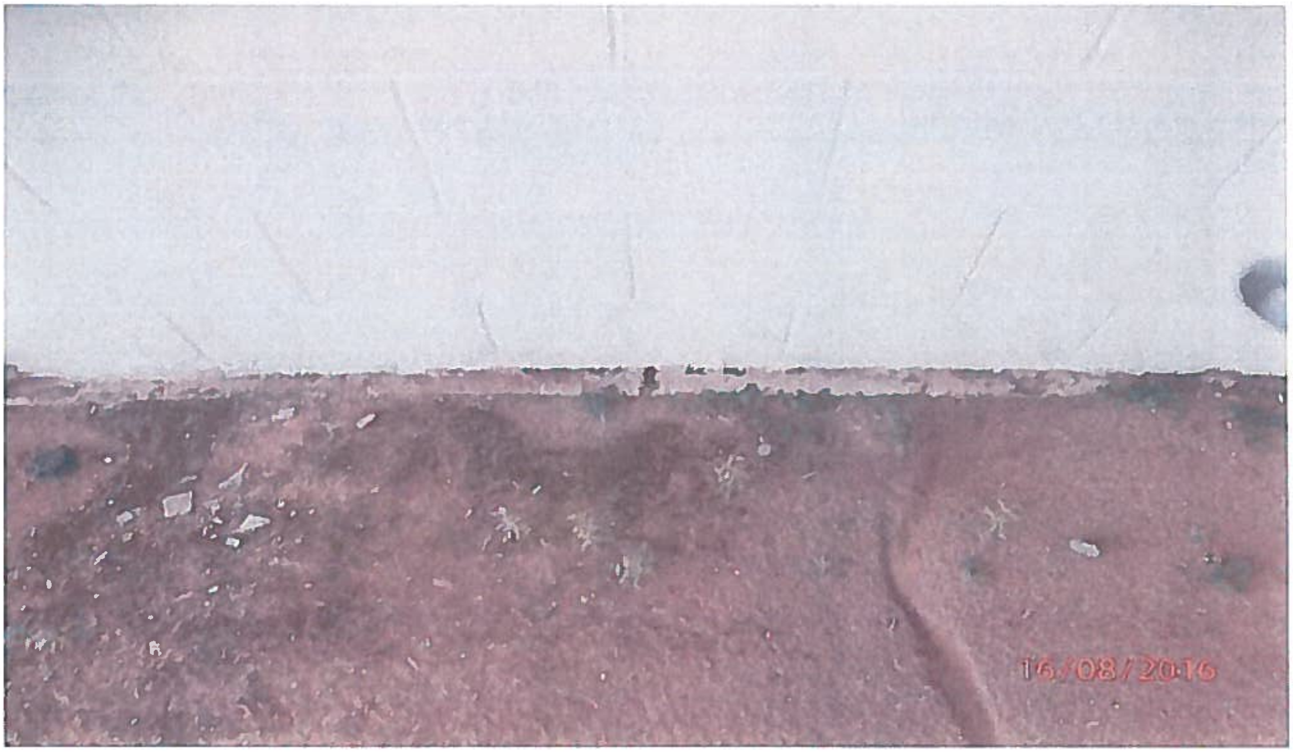

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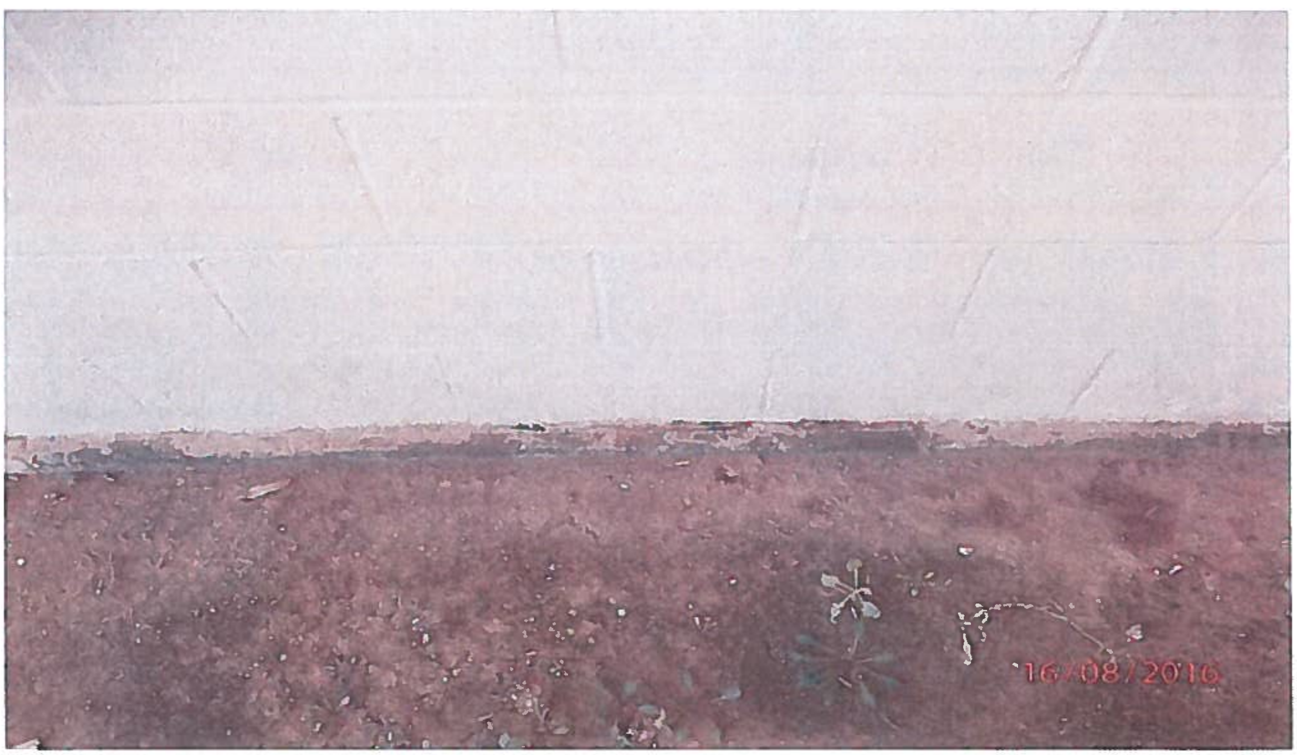


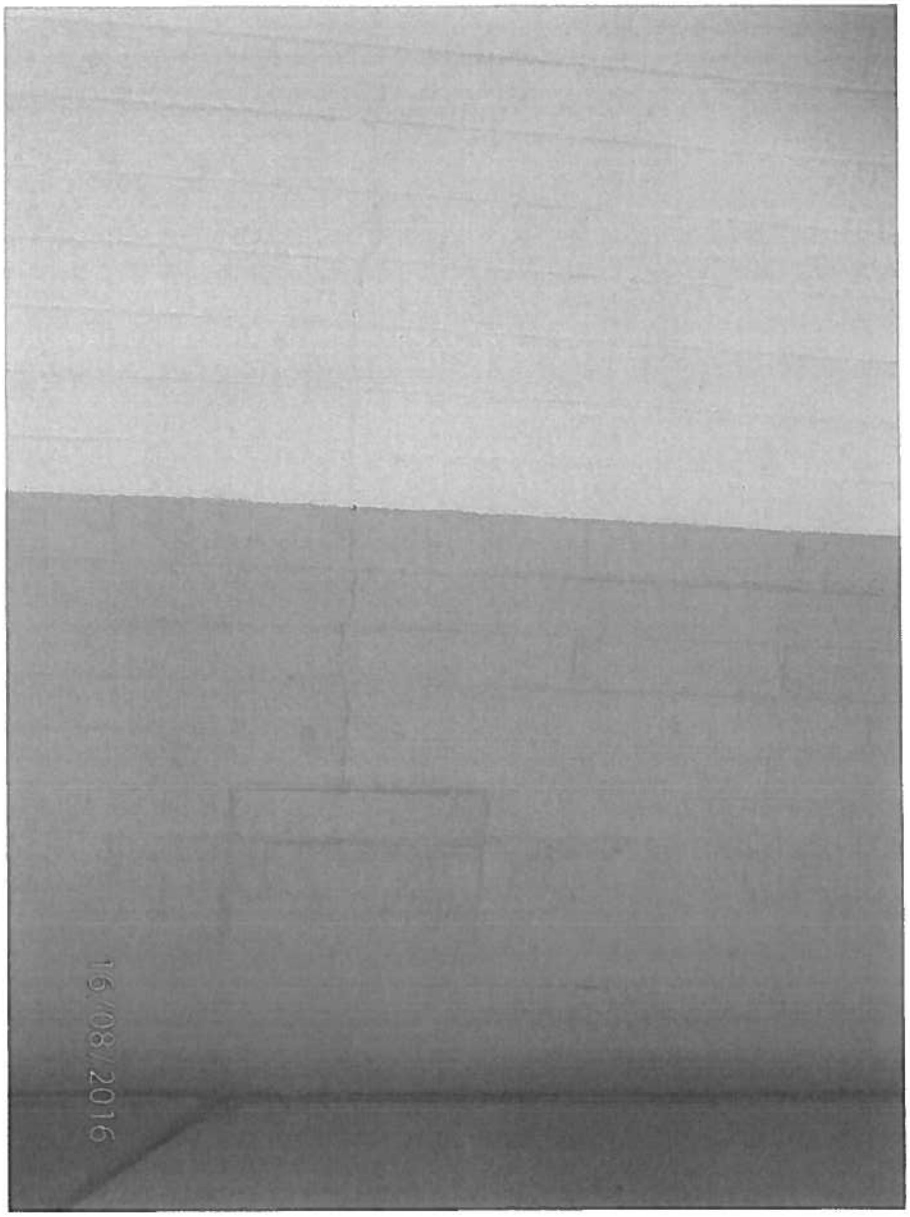
MARKER NO. 4

DON MENSENDICK SCHOOL – BUILDING 20

MARKER NO. 5

MARKER NO. 6

DON MENSENDICK SCHOOL – BUILDING 21

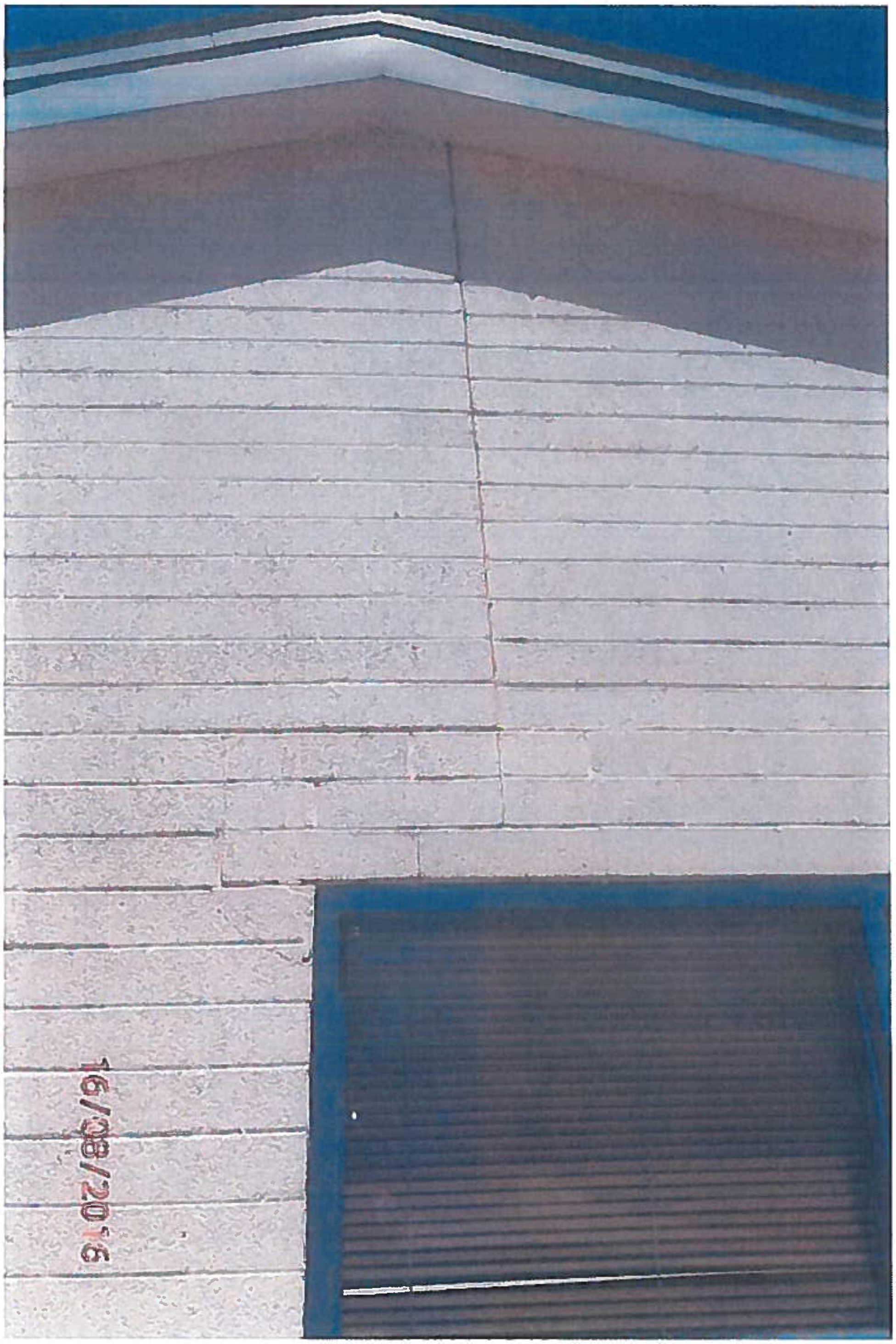


MARKER NO. 1

DON MENSENDICK SCHOOL – BUILDING 22

MARKER NO. 1

DON MENSENDICK SCHOOL – BUILDING 22



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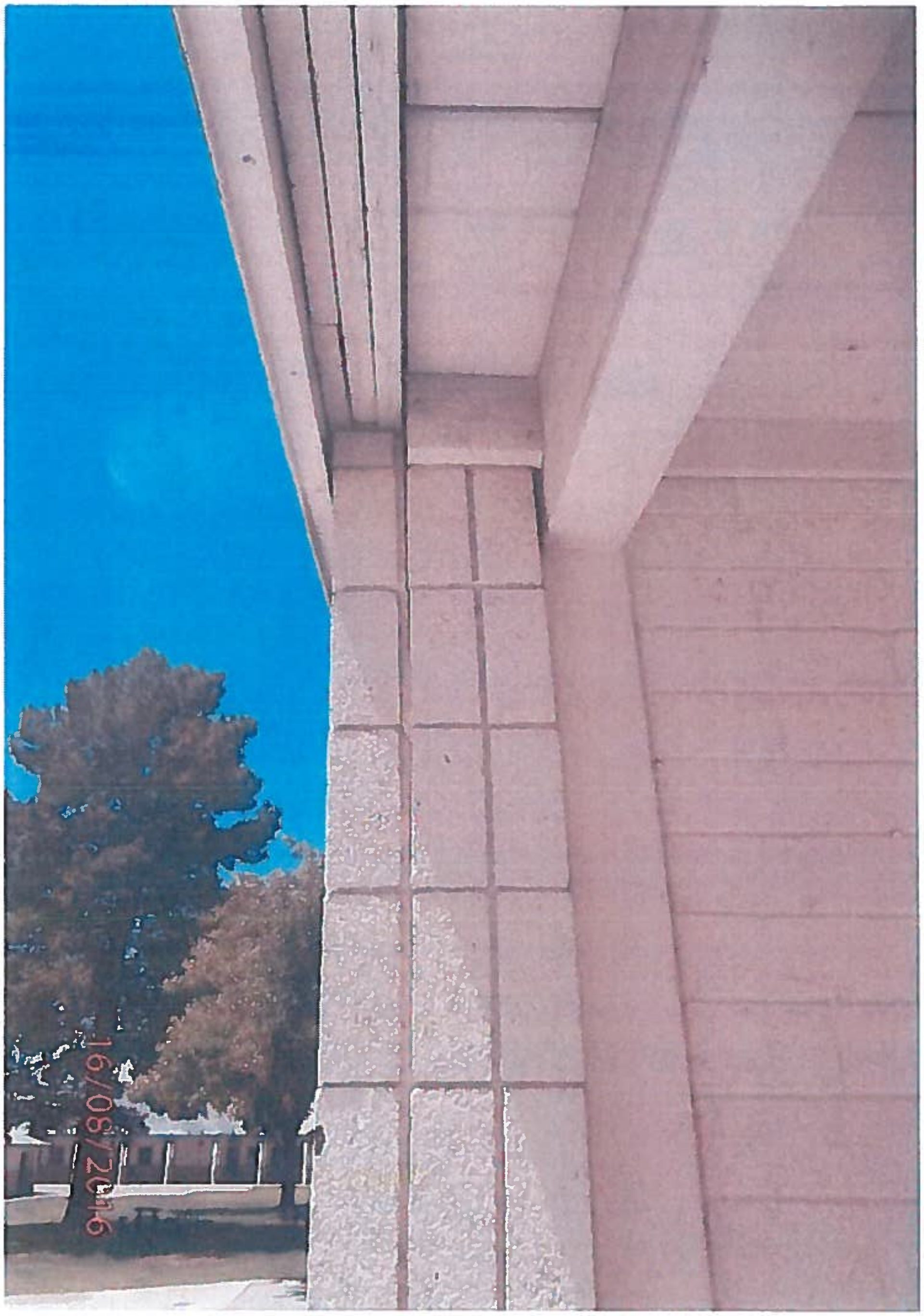
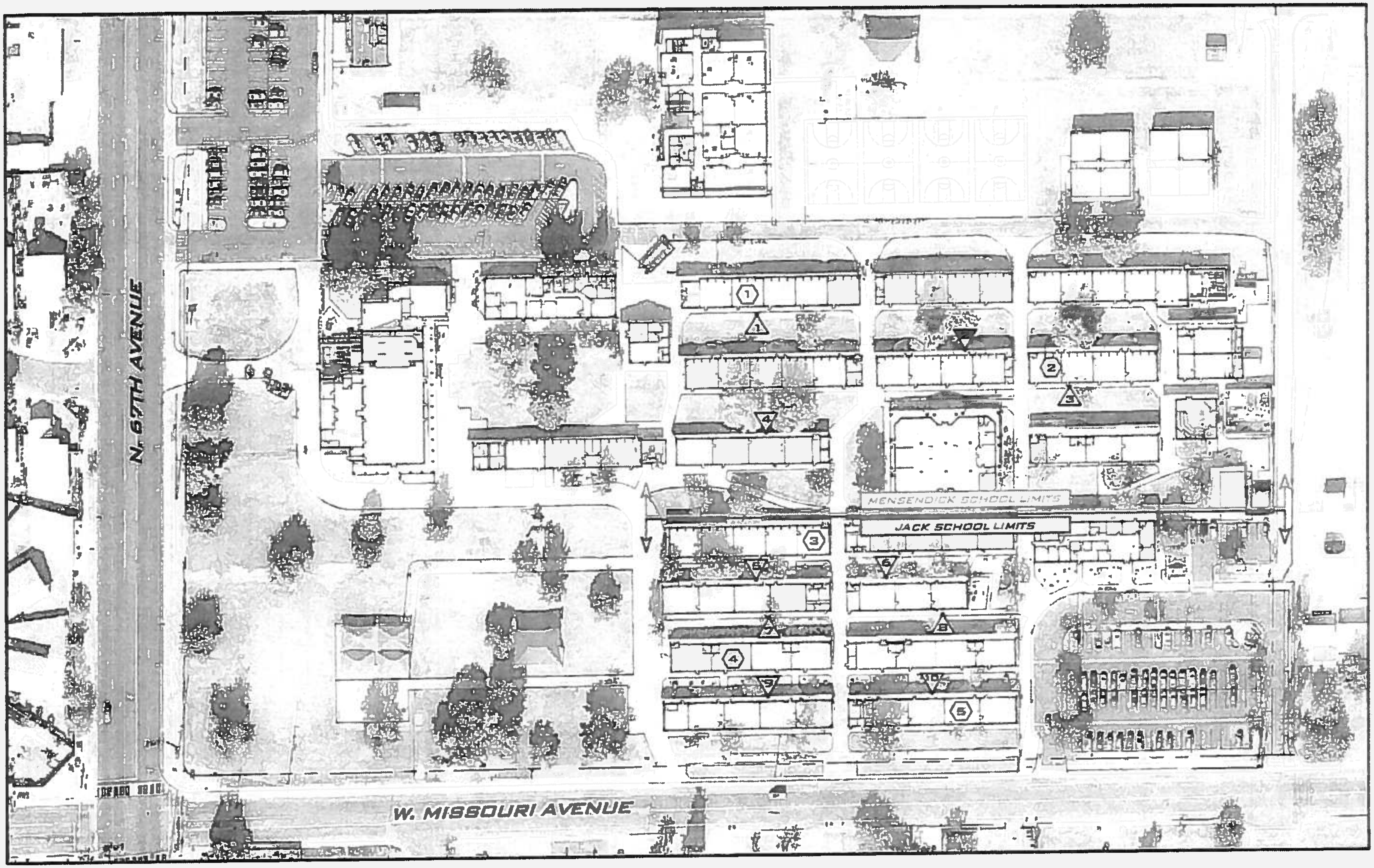


MARKER NO. 3

DON MENSENDICK SCHOOL – BUILDING 24

MARKER NO. 1

SURFACE PENETRATING RADAR REPORT



(X) - APPROXIMATE GPR SCAN LOCATIONS (FLOOR SLAB)

△X - APPROXIMATE GPR SCAN LOCATIONS (CMU WALL)

G.P.R. SCAN LOCATION PLAN		MENSENDICK SCHOOL BUILDING DISTRESS 5535 N. 67TH AVENUE GLENDALE, ARIZONA	SPEEDIE AND ASSOCIATES GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
DR: TSW	REV:	CHK:	DATE: 07/06/16
PROJECT NO. 161288TA			

SPEEDIE AND ASSOCIATES

GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR FIELD REPORT

Project Name: Mensendick School-Building Distress - GPR **Project #:** 161288TA **Date:** 07/07/16

Project Location: 5535 N. 67th Ave. - Glendale, AZ. **Time Start:** 4:30 AM **Time Stop:** 2:30 PM

Client: SPS Arrchitects **Rep:** Dave Bixler **Doc #:** *GPR* RW432

WORK ORDERED BY CLIENT:

STRUCTURE TYPE: Cast in Place ☑ Pre-Cast ☐ Masonry ☑ Other ☐ ________

STRUCTURE ELEMENT: Footing ☐ SOG ☑ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ________

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☑ Other ☐ ________

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Duct Tape ☑

SIZE / LOCATION OF AREA(S):

S&A performed Ground Penetrating Radar (GPR) scanning at the Mensendick/Jack Elementary School buildings. We utilized the GSSI SIR-3000 Data Acquisition System with model 5100B - 1600 and 2000 MHz antennas. We scanned the CMU walls and slab on grade at locations that were predetermined by the structural engineer to identify and note reinforcement indications. Per our proposal, we scanned an approximate 10' x 10' sections of wall and SOG at each location. We marked reinforcement indications with tape. The tape markings were stopped at the limits of the approximate 10'x10' scanned sections.

* Please see our attached site plan for specific locations.
* Observations and measurements were reported separately at each scan location (see scan notes).
* A photo of each scanned location was taken for reference (see photo outline) .

1. Mensendick Elementary School:
A. (10) CMU Wall with approximate 10'x10' areas scanned.
B. (5) Slab-on-grade with approximate 10'x10' floor areas scanned.

GPR SERVICE PROVIDED:	QUANTITY	UNIT PRICE	EXTENSION
Trip Charge		$	$
GPR Technician (3 hr. minimum)		$	$
Support Tech (3 hr. minimum)		$	$
3-D Imaging		$	$
Additional Services		$	$
		TOTAL	

On Account ☑ COD – Cash ☐ Check ☐ # ________ Credit Card - VISA ☐ MC ☐ DISCOVER ☐

The information presented is based upon interpretation of the data collected and is provided solely for illustration and informational purposes. Speedie & Associates is not responsible for any loss or damage caused, arising out of the use of or reliance on the data collected or the report generated. Speedie & Associates hereby disclaims all warranties, expressed or implied with respect to the nature, or quality of the services performed hereunder and except to the extent of its sole gross negligence shall not be liable for any damages as a result of its performance.

