	<b>Grand Canyon Unified School District, #4</b> Amendment #1		100 Boulder Street Grand Canyon Village, AZ 86023
	IFB: 21-02-21 PROJECT: Playground Fence/Retaining Wall at Grand Canyon Elementary	Page 1 of 52	

December 15, 2020

This amendment is released to all interested parties.

1. A non-mandatory pre-bid meeting was held on December 7, 2020. The Sign-In Sheet is attached for reference. Items contained within this Amendment are intended to clarify and/or change items within the bid as a result of discussions at meeting and walk-through of the sites.



GCUSD Sign In.pdf

2. Technical clarifications are attached within Addendum No. 1 from EMC2 is 38 pages.



710 Amendment  
01.pdf

3. Please refer to the revised eight page drawings which will answer most of the questions discussed at the prebid meeting.



710 Grand Canyon  
ES Retaining Wall AM

4. Page 40 of the specifications indicates a 60 day schedule for substantial completion following notice to proceed. Please confirm when the anticipated notice to proceed will be. Is it the intent to perform this project in the winter? Can the project be performed in the spring when the students are at school session or is it the intent to perform this in the summer 2021?

**Response:** The District must obtain funding from the School Facilities Board, Page 27, #1. Page 29, #16, “the Governing Board of the District will award it at the first meeting following the funding from the SFB” Page 33, #31, “no commitment is made to this award date as the District cannot control the SFB Agenda process.”

5. Is there a budget or engineer’s estimate available for this project for bonding?

**Response:** There is no estimate available for this project.

6. The letter of authorization from the National Park Service and their terms and conditions is attached in three pages.



Grand Canyon.pdf

7. All other terms and conditions remain the same.
8. Please remember to acknowledge this Amendment #1 with your offer.
9. End of Amendment #1.



Grand Canyon Unified School District, #4  
Pre-Bid Conference Sign-In Sheet

IFB: 21-02-21  
PROJECT: Playground Fence/Retaining Wall at Grand  
Canyon Elementary

Page 1  
of 3

100 Boulder Street  
Grand Canyon Village,  
AZ 86023

Non-Mandatory: Parking Lot at Grand Canyon Elementary, 100 Boulder Street  
December 7, 2020 at 11:00 AM

Firm	Representative	Phone	Email
PGPC	KC Brackley	(480) 204-0146	KC@pgpc.org
Emc2	Dominic Monacchio	602-803-2435	dmonacchio@emc2architects.com
GCUSD	Kris Swatski	406-381-1388	K.Swatski@GrandCanyonSchool.org
Doege Development	Ben Martinez	602-679-1169	benjaminm@doege-development.com
LP's Excavating	Mike Davidson	623-381-5728	LPExcavatingMike@AOL.com
MARSH DEVELOPMENT INC	DAVID BAUGHMAN	520-559-6362	DAVID@MARSH-DEVELOPMENT.COM
GCSD	Thomas O'Loon	360-607-8351	tocennor@grandcanyon-school.org
GCUSD	Juan Landry	928-890-7968	ilandry@grandcanyon-school.org
EDGE Construction	Dylan Witzig	602-918-0088	estimating@edgeconstruct.com
Kinney Construction LLC	Prashanth Venigalla	928-779-2820	PV@kinneyconstruction.net

**Project:**  
Grand Canyon Elementary  
Retaining Wall Replacement

**Project No. :**

SFB – 030204001-9999-004-BRG  
Emc2 – 14819710  
IFB – 21-02-21

**Date:**

12 / 14 / 2020



*Learning Places & Growing Spaces*

**Emc2 GROUP ARCHITECTS PLANNERS, PC**  
1635 North Greenfield Road  
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## AMENDMENT NO. 01

This Amendment forms a part of the Contract Documents and modifies and supplements the original Bid Documents as noted below. It shall be the sole responsibility of the Bidder to appropriately disseminate this data to all concerned prior to the assigned bid date and time.

Acknowledge receipt of the Amendment on the Bid Form. Failure to do so may disqualify the Bid.

### A. COMPLIANCE DOCUMENTS AND GUIDELINES

NPS Letter of Authorization – special requirements and procedures.  
Tree Removal Clarification - Document identifying specific tree removal  
National Park Partner Form

### B. Pre Bid Clarifications

Railroad Ties have creosote and must be removed according to State/ Federal regulations and special permits may be required.  
Contractor to provide a COVID plan prior to mobilization.  
Work hour window is 7am to 7pm daily. Students are not on campus on Fridays. Access can be coordinated with the district.  
Staging area and construction fencing to be coordinated with the district.  
Dirt track drains well and is expected to support a truck for access. The contractor will be expected to regrade any surfaces used for equipment back to original condition.  
Formliner to be Specformliner Inc. #1407, or similar approved equal.  
The entire wall that is facing the walking trail is to be finished with the formliner.  
Color of the wall is intended to match the CMU that is on the adjacent buildings, a light tan color.  
Subgrade waterproofing Specification to be Drylock Extreme or approved equal.  
Geotech Report attached.  
It is expected that the project will be a Spring / Summer project with a NTP beginning Late Feb or early March.

**C. Drawings**

Sheet A100 – Detail A5 revised to show additional existing condition information.  
Sheet A101 – Detail A5 revised to include additional 2" of recycled rubber playground fall protection to match existing.

**C. ATTACHMENTS**

NPS Letter of Authorization – special requirements and procedures.  
Tree Removal Clarification - Document identifying specific tree removal  
National Park Partner Form  
Sub Grade Waterproofing Specification  
Geotech Report  
FULL SET – Amendment 01 with revised drawing changes.

This is a summary of technical modifications, further administrative modifications may be required in the complete issued Amendment.



# DRYLOK® Extreme Masonry Waterproofer

**MANUFACTURER**

**UNITED GILSONITE LABORATORIES**

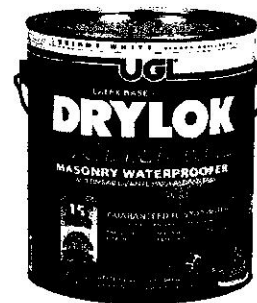
**MAILING:** P.O. Box 70, Scranton, Pennsylvania, 18501

**SHIPPING:** 1396 Jefferson Avenue, Dunmore, Pennsylvania, 18509

**TOLL FREE:** 1-800-UGL-LABS (845-5227)

**PHONE:** 1-570-344-1202 • **FAX:** 1-570-969-7634

**www.ugl.com**



**PRODUCT DESCRIPTION**

Latex Base DRYLOK EXTREME Masonry Waterproofer is the Next Generation in waterproof coatings. Features flexible Encapsulated Polymers which squeeze into the masonry for the ultimate in waterproof protection.