Accepted By: ______________________ Technician: Rodd Whisel

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GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR **Project #:** 161288TA **Date:** 07/07/2016

Project Location: 535 N. 67th Ave., Glendale AZ **Time Start:** 4:30AM **Time Stop:** 2:30PM

Client: SPS Architects **Rep:** Jennifer Bowen **Doc #:** GPR RW432-1

SCAN NUMBER: 1-Wall

SCAN LOCATION: Mensendick School, Room 602, South Wall (PO picture 1)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ________

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ______

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐
Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ________

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ________
Vertical Target Depth: ________

Horizontal Target Spacing: ________
Horizontal Target Depth: ________

Longitudinal Target Spacing: ________
Longitudinal Target Depth: ________

Lateral Target Spacing: ________
Lateral Target Depth: ________

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: No indications (ungrouted)
Vertical Target Depth: ________

Horizontal Target Spacing: No indications (ungrouted)
Horizontal Target Depth: ________

Masonry Joint Reinf. Spacing: No indications

ADDITIONAL NOTES/OBSERVATIONS:

4"x8"x16" CMU Block
Green tape indicating possible target in un-grouted block

Accepted By: ________________ Technician: Rodd Whisel

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GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-6

SCAN NUMBER: 4-Wall

SCAN LOCATION: Mensendick School, Room 537, North Wall (PO picture 6)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing:
Vertical Target Depth:

Horizontal Target Spacing:
Horizontal Target Depth:

Longitudinal Target Spacing:
Longitudinal Target Depth:

Lateral Target Spacing:
Lateral Target Depth:

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: Each side of wood column and near center span (grouted)
Vertical Target Depth:

Horizontal Target Spacing: Approximately 8" down from window, possible bond beam (grouted)
Horizontal Target Depth:

Masonry Joint Reinf. Spacing: 16" OC up to 4'" above FF elevation

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x16" CMU Block

Accepted By: ____________ Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-7

SCAN NUMBER: 3-SOG

SCAN LOCATION: Jack School, Room 528, SOG near center of room (PO picture 7)

STRUCTURE TYPE: Cast in Place ☑ Pre-Cast ☐ Masonry ☐ Other ☐ ________

STRUCTURE ELEMENT: Footing ☐ SOG ☑ Wall ☐ Column ☐ Beam ☐ Deck ☐ Other ☐ ________

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☐ Un-Grouted Cells ☐ Other ☐ ________

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ________
Vertical Target Depth: ________

Horizontal Target Spacing: ________
Horizontal Target Depth: ________

Longitudinal Target Spacing: No indications
Longitudinal Target Depth: ________

Lateral Target Spacing: No indications
Lateral Target Depth: ________

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ________
Vertical Target Depth: ________

Horizontal Target Spacing: ________
Horizontal Target Depth: ________

Masonry Joint Reinf. Spacing: ________

ADDITIONAL NOTES/OBSERVATIONS:

Approximate scan area 10'x10'
Approximate slab thickness 4.0"

Accepted By: ________________ Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-8

SCAN NUMBER: 5-Wall

SCAN LOCATION: Jack School, Room 521, North Wall (PO picture 8)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ________

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ________

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ________

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ________
Vertical Target Depth: ________

Horizontal Target Spacing: ________
Horizontal Target Depth: ________

Longitudinal Target Spacing: ________
Longitudinal Target Depth: ________

Lateral Target Spacing: ________
Lateral Target Depth: ________

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: Varies see picture in photo outline. See notes below
Vertical Target Depth: ________

Horizontal Target Spacing: Approximately 8" down from window, 12" down from top of wall (grouted)
Horizontal Target Depth: ________

Masonry Joint Reinf. Spacing: 16" OC up to 4' from FF elevation (varies above 4 feet from FF elevation-see pic)

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x16" CMU Block
Dashed orange tape indicates voids at vertical reinforced location

Accepted By: ________________ Technician: Rodd Whisel

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GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-9

SCAN NUMBER: 6-Wall

SCAN LOCATION: Jack School, Room 518, North Wall (PO picture 9)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ______

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ______

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ______

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ______
Vertical Target Depth: ______

Horizontal Target Spacing: ______
Horizontal Target Depth: ______

Longitudinal Target Spacing: ______
Longitudinal Target Depth: ______

Lateral Target Spacing: ______
Lateral Target Depth: ______

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: First cell adjacent to column and near mid span of wall
Vertical Target Depth: ______

Horizontal Target Spacing: Approximately 12" down from window, possible bond beam (grouted)
Horizontal Target Depth: ______

Masonry Joint Reinf. Spacing: 16" OC up to 5'-8" from FF elevation

ADDITIONAL NOTES/OBSERVATIONS:

4"x8"x16" CMU Block
Blue tape indicates metal terminated near mid span (possible rebar)

Accepted By: ______ Technician: Rodd Whisel

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GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-10

SCAN NUMBER: 7-Wall

SCAN LOCATION: Jack School, Room 521, South Wall (PO picture 10)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ____

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ____

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ____

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ____
Vertical Target Depth: ____

Horizontal Target Spacing: ____
Horizontal Target Depth: ____

Longitudinal Target Spacing: ____
Longitudinal Target Depth: ____

Lateral Target Spacing: ____
Lateral Target Depth: ____

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: Varies see photo outline, see below for additional notes
Vertical Target Depth: ____

Horizontal Target Spacing: Varies see photo outline, possible partial bond beam at 4'-8"
Horizontal Target Depth: ____

Masonry Joint Reinf. Spacing: Partial at 24" above FF

ADDITIONAL NOTES/OBSERVATIONS:

4"x8"x16" CMU Block
Wall infill at previous man door
Solid orange tape indicate grouted solid
Dashed orange tape indicates voids at reinforced cells

Accepted By: ____ Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone: (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-11

SCAN NUMBER: 8-Wall

SCAN LOCATION: Jack School, Room 517, South Wall (PO picture 11)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ____

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ____

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ____

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ____
Vertical Target Depth: ____

Horizontal Target Spacing: ____
Horizontal Target Depth: ____

Longitudinal Target Spacing: ____
Longitudinal Target Depth: ____

Lateral Target Spacing: ____
Lateral Target Depth: ____

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: Adjacent cell E. of column and partial near mid span, see photo outline
Vertical Target Depth: ____

Horizontal Target Spacing: Possible bond beam at 8" below top of wall
Horizontal Target Depth: ____

Masonry Joint Reinf. Spacing: 16" OC starting at 8" above FF

ADDITIONAL NOTES/OBSERVATIONS:

4"x8"x16" CMU Block

Accepted By: ____ Technician: Rodd Whisel

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3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-12

SCAN NUMBER: 4-SOG

SCAN LOCATION: Jack School, Room 515, SOG West end of room near center (PO picture 12)

STRUCTURE TYPE: Cast in Place ☑ Pre-Cast ☐ Masonry ☐ Other ☐ ____

STRUCTURE ELEMENT: Footing ☐ SOG ☑ Wall ☐ Column ☐ Beam ☐ Deck ☐ Other ☐ ____

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☐ Un-Grouted Cells ☐ Other ☐ ____

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ____
Vertical Target Depth: ____

Horizontal Target Spacing: ____
Horizontal Target Depth: ____

Longitudinal Target Spacing: No indications
Longitudinal Target Depth: ____

Lateral Target Spacing: No indications
Lateral Target Depth: ____

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ____
Vertical Target Depth: ____

Horizontal Target Spacing: ____
Horizontal Target Depth: ____

Masonry Joint Reinf. Spacing: ____

ADDITIONAL NOTES/OBSERVATIONS:

Approximate scan area 10'x10'
Approximate slab thickness 4.0"
White tape indicates metal (possible electrical conduits) at approximately 2" below surface

Accepted By: ____ Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-13

SCAN NUMBER: 9-Wall

SCAN LOCATION: Jack School, Room 506, North Wall (PO picture 13)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐ ____

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐ ____

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐
Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐ ____

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ____
Vertical Target Depth: ____

Horizontal Target Spacing: ____
Horizontal Target Depth: ____

Longitudinal Target Spacing: ____
Longitudinal Target Depth: ____

Lateral Target Spacing: ____
Lateral Target Depth: ____

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: 1st adjacent cell from wood column and near mid span (grouted)
Vertical Target Depth: ____

Horizontal Target Spacing: Possible bond beams at 6'-8" and 8'-6" above FF (grouted)
Horizontal Target Depth: ____

Masonry Joint Reinf. Spacing: At 16", 32" and 64" above FF

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x16" CMU Block
Grouted solid between horizontal reinforcing

Accepted By: ____ Technician: Rodd Whisel

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GROUND PENETRATING RADAR SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-14

SCAN NUMBER: 10-Wall

SCAN LOCATION: Jack School, Room 503, North Wall (PO picture 14)

STRUCTURE TYPE: Cast in Place ☐ Pre-Cast ☐ Masonry ☑ Other ☐

STRUCTURE ELEMENT: Footing ☐ SOG ☐ Wall ☑ Column ☐ Beam ☐ Deck ☐ Other ☐

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☑ Un-Grouted Cells ☐ Other ☐

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing:
Vertical Target Depth:

Horizontal Target Spacing:
Horizontal Target Depth:

Longitudinal Target Spacing:
Longitudinal Target Depth:

Lateral Target Spacing:
Lateral Target Depth:

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: 1st adjacent cell of wood column and near mid span (grouted)
Vertical Target Depth:

Horizontal Target Spacing: Possible bond beams at 8'-6" above FF (grouted)
Horizontal Target Depth:

Masonry Joint Reinf. Spacing: At 16", 32", 48", 64" and 88" above FF

ADDITIONAL NOTES/OBSERVATIONS:

8"x8"x16" CMU Block

Accepted By: ____________ Technician: Rodd Whisel

SPEEDIE AND ASSOCIATES
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3331 E. Wood St., Phoenix, Arizona 85040 Telephone (602) 997-6391 Fax (602) 943-5508

GROUND PENETRATING RADAR
SCAN NOTES

Project Name: Mensendick/Jack Elementary School Distress - GPR	**Project #:** 161288TA	**Date:** 07/07/2016
Project Location: 535 N. 67th Ave., Glendale AZ	**Time Start:** 4:30AM	**Time Stop:** 2:30PM
Client: SPS Architects	**Rep:** Jennifer Bowen	**Doc #:** GPR RW432-15

SCAN NUMBER: 5-SOG

SCAN LOCATION: Jack School, Room 515, SOG West end of room near center (PO picture 15)

STRUCTURE TYPE: Cast in Place ☑ Pre-Cast ☐ Masonry ☐ Other ☐ ______

STRUCTURE ELEMENT: Footing ☐ SOG ☑ Wall ☐ Column ☐ Beam ☐ Deck ☐ Other ☐ ______

TARGET INDICATIONS: Reinforcing Steel ☑ PT Cables ☐ PVC Conduit ☐ Voids ☐ Grouted Cells ☐ Un-Grouted Cells ☐ Other ☐ ______

PICTURES TAKEN: Yes ☑ No ☐ **TARGETS MARKED WITH:** Crayon ☐ Paint ☐ Tape ☑

CONCRETE TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ______
Vertical Target Depth: ______

Horizontal Target Spacing: ______
Horizontal Target Depth: ______

Longitudinal Target Spacing: No indications
Longitudinal Target Depth: ______

Lateral Target Spacing: No indications
Lateral Target Depth: ______

CMU TARGET INDICATION ORIENTATION / APPROXIMATE SPACING AND DEPTH:

Vertical Target Spacing: ______
Vertical Target Depth: ______

Horizontal Target Spacing: ______
Horizontal Target Depth: ______

Masonry Joint Reinf. Spacing: ______

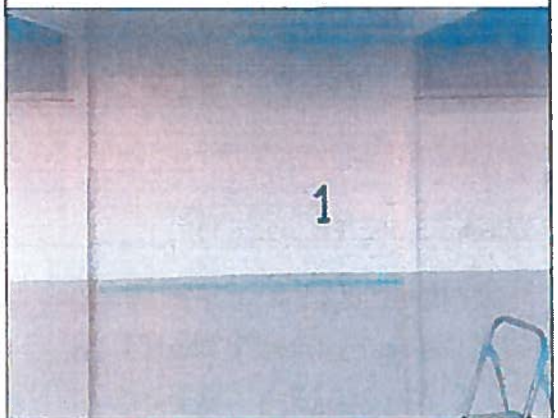
ADDITIONAL NOTES/OBSERVATIONS:

Approximate scan area 10'x10'
Approximate slab thickness 5.0"

Accepted By: ______ Technician: Rodd Whisel

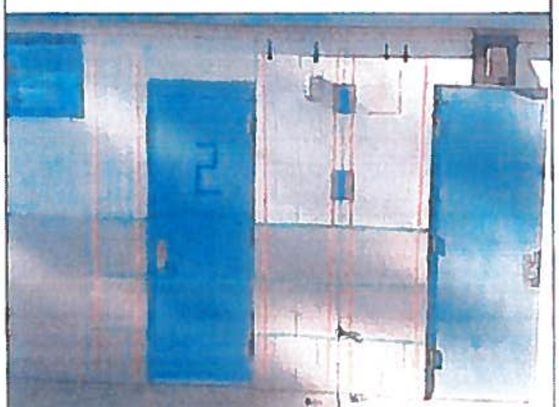
Project Name: Mensendick School-Building Distress - GPR
Project Address: 5535 N. 67th Ave. – Glendale, AZ.
Photo Outline 1

Project No.:161288TA / GPR RW432 Date: July 7, 2016

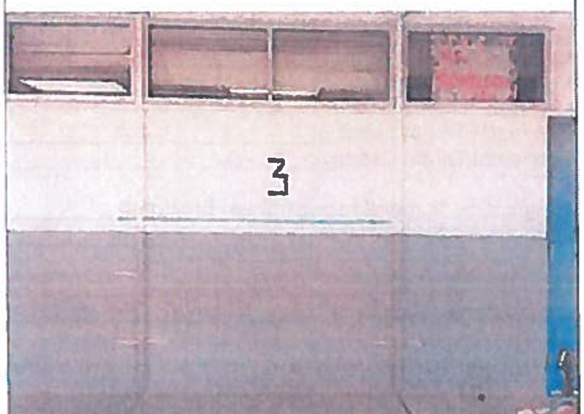


No. 1	Scan 1-Wall: Mensendick, Rm 602, S. wall. Green Tape indicating ungrouted target, possible electrical conduit.

No. 2	Scan 1-SOG: Mensendick, Rm 602. Approx 10'x10' area. slab approx.. 4" Thick.



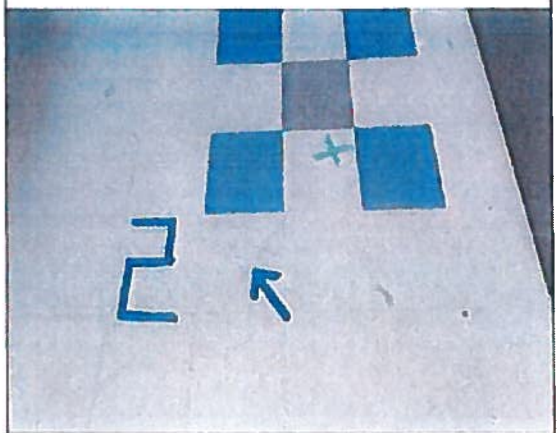
No. 3	Scan 2-Wall: Mensendick, Rm. 623, W. wall. Orange vert-rebar, green horiz joint reinf. Blue-steel indications at top course



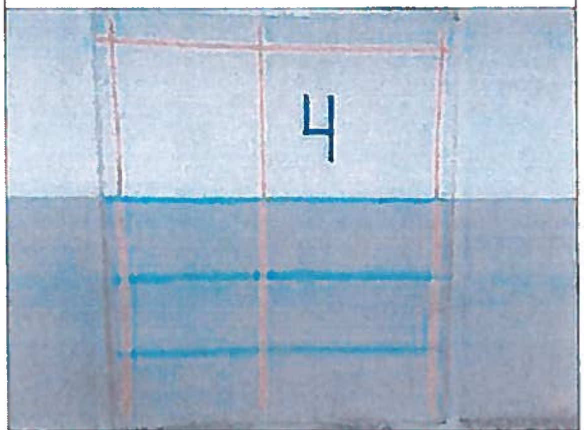
No. 4	Scan 3-Wall: Mensendick, Rm 625, S. wall. Green-horiz joint reinf. White-steel indications at wood columns (grouted solid)

Project Name: Mensendick School-Building Distress - GPR
Project Address: 5535 N. 67th Ave. – Glendale, AZ.
Photo Outline 1

Project No.:161288TA / GPR RW432 Date: July 7, 2016

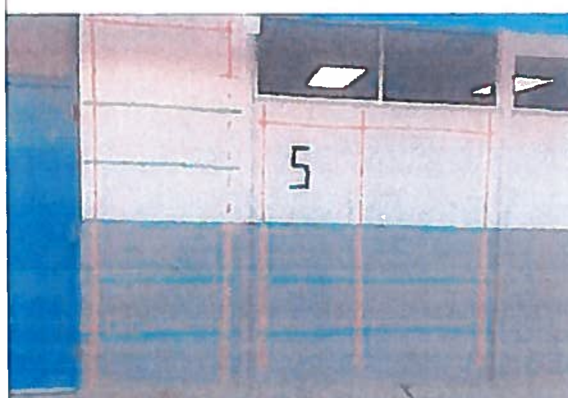


No. 5	Scan 2 SOG: Mensendick, Rm. 624. Approx. 10'x10' area. NWC of Room. No indication of reinf, approx 4" thick. Note crack at blue arrow.



No. 6	Scan 4 Wall: Mensendick, Rm. 537, N wall. Orange-vert & horiz reinf. Green-joint reinf at bottom of wall

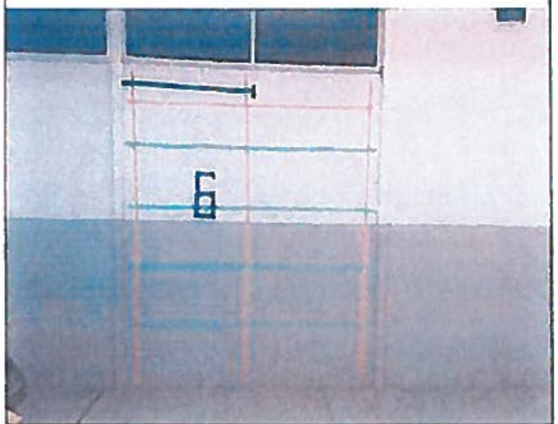
No. 7	Scan 3 SOG: Jack, Rm 528, S. SOG at center of room, slab approx. 4" thick



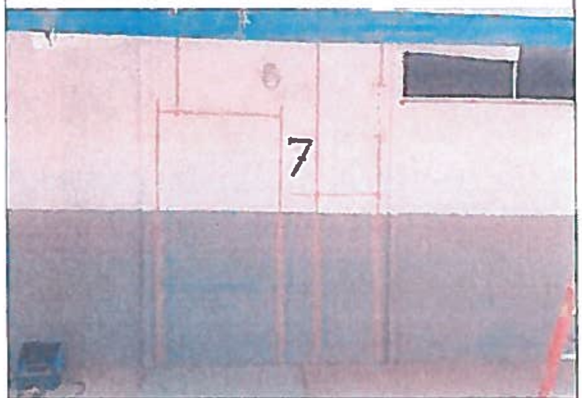
No. 8	Scan 5 Wall: Jack, Rm 521: Orange-vert & horiz reinf (dashed line not grouted), greet-joint reinf

Project Name: Mensendick School-Building Distress - GPR
Project Address: 5535 N. 67th Ave. – Glendale, AZ.
Photo Outline 2

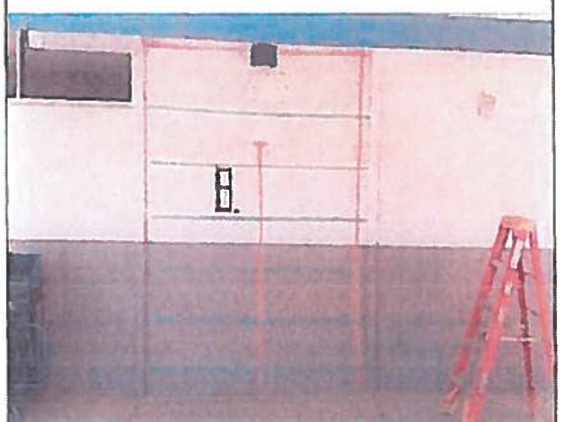
Project No.:161288TA / GPR RW432 Date: July 7, 2016



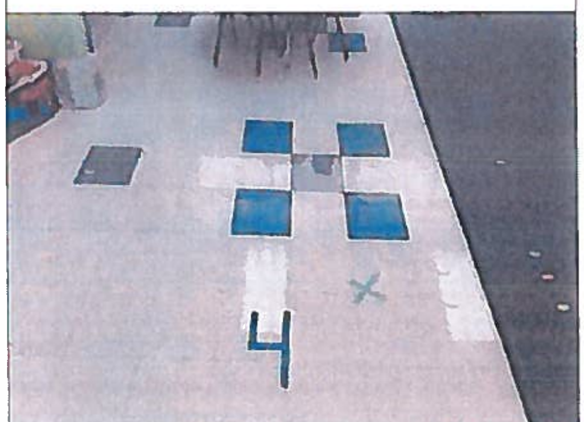
No. 9	Scan 6 Wall: Jack Bldg., Rm. 518 N. wall. Orange-vert. & horiz. reinf. Green-joint reinf.



No. 10	Scan 7 Wall: Jack Bldg. Rm. 521. S. wall. Orange-vert. & horiz. Reinf (dashed line indicates voids). Green – joint reinf, infill at man door



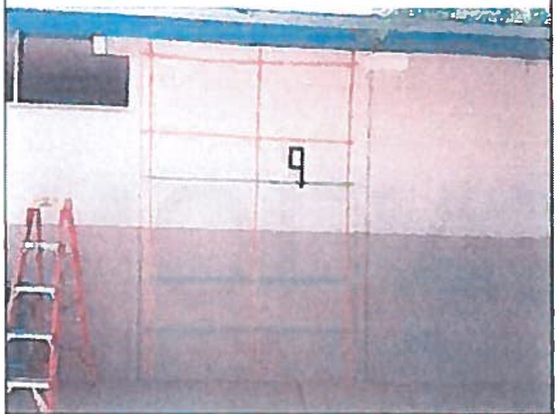
No. 11	Scan 8 Wall: Jack Bldg. Rm. 517, S. wall. Orange-vert & horiz. Reinf, green-joint reinf.



No. 12	Scan 4 SOG: Jack Bldg. Rm. 515. W. end at center of room. White tape indicates possible rebar/conduits 2" deep, Slab approx.. 4" thick.

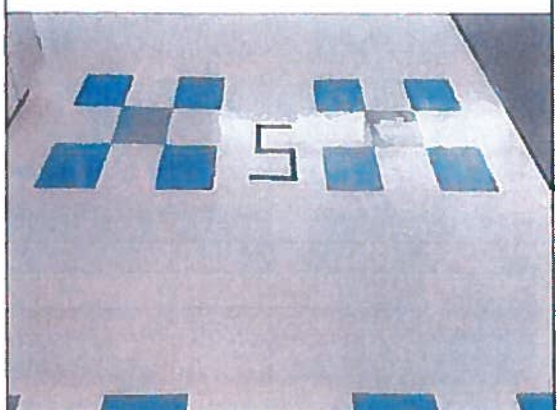
Project Name: Mensendick School-Building Distress - GPR
Project Address: 5535 N. 67th Ave. – Glendale, AZ.
Photo Outline 2

Project No.:161288TA / GPR RW432 Date: July 7, 2016



No. 13	Scan 9 Wall: Jack Bldg., Rm. 506 N. Wall. Orange-vert. & horiz. reinf, Green-joint reinf.

No. 14	Scan 10 Wall: Jack Bldg. Rm. 503, N. Wall. Orange-vert. & horiz. reinf. Green-joint reinf.



No. 15	Scan 5 SOG: Jack Bldg. Rm. 502 W. end at center of room. Approx.. 10'x10' area. No reinf. indications. SOG approx. 5"

SOILS INVESTIGATION REPORT

SPEEDIE AND ASSOCIATES
Geotechnical ▪ Environmental ▪ Materials Engineers

www.speedie.net

August 5, 2016

Jennifer Bowen, AIA
SPS+ Partners Architects LLP
8681 E. Via de Negocio
Scottsdale, AZ 85258

RE: Project No. 161211SA
Mensendick School – Building Distress
5535 North 67th Avenue
Glendale, AZ
Findings & Test Results

Dear Ms. Bowen:

This letter presents the findings of our visual site assessment, limited subsurface investigation and our opinions on the possible cause(s) for the stair step cracking of the masonry walls, separation of doorframes from masonry walls and evidence of slab movement of the interior of the buildings resulting in slab cracks.

On July 7 and 8, 2016, representatives from Speedie & Associates were at the site to conduct a limited soil investigation, as outlined in our proposal number 56061s. The investigation was broken into three tasks. The first task consisted of coring the interior slab of the buildings at three (3) locations and obtaining soil samples. The second task was to hand auger up to fifteen (15) exterior locations and obtaining soil samples. The third task was to excavate six (6) test pits on the exterior of the buildings in order to determine the depth and size of the footings and general subsoil bearing conditions, including the type of footing or turndown.