Specially formulated to resist mildew growth on the dry paint film with the incorporation of an environmentally friendly green biocide. Fully transferable 15 year warranty. Tested to ASTM D-7088 Resistance to Hydrostatic Pressure at 15 psi and ASTM D-6904 Resistance to Wind Driven Rain. Reduces radon gas penetration.

- Bright white, smooth finish
- Resists mildew growth on the dry paint film
- Resists 15 psi, equivalent to a wall of water 33 ft. high
- Fully transferable 15 year warranty
- Guaranteed to stop water, even under pressure
- Features flexible encapsulated polymers
- Reduces radon gas penetration
- White is tintable

**BASIC USES**

Ideal for interior, exterior, above or below grade masonry walls, basement walls, retaining walls, foundations, landscape walls, cinder blocks, concrete blocks, bare concrete swimming pools, stucco and brick.

**LIMITATIONS**

DRYLOK Extreme may be applied over previous coatings in sound condition, but the warranty is void. **Not formulated for horizontal surfaces subject to foot traffic.**

**TECHNICAL DATA**

**COMPOSITION:**

Latex base

**SHEEN:**

N/A

**% WEIGHT SOLIDS:**

64-66%

**% VOLUME SOLIDS:**

55-57%

**DENSITY (LBS./US GAL.):**

9.8-10.0

**VISCOSITY:**

110-120 Ku@77°F

**pH:**

9.0-9.9

**COLOR:**

- White – ready mixed formula

**DRY TIME:**

- 2 hours
- To recoat: 3 hours

**Note:** Maximum cure and dry time will be prolonged when slightly humid and damp, cool conditions prevail.

**CLEAN UP:**

Warm soapy water  
Dispose of contaminated absorbent, container and unused contents in accordance with local, state and federal regulations.

**COVERAGE (SQ. FT./US GAL.):**

- 75-100 sq. ft./gallon

**Note:** Actual coverage will vary depending upon application method, surface texture and porosity.

**RECOMMENDED FILM THICKNESS/COAT:**

- 13-21 wet mils/coat

**FLASH POINT:**

N/A

**SHELF LIFE:**

5 Years

**FREEZE/THAW:**

Three cycles

**CONTAINER SIZES:**

One gallon (US), and five gallon (US) containers

**VOC**

Does not exceed 100 g/L

**TINTING**

Use alkali-proof universal tinting colorants. Use only 50% of color normally recommended. Do not use more than 2 fl. oz. of colorant per gallon.

**SURFACE PREPARATION**

Masonry surfaces must be clean and free from dirt, dust, grease, oil, form release compound, frost or paint. Patch all holes or cracks with DRYLOK FAST PLUG®, a fast setting hydraulic cement, and smooth the patch evenly with the surface around it. Check the joint where the floor and wall meet and fill any breaks with DRYLOK FAST PLUG®.

**EFFLORESCENCE**, a white, powdery, crystal-like deposit visible on the masonry surface must be removed.

DRYLOK ETCH or muriatic acid, used according to manufacturer's directions, are effective efflorescence removal agents. All masonry surfaces are subject to occurrences of efflorescence.

May be applied on slightly damp surfaces, but best results are obtained when applied over dry surfaces. For best waterproofing results, wait for a dry (rain-free) period.

**WARNING**

If you scrape, sand, or remove old paint, you may release lead dust. **LEAD IS TOXIC.**



**DRY TIME:**

2 Hours  
Recoat 3 Hours



Soap

**CLEAN-UP:**

Soap and Water



**COVERAGE:**

2 Coats/Minimum



**SPREAD RATE:**

100 Sq. Ft./Gallon

EXPOSURE TO LEAD DUST CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE. Wear a NIOSH-approved respirator to control lead exposure. Clean up carefully with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the National Lead Information Hotline at 1-800-424-LEAD or log on to [www.epa.gov/lead](http://www.epa.gov/lead).

### APPLICATION

STIR THOROUGHLY BEFORE AND DURING APPLICATION. DO NOT THIN. Air and surface temperatures must be 50°F, or higher. Apply directly on bare masonry. Apply first coat with a roller (3/4" nap), DRYLOK Brush or a good quality nylon bristle brush or sprayer. If rolled, back brush the first coat to fill any pinholes in the masonry. If brushed, work the DRYLOK into the pores of the masonry, making sure to fill all pores and pinholes (see COVERAGE). If sprayed, refer to spray specification sheet D98 at [www.ugl.com](http://www.ugl.com). Apply two coats. Allow to dry 3 hours between coats. The second and subsequent coats may be applied by roller, brush or spray. When painting the inside of concrete swimming pools allow DRYLOK Extreme Waterproofer to dry at least one week before putting into service.

### IMPORTANT

If leaking is still present after two coats, it indicates that pores or pin holes are still open. After applying the second coat of DRYLOK Extreme, carefully inspect the entire wall surface for any pinholes in the waterproof coating. Any affected area should be painted with an additional coat to ensure satisfactory waterproofing results. Paint these areas again.

### CAUTION

**Use only with adequate ventilation.** Vapor harmful. May affect the brain or nervous system causing dizziness, headache or nausea. Causes eye, nose and throat irritation. May be harmful if absorbed through skin. Harmful if swallowed.

NOTICE: Reports have associated repeated and prolonged occupational overexposure

to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Do not breathe vapors or spray mist. Ensure fresh air entry during application and drying. If you experience eye watering, headache or dizziness or if air monitoring demonstrates vapor/mist levels are above applicable limits, wear an appropriate, properly fitted respirator (NIOSH approved) during and after application. Follow respirator manufacturer's directions for respirator use. Close container after each use. Do not get in eyes, on skin or clothing. Wash thoroughly after handling.

KEEP OUT OF REACH OF CHILDREN.  
DO NOT TAKE INTERNALLY.  
KEEP FROM FREEZING.

### FIRST AID

**EYES:** Flush immediately with large amounts of water for at least 15 minutes. Consult a physician if irritation persists.

**SKIN:** Wash affected areas with soap and water. Consult a physician if irritation persists.

**INGESTION:** Give 1 or 2 glasses of water. If individual is drowsy or unconscious do not give anything by mouth. Consult a physician, medical facility or poison control center for advise about whether to induce vomiting.

**INHALATION:** Remove to fresh air.

For additional health and safety information please refer to the "Materials Safety Data Sheet".

### WARRANTY

DRYLOK EXTREME Masonry Waterproofer, when applied according to directions on a properly prepared bare masonry surface, is warranted to provide a waterproof coating for fifteen (15) years from date of sale, warranty includes subsequent owners.

Excludes leaks due to cracking of the surface, recurring efflorescence, swimming pools and application over surfaces previously coated with a paint other than DRYLOK Masonry Waterproofer.

### LIMITED WARRANTY

United Gilsonite Laboratories ("UGL") warrants, subject to the limitations set forth herein, that this

product, under normal use and proper storage, will be free from defects in material or workmanship and merchantable for a period of fifteen (15) years from the original date of purchase. This limited warranty extends to the original consumer purchaser of the product only and is non-transferable. If this product is found to be defective by UGL within the warranty period, you will receive a replacement of the product or, at UGL's option, a full refund of the purchase price upon presentation of proof of purchase (original sales receipt). This limited warranty excludes failure to apply the product to a properly prepared bare surface in accordance with UGL's instructions provided with this product. UGL MAKES NO FURTHER EXPRESS WARRANTIES. THIS LIMITED WARRANTY EXCLUDES (1) LABOR AND ALL OTHER COSTS ASSOCIATED WITH THE APPLICATION OR REMOVAL OF THE PRODUCT OR ANY REPLACEMENT PRODUCT, AND (2) ANY INDIRECT, SPECIAL, EXEMPLARY, INCIDENTAL OR CONSEQUENTIAL DAMAGES. Some states do not allow the limitation or exclusion of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This limited warranty gives you specific legal rights and you may also have other legal rights which vary from state to state. To make a warranty claim please contact (with proof of purchase) the store where you purchased the product or contact UGL directly at 1-800-848-7253 (Consumer Hotline) or by mail at UGL Consumer Inquiry Department, P.O. Box 70, Scranton PA 18501-0070.



Extreme Waterproofer	White
1 QT. 4/Case .....	28612
1 GAL. 2/Case .....	28613
5 GAL. 1/Case .....	28615



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Latex base

### SHEEN:

N/A

### % WEIGHT SOLIDS:

64-66%

### % VOLUME SOLIDS:

55-57%

### DENSITY (LBS./US GAL.):

9.8-10.0

### VISCOSITY:

110-120 Ku@77°F

### pH:

9.0-9.9

### COLOR:

- White – ready mixed formula

### DRY TIME:

- 2 hours
- To recoat: 3 hours

**Note:** Maximum cure and dry time will be prolonged when slightly humid and damp, cool conditions prevail.

### CLEAN UP:

Warm soapy water  
Dispose of contaminated absorbent, container and unused contents in accordance with local, state and federal regulations.

### COVERAGE (SQ. FT./US GAL.):

- 75-100 sq. ft./gallon

**Note:** Actual coverage will vary depending upon application method, surface texture and porosity.

### RECOMMENDED FILM THICKNESS/COAT:

- 13-21 wet mils/coat

### FLASH POINT:

N/A

### SHELF LIFE:

5 Years

### FREEZE/THAW:

Three cycles

### CONTAINER SIZES:

One gallon (US), and five gallon (US) containers

### VOC

Does not exceed 100 g/L

### TINTING

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### DRY TIME:

2 Hours  
Recoat 3 Hours



### CLEAN-UP:

Soap and Water



### COVERAGE:

2 Coats Minimum



### SPREAD RATE:

100 Sq. Ft./Gallon

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product, under normal use and proper storage, will be free from defects in material or workmanship and merchantable for a period of fifteen (15) years from the original date of purchase. This limited warranty extends to the original consumer purchaser of the product only and is non-transferable. If this product is found to be defective by UGL within the warranty period, you will receive a replacement of the product or, at UGL's option, a full refund of the purchase price upon presentation of proof of purchase (original sales receipt). This limited warranty excludes failure to apply the product to a properly prepared bare surface in accordance with UGL's instructions provided with this product. UGL MAKES NO FURTHER EXPRESS WARRANTIES. THIS LIMITED WARRANTY EXCLUDES (1) LABOR AND ALL OTHER COSTS ASSOCIATED WITH THE APPLICATION OR REMOVAL OF THE PRODUCT OR ANY REPLACEMENT PRODUCT, AND (2) ANY INDIRECT, SPECIAL, EXEMPLARY, INCIDENTAL OR CONSEQUENTIAL DAMAGES. Some states do not allow the limitation or exclusion of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This limited warranty gives you specific legal rights and you may also have other legal rights which vary from state to state. To make a warranty claim please contact (with proof of purchase) the store where you purchased the product or contact UGL directly at 1-800-848-7253 (Consumer Hotline) or by mail at UGL Consumer Inquiry Department, P.O. Box 70, Scranton PA 18501-0070.



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## Report on Geotechnical Investigation

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Designation: **Grand Canyon Elementary Retaining Wall**

Location: **100 Boulder Street  
Grand Canyon Village, AZ**

Client: **Emc2 Group Architects Planners P.C.**

Project Number: **200451SF**

Date: **May 27, 2020**

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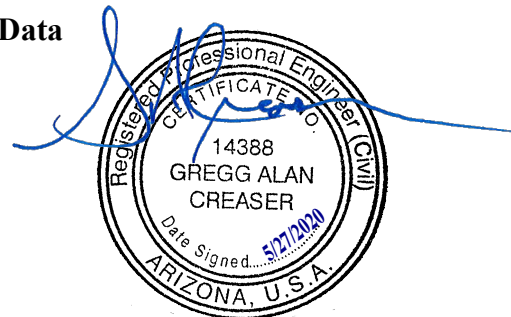
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**APPENDIX – Field and Laboratory Data**





## **1.0 INTRODUCTION**

### **1.1 PROJECT INFORMATION**

This report presents the results of a subsoil investigation carried out at the site of a proposed retaining wall, located at 100 Boulder Street in Grand Canyon Village, Arizona.

At this time, it is our understanding that the existing wood retaining wall is in a state of failure. Plans indicate for the wall to be replaced by a cast in place concrete retaining wall bearing on conventional spread foundations. Structural loads are expected to be light to moderate, and no special considerations regarding settlement tolerances are known at this time. Preliminary information indicates wall heights of between 2 and 7 feet. Retaining wall backfill zones will continue to be used as a playground area, while cut areas will be paved for walking paths and light maintenance truck traffic. Landscaped areas will be utilized for storm water retention and disposal.

### **1.2 FIELD AND LABORATORY INVESTIGATION**

On April 2, 2020, two structural soil borings were drilled at the approximate locations shown on the attached Soil Boring Location Plan. Discussion with elementary school staff took place leading up the field work regarding the removal of playground equipment to allow for a 3<sup>rd</sup> boring location on the eastern side of the existing retaining wall, however no playground equipment had been removed on the day of the field work. Therefore the proposed 3<sup>rd</sup> boring location was inaccessible and was not performed. All exploration work was carried out under the full-time supervision of our staff engineer who recorded subsurface conditions and obtained samples for laboratory testing. The borings were excavated with a CME-75 truck mounted drill rig utilizing 7-inch diameter hollow stem augers. Detailed information regarding the soil borings and samples obtained can be found on an individual Log of Test Boring prepared for each location.