The results of the sampling and individual logs of each core, boring and test pit location and laboratory data are attached to this report. The approximate locations of each are located on the attached Soil Boring Location Plan. The following summarizes our findings:

Interior Testing

Three cores were selected at the interior of three separate buildings spread throughout the school campus. Each core was made along the interior walls. Coring consisted of hand augering and sampling of soils up to 3 to 4 feet below grade.

The concrete building slab thicknesses ranged from approximately 4.25 to 5.50 inches underlain by 4.0 to 6.0 inches of coarse gravel. It is noted that core C-2 had a 3-inch void under the slab. The subgrade soils consisted of moist sandy lean clay. An undisturbed ring sample was taken of the subgrade soils at a depth of 2.5 and 3.5 feet below the existing surface. The samples were obtained by driving a ring sampler with a 30-lb post hammer. At a depth of 1.5 feet it took between 13 and 27 blows to drive the hammer 12 inches. At a depth of 2.5 feet it took between 16 and 35 blows to drive the hammer 12 inches.

Exterior Testing

Fifteen hand auger borings were selected throughout the school campus along the south side of the buildings in the landscaped areas closest to the buildings. The majority of the landscaping was consistent with irrigated grass and large trees. Each boring was hand augured to a depth of approximately three feet below existing grade and soil samples were obtained at each foot interval. Subgrade soils consisted predominately of moist sandy lean clay with the exception of borings B-10, B-11 and B-14, which consisted of moist sandy silty clay with subordinate amount of gravel.

Test Pits

As part of this analysis, six locations on the north side of the buildings were selected to document the current soil conditions, depth of foundations and foundation type. Samples of the soils over and under the slab footings were obtained by means of hand auger. The subgrade soils consisted predominately of moist sandy lean clay and moist sandy silty clay.

Depths to the bottom of the footings ranged from 21 to 42 inches. It is noted that test pit #3 was not excavatable due to an existing sewer line that runs parallel to the building. More detailed diagrams and measurements of the footing dimensions are located on the attached Test Pit/Footing Details.

General Subsurface Conditions

The native subsoils consisted primarily of sandy lean clay and sandy silty clay to the termination depths of 3 to 4 feet below existing grades. Subordinate amounts of gravel were also noted throughout the profile. No groundwater was encountered during this investigation. Based on visual and tactile observation, the upper soils were in a 'moist' state at the time of investigation.

Laboratory testing indicates in-situ dry densities of the upper soils ranged from 78 to 107 pcf and water contents from 7.2 to 26.4 percent at the time of investigation. Liquid limits ranged from 23 to 30 percent with plasticity indices at 16 to 19 percent. The upper clayey soils exhibit volume increase **(swell)** due to wetting of 1.6 to 3.8 percent when compacted to moisture and density levels normally expected during construction. Undisturbed samples displayed minor to moderate (2 to 4%) compression due to incremental loading and **minor to significant (1 to 16%)** additional compression due to inundation under a maximum confining load of 3,200 psf.

Laboratory testing for sulfate contents indicates 22 ppm. This value represents a minor potential for sulfate attack on concrete. The soil pH was 8.2, the soil resistivity was 1000 Ohm-Centimeters, and Chloride concentrations were 149 ppm. The laboratory resistivity test is conducted under a saturated condition. In the field, the saturation of soils should not be expected which would thereby increase the resistivity. Based on the soil classification, test results and local experience, the soils will likely have moderate corrosivity to direct buried metal. Chloride concentrations of 500 ppm or greater are considered severely corrosive.

Conclusions

At this time no obvious single cause was observed to cause the distress in the building. Based on the limited investigation, our laboratory testing and field observation, it is our opinion that the distress may be related to a combination of water induced settlement, or shrinkage of the soil and possibly minor amounts of slab heave or swell as a result of moisture fluctuations in the supporting soils. These moisture fluctuations are a result of the constant irrigation of the grassy areas surrounding the buildings. Based on the soil classification and observations, the soils on the site are moisture sensitive and will be prone to volume change (both shrinkage and swelling) as a result of moisture changes (drying and wetting).

Most all soils related issues are in direct relationship to moisture change in the supporting soils. This can come from results of wet utility leaks or breaks, over irrigation, or poor drainage. Based on the samples obtained, the amounts of moisture in the majority of the soils were at optimum moisture or higher.

At this time our scope was only to conduct the field sampling and laboratory testing and provide the data obtained. If there are any questions, please feel free to call.

Respectfully Submitted,
SPEEDIE & ASSOCIATES, INC.

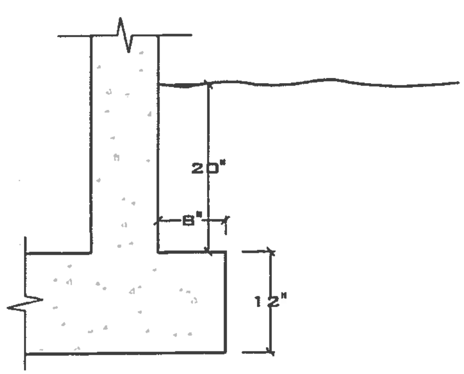
Ray C. Markley Jr., E.I.T.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
37292
KEITH R.
GRAVEL
Date Signed 8-5-16
ARIZONA, U.S.A.
Expires 03/31/2017

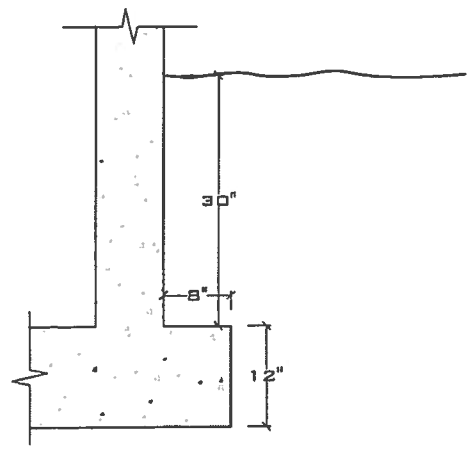
Keith R. Gravel, P.E.

Attachments

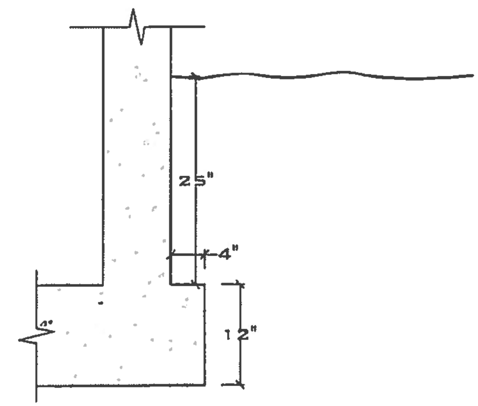
TEST PIT #1



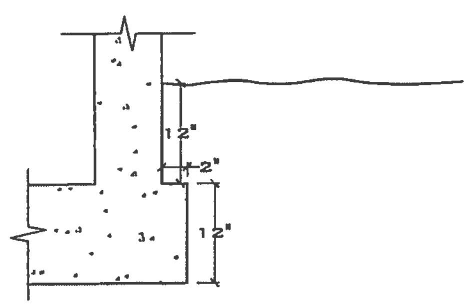
TEST PIT #2



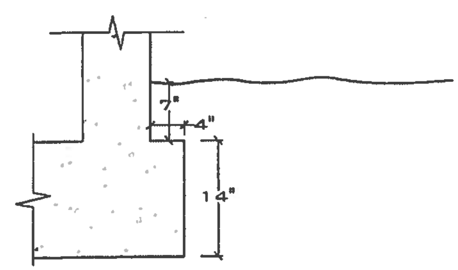
TEST PIT #4



TEST PIT #5



TEST PIT #6

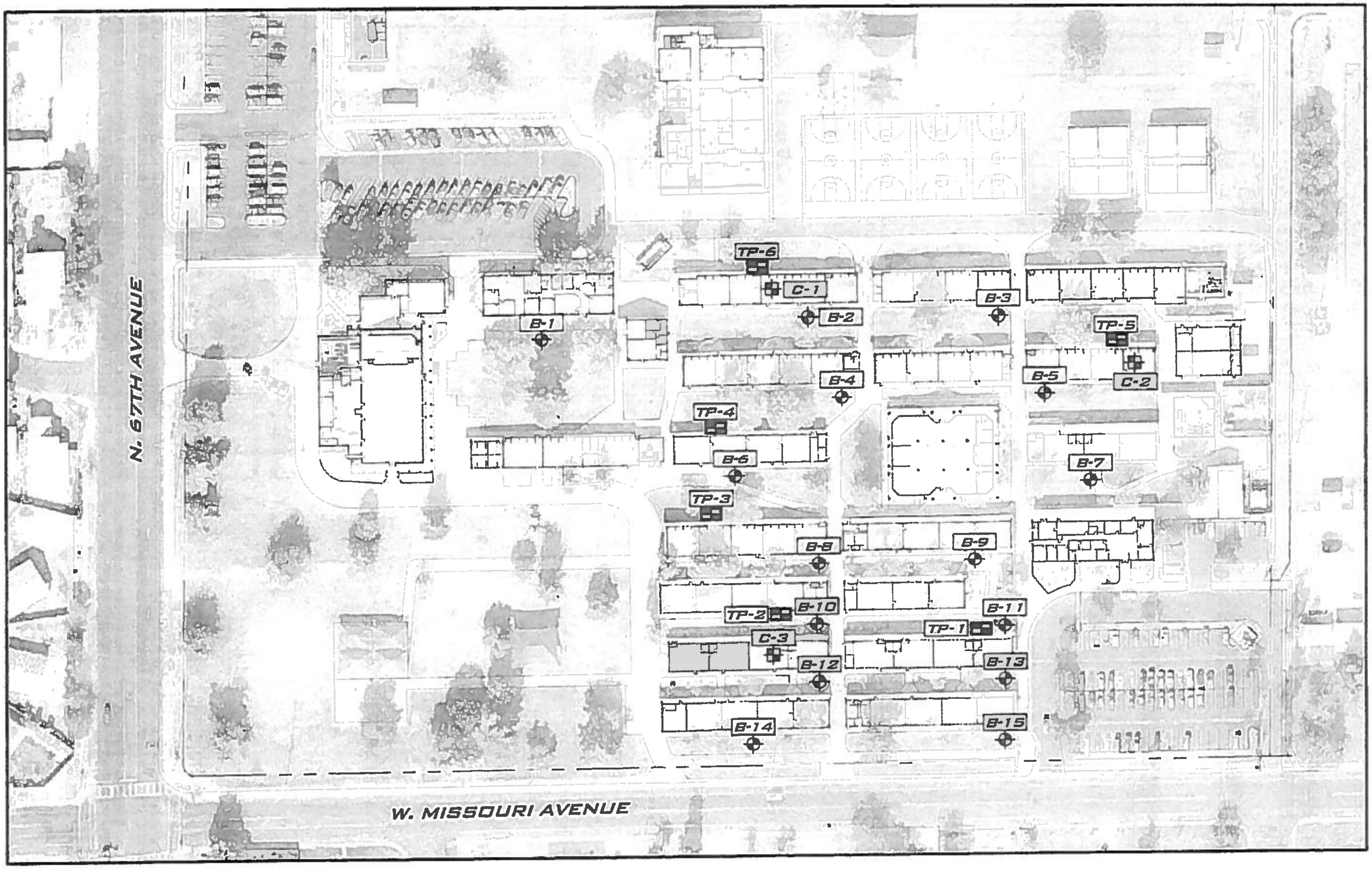


TEST PIT / FOOTING DETAILS

DR: TSW | REV: | CHK: | DATE: 08/05/16 | PROJECT NO. 161211SA

MENSENDICK SCHOOL BUILDING DISTRESS
5535 N. 67TH AVENUE
GLENDALE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-6391



- APPROXIMATE HAND-AUGER BORING LOCATIONS
- APPROXIMATE FLOOR SLAB CORE LOCATIONS
- APPROXIMATE TEST PIT LOCATIONS

SOIL BORING LOCATION PLAN

DR: TSW | REV: | CHK: | DATE: 07/06/16 | PROJECT NO. 161211SA

MENSENDICK SCHOOL BUILDING DISTRESS
5535 N. 67TH AVENUE
GLENDALE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-6391

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		Firm Brown SANDY LEAN CLAY (CL-Moist) with Trace Gravel	AS-1	1.0	NT	NT	
			AS-2	2.0	NT	NT	
		3.0	AS-3	3.0	10.7	NT	
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		Firm Brown SANDY LEAN CLAY (CL-Moist) with Trace Gravel	AS-1	1.0	NT	NT	
			AS-2	2.0	NT	NT	
3.0		End of Boring	AS-3	3.0	14.7	NT	
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 2

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Firm Brown <u>SANDY LEAN CLAY</u> (CL-Moist) with Trace Gravel	AS-1	1.0	15.7	NT	
			AS-2	2.0	NT	NT	
3.0		End of Boring	AS-3	3.0	NT	NT	
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 3

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Firm Brown <u>SANDY LEAN CLAY</u> (CL-Moist)	AS-1	1.0	NT	NT	
3.0		End of Boring					
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 4

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Firm Brown SANDY LEAN CLAY (CL-Moist)	AS-1	1.0	NT	NT	
			AS-2	2.0	NT	NT	
3.0		End of Boring	AS-3	3.0	13.5	NT	
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 5

Mensendick School-Building Distress
5535 North 67th Avenue
Glendale, Arizona

Project No.: 161211SA

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Rig Type: **Hand Auger**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Firm Brown SANDY LEAN CLAY (CL-Moist)	AS-1	1.0	NT	NT	
			AS-2	2.0	NT	NT	
3.0		End of Boring	AS-3	3.0	22.8	NT	
5							

Boring Date: **7-7-16**
Field Engineer/Technician: **K. Euge II**
Driller: **R. Markley**
Contractor: **Speedie & Assoc.**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 6**

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: **161211SA**

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Firm Brown SANDY LEAN CLAY (CL-Moist)		AS-1	1.0	NT	NT	
				AS-2	2.0	18.8	NT	
		End of Boring	3.0	AS-3	3.0	NT	NT	
5								

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 7

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Rig Type:	Hand Auger
Boring Type:	Hollow Stem Auger
Surface Elevation:	N/A

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Firm Brown SANDY LEAN CLAY (CL-Moist)	AS-1	1.0	NT	NT	
			AS-2	2.0	9.5	NT	
3.0		End of Boring	AS-3	3.0	NT	NT	
5							

Boring Date:	7-7-16
Field Engineer/Technician:	K. Euge II
Driller:	R. Markley
Contractor:	Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 8

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Firm Brown SANDY LEAN CLAY (CL-Moist)	AS-1	1.0	NT	NT	
			AS-2	2.0	NT	NT	
		3.0 End of Boring	AS-3	3.0	7.2	NT	
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 9

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		Firm Brown SANDY SILTY CLAY (CL/ML-Moist)					
			AS-1	1.0	NT	NT	
			AS-2	2.0	NT	NT	
		3.0	AS-3	3.0	26.4	NT	
		End of Boring					
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-10**

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: **161211SA**

SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Firm Brown SANDY LEAN CLAY (CL-Moist)	AS-1	1.0	NT	NT	
			AS-2	2.0	NT	NT	
3.0		End of Boring	AS-3	3.0	14.5	NT	
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-11**

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: **161211SA**

Rig Type:	Hand Auger
Boring Type:	Hollow Stem Auger
Surface Elevation:	N/A

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0	Firm Brown <u>SANDY SILTY CLAY</u> (CL/ML-Moist) with Trace Gravel					
		AS-1	1.0	NT	NT	
		AS-2	2.0	8.1	NT	
3.0	End of Boring	AS-3	3.0	NT	NT	
5						

Boring Date:	7-7-16
Field Engineer/Technician:	K. Euge II
Driller:	R. Markley
Contractor:	Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-12**

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: **161211SA**

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Firm Brown SANDY LEAN CLAY (CL-Moist)	AS-1	1.0	NT	NT	
			AS-2	2.0	NT	NT	
		3.0	AS-3	3.0	12.7	NT	
		End of Boring					
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-13

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Firm Brown SANDY SILTY CLAY (CL/ML-Moist) with Trace Gravel	AS-1	1.0	14.6	NT	
3.0		End of Boring					
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-14

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Rig Type: Hand Auger Boring Type: Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Firm Brown <u>SANDY LEAN CLAY</u> (CL-Moist)					
			AS-1	1.0	NT	NT	
			AS-2	2.0	NT	NT	
		3.0	AS-3	3.0	21.6	NT	
		End of Boring					
5							

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-15**

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: **161211SA**

SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Rig Type: **Hand Auger**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0	5.5" Concrete					
0.5	6" Coarse Gravel					
1.0	Very Stiff Brown SANDY LEAN CLAY (CL-Moist)					
		RS-1	2.5	13.2	98.4	
3.5	End of Boring	RS-2	3.5	12.4	102.6	
5						

Boring Date: **7-7-16**
Field Engineer/Technician: **K. Euge II**
Driller: **R. Markley**
Contractor: **Speedie & Assoc.**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: C-1

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: **161211SA**

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0	5" Concrete						
	3" Void	0.4					
	4" Coarse Gravel	0.7					
	Stiff Brown SANDY LEAN CLAY (CL-Moist)	1.0					
			RS-1	2.5	14.9	78.3	
	End of Boring	3.5	RS-2	3.5	16.1	94.0	
5							

Rig Type: Hand Auger
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Penetration Resistance scale: 0, 25, 50

Boring Date: 7-7-16
Field Engineer/Technician: K. Euge II
Driller: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: C-2

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		4.25" Concrete					
0.4		6" Coarse Gravel					
0.9		Very Stiff Brown SANDY LEAN CLAY (CL-Moist)					
			RS-1	2.5	17.0	106.7	
3.5		End of Boring	RS-2	3.5	20.2	87.5	
5							

Rig Type: **Hand Auger**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Boring Date: **7-7-16**
Field Engineer/Technician: **K. Euge II**
Driller: **R. Markley**
Contractor: **Speedie & Assoc.**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **C-3**

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: **161211SA**

_SPEEDIE 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Equipment Type: Hand Tools, Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Soft to Firm Brown <u>SANDY LEAN CLAY</u> (CL-Moist) with Trace Gravel					
2.7		End of Test Pit					
			BS-1	3.0	NT	NT	
5							

Excavation Date: 7-8-16
Field Engineer/Technician: K. Euge II
Excavator: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Pit Number: **TP-1**

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: **161211SA**

TEST PIT 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Equipment Type: Hand Tools, Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Soft to Firm Brown SANDY LEAN CLAY (CL-Moist) with Trace Gravel					
3.5		End of Test Pit					
5							

Excavation Date: 7-8-16
Field Engineer/Technician: K. Euge II
Excavator: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Pit Number: TP-2

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

TEST PIT 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Equipment Type: Hand Tools Hollow Stem Auger Surface Elevation: N/A Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot 0 25 50
0		NOT EXCAVATED DUE TO EXISTING UNDERGROUND UTILITY LINE					
5							

Excavation Date: 7-8-16
Field Engineer/Technician: K. Euge II
Excavator: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Pit Number: TP-3

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

TEST PIT 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Equipment Type: Hand Tools, Hand Excavation; Surface Elevation: N/A — Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 25 50)
0		Soft to Firm Brown SANDY LEAN CLAY (CL-Moist) with Trace Gravel						
		End of Test Pit	3.1					
				BS-1	3.5	NT	NT	
5								

Excavation Date: 7-8-16
Field Engineer/Technician: K. Euge II
Excavator: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Pit Number: TP-4

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

TEST PIT 161211SA.GPJ GENGEO.GDT 8/1/16

Depth (feet)	Graphic Log	Equipment Type: Hand Tools, Hollow Stem Auger; Surface Elevation: N/A — Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0		Soft to Firm Brown SANDY LEAN CLAY (CL-Moist) with Trace Gravel					
2.0		End of Test Pit					
5							

Excavation Date: 7-8-16
Field Engineer/Technician: K. Euge II
Excavator: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Pit Number: TP-5

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

TEST PIT 161211SA.GPJ GENGEO GDT 8/1/16

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Soft to Firm Brown SANDY SILTY CLAY (CL/ML-Moist) with Trace Gravel					
1.8		End of Test Pit					
			BS-1	2.5	NT	NT	
5							

Equipment Type: Hand Tools
Hollow Stem Auger
Surface Elevation: N/A

Excavation Date: 7-8-16
Field Engineer/Technician: K. Euge II
Excavator: R. Markley
Contractor: Speedie & Assoc.

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Pit Number: TP-6

Mensendick School-Building Distress

5535 North 67th Avenue

Glendale, Arizona

Project No.: 161211SA

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B-1	AS-3	AS	2.0 - 3.0	10.7	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-2	AS-3	AS	2.0 - 3.0	14.7	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-3	AS-1	AS	0.0 - 1.0	15.7	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-6	AS-3	AS	2.0 - 3.0	22.8	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-7	AS-2	AS	1.0 - 2.0	18.8	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-8	AS-2	AS	1.0 - 2.0	9.5	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-9	AS-3	AS	2.0 - 3.0	7.2	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-10	AS-3	AS	2.0 - 3.0	26.4	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-11	AS-3	AS	2.0 - 3.0	14.5	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-12	AS-2	AS	1.0 - 2.0	8.1	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-13	AS-3	AS	2.0 - 3.0	12.7	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-14	AS-1	AS	0.0 - 1.0	14.6	NT	NT	NT	NT	NT	NT	NT	NT	NT		
B-15	AS-3	AS	2.0 - 3.0	21.6	NT	NT	NT	NT	NT	NT	NT	NT	NT		
C-1	RS-1	RING	1.5 - 2.5	13.2	98.4	NT	NT	NT	NT	NT	NT	NT	NT		
C-1	RS-2	RING	2.5 - 3.5	12.4	102.6	67	93	99	100	100	26	16	10	CL	SANDY LEAN CLAY
C-2	RS-1	RING	1.5 - 2.5	14.9	78.3	NT	NT	NT	NT	NT	NT	NT	NT		

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

NT=Not Tested

Sheet 1 of 2

Mensendick School-Building Distress
5535 North 67th Avenue
Glendale, Arizona
Project No. 161211SA

SPEEDIE AND ASSOCIATES

TABULATION OF TEST DATA 161211SA.GPJ GENGEO.GDT 8/1/16

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
C-2	RS-2	RING	2.5 - 3.5	16.1	94.0	NT	NT	NT	NT	NT	NT	NT	NT		
C-3	RS-1	RING	1.5 - 2.5	17.0	106.7	NT	NT	NT	NT	NT	NT	NT	NT		
C-3	RS-2	RING	2.5 - 3.5	20.2	87.5	NT	NT	NT	NT	NT	NT	NT	NT		
TP-1	BS-1	BULK	0.0 - 3.0	NT	NT	61	75	86	96	100	30	19	11	CL	SANDY LEAN CLAY
TP-4	BS-1	BULK	1.5 - 3.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		
TP-6	BS-1	BULK	0.0 - 2.5	NT	NT	52	86	94	96	100	23	17	6	CL-ML	SANDY SILTY CLAY

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

NT=Not Tested

Sheet 2 of 2

Mensendick School-Building Distress
5535 North 67th Avenue
Glendale, Arizona
Project No. 161211SA

SPEEDIE AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	PERCENT COMPACTION	FINAL MOISTURE CONTENT (%)	CONFINING LOAD (psf)	TOTAL SWELL (%)
TP-1, BS-1	3.0	114.5	13.6	108.9	11.7	95.1	20.4	100	3.8
TP-6, BS-1	2.5	118.6	13.5	112.4	12.0	94.8	17.6	100	1.6

Mensendick School-Building Distress
5535 North 67th Avenue
Glendale, Arizona
Project No. 161211SA

SPEEDIE AND ASSOCIATES

CORROSIVE TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	PERCENT FINER #200 SIEVE	pH	RESISTIVITY (Ohm-Centimeters)	PPM SULFATE (SO4)	PPM CHLORIDE (CL)	SULFIDE (+ or -)	REDOX (millivolts)	UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
TP-4	BS-1	BULK	1.5 - 3.5	NT	8.2	1000	22	149	NT	NT		

Mensendick School-Building Distress
5535 North 67th Avenue
Glendale, Arizona
Project No. 161211SA

SPEEDIE AND ASSOCIATES

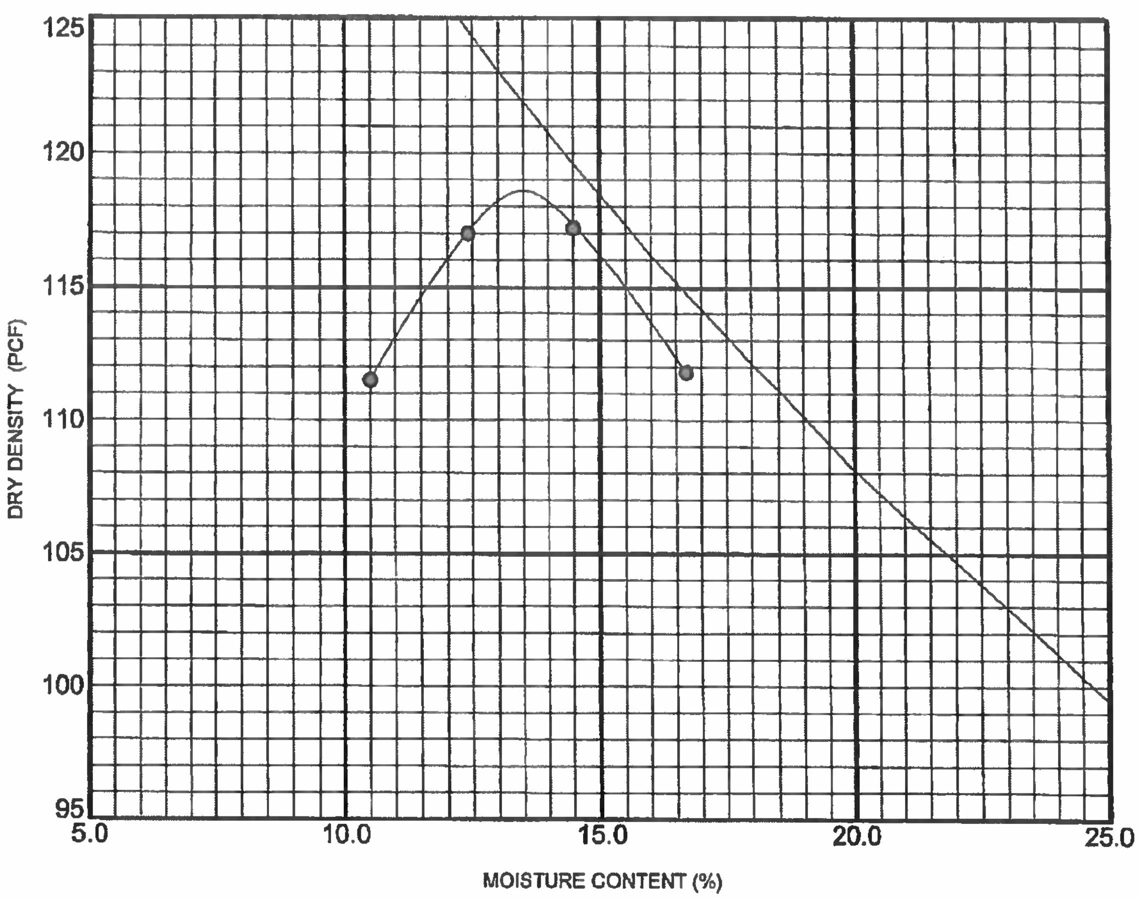
TABOFLAB REDOX-SULFIDE 161211SA.GPJ GENGEO.GDT 8/1/16

MOISTURE-DENSITY RELATIONS

PROJECT:	Mensendick School-Building Distress			PROJECT NO.:	161211SA
LOCATION:	5535 North 67th Avenue			DATE:	7/8/16
BORING NO.: TP-6	SAMPLE NO.: BS-1	SAMPLE DEPTH: 0 to 2.5		LABORATORY NO.:	
METHOD OF COMPACTION:	D698A				
LIQUID LIMIT:	23	PLASTIC LIMIT:	17	PLASTICITY INDEX:	6
CLASSIFICATION:	CL-ML	ASTM SOIL DESCRIPTION:	SANDY SILTY CLAY		

MAXIMUM DRY DENSITY: 118.6 PCF

OPTIMUM MOISTURE CONTENT: 13.5%



SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Mensendick School-Building Distress PROJECT NO.: 161211SA

LOCATION: 5535 North 67th Avenue DATE: 7/8/16

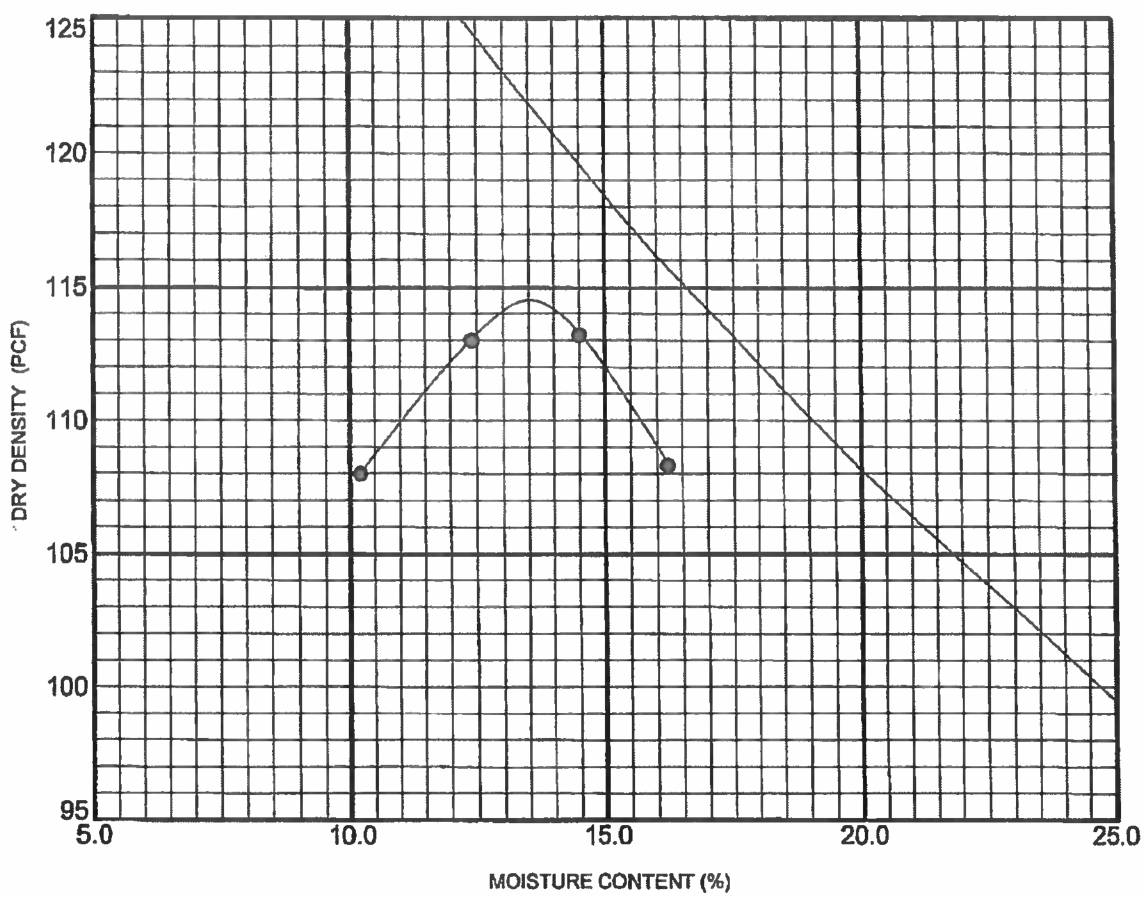
BORING NO.: TP-1 SAMPLE NO.: BS-1 SAMPLE DEPTH: 0 to 3 LABORATORY NO.:

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 30 PLASTIC LIMIT: 19 PLASTICITY INDEX: 11

CLASSIFICATION: CL ASTM SOIL DESCRIPTION: SANDY LEAN CLAY

MAXIMUM DRY DENSITY: 114.5 PCF OPTIMUM MOISTURE CONTENT: 13.6%

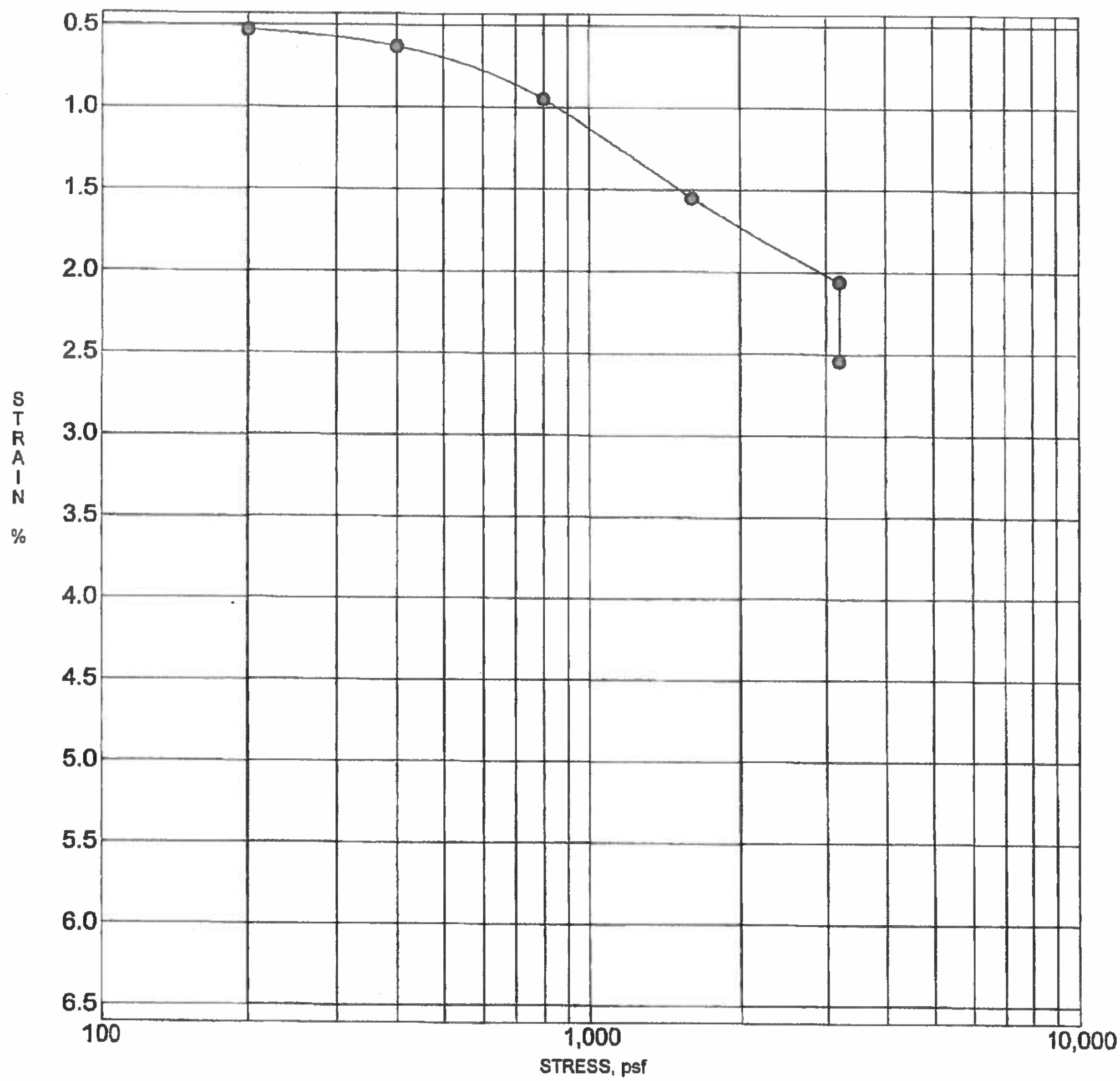


SPEEDIE AND ASSOCIATES

GEOTECH PROCTOR 161211SA.GPJ 8/1/16

CONSOLIDATION TEST

PROJECT: Mensendick School-Building Distress
PROJECT NO.: 161211SA
LOCATION: 5535 North 67th Avenue
DATE: 7/7/16
BORING NO.: C-3 SAMPLE NO.: RS-1 SAMPLE DEPTH: 1.5 to 2.5
LABORATORY NO.:
LIQUID LIMIT:
PLASTIC LIMIT:
PLASTICITY INDEX:
CLASSIFICATION:
ASTM SOIL DESCRIPTION:

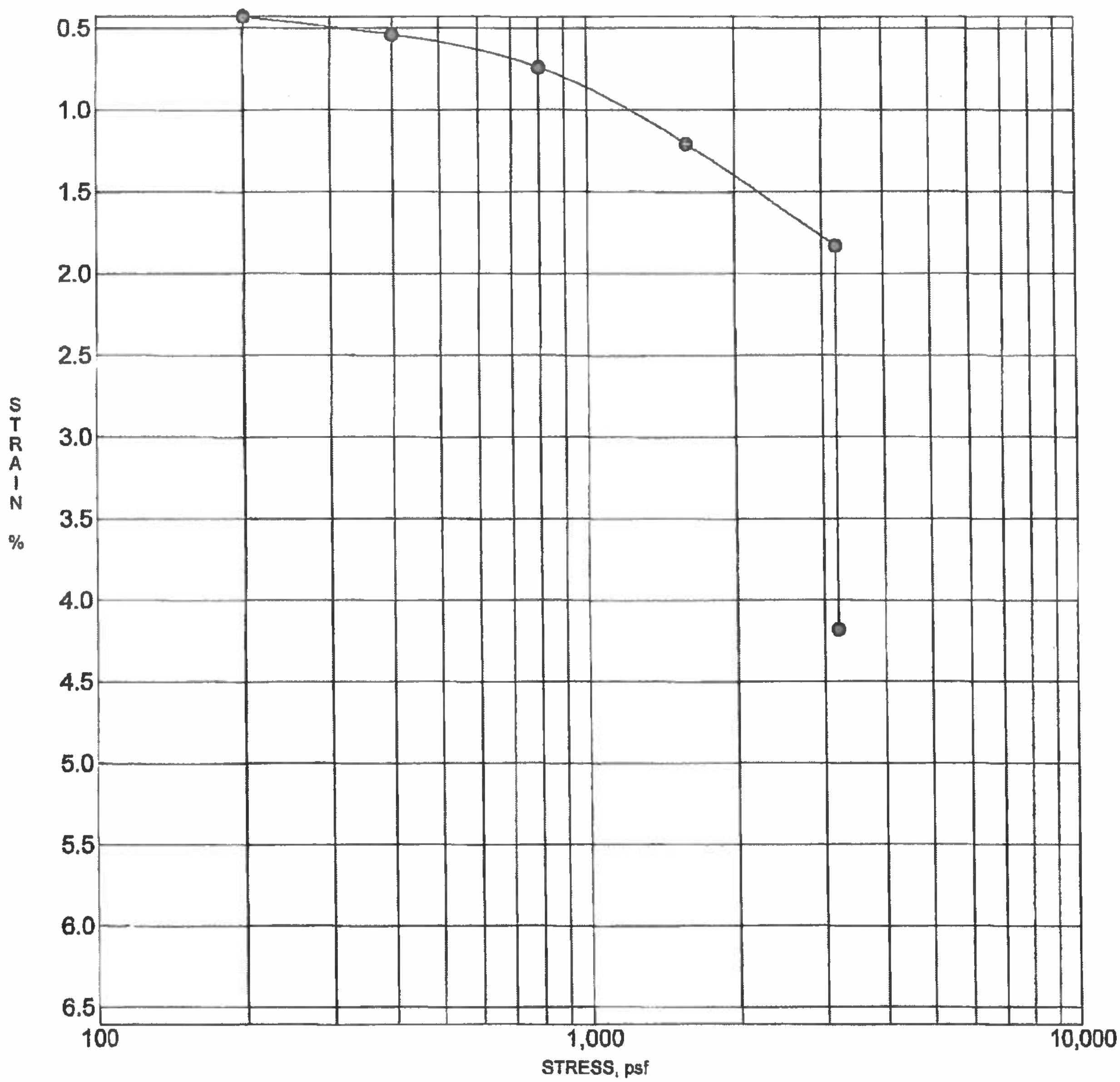


Sample inundated at end of test at 3200 psf

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST

PROJECT: Mensendick School-Building Distress | PROJECT NO.: 161211SA
LOCATION: 5535 North 67th Avenue | DATE: 7/7/16
BORING NO.: C-1 | SAMPLE NO.: RS-2 | SAMPLE DEPTH: 2.5 to 3.5 | LABORATORY NO.:
LIQUID LIMIT: 26 | PLASTIC LIMIT: 16 | PLASTICITY INDEX: 10
CLASSIFICATION: CL | ASTM SOIL DESCRIPTION: SANDY LEAN CLAY



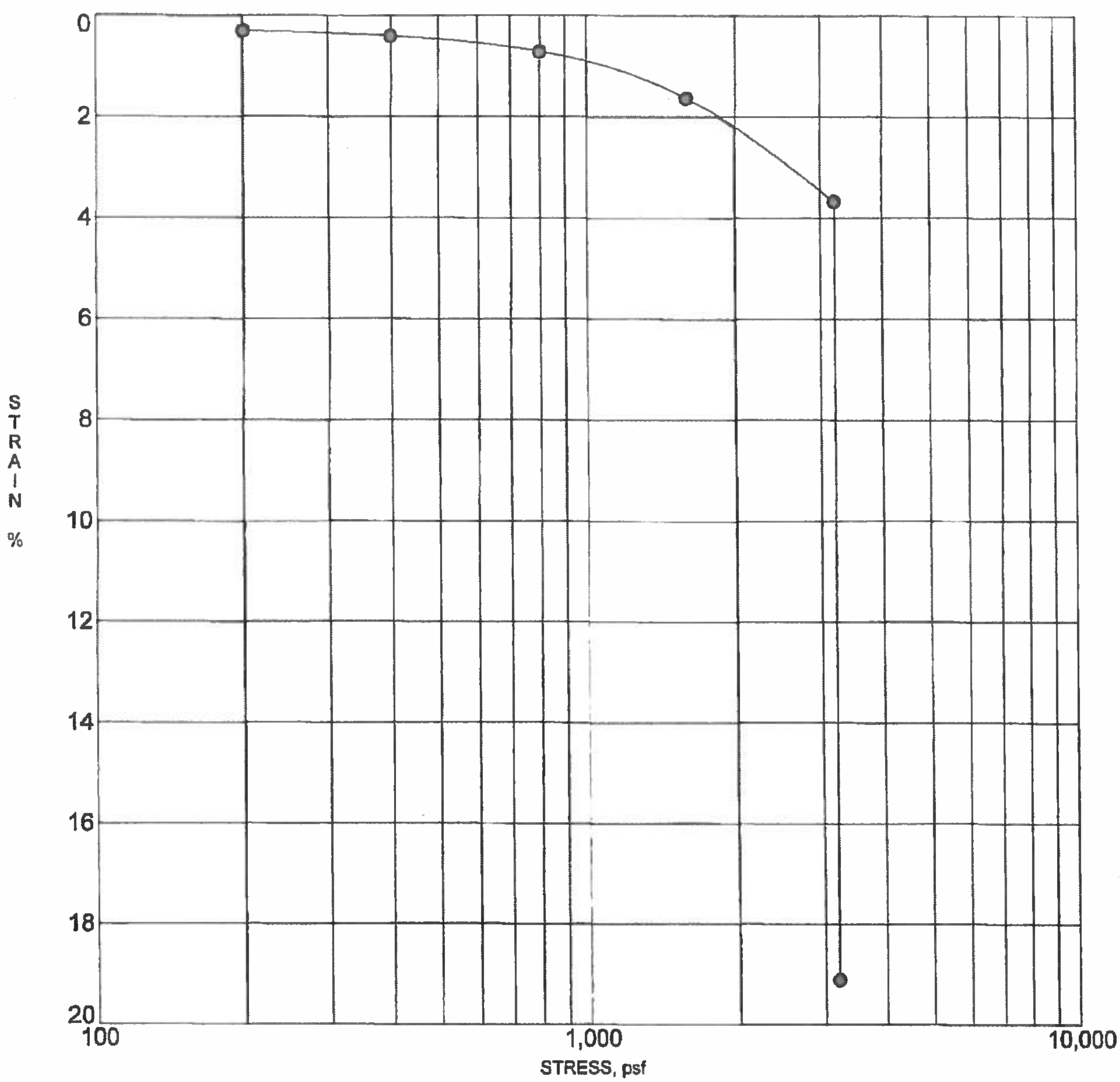
Sample inundated at end of test at 3200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 161211SA.GPJ GENGEO.GDT 8/1/16

CONSOLIDATION TEST

PROJECT: Mensendick School-Building Distress PROJECT NO.: 161211SA
LOCATION: 5535 North 67th Avenue DATE: 7/7/16
BORING NO.: C-2 SAMPLE NO.: RS-1 SAMPLE DEPTH: 1.5 to 2.5 LABORATORY NO.:
LIQUID LIMIT: PLASTIC LIMIT: PLASTICITY INDEX:
CLASSIFICATION: ASTM SOIL DESCRIPTION:



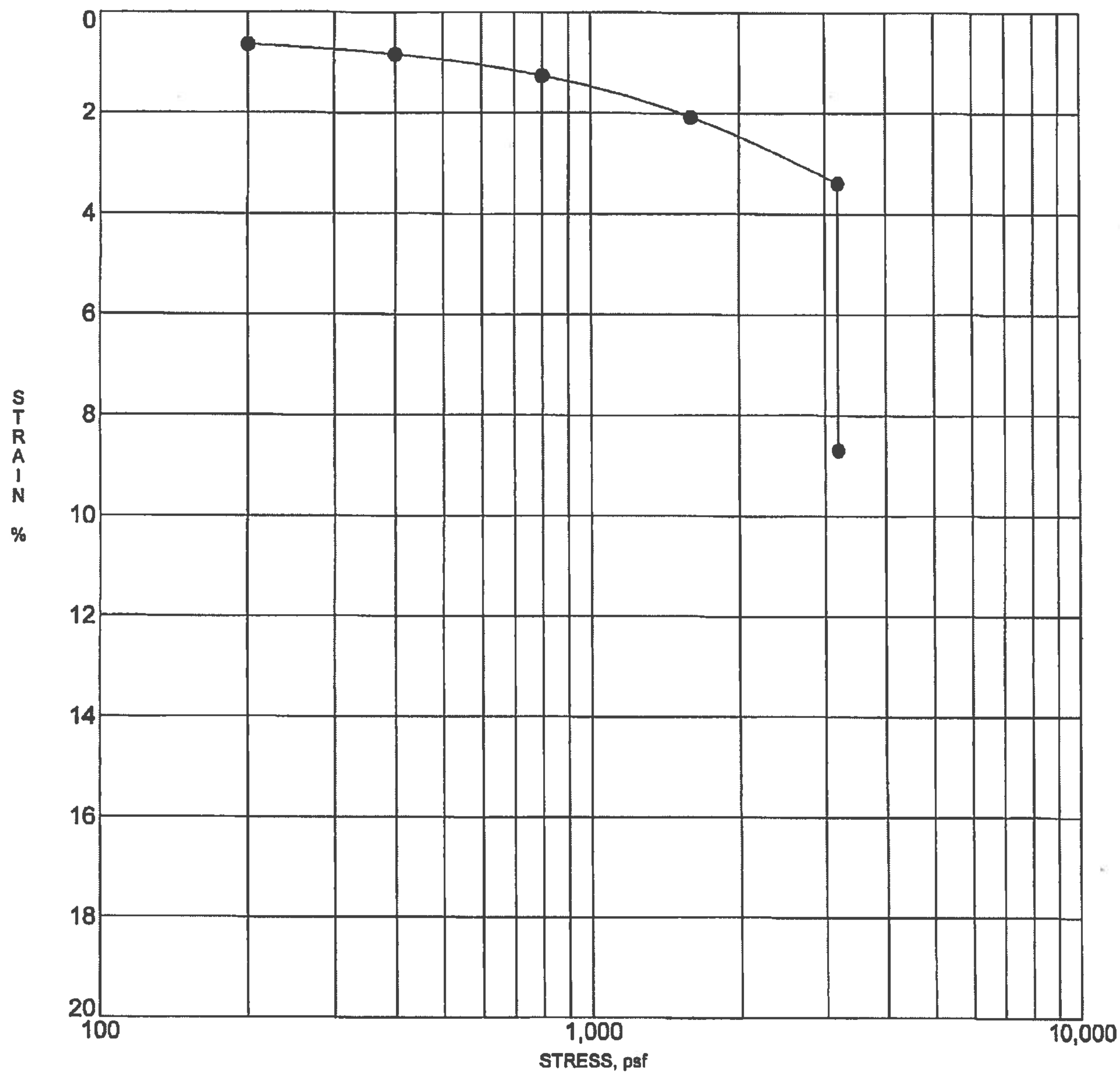
Sample inundated at end of test at 3200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 161211SA.GPJ GENGEO.GDT 8/1/16

CONSOLIDATION TEST

PROJECT: Mensendick School-Building Distress PROJECT NO.: 161211SA
LOCATION: 5535 North 67th Avenue DATE: 7/7/16
BORING NO.: C-2 SAMPLE NO.: RS-2 SAMPLE DEPTH: 2.5 to 3.5 LABORATORY NO.:
LIQUID LIMIT: PLASTIC LIMIT: PLASTICITY INDEX:
CLASSIFICATION: ASTM SOIL DESCRIPTION:



Sample inundated at end of test at 3200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 161211SA.GPJ GENGEO.GDT 8/1/16

MENSENDICK DRAINAGE

Glendale Elementary School District SFB Projects: Construction Cost Estimates

BRG:	Project:	Scope: Updated 9/1/16	Cost Estimate:
070440106-9999-011-BRG	Mensendick Drainage		
	Phase2	Chasse Estimate	$ 250,133.25
		Estimated Phase 2 Subtotal	**$ 250,133.25**
		Estimated Total Repair:	**$ 250,133.25**

DRAINAGE CORRECTIONS
AT
DON MENSENDICK MIDDLE SCHOOL

SITE ADDRESS: 5535 NORTH 67TH AVENUE
GLENDALE, ARIZONA 85301
FOR
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40 (OWNER)

7301 N. 58TH AVENUE
GLENDALE, ARIZONA 85303
PHONE: (623) 842-8100
CONTACT: GREG GILLIAM

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

Registered Professional Engineer (Civil) 36864 PERCY MYRON JR. 8/10/16 ARIZONA, U.S.A.
EXPIRES 9-30-16

DES. PMJ	DRN. JCW	CKD. PMJ	JOB NO. 1512-02

GENERAL NOTES FOR CONSTRUCTION:

A. ALL CONSTRUCTION SHALL CONFORM TO THE LATEST MAG STANDARD DETAILS AND SPECIFICATIONS AND THE CITY'S CURRENT ENGINEERING DESIGN AND CONSTRUCTION STANDARDS.