Laboratory testing consisted of moisture content, dry density, grain-size distribution and plasticity (Atterberg Limits) tests for classification and design parameters. Remolded swell tests were performed on samples compacted to densities and moisture contents expected during construction. Compression tests were performed on a selected ring samples in order to estimate settlements and determine effects of inundation. All field and laboratory data are presented in this appendix.

## **2.0 SITE CONDITIONS**

### **2.1 PROPERTY DESCRIPTION**

The existing timber retaining wall is approximately 220 feet in length and is 2 to 7 feet in height. The wall is bounded on the north by a walking path and Grand Canyon School buildings beyond, on the south by existing playground equipment, with the Grand Canyon Schools football field and track beyond, on the west by additional Grand Canyon Schools buildings, and on the east by walking paths and lightly developed forested land. At the time of the investigation the site was covered with Ponderosa pine trees and existing playground equipment. A French drain was observed on the eastern portion of the wall. Site drainage is generally to the north.

### **2.1.1 Existing Retaining Wall Conditions**

The existing retaining wall looks to have been constructed of wooden railroad ties and is in a state of relative failure. While still retaining soil in the area of the playground, there are several areas along the wall that showcase wooden beams with up to 6 inches of outward displacement. In addition to this, several vertical support columns have been tilted in the outward direction leaning away from the wall backfill zone. Some areas showcase up to 6 inches of outward movement of vertical support beams as horizontal beams push against them. As previously noted, a french drain system was observed on the eastern side of the wall.

## **2.2 SUBSURFACE CONDITIONS**

### **2.2.1 Field Results**

Subsurface conditions are somewhat variable. The upper soils consist of silty sands, sandy lean clays, and small amounts of highly plastic “fat” clay. Underlying the upper soils is predominantly decomposed limestone followed by moderately weathered limestone. Predominantly decomposed limestone was encountered between 5 and 6 feet below existing grade.

Standard Penetration Resistance Tests (SPT) values range from 7 to 55 blows per foot (bpf) in the upper soils, with the majority of soils exhibiting blows per foot between 23 and 50. SPT values of 50+ bpf were typically encountered in the strata identified as predominantly decomposed and moderately weathered limestone bedrock. Based on visual and tactile observation, the upper soils were typically in a moist state, below or near the plastic limit at the time of investigation. Groundwater was not encountered during this investigation; however, it is not uncommon to have seasonally perched water that may be encountered at or near the soil/bedrock interface.

### **2.2.2 Laboratory Results**

Laboratory testing indicates liquid limits in the range of non-plastic to 55 percent with plasticity indices ranging from non-plastic to 35 percent. In-place densities of the upper soils ranges from 98 to 102 pcf with moisture contents on the order of 20 percent. Volume increase due to wetting of the upper soils is generally on the order of 2.4 percent when re-compacted to moistures and densities normally expected during construction and confined to 100 psf. An undisturbed sample displayed a moderate volume decrease of 5.8 percent due to inundation when subjected to 3200 psf.

## **2.3 SEISMIC PARAMETERS**

The project area is located in a seismic zone that is considered to have low to moderate historical seismicity. Grand Canyon Village, Arizona has a moderate earthquake risk, with a magnitude 2.6 earthquake having occurred in 2013. The USGS database shows that there is a 26% chance of a 5.0 magnitude or greater earthquake within 50km of Grand Canyon Village, Arizona within the next 50 years.

The largest earthquake within 50 miles of Grand Canyon Village AZ was a 5.3 magnitude earthquake in 1993. Liquefaction should not be a concern as groundwater exceeds 15 meters below the surface.

Although borings were not advanced to 100 feet, based on the nature of the subsoils encountered in the borings and geology in the area, a Site Class Definition, Class C may be used for design of the structures. In addition, the following seismic parameters may be used for design (based on ASCE 7-16 (IBC 2018), utilizing the ATC Hazards by Location Online Tool):

<b>2.3.1 Seismic Parameters</b>	
<b>Site Class:</b>	<b>C</b>
MCE <sup>1</sup> spectral response acceleration for 0.2 second period, <b>S<sub>s</sub>:</b>	<b>0.375 g</b>
MCE <sup>1</sup> spectral response acceleration for 1.0 second period, <b>S<sub>1</sub>:</b>	<b>0.114 g</b>
Site coefficient, <b>F<sub>a</sub>:</b>	<b>1.3</b>
Site coefficient, <b>F<sub>v</sub>:</b>	<b>1.5</b>
MCE <sup>1</sup> spectral response acceleration adjusted for site class, <b>S<sub>MS</sub>:</b>	<b>0.488 g</b>
MCE <sup>1</sup> spectral response acceleration adjusted for site class, <b>S<sub>M1</sub>:</b>	<b>0.17 g</b>
5% Damped spectral response acceleration, <b>S<sub>DS</sub>:</b>	<b>0.325 g</b>
5% Damped spectral response acceleration, <b>S<sub>D1</sub>:</b>	<b>0.114 g</b>
NOTE 1: MCE = maximum considered earthquake	

### 3.0 ANALYSIS

This report herein assumes that the information contained in Section 1.1 Project Information is accurate and that cuts and/or fills will be 10 feet or less. If cuts and/or fills greater than 10 feet are required to reach finished grades, this office should be contacted for additional recommendations. Analysis of the field and laboratory data indicates that subsoils at the site are generally not suitable for support of the proposed retaining wall. Rock was encountered at depths ranging from 5 to 6 feet below existing grade on the backfill side of the existing retaining wall. It is understood that new proposed retaining wall heights are on the order of 2-7 feet. Accordingly, recommendations are provided to support retaining wall foundations on undisturbed limestone bedrock. Foundation options provided include standard shallow foundations.

It is likely that bedrock will be shallow enough for support of the proposed retaining wall on shallow spread footings bearing directly on undisturbed, clean, competent limestone bedrock, or a 2 sack CLSM per M.A.G. Specification Section 728 extending to competent bedrock below footings bearing at a minimum depth of 30 inches below finished exterior grade within 5 feet of the structure. Care must be taken during foundation excavation to ensure that the surface of bearing material remains undisturbed to

prevent post construction settlement. Limestone that is disturbed during foundation excavations will need to be removed. Competent limestone on the site will generally be excavatable by conventional means, however heavy duty rock removal equipment may be necessary where moderately weathered limestone is encountered. The competent bedrock should be cleaned of all soil and organic material (i.e. tree roots, pine needles, etc.) within the footing excavations. Due to the possibility of encountering rock at variable depths, stepping of the footings may be required.

The upper fill soils present some moderate concerns with respect to expansion/shrinkage potential due to moisture fluctuations. The swell potential is considered moderate but may be great enough to cause damage to structures bearing on this material. In addition to the expansion potential, fill soils encountered within the backfill zone of the existing retaining wall are undocumented and should be removed prior to new construction.