B. THIS SET OF PLANS HAS BEEN REVIEWED FOR COMPLIANCE WITH CITY REQUIREMENTS PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS. HOWEVER, SUCH REVIEW AND ACCEPTANCE SHALL NOT PREVENT THE CITY FROM REQUIRING CORRECTION OF ERRORS IN SAID PLANS AND/OR CONSTRUCTION WHEN IN VIOLATION OF ANY LAWS, ORDINANCES, CODES OR STANDARDS THAT ARE IN EFFECT. REVIEW AND ACCEPTANCE OF PLANS DOES NOT RELEASE A DEVELOPER OR ENGINEER FROM RESPONSIBILITY FOR ERRORS OR OMISSIONS ON SAID PLANS.

C. THE CITY DOES NOT WARRANT ANY QUANTITIES SHOWN ON THESE PLANS.

D. THE CITY PLANS ACCEPTANCE IS FOR GENERAL LAYOUT IN THE RIGHT-OF-WAY ONLY. THIS ACCEPTANCE IS VALID FOR A PERIOD OF SIX MONTHS. CONSTRUCTION PERMITS SHALL BE OBTAINED DURING THIS PERIOD OR THE PLANS SHALL BE RESUBMITTED FOR REVIEW.

E. A CITY ACCEPTED SET OF PLANS SHALL BE AVAILABLE ON THE JOB SITE AT ALL TIMES.

F. THE CITY SHALL BE NOTIFIED 48 HOURS PRIOR TO ANY CONSTRUCTION WORK. CONSTRUCTION WORK CONCEALED WITHOUT INSPECTION BY THE CITY SHALL BE SUBJECT TO EXPOSURE AT THE CONTRACTOR'S EXPENSE.

G. A RIGHT-OF-WAY CONSTRUCTION PERMIT IS REQUIRED FOR ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY OR WITHIN A CITY EASEMENT. A 100% PERFORMANCE BOND OR EQUIVALENT FORM OF FINANCIAL SURETY MAY BE REQUIRED FOR ALL WORK WITHIN THE RIGHT-OF-WAY PRIOR TO THE ISSUANCE OF ANY RIGHT-OF-WAY CONSTRUCTION PERMIT(S). ALL WORK WITHIN THE RIGHT-OF-WAY SHALL BE INSPECTED AND APPROVED BY THE CITY'S ENGINEERING DIVISION.

H. IMPROVEMENTS SHALL NOT BE ACCEPTED UNTIL "AS-BUILT" PLANS AND ELECTRONIC (AUTOCAD) FILES HAVE BEEN SUBMITTED AND APPROVED BY THE CITY.

I. THE DEVELOPER IS RESPONSIBLE FOR ALL COSTS AND WORK RELATED TO THE REMOVAL, RELOCATION OR ABANDONMENT OF ALL OBSTRUCTIONS AND/OR UTILITIES WITHIN THE RIGHT-OF-WAY THAT CONFLICT WITH THE NEW IMPROVEMENTS.

J. THE DEVELOPER IS RESPONSIBLE FOR OBTAINING OR DEDICATING ALL REQUIRED RIGHTS-OF-WAY AND EASEMENTS TO THE CITY PRIOR TO ISSUANCE OF THE BUILDING'S CERTIFICATE OF OCCUPANCY.

K. THE CONTRACTOR SHALL CONTACT BLUE STAKE (602-263-1100) 48 HOURS PRIOR TO CONSTRUCTION.

L. THE CONTRACTOR SHALL BARRICADE CONSTRUCTION SITES AT ALL TIMES PER THE CITY OF PHOENIX TRAFFIC BARRICADE MANUAL. WHEN REQUIRED BY THE CITY, A TRAFFIC CONTROL PLAN SHALL BE SUBMITTED FOR APPROVAL A MINIMUM OF 72 HOURS IN ADVANCE OF CONSTRUCTION.

M. THE CONTRACTOR MAY OBTAIN A FIRE HYDRANT METER FOR CONSTRUCTION WATER FROM THE CITY WATER SERVICES DEPARTMENT. THE UNLAWFUL REMOVAL OF WATER FROM A FIRE HYDRANT IS A VIOLATION OF THE MUNICIPAL CODE, PUNISHABLE BY FINE AND/OR IMPRISONMENT.

N. DAMAGE CAUSED BY THE DEVELOPER DURING CONSTRUCTION TO CITY INFRASTRUCTURE OR FACILITIES SHALL BE REPAIRED OR REPLACED BY THE DEVELOPER, AT HIS EXPENSE, IN A MANNER ACCEPTABLE TO THE CITY.

O. THERE SHALL BE NO DIRT RAMPS OVER SIDEWALKS DURING CONSTRUCTION.

P. AN AZPDES PERMIT IS REQUIRED FOR ALL CONSTRUCTION THAT DISTURBS LAND OVER ONE (1) ACRE IN SIZE. PRIOR TO START OF ANY CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A NOTICE OF INTENT (NOI) TO THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ) AND A COPY TO THE CITY OF GLENDALE AND HAVE A COPY OF THE SWPPP ON SITE AT ALL TIMES.

NOTE:

THESE DRAWINGS ARE AN INSTRUMENT OF SERVICE ONLY AND ARE AND SHALL REMAIN THE EXCLUSIVE PROPERTY OF HESS-ROUNTREE, INC. NO REPRODUCTION OR OTHER USE SHALL BE MADE BY ANY PERSON OR FIRM OTHER THAN HESS-ROUNTREE, INC. OR THE CITY OF PHOENIX WITHOUT EXPRESS PERMISSION OF HESS-ROUNTREE, INC. ANY UNAUTHORIZED USE SHALL VOID THE ENGINEER'S SEAL AND SIGNATURE HEREON AND NO PROFESSIONAL RESPONSIBILITY WILL REMAIN.

THESE PLANS HAVE BEEN SUBMITTED TO THE FOLLOWING UTILITY COMPANIES AND THE WORK CONTAINED IN THESE PLANS HAS BEEN APPROVED BY THESE COMPANIES WITHIN THEIR AREA OF INTEREST. THE SIZE AND LOCATIONS, AS SHOWN OF THE GAS, TELEPHONE AND POWER LINES, AND CONNECTIONS AGREE WITH THE INFORMATION CONTAINED IN THE UTILITY COMPANY'S RECORDS. WHEN THE WORK TO BE DONE CONFLICTS WITH ANY OF THESE UTILITIES, THE CONFLICTS WILL BE RESOLVED AS SPECIFIED IN THE SPECIAL PROVISIONS AND/OR AS OTHERWISE NOTED ON THESE PLANS. CONFLICTS ARISING DURING THE COURSE OF CONSTRUCTION FROM UNFORSEEN CIRCUMSTANCES SHALL BE REPORTED TO THE INTERESTED UTILITY COMPANY AND BE RESOLVED BY THEM AND THE DESIGN ENGINEER.

Company	CO. REPRESENTATIVE CONTACTED	DATE SUBMITTED
SPRINT COMMUNICATIONS	COLIN SWORD	.
COX COMMUNICATIONS	TMC-DV2-01	.
SALT RIVER PROJECT DISTRICT	BECKY THOMAS	.
S R V W U A	SUSANA ORTEGA	.
ARIZONA PUBLIC SERVICE	VIRGINIA NISKALA	.
QWEST COMMUNICATIONS	CONFLICT LIAISON DEPT.	.
EL PASO NATURAL GAS COMPANY	DENNIS SEGARS	.
KINDER MORGAN	D. TARANGO	.
SOUTHWEST GAS CORPORATION	FRANCHISE DEPT. 420-586	.

ACREAGE

GROSS SITE AREA	= 25.57 ACRES
NET SITE AREA	= 24.67 ACRES
CONSTRUCTION AREA	= 0.16 ACRES

GENERAL NOTES FOR GRADING AND DRAINAGE CONSTRUCTION:

A. THE DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR PAYING PERMIT FEES PRIOR TO CONSTRUCTION.

B. A SEPARATE PERMIT IS NECESSARY FOR ANY CONSTRUCTION IN THE RIGHT-OF-WAY.

C. PRIOR TO THE START OF ANY ON-SITE GRADING OPERATIONS, THE CONTRACTOR SHALL NOTIFY THE CITY ENGINEERING DIVISION AT LEAST 48 HOURS PRIOR TO COMMENCING WORK BY CALLING 623-930-3630.

D. STAKING PAD AND/OR FINISHED FLOOR ELEVATIONS ARE THE RESPONSIBILITY OF THE DEVELOPER OR HIS ENGINEER. IN NON-CRITICAL AREAS, THE DEVELOPER'S ENGINEER SHALL SUBMIT CERTIFICATIONS OF CONSTRUCTED BUILDING PAD ELEVATIONS PRIOR TO THE CITY'S ACCEPTANCE OF PROJECT. IN A CRITICAL DRAINAGE AREA, CERTIFICATION OF THE FINISHED BUILDING FLOOR OR STEM WALL ELEVATION SHALL BE SUBMITTED AND APPROVED PRIOR TO ANY VERTICAL CONSTRUCTION.

E. AN APPROVED GRADING AND DRAINAGE PLAN SHALL BE ON THE JOB SITE AT ALL TIMES. DEVIATIONS FROM THE PLAN MUST BE PRECEDED BY AN APPROVED PLAN REVISION.

F. ACCEPTANCE OF GRADING AND DRAINAGE IMPROVEMENTS SHALL INCLUDE, BUT NOT BE LIMITED TO, THE CONSTRUCTION OF RETENTION BASINS, CATCH BASINS, CURB FOR OTHER DRAINAGE FACILITIES, SITE GRADING, DRYWELLS, STORM DRAIN PIPES, UNDERGROUND STORAGE TANKS AND ASPHALT PAVEMENT.

G. DRYWELLS MUST BE DRILLED A MINIMUM OF 10 FEET INTO PERMEABLE POROUS STRATA.

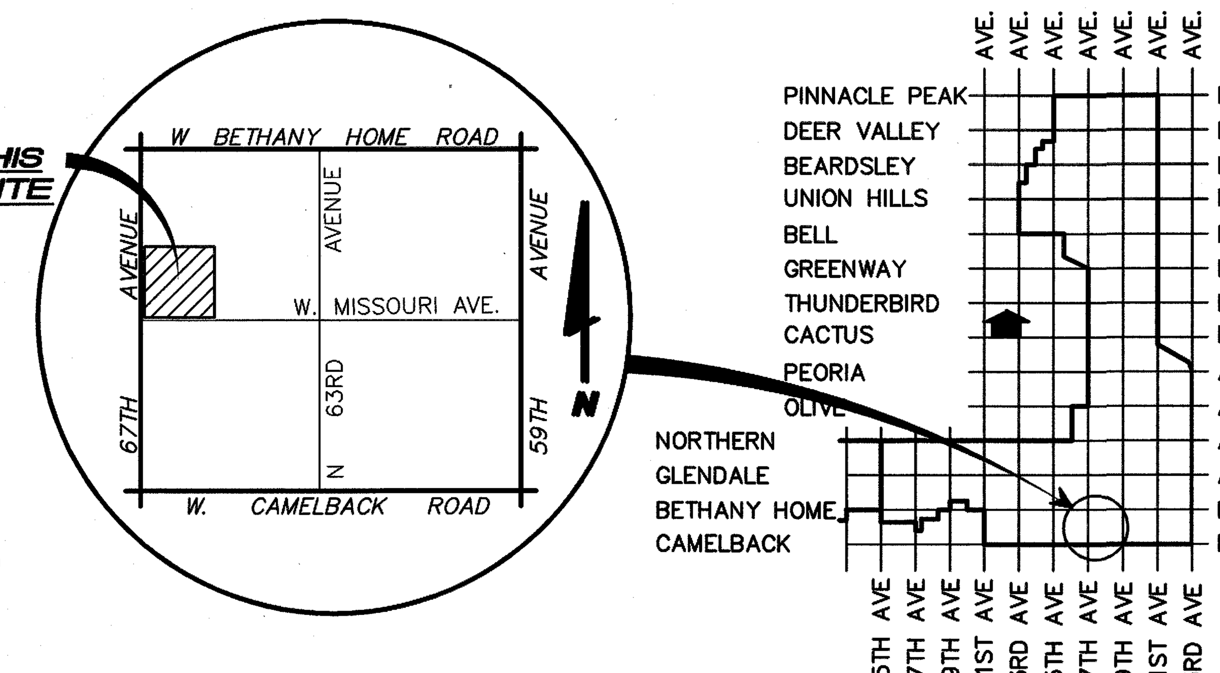
H. THE CONTRACTOR SHALL CONSTRUCT ALL RETENTION BASINS TO THE ELEVATIONS AND SLOPES SHOWN ON THE PLANS.

I. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND CONFIRMING DEPTH OF ALL THE EXISTING UTILITY LINES WITHIN PROPOSED RETENTION BASIN AREAS. IF THE BASIN CANNOT BE CONSTRUCTED PER PLAN AS A RESULT OF CONFLICT WITH UNDERGROUND UTILITIES, THE CONTRACTOR SHOULD CONTACT THE CITY AND DESIGN ENGINEER AND REQUEST MODIFICATION OF THE BASIN DESIGN.

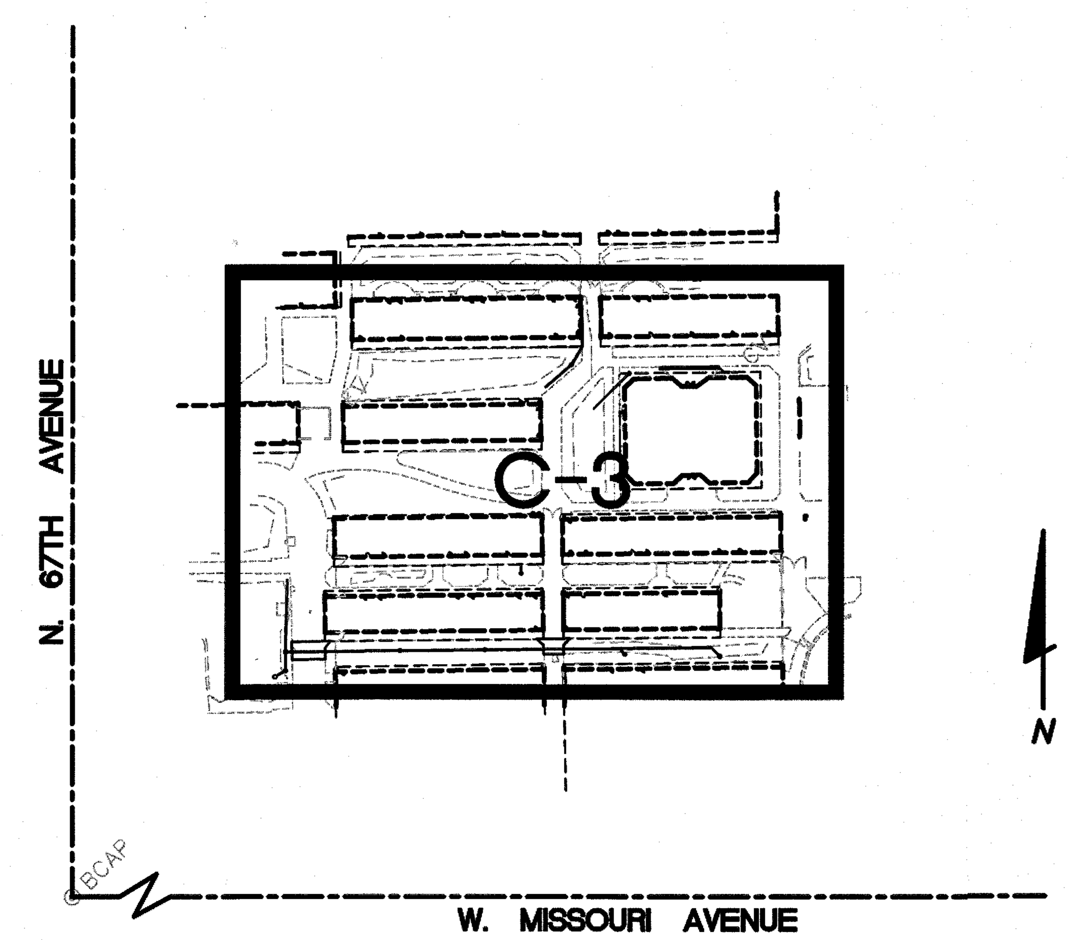
J. THIS SET OF PLANS HAS BEEN REVIEWED FOR COMPLIANCE WITH CITY REQUIREMENTS PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS AND SHALL BE KEPT AT THE CONSTRUCTION SITE. SUCH REVIEW SHALL NOT PREVENT THE CITY FROM REQUIRING CORRECTIONS TO ERRORS ON THE PLANS, WHICH ARE FOUND TO BE IN VIOLATION OF ANY LAW OR ORDINANCE.

K. NO PERSON SHALL USE ANY MECHANICAL EQUIPMENT FOR CLEARING, GRUBBING, ROAD CONSTRUCTION, TRENCHING, EXCAVATING, DEMOLITION OR ENGAGE IN ANY EARTHMOVING ACTIVITY WITHOUT FIRST OBTAINING A DUST CONTROL PERMIT FROM MARICOPA COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES.

GRADING & DRAINAGE PERMIT FEE	
BASE FEE	1 EA
ON-SITE PAVING	0 SY
CATCH BASIN/SCUPPER	1 EA
MANHOLE/DRYWELL	1 EA
STORM DRAIN PIPE (12"+)	350 LF



VICINITY MAP
NOT TO SCALE



SHEET INDEX MAP
NOT TO SCALE

UTILITY UNDERGROUND STATEMENT:

"PURSUANT TO CHAPTER 32.5 OF THE GLENDALE CITY CODE, ALL NEW AND EXISTING UTILITIES WITHIN OR CONTIGUOUS TO THIS STATE SHALL BE PLACED UNDERGROUND IN CONDIUT."

OWNER/DEVELOPER:

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
7301 NORTH 58TH AVENUE
GLENDALE, ARIZONA 85303
PHONE: (623) 842-8100
CONTACT: DEAN WALLACE

ENGINEER:

HESS-ROUNTREE, INC.
9831 S. 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044
PHONE: (480) 496-0244
FAX: (480) 496-0094
CONTACT: PERCY MYRON JR., P.E.

SHEET INDEX:

C-1 COVER SHEET
C-2 DETAIL SHEET
C-3 GRADING AND DRAINAGE PLAN

PLANS ACCEPTANCE

THE CITY OF GLENDALE ACCEPTS THESE PLANS FOR CONSTRUCTION, AS BEING IN GENERAL COMPLIANCE WITH PLAN PREPARATION REQUIREMENTS OF THE CITY. RESPONSIBILITY FOR THE COMPLETENESS AND ACCURACY OF THE PLANS AND RELATED DESIGNS RESIDES WITH THE ENGINEER AND THE ENGINEERING FIRM OF RECORD.

LAND DEVELOPMENT ENGINEER ______ DATE ______

TRANSPORTATION ENGINEER ______ DATE ______

RECORD DRAWING

I CERTIFY THAT THE LOCATIONS, ELEVATIONS, DEPTHS, AND RECORD DRAWING COMMENTS ACCURATELY REFLECT THE EXISTING FIELD CONDITIONS AND MATERIALS ACTUALLY USED DURING CONSTRUCTION. THIS CERTIFICATION IS BASED ON INFORMATION OBTAINED UNDER BY DIRECT SUPERVISION AND IS CORRECT AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

NAME ______ DATE ______

REGISTRATION NO. ______ EXP.DATE ______

REVD BY: ______
ENGINEERING DEPARTMENT

DRYWELL CERTIFICATION

I CERTIFY THAT ALL DRYWELLS HAVE BEEN REGISTERED WITH AND CONFORM TO ALL REQUIREMENTS OF THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ).

NAME ______ DATE ______

COMPANY ______

ARIZONA PUBLIC SERVICE-ELECTRICAL SOUTHWEST GAS CORPORATION – GAS SALT RIVER PROJECT – IRRIGATION SALT RIVER PROJECT – ELECTRICAL QWEST COMMUNICATIONS – CABLE TV (OTHER) **AGENCIES ALSO REQUIRING PERMITS WHEN INVOLVED ARE: MARICOPA COUNTY HIGHWAY DEPT., A.D.O.T., CITY OF PHOENIX, CITY OF PEORIA, SANTA FE RAILROAD, EL PASO NATURAL GAS, & MARICOPA COUNTY FLOOD CONTROL DISTRICT.	PLANS SUBMITTED TO (NAME)	PLANS REVIEWED BY (NAME)	PERMIT RECEIVED DATE

DESIGN CIVIL ENGINEER'S NOTES TO CONTRACTOR:

1. NOTHING CONTAINED IN THE CONTRACT DOCUMENTS SHALL CREATE, NOR SHALL BE CONSTRUED TO CREATE, ANY CONTRACTUAL RELATIONSHIP BETWEEN THE DESIGN CIVIL ENGINEER AND THE CONTRACTOR OR ANY SUBCONTRACTOR.

2. THE DESIGN CIVIL ENGINEER WILL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FOR SAFETY PRECAUTIONS OR PROGRAMS UTILIZED IN CONNECTION WITH THE WORK, THESE ARE SOLELY THE CONTRACTOR'S RESPONSIBILITY. THE DESIGN CIVIL ENGINEER WILL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S FAILURE TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

3. THE CONTRACTOR SHALL PROVIDE ADEQUATE MEANS OF CLEANING TRUCKS AND/OR OTHER EQUIPMENT OF MUD PRIOR TO ENTERING PUBLIC STREETS, AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO CLEAN STREETS, ALLAY DUST, AND TO TAKE WHATEVER MEASURES ARE NECESSARY TO INSURE THAT ALL ROADWAYS AND ON SITE PARKING LOTS/FIRE LANES ARE MAINTAINED IN A CLEAN, MUD AND DUST-FREE CONDITION AT ALL TIMES.

4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE BLUE STAKE CENTER TWO WORKING DAYS PRIOR TO ANY EXCAVATION. THE UNDERGROUND UTILITY LOCATIONS AS SHOWN HEREON ARE BASED ON THE BEST INFORMATION AVAILABLE FROM UTILITY RECORDS AND OTHER DATA AS SUPPLIED TO THIS DESIGN CIVIL ENGINEER. THERE MAY BE OTHER UNDERGROUND UTILITY LINES, SERVICE LINES AND STRUCTURES PRESENT IN THE SUBJECT AREA. CONTRACTOR SHALL INCLUDE IN HIS BID THE COST OF HIRING AN UNDERGROUND UTILITY LOCATING SERVICE FOR THE PURPOSE OF LOCATING ALL UNDERGROUND UTILITIES. CONTRACTOR WILL COORDINATE WITH THE OWNER AND ARCHITECT TO DETERMINE WHETHER SAID UTILITIES ARE TO BE ABANDONED OR PROTECTED FROM DAMAGE.