For retaining wall construction, the uphill side of the wall should have clean leach rock wrapped with filter fabric along with weep holes installed near the base of the wall (or other means). This will prevent water from building up behind the wall and increasing the hydrostatic pressure, leading to potentially negative wall performance. Bearing capacities and lateral loading parameters provided in Sections 4.2 and 4.3 of this report may be used for cast in place concrete and/or masonry retaining walls. If MSE walls are used, soil parameters for the reinforced zone will be dependent upon the design and material used within the reinforced zone.

Preparation of the site should be relatively straight forward, with extra care being needed to not disturb decomposed limestone during footing excavations.

## **4.0 RECOMMENDATIONS**

### **4.1 EARTHWORK**

#### **4.1.1 Site Preparation**

The entire area to be occupied by the proposed construction should be stripped of all vegetation, debris, rubble and obviously loose surface soils. As previously indicated, following demolition of the existing retaining wall and any other structures, all fill soils within the new construction zone should be removed to verify that all foundation elements and utility/drainage components have been removed. Excavations as a result of foundation and utility removal should be widened as necessary to accommodate compaction equipment.

All cut areas and areas to receive engineered fill should be scarified 8 inches, moisture conditioned to optimum  $\pm 2$  percent and compacted to at least 95 percent of maximum dry density as determined by ASTM D-698. Scarification of rock is not necessary. A representative of the Geotechnical Engineer should examine foundation excavations to ensure that undisturbed, competent bedrock has been achieved prior to footing placement.

#### 4.1.2 Site Drainage

Although foundations bearing on undisturbed bedrock should be minimally impacted by the infiltration of water, recognizing the need to minimize significant water penetration adjacent to the wall perimeter that could detrimentally affect retaining wall backfill materials, precautions must be taken to ensure that shallow spread footings perform as expected. Attention must be paid to provide proper drainage to limit the potential for water infiltration of deeper soils. Potential landscape plans should use mostly low water use or "green" desert type plants (xeriscape). It is preferred to keep irrigated plants completely out of the retaining wall backfill zone, and with irrigation schedules set and maintained to run intermittently. **Unpaved planter areas should be sloped at least 5 percent for a distance of at least 10 feet away from the wall.** It is understood that this may not be possible due to ADA maximum slope requirements for the adjacent playground area. The slope may be reduced to 2 percent provided extra care is taken to ensure sidewalks and other hardscape features do not create a "dam" that prevents positive drainage away from the buildings, creating a "pond" adjacent to the building. Weep hole drainage should also be directed away from the wall.

It is reiterated that conventional shallow spread footings are recommended for the retaining wall foundation since this is the most economical system available and if loading conditions allow. As previously mentioned, foundations bearing on undisturbed bedrock should be minimally affected by moisture fluctuations, however the following recommendations are made to ensure performance of the retaining wall:

- 1) Take extra precaution to backfill and compact native soil fill to 95 percent in all retaining wall backfill zones.
- 2) Create and maintain positive drainage away from the wall for a minimum of 10 feet.
- 3) Avoid sidewalks, curbs or other elements that create a dam that could cause water to pond within 5 feet of the perimeter wall.
- 4) Include no irrigated landscape materials within the backfill zone of the wall.
- 5) Between 3 and 5 feet from the backfill zone, include only landscape materials that can be irrigated with a maximum of 1 gallon per hour emitter heads. Set and maintain irrigation controllers to prevent 24/7 flows.
- 6) Any landscape materials requiring greater than 1 gallon per hour irrigation, including turf, shall be at least 10 feet from backfill zone.
- 7) All irrigation feeder lines, other than those that supply individual emitters, shall not be placed closer than 5 feet to the backfill zone.

### 4.1.3 Fill and Backfill

Native soils are marginally suitable for use in grading fills. As indicated some of the soils present a minor concern regarding the swell potential. It may be possible to selectively stockpile some of the native material for reuse as retaining wall backfill. Native soils excluding material classifying as CH may be used for general grading fill. Retaining wall backfill soils, native or otherwise should meet the specifications set forth below. Oversized material (> 3 inches) should be removed or reduced in size.

4.1.3.1 Fill Specification		
Specification	Retaining Wall Backfill	General Fill
Passing 3"/75mm	100%	100%
Passing #200/0.075mm	≤60%	15-60%
Liquid Limit	<30%	<30%
Plasticity Index	<10%	<10%
Swell <sup>1</sup>	<1.5	<2.0

Notes:  
 1. Swell potential when compacted to 95 percent of maximum dry density (ASTM D-698) at a moisture content of 2 percent below optimum, confined under a 100 psf surcharge, and inundated.

**Clean Cinders are not acceptable beneath foundations. For fill placed beneath foundations, it should meet the above specifications in addition to containing at least 15 percent passing the 200 sieve.** Although “clean” cinders often times meet our fill specifications for placement beneath building slabs, they may pose difficulties during construction. Due to their granular nature and lack of sufficient fines, “clean” cinders are a free draining material. As a result, they may be difficult to properly moisture condition and water may infiltrate the cinders and saturate the underlying soils. This could result in an unstable support for foundations and building slabs. Excess water, as a result of moisture conditioning, is often observed at the interface between the fill and underlying less permeable material. This often results in free water accumulating in foundation excavations prior to the placement of concrete. Free water and loose saturated soils would need to be removed prior to placement of concrete. “Clean” cinders also pose difficulties in trenching operations due to the inability to excavate neat trenches. With the lack of fines and cohesive soils, the clean cinders generally slough and vertical walls are hard to maintain. If a cinder based product is used for import fill above foundation bottom elevation, consideration should be given to a “dirty” cinder product that meets the fill criteria for placement beneath foundations.

Imported common fill for use in site grading should be examined by a Soils Engineer to ensure that it is of low swell potential and free of organic or otherwise deleterious material. Fill should be placed on subgrade which has been properly prepared and approved by a Soils Engineer. Fill must be wetted and thoroughly mixed to achieve optimum moisture content, ±2 percent. Granular fill



(ASTM Classification GW, GP, SW, SP) can be placed on the dry side of optimum at the discretion of the geotechnical engineer on record.

Fill should be placed in horizontal lifts of 8-inch thickness (or as dictated by compaction equipment) and compacted to 95 percent of maximum dry density per ASTM D-698. Frozen material shall not be placed, nor shall fill be placed upon frozen grade.

## 4.2 FOUNDATION DESIGN

### 4.2.1 Shallow Foundations

The following bearing capacities can be utilized for design:

4.2.1.1 Foundation Bearing Capacities					
Structure	Foundation Type	Foundation Depth	Bearing Medium	Bearing Capacity	Notes
Retaining Wall	Spread	2.5 ft <sup>1</sup>	Undisturbed, Competent Limestone	3,500 psf	1
<b>Notes:</b>					
1. – Foundation depth refers to the bottom of footing elevation from the lowest exterior grade within 5.0 feet of the foundation element. All capacities are based on bearing media.					

This bearing capacity refers to the total of all loads, dead and live, and is a net pressure. It may be increased one-third for wind, seismic or other loads of short duration. All footing excavations should be level and cleaned of all loose or disturbed materials. Positive drainage away from the proposed buildings must be maintained at all times.

Estimated settlements under design loads for foundations bearing on undisturbed rock will be negligible. Post-construction differential settlements will be negligible, under existing and compacted moisture contents. As indicated in [Section 4.1.2 Site Drainage](#), positive drainage away from structures, and controlled routing of runoff should be provided to prevent ponding adjacent to perimeter walls. Caution must be used when considering planters requiring heavy watering. Care should be taken in design and construction to insure that domestic and interior storm drain water is contained to prevent seepage. Consideration should be given to including a shear key embedded into the limestone bedrock to aid in sliding and over-turn resistance.

### 4.3 LATERAL PRESSURES

The following lateral pressure values may be utilized for the proposed construction:

4.3.1 Lateral Pressures		
Active Pressure		
Unrestrained Walls		<b>35 pcf</b>
At-Rest Pressure		
Restrained Walls		<b>60 pcf</b>
Passive Pressures		
Continuous Footings		<b>300 pcf</b>
Spread Footings or Drilled Piers		<b>350 pcf</b>
Coefficient of Friction		
With Passive Pressure		<b>0.35</b>
Without Passive Pressure		<b>0.45</b>
Clean Bedrock		<b>0.60</b>

All backfill must be compacted to not less than 95 percent (ASTM D-698) to mobilize these passive values at low strain. **Expansive native soils should not be used as retaining wall backfill**, except as a surface seal to limit infiltration of storm/irrigation water. The expansive pressures could greatly increase active pressures. The exposed rock cut must be cleaned of all loose debris by high pressure air or water to take advantage of the higher coefficient of friction.

### 4.4 UTILITY INSTALLATION

Trench excavations for utilities can be accomplished by conventional trenching equipment except in areas where moderately weathered limestone is encountered. Heavy duty rock removal equipment will be necessary where rock is encountered. Trench walls should stand near-vertically for the short periods of time required to install utilities. Sloughing of upper soils should be anticipated as trench walls dry out. If trenches are greater than shoulder-height, precautions must be taken to protect workmen. All trenches should be in accordance with [OSHA Excavation Standard 1926 Subpart P](#).

Pipe bedding and shading should be per M.A.G. Specification Section 601.4 (and any Grand Canyon National Park/Coconino County modifications). Backfill of trenches above bedding zones may be carried out with native excavated material provided material greater than 8 inches is broken down or removed. Material used for backfill of trenches should be moisture-conditioned, placed in 8 inch lifts and mechanically compacted. Water settling is not recommended. Compaction requirements are summarized in [Section 4.1.3 Fill and Backfill](#) of this report.

### 4.5 TEMPORARY AND PERMANENT SLOPES

Care should be taken during excavation not to endanger nearby existing structures, roadways, utilities, etc. Depending on proximity, existing structures (including utilities) may require

shoring, bracing or underpinning to provide structural stability and protect personnel working in the excavation.

Generally, permanent cut or fill slopes should be no steeper than 2 horizontal to 1 vertical (2:1). Where particular conditions make it appropriate to vary from these slopes, these must be addressed on a case by case basis, either in this report or at special request directed to a representative of this office. Steeper cut slopes in stable rock may be possible (depending of geology), not very likely in soils. Determination of acceptable steeper slope ratios is predicated on a stability analysis of the specific geometry, determinations of soil and groundwater characteristics, structure set backs, surcharge loads and slope stabilization.

Where fills are made on hillsides or slopes, the slope of the original ground upon which the fill is to be placed shall be plowed or scarified deeply or where the slope ratio of the original ground is steeper than 5 horizontal to 1 vertical (5:1), the bank shall be stepped or benched to remove all loose soils and to provide a level surface for placement of fill. Ground slopes which are flatter than 5 to 1 may require benching when considered necessary by a representative of this office. The benches should be cut wide enough to remove loose surface soils and allow proper compaction of fills. A minimum bench width of 8 feet is typically recommended for the first lift (toe) of any fill placed on a slope. This width may be reduced at the direction of the field engineer depending on the presence of loose soils, slope steepness, exposed rock and lift thickness. A keyway shall also be constructed at the toe of the slope. The key width shall be  $\frac{1}{2}$  times the height of the slope or at least  $1\frac{1}{2}$  times the width of the compaction equipment. The key bottom shall be sloped 2% toward the slope. The key shall be excavated into dense soil or rock formation to a minimum depth of 18 inches unless approved otherwise by the engineer.

Placement and obtaining compaction of fill adjacent to fill slopes may be very difficult. Depending on soil type and final slope configuration, it may be necessary to over-build the slope and cut back to the final configuration to obtain the required degree of compaction.

## **5.0 CONCLUSION**

The scope of this investigation and report includes only regional published considerations for seismic activity and ground fissures resulting from subsidence due to groundwater withdrawal, not any site specific studies. The scope does not include any considerations of hazardous releases or toxic contamination of any type.

Our analysis of data and the recommendations presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific sample locations. Our work has been performed in accordance with generally accepted engineering principles and practice; this warranty is in lieu of all other warranties expressed or implied.

We recommend that a representative of the Geotechnical Engineer observe and test the earthwork and foundation portions of this project to ensure compliance to project specifications and the field applicability of subsurface conditions which are the basis of the recommendations presented in this report. If any significant changes are made in the scope of work or type of construction that was assumed in this report, we must review such revised conditions to confirm our findings if the conclusions and recommendations presented herein are to apply.

Respectfully submitted,  
SPEEDIE & ASSOCIATES, INC.



Garrett J. Chott, E.I.T.



Gregg A. Creaser, P.E.