5. THE DESIGN CIVIL ENGINEER MAKES NO REPRESENTATION OR GUARANTEE REGARDING THE EARTHWORK QUANTITIES OR THAT THE EARTHWORK FOR THIS PROJECT WILL BALANCE DUE TO THE VARYING FIELD CONDITIONS, CHANGING, SOIL TYPES, ALLOWABLE CONSTRUCTION TOLERANCES AND CONSTRUCTION METHODS. PRIOR TO BIDDING THE WORK, THE CONTRACTOR SHALL THOROUGHLY SATISFY HIMSELF AS TO THE ACTUAL CONDITIONS, EARTHWORK QUANTITIES AND REQUIREMENTS OF THE WORK AND EXCESS OR DEFICIENCY THEREIN, ACTUAL OR RELATIVE.

6. THE CONTRACTOR SHALL ADJUST ALL EXISTING AND NEW CLEANOUTS, WATER VALVE BOXES, MANHOLES, GAS VALVE BOXES, IRRIGATION BOXES, ETC. IN THE CONSTRUCTION AREA TO FINISH GRADE PER THE APPLICABLE MAG STANDARD DETAIL. ALL VALVE BOXES, MANHOLES, ETC. IN CONCRETE PAVEMENT AREAS SHALL BE ISOLATED FROM THE CONCRETE PAVEMENT WITH EXPANSION JOINTS.

7. ALL NEW UNDERGROUND FACILITIES/UTILITIES SHALL BE INSTALLED WITH A DETECTABLE UNDERGROUND LOCATION DEVICE. INSTALL A #18 INSULATED TRACER WIRE SECURELY ATTACHED TO EACH UTILITY AT 8-FEET ON CENTER. 12" OF TRACER WIRE SHALL BE ACCESSIBLE ABOVE GRADE AT THE TERMINATION AND SHALL BE SECURELY ATTACHED AT THAT POINT. THE CONTRACTOR SHALL INCLUDE ALL COSTS ASSOCIATED WITH THIS REQUIREMENT IN THEIR BID.

8 THE CONTRACTOR SHALL MAKE NO CLAIMS AGAINST THE OWNER OR THE DESIGN CIVIL ENGINEER REGARDING ALLEGED INACCURACY OF CONSTRUCTION STAKES SET BY THE DESIGN CIVIL ENGINEER UNLESS ALL SURVEY STAKES SET BY THE DESIGN CIVIL ENGINEER ARE MAINTAINED INTACT AND CANNOT BE VERIFIED AS TO THEIR ORIGIN, ANY REMEDIAL WORK REQUIRED TO CORRECT ANY ITEM OF IMPROPER CONSTRUCTION WORK IN THIS DEVELOPMENT SHALL BE PERFORMED AT THE SOLE EXPENSE OF THE RESPONSIBLE CONTRACTOR OR SUBCONTRACTOR.

BENCH MARK:

MCDOT BENCHMARK 23041-1. TOP OF 3" GLENDALE BRASS CAP IN HANDHOLE, DOWN 0.5', STAMPED "N397" LOCATED AT THE INTERSECTION OF 67TH AVENUE AND MISSOURI AVENUE.

ELEVATION = 1117.340 (NAVD88 DATUM)

CERTIFICATION:

"I HEREBY CERTIFY THAT THIS DESIGN IS BASED ON A SITE VISIT OR ACCURATE FIELD DATA WHICH HAS BEEN CHECKED IN THE FIELD WITHIN 180 DAYS PRIOR TO SUBMISSION FOR CITY APPROVAL.

BY: Percy Myron Jr. DATE: 8/10/16

Call at least two full working days before you begin excavation. ARIZONA 811 Arizona Blue Stake, Inc. Dial 8-1-1 or 1-800-STAKE-IT (782-5348) In Maricopa County: (602) 263-1100

COVER SHEET
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
DRAINAGE CORRECTIONS AT
DON MENSENDICK ELEMENTARY SCHOOL

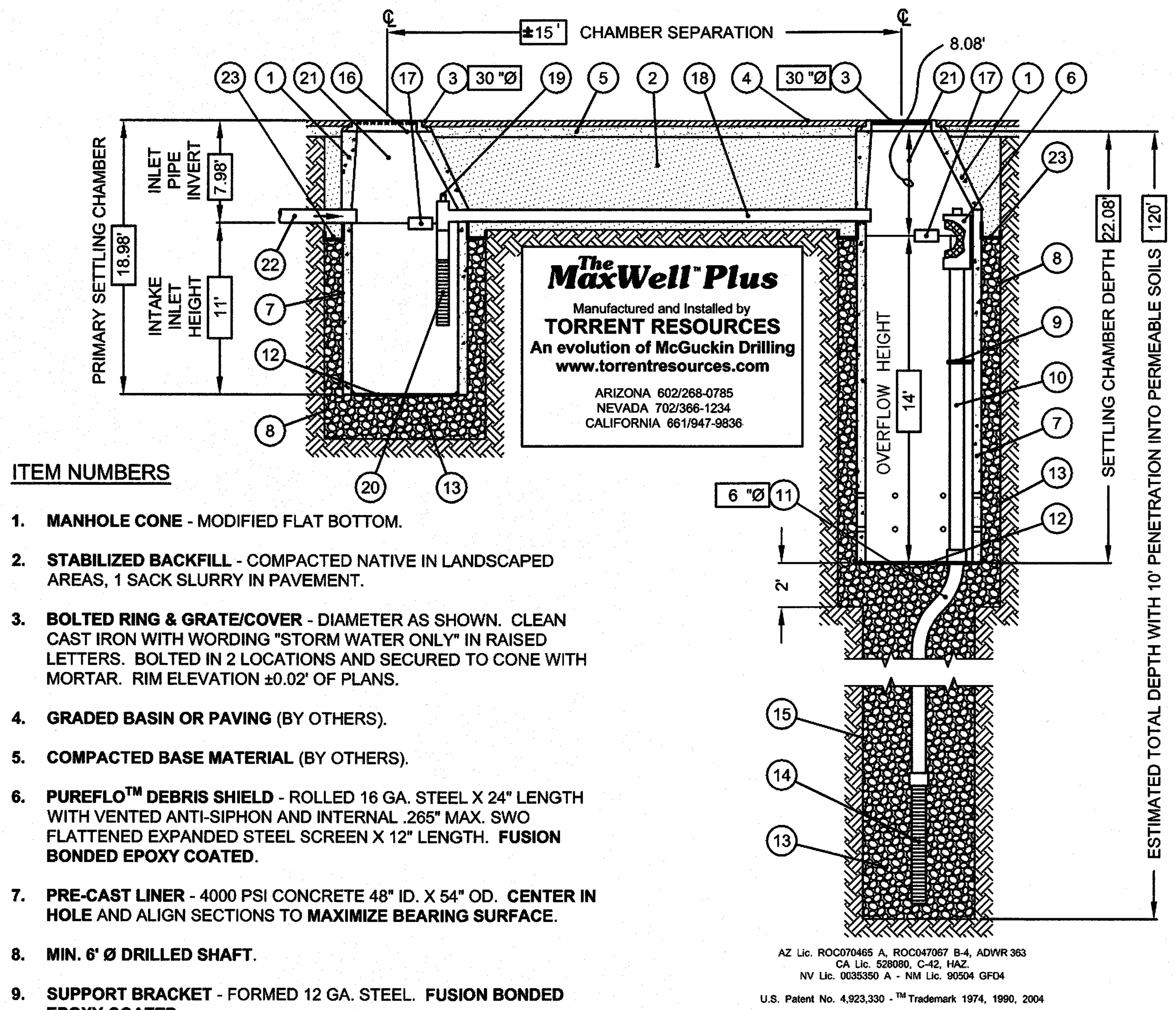
DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	1	3	C-1
DATE: 08-10-16			

151202CR1.DWG

The MaxWell™ Plus Drainage System Detail And Specifications

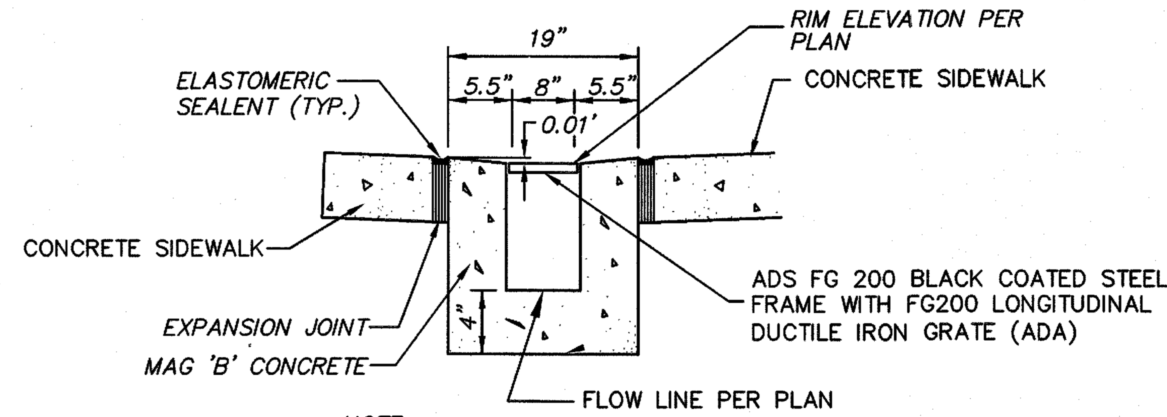
NOTE:

1. CONTRACTORS TO REGISTER ALL DRYWELLS WITH ADEQ.
2. INSTALL 8" WIDE BY 8" DEEP CONCRETE COLLARS AROUND GRATES, MAG CLASS B.



ITEM NUMBERS

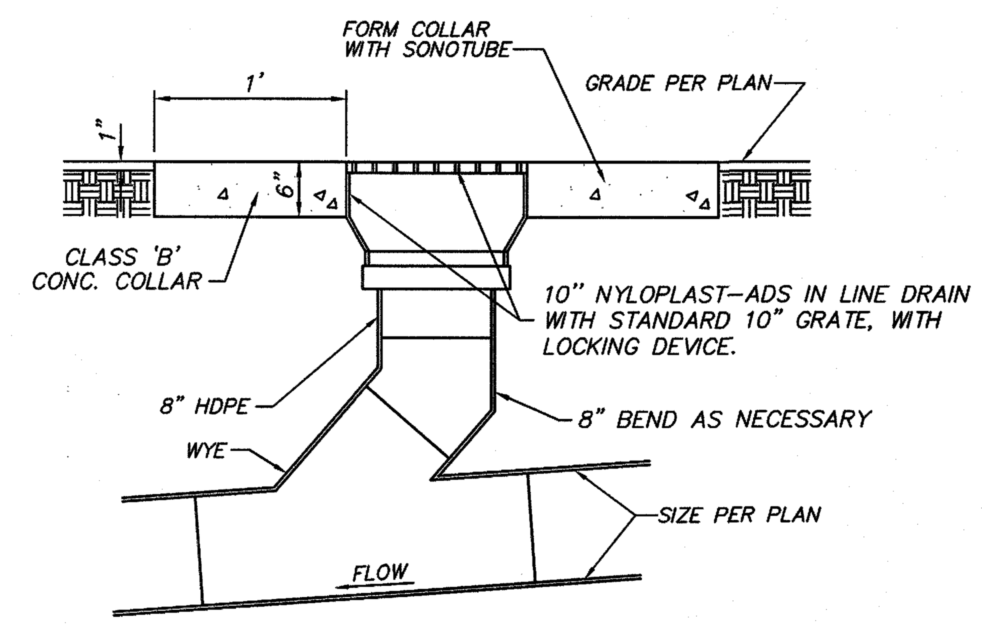
1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **STABILIZED BACKFILL** - COMPACTED NATIVE IN LANDSCAPED AREAS, 1 SACK SLURRY IN PAVEMENT.
3. **BOLTED RING & GRATE/COVER** - DIAMETER AS SHOWN. CLEAN CAST IRON WITH WORDING "STORM WATER ONLY" IN RAISED LETTERS. BOLTED IN 2 LOCATIONS AND SECURED TO CONE WITH MORTAR. RIM ELEVATION ±0.02' OF PLANS.
4. **GRADED BASIN OR PAVING** (BY OTHERS).
5. **COMPACTED BASE MATERIAL** (BY OTHERS).
6. **PUREFLO™ DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL .265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED.**
7. **PRE-CAST LINER** - 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE** AND ALIGN SECTIONS TO **MAXIMIZE BEARING SURFACE.**
8. **MIN. 6' Ø DRILLED SHAFT.**
9. **SUPPORT BRACKET** - FORMED 12 GA. STEEL. **FUSION BONDED EPOXY COATED.**
10. **OVERFLOW PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
11. **DRAINAGE PIPE** - ADS HIGHWAY GRADE WITH TRI-A COUPLER. **SUSPEND PIPE** DURING BACKFILL OPERATIONS TO PREVENT BUCKLING OR BREAKAGE. DIAMETER AS NOTED.
12. **BASE SEAL** - GEOTEXTILE, POLY LINER OR CONCRETE SLURRY.
13. **ROCK** - CLEAN AND WASHED, SIZED BETWEEN 3/8" AND 1-1/2" TO **BEST COMPLEMENT SOIL CONDITIONS.**
14. **FLOFAST™ DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. DIAMETER VARIES 96" OVERALL LENGTH WITH TRI-B COUPLER.
15. **MIN. 4' Ø SHAFT** - DRILLED TO **MAINTAIN PERMEABILITY** OF DRAINAGE SOILS.
16. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION.
17. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY.
18. **CONNECTOR PIPE** - 6" Ø SCH. 40 PVC .
19. **VENTED ANTI-SIPHON** INTAKE WITH FLOW REGULATOR.
20. **INTAKE SCREEN** - SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. 48" OVERALL LENGTH WITH TRI-C END CAP.
21. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE PRIMARY/SECONDARY SETTLING CHAMBER DEPTHS AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE CONNECTOR PIPE OVERFLOW.
22. **OPTIONAL INLET PIPE** (BY OTHERS).
23. **MOISTURE MEMBRANE** - 6 MIL. PLASTIC. PLACE SECURELY AGAINST ECCENTRIC CONE AND HOLE SIDEWALL. USED IN LIEU OF SLURRY IN LANDSCAPED AREAS.



NOTE:
CONCRETE ADJACENT TO GRATE SHALL BE APPROXIMATELY 1/8" HIGHER THAN THE PROPOSED RIM ELEVATION.

TRENCH DRAIN DETAIL

NOT TO SCALE



INSTALL 2 LAYERS OF MIRAFI 100X FABRIC BENEATH GRATE. GENERAL CONTRACTOR TO REMOVE AFTER CONSTRUCTION IS COMPLETE.

AREA DRAIN

NOT TO SCALE

36684 PERCY MYRON JR. 8/10/16 ARIZONA, U.S.A.
EXPIRES 9-30-16

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

DES. PMJ	DRN. JCW	CKD. PMJ	JOB NO. 1512-02

LEGEND

×BC 1119.13	EXISTING BACK OF CURB ELEVATION
×1118.66 G	EXISTING GUTTER ELEVATION
×1119.43 C	EXISTING CONCRETE ELEVATION
×1119.62 SW	EXISTING SIDEWALK ELEVATION
×1119.14 NG	EXISTING NATURAL GROUND ELEVATION
×1120.35 TB	EXISTING TOP OF BERM ELEVATION
×1118.07 TS	EXISTING TOE OF SLOPE ELEVATION
×1119.28 DG	EXISTING DECOMPOSED GRANITE ELEVATION
×1120.87 FL	EXISTING FLOWLINE ELEVATION
×1120.46 FF	EXISTING FINISH FLOOR ELEVATION
ICV	EXISTING IRRIGATION CONTROL VALVE
CLM	EXISTING COLUMN
RD	EXISTING ROOF DRAIN
DF	EXISTING DRINKING FOUNTAIN
PV	EXISTING PASTURE VALVE
WV	EXISTING WATER VALVE
SSCO	EXISTING SANITARY SEWER CLEANOUT
EV	EXISTING ELECTRIC VAULT
CV	EXISTING COMMUNICATION VAULT
BCAP	EXISTING BRASS CAP
BLDR.	EXISTING BOULDER
DW RIM=1119.01	EXISTING DRYWELL
CB RIM=1118.91	EXISTING CATCH BASIN
SSMH RIM=1119.42	EXISTING SANITARY SEWER MANHOLE
BB RIM=1118.68	EXISTING BUBBLER BOX
	EXISTING CACTI
TREE	EXISTING TREE
	SAWCUT, REMOVE AND REPLACE EXISTING CONCRETE SIDEWALK (MAG S.D. NO. 230).
	SAWCUT, REMOVE AND REPLACE EXISTING CONCRETE FIRE LANE.

DETAIL SHEET

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

DRAINAGE CORRECTIONS AT
DON MENSENDICK ELEMENTARY SCHOOL

DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL			
DATE: 08-10-16	2	3	C-2

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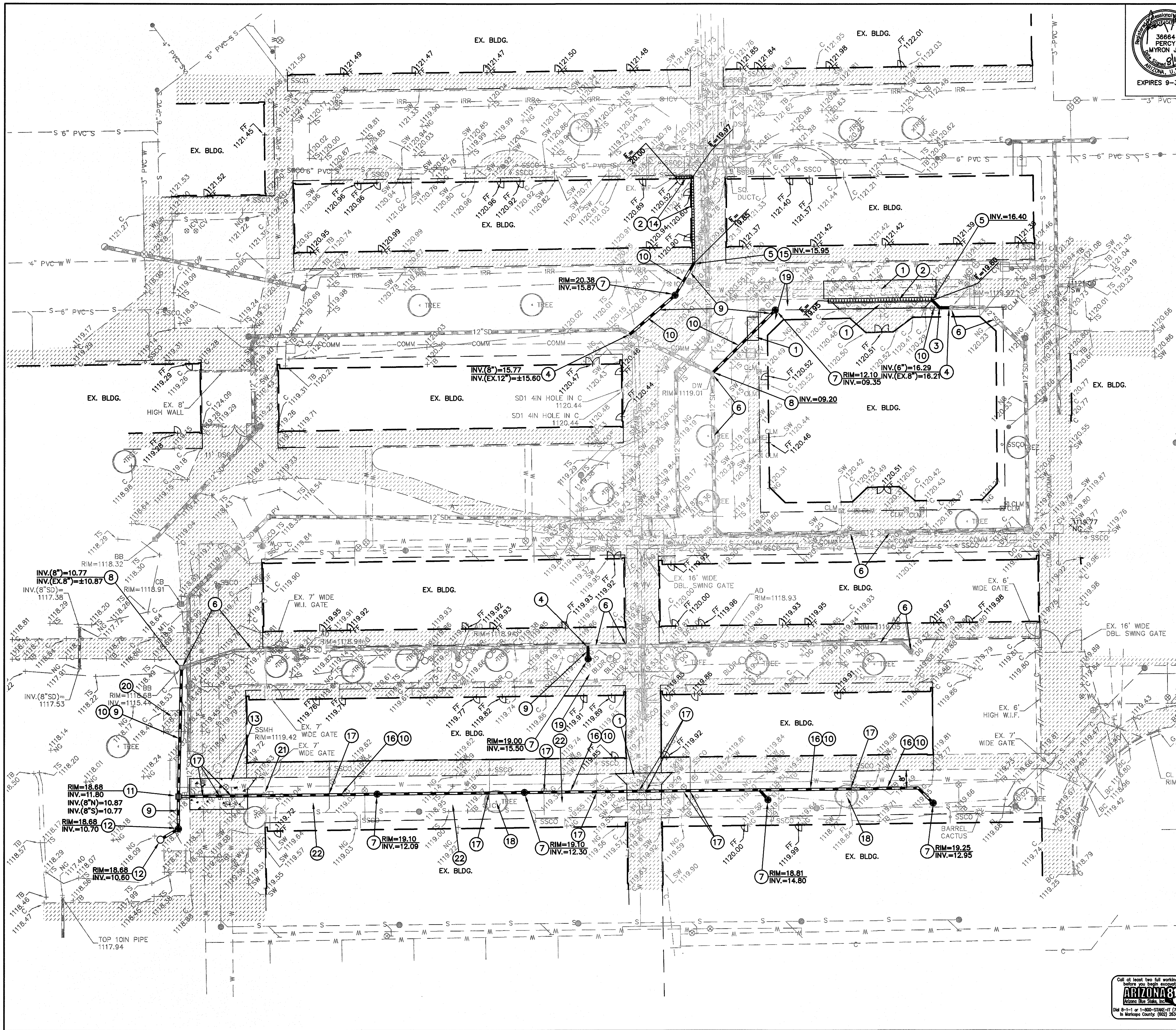


Registered Professional Engineer (Civil) Certificate No. 36664 PERCY MYRON JR. Date Signed 9/10/16 ARIZONA, U.S.A.

EXPIRES 9-30-16

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

DES. PMJ	DRN. JCW	CKD. PMJ	JOB NO. 1512-02

CONSTRUCTION NOTE:

1. SAWCUT, REMOVE AND REPLACE EXISTING CONCRETE SIDEWALK TO THE NEAREST JOINT (MAG STANDARD DETAIL NO. 230).
2. CONSTRUCT TRENCH DRAIN (SEE DETAIL ON SHEET C-2).
3. INSTALL 6" HIGH DENSITY POLYTHYLENE PIPE WITH SMOOTH INTERIOR AND 10.8 P.S.I. JOINTS.
4. CONNECT NEW STORM DRAIN PIPE TO EXISTING STORM DRAIN PIPE WITH NECESSARY AND APPROPRIATE FITTINGS. FIELD VERIFY ELEVATION OF EXISTING STORM DRAIN LINE PRIOR TO CONSTRUCTION.
5. INSTALL 6" VERTICAL PIPE CONNECTION AT END OF TRENCH DRAIN. INSTALL 6" HIGH DENSITY POLYTHYLENE PIPE WITH SMOOTH INTERIOR AND 10.8 P.S.I. JOINTS VERTICALLY DOWN TO 6"-90 DEGREE BEND. INVERT SHOWN ON PLAN IS AT 6"-90 DEGREE BEND.
6. HYDROVAC AND CLEANOUT EXISTING AREA DRAINS, STORM DRAIN PIPING, DRYWELL AND BUBBLER BOX.
7. INSTALL AREA DRAIN (SEE DETAIL ON SHEET C-2).
8. CONNECT TO EXISTING DRYWELL OR BUBBLER BOX WITH A WATERTIGHT CONNECTION.
9. INSTALL 8" HIGH DENSITY POLYTHYLENE PIPE WITH SMOOTH INTERIOR AND 10.8 P.S.I. JOINTS.
10. REPAIR/REPLACE DAMAGED LANDSCAPING AND GRANITE DISTURBED BY STORM DRAIN INSTALLATION. INSTALL SOD IN TURF AREAS.
11. CONSTRUCT CATCH BASIN (MAG STANDARD DETAIL 537).
12. CONSTRUCT DUAL CHAMBER DRYWELL (SEE DETAIL ON SHEET C-2).
13. SAWCUT, REMOVE AND REPLACE EXISTING CONCRETE FIRE LANE TO THE NEAREST JOINT. REPLACE WITH 7" THICK MAG AA CONCRETE.
14. SAWCUT AND REMOVE EXISTING CONCRETE SIDEWALK AS REQUIRED TO INSTALL TRENCH DRAIN.
15. INSTALL 8" TO 6" REDUCER AT THE HORIZONTAL END OF THE 6"-90° BEND.
16. INSTALL 12" HIGH DENSITY POLYTHYLENE PIPE WITH SMOOTH INTERIOR AND 10.8 P.S.I. JOINTS.
17. FIELD VERIFY ELEVATION AND LOCATION OF EXISTING ELECTRICAL, COMMUNICATION, WATER AND SEWER LINES. PROTECT FROM DAMAGE.
18. REMOVE EXISTING TREE.
19. GRADE PLANTER TO DRAIN TO RIM ELEVATION OF AREA DRAIN. REPLACE GRANITE WITH A 2" THICKNESS OF DECOMPOSED GRANITE (1/4" MINUS MADISON GOLD).
20. REMOVE EXISTING CONCRETE SLAB. INSTALL SOD AND FILL IN VOID WITH CLEAN TOPSOIL.
21. EXISTING WROUGHT IRON FENCE. PROTECT FROM DAMAGE.
22. REMOVE AND REINSTALL GARDEN PLANTER BOXES AND PLANTS IN KIND. REPAIR/REPLACE ENTIRE DRIP IRRIGATION SYSTEM DAMAGE/REMOVE FOR INSTALLATION OF STORM DRAIN PIPE. AT COMPLETION OF PROJECT, THE DROP IRRIGATION SHALL BE IN 100% COMPLETE WORKING ORDER.

0 4 8 20
2 6 10 40

SCALE: 1"=20'

GRADING AND DRAINAGE PLANS

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40			
DRAINAGE CORRECTIONS AT DON MENSENDICK ELEMENTARY SCHOOL			
DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	3	3	C-3
DATE: 08-10-16			

151202GR2.DWG

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36664
PERCY
MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 02 21 13

CONSTRUCTION STAKING

Construction staking shall be performed by a licensed Surveyor acceptable to the Architect. Staking will be paid from the Construction Staking Allowance in the Contract.