# APPENDIX

**SOIL BORING LOCATION PLAN**

**SOIL LEGEND**

**LOG OF TEST BORINGS**

**TABULATION OF TEST DATA**

**CONSOLIDATION TESTS**

**MOISTURE-DENSITY RELATIONS**

**SWELL TEST DATA**





 - APPROXIMATE SOIL BORING LOCATIONS  
 B-3 NOT ACCESSIBLE AT THE TIME OF FIELD INVESTIGATION

Drawing Courtesy of Google Earth



# SOIL BORING LOCATION PLAN

Grand Canyon Elementary Retaining Wall  
 100 Boulder Street  
 Grand Canyon Village, Arizona

**SPEEDIE  
 AND ASSOCIATES**  
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS  
 2026 N. 3rd Street  
 FLAGSTAFF, ARIZONA 86004

DR:GJC	CHK:CWS	REV:	DATE: 5-21-2020	PROJECT NO. 200451SF
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TMPLT 2000.CAD 10/23/00



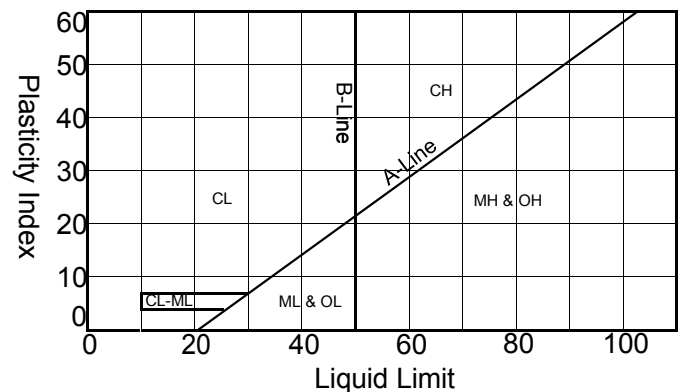
# SOIL LEGEND

SAMPLE DESIGNATION	DESCRIPTION	
<b>AS</b>	<b>Auger Sample</b>	A grab sample taken directly from auger flights.
<b>BS</b>	<b>Large Bulk Sample</b>	A grab sample taken from auger spoils or from bucket of backhoe.
<b>S</b>	<b>Spoon Sample</b>	Standard Penetration Test (ASTM D-1586) Driving a 2.0 inch outside diameter split spoon sampler into undisturbed soil for three successive 6-inch increments by means of a 140 lb. weight free falling through a distance of 30 inches. The cumulative number of blows for the final 12 inches of penetration is the Standard Penetration Resistance.
<b>RS</b>	<b>Ring Sample</b>	Driving a 3.0 inch outside diameter spoon equipped with a series of 2.42-inch inside diameter, 1-inch long brass rings, into undisturbed soil for one 12-inch increment by the same means of the Spoon Sample. The blows required for the 12 inches of penetration are recorded.
<b>LS</b>	<b>Liner Sample</b>	Standard Penetration Test driving a 2.0-inch outside diameter split spoon equipped with two 3-inch long, 3/8-inch inside diameter brass liners, separated by a 1-inch long spacer, into undisturbed soil by the same means of the Spoon Sample.
<b>ST</b>	<b>Shelby Tube</b>	A 3.0-inch outside diameter thin-walled tube continuously pushed into the undisturbed soil by a rapid motion, without impact or twisting (ASTM D-1587).
<b>--</b>	<b>Continuous Penetration Resistance</b>	Driving a 2.0-inch outside diameter "Bullnose Penetrometer" continuously into undisturbed soil by the same means of the spoon sample. The blows for each successive 12-inch increment are recorded.

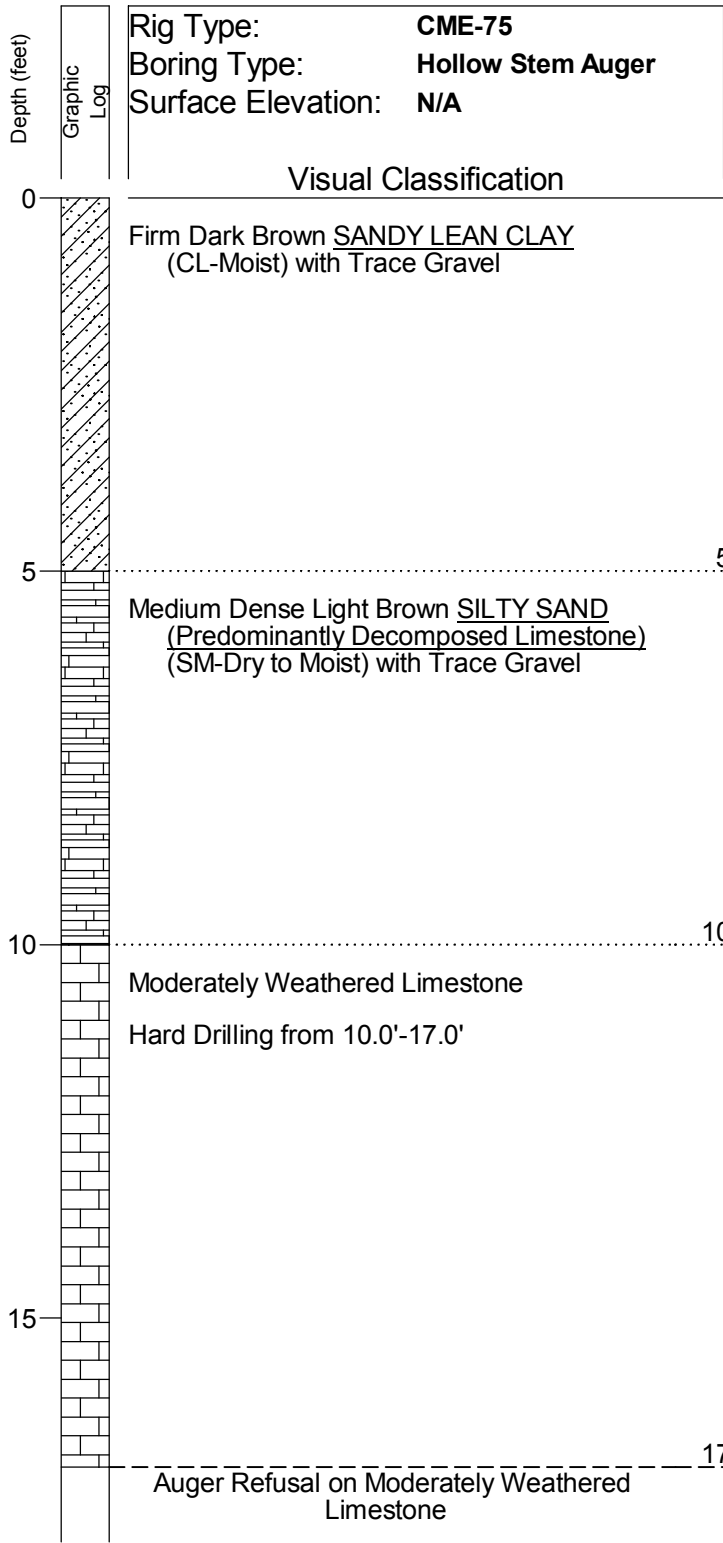
CONSISTENCY			RELATIVE DENSITY	
Clays & Silts	Blows/Foot	Strength (tons/sq ft)	Sands & Gravels	Blows/Foot
Very Soft	0 - 2	0 - 0.25	Very Loose	0 - 4
Soft	2 - 4	0.25 - 0.5	Loose	5 - 10
Firm	5 - 8	0.5 - 1.0	Medium Dense	11 - 30
Stiff	9 - 15	1 - 2	Dense	31 - 50
Very Stiff	16 - 30	2 - 4	Very Dense	> 50
Hard	> 30	> 4		