Stakes: A minimum one set of construction grade stakes or "blue-tops" if possible of the following kind and at the stated interval shall be set. Blue-tops shall be set for all finish grading, sidewalk, curbing, concrete valley gutters, paving subgrade and A.B.C. and shall be left in place until checked and certified by the Civil Engineer.

1. Field staking control.
2. Two site benchmarks.
3. Mark out demo/sawcuts.
4. Rough grading cut and fill for onsite: at 50-foot intervals and grade breaks.
5. Concrete sidewalk: line and grade at 25-foot intervals and grade breaks.
6. Storm drain: 25-foot intervals and grade breaks.
7. As-builts finish grade.
8. Storm drain area drains/catch basins: location and elevation.
9. Prepare and submit as-built drawings to Contractor for submittal.
10. Office computer calculation for above staking.

END OF SECTION

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36664
PERCY
MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 31 01 00

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Perform earthwork as shown on the Drawing and as specified herein.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Procure necessary permits or certificates required by City of Phoenix, State of Arizona and Maricopa County. Comply with applicable federal, state and local ordinances, including MAG Standard Specifications and Details. Owner to pay for permits.

B. Layout of all Work under this Section shall be made by a licensed Engineer/Surveyor acceptable to the Architect.

C. General Contractor shall give the Work his personal supervision. In his absence, he shall leave a responsible representative in charge who shall have the authority to receive and execute orders from the Architect and/or his representative.

1.03 PROJECT/SITE CONDITIONS

A. Environmental Requirements: No fill materials shall be placed, spread or rolled during unfavorable weather conditions. When the Work is interrupted by rain, fill operations shall not be resumed until it can be shown to the Civil Engineers/Architect's satisfaction that the moisture content and density of the previously placed fill are as specified.

B. Visit the site. Examine and note conditions as to the character and extent of Work involved.

PART 2 PRODUCTS

2.01 FILL

A. Cleaned onsite soils may be used for fills in all areas of the site.

B. Fill materials shall be approved by the Geotechnical Engineer and Civil Engineer and shall have low swell potential and be free of organic or deleterious material.

C. Imported fill of low or non-expansive soils shall conform with the following requirements:

Maximum Percent Passing No. 200 Sieve	15 percent
Maximum Particle Size	6 inches (1 inch in landscape or turf areas)
Maximum Swell Potential Within exterior concrete slabs	1.5 percent *

*Based on a sample which is remolded to 95% of the ASTM D698 maximum dry density at a moisture content of 2 percent below optimum, placed under a surcharge load of 100 psf and wetted.

PART 3 EXECUTION

3.01 PREPARATION

A. Existing Utilities:
   1. Where existing utilities not shown on the Drawings are encountered, support, shore up, protect same and immediately notify Engineer and General Contractor. Allow entrance, opportunity and ample time for measures necessary for continuance and/or relocation of such services.
   2. Where noted on Drawings, cut and cap all street connections encountered in the excavating along curb line and mark location so they can subsequently be located and reconnected as required.

B. Protection:
   1. Keep all excavations, pits, trenches, etc. entirely free from water.
   2. Protect excavations from rain or water from any source during construction. Use suitable pumping equipment or other means as required by conditions. Continue pumping as necessary until completion of project or until released by Engineer.
   3. Conduct Work in an orderly manner so as not to create a nuisance. Dirt shall not be permitted to accumulate on streets or sidewalks nor to be washed into sewers.
   4. During construction operations and after building construction, buildings shall be protected from surface water run-off and drainage from surrounding heights. Run-off water shall be diverted around buildings and construction operations.

C. Layout:
   1. Maintain all bench marks, control monuments and stakes, whether newly established by Surveyor or previously existing. Protect from damage and dislocation. If necessary to disturb existing bench marks, have Surveyor reestablish in a safe place.
   2. If any discrepancies are found by Surveyor between the Drawings and actual conditions at the site, Engineer reserves the right to make such minor adjustments in Work specified as necessary to accomplish the intent of the contract Documents, without increased cost to Owner.

3.02 EXCAVATABILITY

A. The excavatability of site materials is difficult to evaluate based only on the exploration equipment used during the geotechnical design report. Therefore, the Geotechnical Engineer recommends that the Contractor evaluate the excavatability of site materials by performing test excavations with the size and type of equipment that Contractor plans on using at the site.

B. The near surface and underlying soils can probably be removed with conventional excavating equipment. Deeper excavations may be slower and more difficult to accomplish due to caving and presence of oversized material. Caving should be expected in the non-cohesive granular soils encountered. OSHA requires all excavations over five feet in depth, in which personnel are to enter, be either braced or sloped in accordance with OSHA regulations.

3.03 WORKABILITY

A. Wetting site soils such that moisture contents are at or above optimum could result in some soil pumping under dynamic loadings such as heavy construction equipment driving over the area. In the building area, some pumping is not detrimental to foundation or floor slabs provided the specified percent compaction is achieved. However, in flexible pavement areas where pumping has occurred, and in building areas where severe pumping has damaged subgrade conditions, the area shall be allowed to dry until soils are workable without pumping or the wetted areas removed and replaced with drier site soils.

3.04 GRADING

A. General Contractor shall provide personal supervision for the Work. Leaving a responsible representative in charge, when absent, who shall have the authority to receive and execute instructions from the Architect or his representative.

B. Grading tolerance shall be +0.00 feet and -0.10 feet.

C. The following requirements are for site grading under, within and extending five feet beyond the sidewalks, exterior concrete slabs, and concrete fire lanes.

D. Strip the entire site of all existing fill zones, any backfill zones and any unstable soils. During stripping observe the surface for evidence of buried debris, vegetation or disturbed materials which will require additional removal. If encountered, these materials shall be removed. Areas steeper than 5H to 1V should be benched and any depressions widened to accommodate compaction equipment.

E. Widen any resulting depressions as necessary to accommodate compaction equipment and provide a level base for placing fill.

F. Prepare the ground surface in fill areas and in areas cut to grade by scarifying, moisture conditioning and compacting the exposed surface soils to a minimum 10-inch depth. Moisture conditioning and compaction shall meet requirements under Section 3.07, Compaction.

G. Moisture condition and place engineering fill material required to elevate areas to specified subgrade elevations.

H. Placing, Spreading and Compacting Fill Materials: Fill materials shall be placed and compacted in horizontal lifts of thickness compatible with the compaction equipment used. Each layer shall be spread evenly, moisture conditioned and compacted per Section 3.7, Compaction. The Contractor shall widen any depressions as necessary to accommodate compaction equipment and provide a level base for placing fill. Compaction of each layer shall be continuous over its entire area and the compaction equipment shall make sufficient trips to insure that the required density has been obtained. No lift shall be placed until the previous lift has been approved. Fill operation shall be continued until the fill has been brought to the finished slopes and elevations shown on the Drawings. Imported fill shall conform to the requirements previously defined.

I. Compacted subgrade shall be maintained in a moist state and shall not be allowed to significantly dry prior to placing more fill or base course.

3.05 EXCAVATION

A. Excavation consists of removal and disposal of materials encountered to obtain required subgrade elevations.

B. Excavation for foundations and footings shall have clean vertical walls, all corners squared up. Keep entire excavation free from any loose material. Excavation shall conform to dimensions and elevations indicated with allowance for erection of forms, shoring and inspection of footings.

C. Material to be excavated shall be non-classified and shall include all earth or other materials encountered in excavating and grading. Where material encountered within the limits of Work is considered unsuitable by the Architect, such material shall be excavated below the grade shown on the Drawings as directed, and replaced with suitable material.

D. Earth forms for footings may be permitted provided the earth is suitable and self-supporting as approved by the Architect or Geotechnical Engineer. Earthbank forms for foundation walls will not be permitted.

E. Unauthorized excavation consists of materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect. Under footing, foundation bases, or retaining walls, fill unauthorized excavations by extending the indicated bottom elevations of footing or base at the excavation bottom, without altering required top elevation. Clean concrete fill may be used to bring elevations to proper position, only when acceptable to the Architect. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavations, unless otherwise directed by the Architect. Costs for testing, if required, shall be borne by the Contractor.

F. Stockpile satisfactory materials where directed, until required for backfill or fill. Locate and retain materials away from edge of excavations, even though such excavations are sheeted and braced to prevent such material falling or sliding into the excavations.

G. Maintain sides and slops of excavations in a safe condition until completion of backfilling, by scaling, benching, shelving or bracing. Take precautions to prevent slide or cave-ins.

3.06 BACKFILLING

A. Place backfill about the buildings and structures as far as practical, as the Work of construction progresses. Backfilling against concrete work shall be done only when approved and directed. Backfill shall be deposited in layers of not more than six inches (6") in depth, and for the full width of the cross section. The material shall be carefully watered during placing by means of a fine spray or other approved method, so that each layer shall be thoroughly and uniformly wetted as directed by the Architect. The moisture content of all the material shall be carefully controlled at all times, and shall be checked at proper intervals to insure correct moisture content for compaction specified.

Each layer of fill material shall be compacted by hand and machine tampers to the density required in Section 3.07 COMPACTION when forming subgrade for concrete areas or supporting concrete floor slabs or supporting building footings.

J. Backfilling of trenches shall progress as rapidly as the construction and testing of the Work will permit. In back-filling pipe trenches, approved fill shall first be compacted on both sides of the pipe in eight inch (8") layers to a depth of one foot over the top of the pipe. The remainder of the trenches shall be backfilled in compacted one-foot layers, except that fill in trenches in paved areas shall be compacted in six inch (6") layers to required grade.

3.07 COMPACTION

Compaction of cleaned exposed soil, imported soils, each lift of backfill, subbase fill, imported fill and base course materials shall be accomplished to the following density criteria:

Material	Percent Compaction (ASTM D698)
Cleaned exposed soil, imported soils, backfill and subbase fill:	
Below concrete sidewalk/slabs	90 max
Below pavement sections	95 min
Top soil in playfields and landscape areas	85-90 min
Miscellaneous Backfill not under buildings, concrete or paved areas	90 min

Compaction of clean, exposed site soils or fills of cleaned site soils within sidewalks and exterior concrete slab areas shall be accomplished with soils uniformly mixed at a moisture content of optimum to optimum plus three percent (+3%).

Compaction of imported soils within sidewalks and exterior concrete slab areas shall be accomplished with soils uniformly mixed at a moisture content of optimum plus or minus three percent (±3%).

Natural undisturbed soils or compacted soils subsequently disturbed or removed by construction operations shall be replaced with materials compacted as specified above.

3.08 FINISH GRADING

A. Perform finish grading required as indicated or reasonably inferred to permit installation of Work of others as shown on Drawings. After final clean-up of exterior and removal of trash and construction of the buildings, the site shall be graded to slopes and elevations as indicated on the Drawings and as directed by the Architect. Additional material required for finish grading shall be of topsoil quality, provided, placed and graded by the Contractor. Lawn areas around walks shall provide good slope drainage away from buildings as indicated. Rake indicated site and lawn areas smooth and level to a tolerance of plus or minus 0.1 foot from elevations indicated.

B. Existing clean site soils free of debris and rocks over 1 inch in diameter may be used for fills in landscape areas.

3.09 FIELD QUALITY CONTROL

A. Test: Field density tests shall be made by an approved independent soils testing laboratory, as defined herein, or at the request of the Architect and paid for with the testing allowance. When these tests indicate that the density of any area(s) is below the required density, that particular area(s) shall be reworked until the required density has been obtained.

B. Restore any damage to adjacent properties, street and the like, caused by operations of this Section to original condition without additional cost to Owner.

3.10 CLEANING

A. Conduct Work in an orderly and workmanlike manner and so as not to create a nuisance. Dirt shall not be permitted to accumulate on streets or sidewalks nor to be washed into sewers.

B. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

3.11 AS-BUILT DRAWINGS

A. The Surveyor shall provide certified, signed and sealed as-builts for all finish grade elevations indicated on the Drawings on 4 mil mylar and AutoCAD disk (2011 version or later). The Contractor shall schedule the Work to allow the Surveyor to obtain the as-builts. This Work will not be accepted until as-builts are approved by the Design Civil Engineer and City of Glendale.

END OF SECTION

ARIZONA, U.S.A.
Registered Professional Engineer (Civil)
CERTIFICATE NO. 36664
PERCY MYRON, JR.
Date Signed 8/10/16
Expires 09/30/16

SECTION 32 16 00

CONCRETE CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Installation of concrete curbs, gutters, sidewalks, and driveways as shown on the Drawings and as specified herein.

1.02 REFERENCE STANDARDS

A. MAG Specifications Section 340: Concrete curb, gutter, sidewalk, driveways and alley entrances.

B. City of Glendale and MAG Standard Details.

1.03 SUBMITTALS

A. Mix design to Architect a minimum of seven (7) days prior to start of construction.

B. Tests: Submit three certified copies of test results, samples and suppliers certification that materials conform to specified criteria.

1.04 QUALITY ASSURANCE

A. Contractor shall obtain, at his expense, all necessary construction permits and shall coordinate all necessary inspections with City of Glendale.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete Curb, Gutter (where not next to driveway) and Sidewalk:

Concrete: 2,500 psi (28 day strength), MAG Section 725

B. Concrete Driveway and Curb and Gutter (where next to driveway):

Concrete: 4,000 psi (28 day strength), MAG Section 725

PART 3 EXECUTION

3.01 CONSTRUCTION METHODS FOR CONCRETE CURB, GUTTER, SIDEWALK AND DRIVEWAY

A. Execute Work in accordance with MAG Specifications Section 340 and MAG Details and City of Glendale specifications and details.

B. Sawcut existing pavements and concrete joined by new construction to a true line with straight vertical edges free from irregularities.

C. Construct and compact true to grades and line shown on the Drawings.

D. Curb machines may not be used.

E. Do not place material displaced in the construction on the base and/or surfacing material already in place on the roadway nor the excavated material in such a manner as to interfere with access to property or traffic flow in the street.

3.02 TESTING

A. Inspection and testing will be performed by an independent testing agency employed and paid for in accordance with Section 01 43 26.

B. Provide free access to Work and cooperate with appointed firm.

C. Submit 3 copies of proposed mix design of each class of concrete including water/cement/strength and all supporting data to testing agency and Architect for review a minimum seven (7) days prior to commencement of Work.

D. Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.

E. Four (4) concrete test cylinders will be taken for every 100 or less cubic yards of each class of concrete placed. Make and cure concrete compressive strength test specimens in accordance with ASTM C31. Construct storage box of sufficient size and design to provide protection required by paragraph 7(a).

F. One (1) additional test cylinder will be taken during cold weather concreting, and be cured on job site under same conditions as concrete it represents.

G. One (1) slump test will be taken in accordance with ASTM C-143 of each set of compressive strength test cylinders taken.

H. Where concrete is placed by pumping, tests shall be taken at the truck before concrete is placed in the pump.

I. Tests to be performed by testing agency personnel in accordance with ASTM C39.

3.03 CLEANING

A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

END OF SECTION

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36604
PERCY
MYRON, JR. Jr.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 32 71 00

STORM DRAIN SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Storm Drain Construction as shown on the Drawings and as specified herein.

1.02 SUBMITTALS

A. General: Submittal requirements are specified in Section 01300 - Submittals.

B. Quality Control Submittals:
   1. Storm drainage pipe, fittings, cleanouts, etc.
   2. Area drains, catch basins
   3. Dry well
   4. Oil grease interceptor

1.03 PROJECT/SITE CONDITIONS

A. Visit the site. Examine and note conditions as to the character and extent of Work involved.

1.04 QUALITY ASSURANCE

A. Contractor shall obtain all necessary construction permits and shall coordinate all necessary inspections with the City of Glendale. Owner to pay for permits.

B. Construction staking shall be performed by a State of Arizona licensed Surveyor acceptable to the Architect and Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. As specified on the Drawings and as allowed per MAG Specifications and City of Glendale codes and requirements and as indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Failure to observe this requirement constitutes a waiver to subsequent claims to the contrary and holds Contractor responsible for correction(s) Architect may require. Commencement of Work will be construed as acceptance of subsurfaces.

B. Coordination with other work: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.02 STORM DRAIN CONSTRUCTION

A. Storm drain construction shall conform to the applicable requirements of MAG Specifications, Section 601, Trench Excavation, Backfilling and Compaction, Section 745, P.V.C. Sewer Pipe and Fittings and Section 603, Installation for High Density Polyethylene Pipe. Backfill and compaction shall be performed per Specifications, Section 02200, Earthwork, except as modified below.

B. Storm Drain pipe shall consist of installing P.V.C. or H.D.P.E. storm drain pipe to the alignment and grades indicated on the Drawings.

C. Granular bedding will be required from four inches (4") below the bottom of the pipe to one foot (1') above the pipe. All clean dirt spoils generated from the installation of the storm drain lines shall be removed from the site and disposed of legally.

3.03 CATCH BASINS, AREA DRAINS, DRYWELLS AND OIL/GREASE INTERCEPTOR

A. Catch Basins, area drains, Bubbler Boxes, Drywells and oil/grease interceptors shall be installed per the details on the Drawings and per the MAG Standard Details as indicated on the Drawings.

3.04 "AS-BUILT" DRAWINGS

A. The Contractor's Surveyor shall provide as-builts for all site storm drain lines (outside building areas). The Contractor shall schedule the Work to allow the Surveyor to obtain as-builts for the actual locations and elevations of the completed storm drain line including location, invert elevation and rim elevation of all catch basins, area drains, cleanouts, bends, etc. As-builts shall be provided on 4 mil mylars, certified, sealed and signed by the Surveyor. Mylar and Auto CADD 2011 disk as-builts shall be submitted to the Design Civil Engineer, Owner, and City for review and approval. Project is not accepted until all parties listed above approve as-built Drawings.

3.05 CLEANING

A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of legally away from premises. Leave Work in clean condition.

END OF SECTION

Registered Professional Engineer (Civil)
CERTIFICATE NO.
MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 33 70 00

DECOMPOSED GRANITE

<u>DECOMPOSED GRANITE</u>

The Work under this item shall consist of installing a 2 inch compacted thickness of decomposed granite at the locations as indicated on the plans. The Work shall conform to MAG Specifications Section 430.4 except that no 10-mm black polyethylene liner will be required. Two applications of pre-emergent (one prior to placement of granite and one after placement) will be required.

Granite shall conform to MAG Specifications Section 702.4 and have a size of 1/4 inch minus. Color shall be Madison Gold to match the existing granite at the site.

END OF SECTION

SMITH STUCTURAL AND DRAINAGE

Glendale Elementary School District SFB Projects: Construction Cost Estimates

BRG:	Project:	Scope: Updated 9/1/16	Cost Estimate:
070440103-9999-013-BRG	Smith Structural and Drainage		
	Phase 2	Installation of masonry control joints/repair CMU	$ 100,000.00
		Install helical piers	$ 500,000.00
		Grout injection of slab	$ 100,000.00
		Riddle blockfill of new masonry and coating of Drylok extreme at exposed footing	$ 8,000.00
		Remove turf and irrigation against building and replace with decomposed granite from face of wall to 5'-0" away from building	$ 40,000.00
		Chasse Drainage estimate	$ 57,738.75
		Estimated Phase 2 Subtotal	**$ 805,738.75**
		Estimated Total Repair:	**$ 805,738.75**

DRAINAGE CORRECTIONS
AT
HAROLD W. SMITH ELEMENTARY SCHOOL

SITE ADDRESS: 6534 N. 63RD AVENUE
GLENDALE, ARIZONA 85303

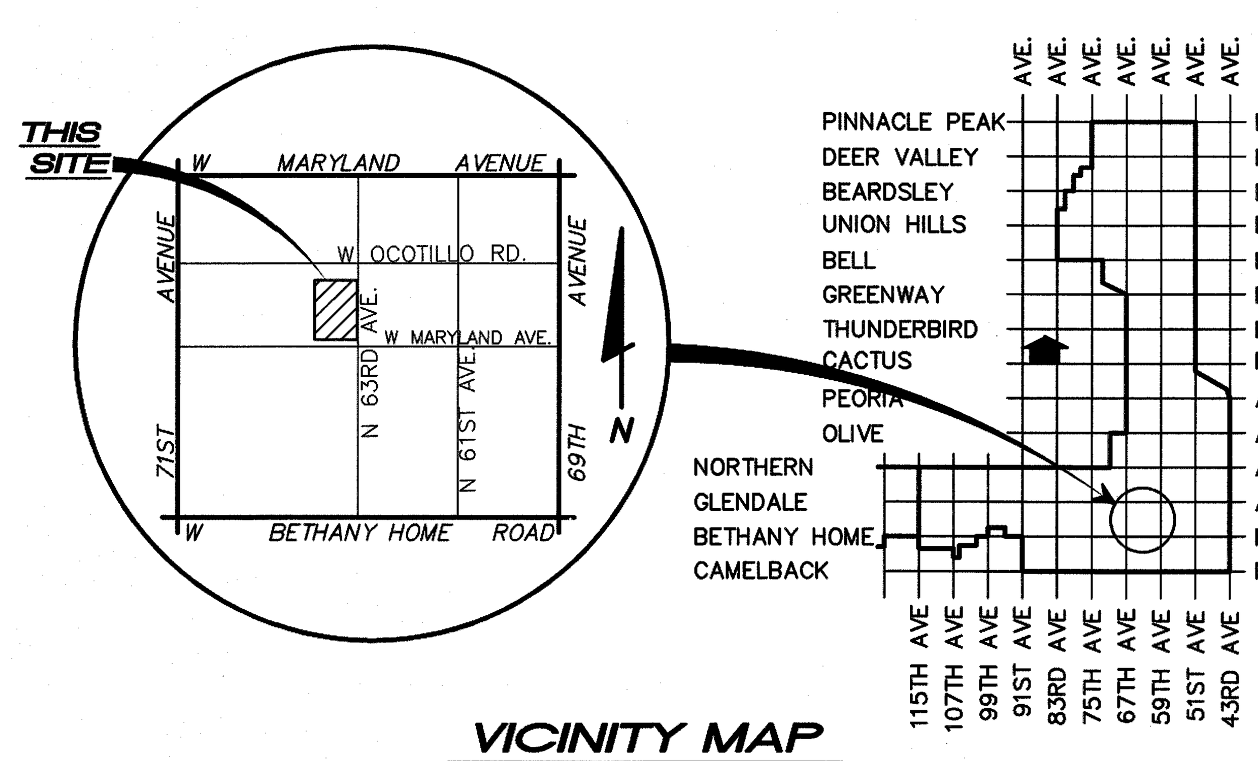
FOR

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40 (OWNER)

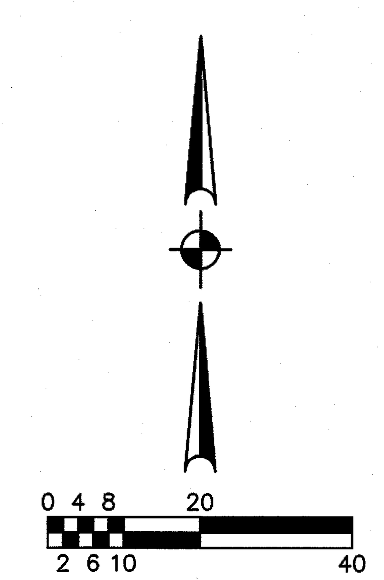
7301 N. 58TH AVENUE
GLENDALE, ARIZONA 85303
PHONE: (623) 842-8100
CONTACT: GREG GILLIAM

DESIGN CIVIL ENGINEER'S NOTES TO CONTRACTOR:

1. NOTHING CONTAINED IN THE CONTRACT DOCUMENTS SHALL CREATE, NOR SHALL BE CONSTRUED TO CREATE, ANY CONTRACTUAL RELATIONSHIP BETWEEN THE DESIGN CIVIL ENGINEER AND THE CONTRACTOR OR ANY SUBCONTRACTOR.
2. THE DESIGN CIVIL ENGINEER WILL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FOR SAFETY PRECAUTIONS OR PROGRAMS UTILIZED IN CONNECTION WITH THE WORK, THESE ARE SOLELY THE CONTRACTOR'S RESPONSIBILITY. THE DESIGN CIVIL ENGINEER WILL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S FAILURE TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. THE CONTRACTOR SHALL PROVIDE ADEQUATE MEANS OF CLEANING TRUCKS AND/OR OTHER EQUIPMENT OF MUD PRIOR TO ENTERING PUBLIC STREETS, AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO CLEAN STREETS, ALLAY DUST, AND TO TAKE WHATEVER MEASURES ARE NECESSARY TO INSURE THAT ALL ROADWAYS AND ON SITE PARKING LOTS/FIRE LANES ARE MAINTAINED IN A CLEAN, MUD AND DUST-FREE CONDITION AT ALL TIMES.
4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE BLUE STAKE CENTER TWO WORKING DAYS PRIOR TO ANY EXCAVATION. THE UNDERGROUND UTILITY LOCATIONS AS SHOWN HEREON ARE BASED ON THE BEST INFORMATION AVAILABLE FROM UTILITY RECORDS AND OTHER DATA AS SUPPLIED TO THIS DESIGN CIVIL ENGINEER. THERE MAY BE OTHER UNDERGROUND UTILITY LINES, SERVICE LINES AND STRUCTURES PRESENT IN THE SUBJECT AREA. CONTRACTOR SHALL INCLUDE IN HIS BID THE COST OF HIRING AN UNDERGROUND UTILITY LOCATING SERVICE FOR THE PURPOSE OF LOCATING ALL UNDERGROUND UTILITIES. CONTRACTOR WILL COORDINATE WITH THE OWNER AND ARCHITECT TO DETERMINE WHETHER SAID UTILITIES ARE TO BE ABANDONED OR PROTECTED FROM DAMAGE.
5. THE DESIGN CIVIL ENGINEER MAKES NO REPRESENTATION OR GUARANTEE REGARDING THE EARTHWORK QUANTITIES OR THAT THE EARTHWORK FOR THIS PROJECT WILL BALANCE DUE TO THE VARYING FIELD CONDITIONS, CHANGING, SOIL TYPES, ALLOWABLE CONSTRUCTION TOLERANCES AND CONSTRUCTION METHODS. PRIOR TO BIDDING THE WORK, THE CONTRACTOR SHALL THOROUGHLY SATISFY HIMSELF AS TO THE ACTUAL CONDITIONS, EARTHWORK QUANTITIES AND REQUIREMENTS OF THE WORK AND EXCESS OR DEFICIENCY THEREIN, ACTUAL OR RELATIVE.
6. THE CONTRACTOR SHALL ADJUST ALL EXISTING AND NEW CLEANOUTS, WATER VALVE BOXES, MANHOLES, GAS VALVE BOXES, IRRIGATION BOXES, ETC. IN THE CONSTRUCTION AREA TO FINISH GRADE PER THE APPLICABLE MAG STANDARD DETAIL. ALL VALVE BOXES, MANHOLES, ETC. IN CONCRETE PAVEMENT AREAS SHALL BE ISOLATED FROM THE CONCRETE PAVEMENT WITH EXPANSION JOINTS.
7. ALL NEW UNDERGROUND FACILITIES/UTILITIES SHALL BE INSTALLED WITH A DETECTABLE UNDERGROUND LOCATION DEVICE. INSTALL A #18 INSULATED TRACER WIRE SECURELY ATTACHED TO EACH UTILITY AT 8-FEET ON CENTER. 12" OF TRACER WIRE SHALL BE ACCESSIBLE ABOVE GRADE AT THE TERMINATION AND SHALL BE SECURELY ATTACHED AT THAT POINT. THE CONTRACTOR SHALL INCLUDE ALL COSTS ASSOCIATED WITH THIS REQUIREMENT IN THEIR BID.
8. THE CONTRACTOR SHALL MAKE NO CLAIMS AGAINST THE OWNER OR THE DESIGN CIVIL ENGINEER REGARDING ALLEGED INACCURACY OF CONSTRUCTION STAKES SET BY THE DESIGN CIVIL ENGINEER UNLESS ALL SURVEY STAKES SET BY THE DESIGN CIVIL ENGINEER ARE MAINTAINED INTACT AND CANNOT BE VERIFIED AS TO THEIR ORIGIN. ANY REMEDIAL WORK REQUIRED TO CORRECT ANY ITEM OF IMPROPER CONSTRUCTION WORK IN THIS DEVELOPMENT SHALL BE PERFORMED AT THE SOLE EXPENSE OF THE RESPONSIBLE CONTRACTOR OR SUBCONTRACTOR.



VICINITY MAP
NOT TO SCALE



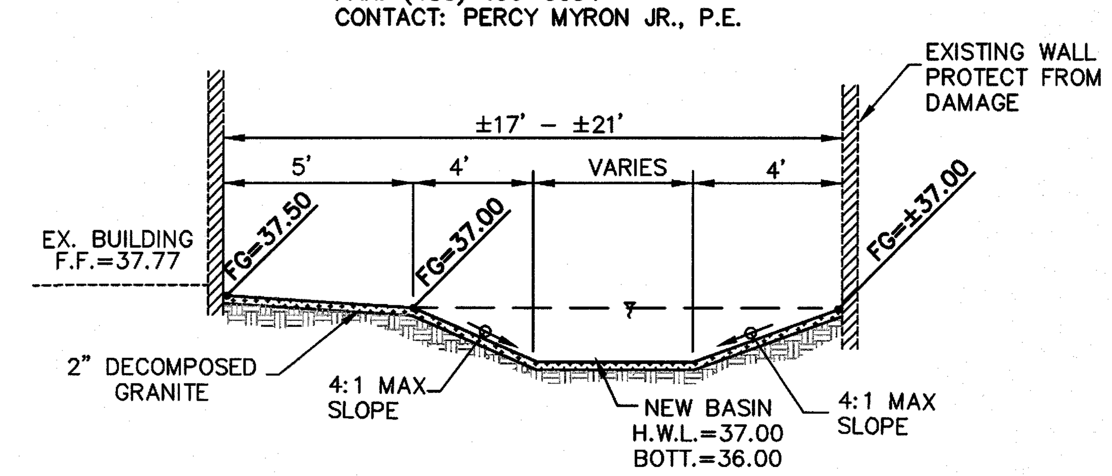
SCALE: 1"=20'

OWNER/DEVELOPER:

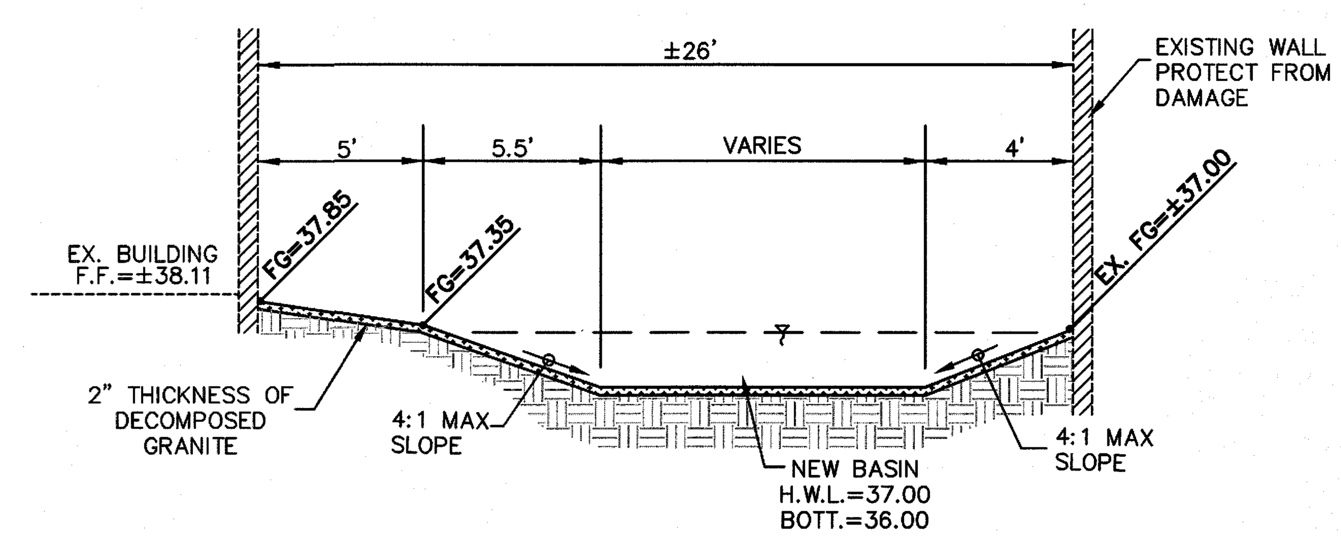
GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40
7301 NORTH 58TH AVENUE
GLENDALE, ARIZONA 85303
PHONE: (623) 842-8100
CONTACT: DEAN WALLACE

ENGINEER:

HESS-ROUNTREE, INC.
9831 S. 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044
PHONE: (480) 496-0244
FAX: (480) 496-0094
CONTACT: PERCY MYRON JR., P.E.



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 36664 PERCY MYRON JR. ARIZONA, U.S.A.
EXPIRES 9-30-16

HESS – ROUNTREE, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
9831 SOUTH 51ST STREET, SUITE C110
PHOENIX, ARIZONA 85044 (480)496-0244

DES. PMJ | DRN. JCW | CKD. DRO | JOB NO. 1602-03

LEGEND

BC 1137.30	EXISTING BACK OF CURB ELEVATION
P 1136.92	EXISTING PAVEMENT ELEVATION
SW 1137.28	EXISTING SIDEWALK ELEVATION
NG 1136.06	EXISTING GROUND ELEVATION
TB 1137.63	EXISTING TOP OF BERM ELEVATION
TS 1136.30	EXISTING TOE OF SLOPE ELEVATION
FF 1138.11	EXISTING FINISH FLOOR ELEVATION
	EXISTING AREA DRAIN
HB	EXISTING HOSE BIBB
GM	EXISTING GAS METER
WV	EXISTING WATER VALVE
GP	EXISTING GATE POST
PP	EXISTING POWER POLE
SSCO	EXISTING SANITARY SEWER CLEANOUT
GR	EXISTING GAS RISER
UGE	EXISTING UNDERGROUND ELECTRIC
	EXISTING TREE
37.85	PROPOSED FINISH GRADE ELEVATION
	NEW DECOMPOSED GRANITE (1/4 MINUS MADISON GOLD).

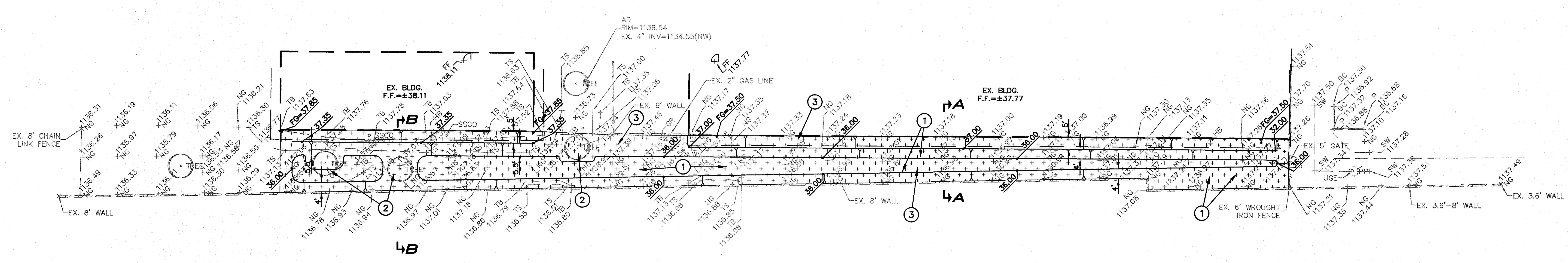
GRADING AND DRAINAGE CONSTRUCTION NOTES:

1. INSTALL 2" THICKNESS OF NEW DECOMPOSED GRANITE (1/4" MINUS MADISON GOLD).
2. PROTECT EXISTING TREE AND ROOTS FROM DAMAGE. MODIFY GRADING AS NEEDED, ADJACENT TO TREE TO PROTECT THE ROOTS.
3. REGRADE LANDSCAPE AREA PER GRADES AND CROSS SECTIONS.

BENCHMARK

MCDOT BENCHMARK 23023-1. TOP OF 3" GLENDALE BRASS CAP IN HANDHOLE, DOWN 1.0', STAMPED "N397" LOCATED AT THE INTERSECTION OF 67TH AVENUE AND MARYLAND AVENUE.

ELEVATION=1128.077 (NAVD88 DATUM)



GRADING AND DRAINAGE PLAN

GLENDALE ELEMENTARY SCHOOL DISTRICT NO. 40

DRAINAGE CORRECTIONS AT
HAROLD W. SMITH ELEMENTARY SCHOOL

DRAWING STATUS	SHEET	OF	
1ST CITY SUBMITTAL	1	1	C-1
DATE: 08-10-16			

160203GR1.DWG

Registered Professional Engineer (Civil)
CERTIFICATE NO
35664
PERCY
MYRON, JR.
Date Signed 3/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 02 21 13

CONSTRUCTION STAKING

Construction staking shall be performed by a licensed Surveyor acceptable to the Architect. Staking will be paid from the Construction Staking Allowance in the Contract.

Stakes: A minimum one set of construction grade stakes or "blue-tops" if possible of the following kind and at the stated interval shall be set. Blue-tops shall be set for all finish grading, sidewalk, curbing, concrete valley gutters, paving subgrade and A.B.C. and shall be left in place until checked and certified by the Civil Engineer.

1. Field staking control.
2. One site benchmark.
3. Mark out demo/sawcuts.
4. Rough grading cut and fill for onsite: at 50-foot intervals and grade breaks.
5. As-builts finish grade.
6. Prepare and submit as-built drawings to Contractor for submittal.
7. Office computer calculation for above staking.

END OF SECTION

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36664
PERCY
MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 31 01 00

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Perform earthwork as shown on the Drawing and as specified herein.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Procure necessary permits or certificates required by City of Phoenix, State of Arizona and Maricopa County. Comply with applicable federal, state and local ordinances, including MAG Standard Specifications and Details. Owner to pay for permits.

B. Layout of all Work under this Section shall be made by a licensed Engineer/Surveyor acceptable to the Architect.

C. General Contractor shall give the Work his personal supervision. In his absence, he shall leave a responsible representative in charge who shall have the authority to receive and execute orders from the Architect and/or his representative.

1.03 PROJECT/SITE CONDITIONS

A. Environmental Requirements: No fill materials shall be placed, spread or rolled during unfavorable weather conditions. When the Work is interrupted by rain, fill operations shall not be resumed until it can be shown to the Civil Engineers/Architect's satisfaction that the moisture content and density of the previously placed fill are as specified.

B. Visit the site. Examine and note conditions as to the character and extent of Work involved.

PART 2 PRODUCTS

2.01 FILL

A. Cleaned onsite soils may be used for fills in all areas of the site.

B. Fill materials shall be approved by the Geotechnical Engineer and Civil Engineer and shall have low swell potential and be free of organic or deleterious material.

C. Imported fill of low or non-expansive soils shall conform with the following requirements:

Maximum Percent Passing No. 200 Sieve	15 percent
Maximum Particle Size	6 inches (1 inch in landscape or turf areas)
Maximum Swell Potential Within exterior concrete slabs	1.5 percent *

*Based on a sample which is remolded to 95% of the ASTM D698 maximum dry density at a moisture content of 2 percent below optimum, placed under a surcharge load of 100 psf and wetted.

PART 3 EXECUTION

3.01 PREPARATION

A. Existing Utilities:
   1. Where existing utilities not shown on the Drawings are encountered, support, shore up, protect same and immediately notify Engineer and General Contractor. Allow entrance, opportunity and ample time for measures necessary for continuance and/or relocation of such services.
   2. Where noted on Drawings, cut and cap all street connections encountered in the excavating along curb line and mark location so they can subsequently be located and reconnected as required.

B. Protection:
   1. Keep all excavations, pits, trenches, etc. entirely free from water.
   2. Protect excavations from rain or water from any source during construction. Use suitable pumping equipment or other means as required by conditions. Continue pumping as necessary until completion of project or until released by Engineer.
   3. Conduct Work in an orderly manner so as not to create a nuisance. Dirt shall not be permitted to accumulate on streets or sidewalks nor to be washed into sewers.
   4. During construction operations and after building construction, buildings shall be protected from surface water run-off and drainage from surrounding heights. Run-off water shall be diverted around buildings and construction operations.

C. Layout:
   1. Maintain all bench marks, control monuments and stakes, whether newly established by Surveyor or previously existing. Protect from damage and dislocation. If necessary to disturb existing bench marks, have Surveyor reestablish in a safe place.
   2. If any discrepancies are found by Surveyor between the Drawings and actual conditions at the site, Engineer reserves the right to make such minor adjustments in Work specified as necessary to accomplish the intent of the contract Documents, without increased cost to Owner.

3.02 EXCAVATABILITY

A. The excavatability of site materials is difficult to evaluate based only on the exploration equipment used during the geotechnical design report. Therefore, the Geotechnical Engineer recommends that the Contractor evaluate the excavatability of site materials by performing test excavations with the size and type of equipment that Contractor plans on using at the site.

B. The near surface and underlying soils can probably be removed with conventional excavating equipment. Deeper excavations may be slower and more difficult to accomplish due to caving and presence of oversized material. Caving should be expected in the non-cohesive granular soils encountered. OSHA requires all excavations over five feet in depth, in which personnel are to enter, be either braced or sloped in accordance with OSHA regulations.

3.03 WORKABILITY

A. Wetting site soils such that moisture contents are at or above optimum could result in some soil pumping under dynamic loadings such as heavy construction equipment driving over the area. In the building area, some pumping is not detrimental to foundation or floor slabs provided the specified percent compaction is achieved. However, in flexible pavement areas where pumping has occurred, and in building areas where severe pumping has damaged subgrade conditions, the area shall be allowed to dry until soils are workable without pumping or the wetted areas removed and replaced with drier site soils.

3.04 GRADING

A. General Contractor shall provide personal supervision for the Work. Leaving a responsible representative in charge, when absent, who shall have the authority to receive and execute instructions from the Architect or his representative.

B. Grading tolerance shall be +0.00 feet and -0.10 feet.

C. The following requirements are for site grading under, within and extending five feet beyond the sidewalks, exterior concrete slabs, and concrete fire lanes.

D. Strip the entire site of all existing fill zones, any backfill zones and any unstable soils. During stripping observe the surface for evidence of buried debris, vegetation or disturbed materials which will require additional removal. If encountered, these materials shall be removed. Areas steeper than 5H to 1V should be benched and any depressions widened to accommodate compaction equipment.

E. Widen any resulting depressions as necessary to accommodate compaction equipment and provide a level base for placing fill.

F. Prepare the ground surface in fill areas and in areas cut to grade by scarifying, moisture conditioning and compacting the exposed surface soils to a minimum 10-inch depth. Moisture conditioning and compaction shall meet requirements under Section 3.07, Compaction.

G. Moisture condition and place engineering fill material required to elevate areas to specified subgrade elevations.

H. Placing, Spreading and Compacting Fill Materials: Fill materials shall be placed and compacted in horizontal lifts of thickness compatible with the compaction equipment used. Each layer shall be spread evenly, moisture conditioned and compacted per Section 3.7, Compaction. The Contractor shall widen any depressions as necessary to accommodate compaction equipment and provide a level base for placing fill. Compaction of each layer shall be continuous over its entire area and the compaction equipment shall make sufficient trips to insure that the required density has been obtained. No lift shall be placed until the previous lift has been approved. Fill operation shall be continued until the fill has been brought to the finished slopes and elevations shown on the Drawings. Imported fill shall conform to the requirements previously defined.

I. Compacted subgrade shall be maintained in a moist state and shall not be allowed to significantly dry prior to placing more fill or base course.

3.05 EXCAVATION

A. Excavation consists of removal and disposal of materials encountered to obtain required subgrade elevations.

B. Excavation for foundations and footings shall have clean vertical walls, all corners squared up. Keep entire excavation free from any loose material. Excavation shall conform to dimensions and elevations indicated with allowance for erection of forms, shoring and inspection of footings.

C. Material to be excavated shall be non-classified and shall include all earth or other materials encountered in excavating and grading. Where material encountered within the limits of Work is considered unsuitable by the Architect, such material shall be excavated below the grade shown on the Drawings as directed, and replaced with suitable material.

D. Earth forms for footings may be permitted provided the earth is suitable and self-supporting as approved by the Architect or Geotechnical Engineer. Earthbank forms for foundation walls will not be permitted.

E. Unauthorized excavation consists of materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect. Under footing, foundation bases, or retaining walls, fill unauthorized excavations by extending the indicated bottom elevations of footing or base at the excavation bottom, without altering required top elevation. Clean concrete fill may be used to bring elevations to proper position, only when acceptable to the Architect. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavations, unless otherwise directed by the Architect. Costs for testing, if required, shall be borne by the Contractor.

F. Stockpile satisfactory materials where directed, until required for backfill or fill. Locate and retain materials away from edge of excavations, even though such excavations are sheeted and braced to prevent such material falling or sliding into the excavations.

G. Maintain sides and slops of excavations in a safe condition until completion of backfilling, by scaling, benching, shelving or bracing. Take precautions to prevent slide or cave-ins.

3.06 BACKFILLING

A. Place backfill about the buildings and structures as far as practical, as the Work of construction progresses. Backfilling against concrete work shall be done only when approved and directed. Backfill shall be deposited in layers of not more than six inches (6") in depth, and for the full width of the cross section. The material shall be carefully watered during placing by means of a fine spray or other approved method, so that each layer shall be thoroughly and uniformly wetted as directed by the Architect. The moisture content of all the material shall be carefully controlled at all times, and shall be checked at proper intervals to insure correct moisture content for compaction specified.

Each layer of fill material shall be compacted by hand and machine tampers to the density required in Section 3.07 COMPACTION when forming subgrade for concrete areas or supporting concrete floor slabs or supporting building footings.

J. Backfilling of trenches shall progress as rapidly as the construction and testing of the Work will permit. In back-filling pipe trenches, approved fill shall first be compacted on both sides of the pipe in eight inch (8") layers to a depth of one foot over the top of the pipe. The remainder of the trenches shall be backfilled in compacted one-foot layers, except that fill in trenches in paved areas shall be compacted in six inch (6") layers to required grade.

3.07 COMPACTION

Compaction of cleaned exposed soil, imported soils, each lift of backfill, subbase fill, imported fill and base course materials shall be accomplished to the following density criteria:

Material	Percent Compaction (ASTM D698)
Cleaned exposed soil, imported soils, backfill and subbase fill:	
Below concrete sidewalk/slabs	90 max
Below pavement sections	95 min
Top soil in playfields and landscape areas	85-90 min
Miscellaneous Backfill not under buildings, concrete or paved areas	90 min

Compaction of clean, exposed site soils or fills of cleaned site soils within sidewalks and exterior concrete slab areas shall be accomplished with soils uniformly mixed at a moisture content of optimum to optimum plus three percent (+3%).

Compaction of imported soils within sidewalks and exterior concrete slab areas shall be accomplished with soils uniformly mixed at a moisture content of optimum plus or minus three percent (±3%).

Natural undisturbed soils or compacted soils subsequently disturbed or removed by construction operations shall be replaced with materials compacted as specified above.

3.08 FINISH GRADING

A. Perform finish grading required as indicated or reasonably inferred to permit installation of Work of others as shown on Drawings. After final clean-up of exterior and removal of trash and construction of the buildings, the site shall be graded to slopes and elevations as indicated on the Drawings and as directed by the Architect. Additional material required for finish grading shall be of topsoil quality, provided, placed and graded by the Contractor. Lawn areas around walks shall provide good slope drainage away from buildings as indicated. Rake indicated site and lawn areas smooth and level to a tolerance of plus or minus 0.1 foot from elevations indicated.

B. Existing clean site soils free of debris and rocks over 1 inch in diameter may be used for fills in landscape areas.

3.09 FIELD QUALITY CONTROL

A. Test: Field density tests shall be made by an approved independent soils testing laboratory, as defined herein, or at the request of the Architect and paid for with the testing allowance. When these tests indicate that the density of any area(s) is below the required density, that particular area(s) shall be reworked until the required density has been obtained.

B. Restore any damage to adjacent properties, street and the like, caused by operations of this Section to original condition without additional cost to Owner.

3.10 CLEANING

A. Conduct Work in an orderly and workmanlike manner and so as not to create a nuisance. Dirt shall not be permitted to accumulate on streets or sidewalks nor to be washed into sewers.

B. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

3.11 AS-BUILT DRAWINGS

A. The Surveyor shall provide certified, signed and sealed as-builts for all finish grade elevations indicated on the Drawings on 4 mil mylar and AutoCAD disk (2011 version or later). The Contractor shall schedule the Work to allow the Surveyor to obtain the as-builts. This Work will not be accepted until as-builts are approved by the Design Civil Engineer and City of Glendale.

END OF SECTION

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36664
PERCY
MYRON, JR.
Date Signed 8/10/16
ARIZONA, U.S.A.
Expires 09/30/16

SECTION 33 70 00

DECOMPOSED GRANITE

DECOMPOSED GRANITE

The Work under this item shall consist of installing a 2 inch compacted thickness of decomposed granite at the locations as indicated on the plans. The Work shall conform to MAG Specifications Section 430.4 except that no 10-mm black polyethylene liner will be required. Two applications of pre-emergent (one prior to placement of granite and one after placement) will be required.

Granite shall conform to MAG Specifications Section 702.4 and have a size of 1/4 inch minus. Color shall be Madison Gold to match the existing granite at the site.

END OF SECTION