MAJOR DIVISIONS		SYMBOLS		TYPICAL DESCRIPTIONS
		GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS <small>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE</small>		<b>GW</b>	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			<b>GP</b>	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			<b>GM</b>	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	SAND AND SANDY SOILS <small>MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE</small>		<b>SW</b>	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			<b>SP</b>	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
			<b>SM</b>	SILTY SANDS, SAND - SILT MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS <small>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE</small>		<b>ML</b>	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			<b>CL</b>	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			<b>OL</b>	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS <small>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE</small>		<b>MH</b>	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			<b>CH</b>	INORGANIC CLAYS OF HIGH PLASTICITY
			<b>OH</b>	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			<b>PT</b>	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

MATERIAL SIZE	PARTICLE SIZE				
	Lower Limit		Upper Limit		
	mm	Sieve Size ♦	mm	Sieve Size ♦	
SANDS	Fine	0.075	#200	0.42	#40
	Medium	0.420	#40	2.00	#10
	Coarse	2.000	#10	4.75	#4
GRAVELS	Fine	4.75	#4	19	0.75" x
	Coarse	19	0.75" x	75	3" x
COBBLES	75	3" x	300	12" x	
BOULDERS	300	12" x	900	36" x	
♦U.S. Standard		*Clear Square Openings			



NOTE: DUAL OR MODIFIED SYMBOLS MAY BE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS OR TO PROVIDE A BETTER GRAPHICAL PRESENTATION OF THE SOIL



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-2	3.5	19.7	102.1	
BS-1	5.0	NT	NT	
S-3	6.5	NT	NT	
RS-4	8.5	NT	NT	
S-5	11.5	NT	NT	55/12"
S-6	15.3	NT	NT	50/4"

Boring Date: **4-2-20**  
 Field Engineer/Technician: **G. Chott**  
 Driller: **B. Anderson**  
 Contractor: **Resilient Drilling**

Water Level		
Depth	Hour	Date
<b>Free Water was Not Encountered</b>		

NT = Not Tested

**SPEEDIE AND ASSOCIATES**

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

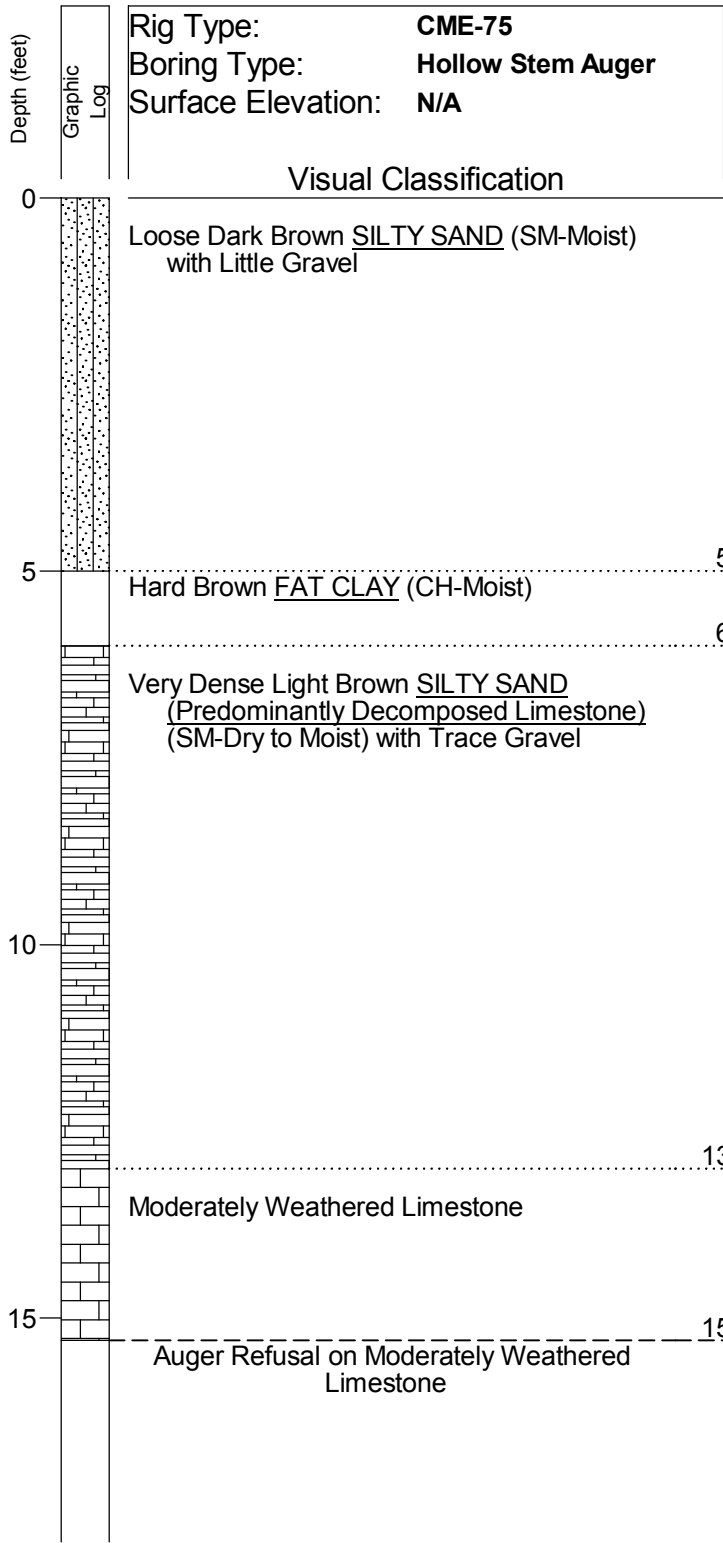
**Grand Canyon Elementary Retaining Wall**

**100 Boulder St.**

**Grand Canyon Village, Arizona**

Project No.: **200451SF**

SPEEDIE 200451SF.GPJ GEN GEO.GDT 5/21/20



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-2	3.5	NT	NT	
BS-1	5.0	NT	NT	
RS-3	6.0	20.3	97.6	
RS-5	8.5	NT	NT	55/12"
BS-4	10.0	NT	NT	
S-6	10.3	NT	NT	50/4"
S-7	15.3	NT	NT	50/3"

Boring Date: **4-2-20**  
 Field Engineer/Technician: **G. Chott**  
 Driller: **B. Anderson**  
 Contractor: **Resilient Drilling**

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

**SPEEDIE AND ASSOCIATES**

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

**Grand Canyon Elementary Retaining Wall**

**100 Boulder St.**

**Grand Canyon Village, Arizona**

Project No.: **200451SF**

SPEEDIE 200451SF.GPJ GEN GEO.GDT 5/21/20

# 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-2	RING	2.5 - 3.5	19.7	102.1	57.6	77	81	84	100	24	15	9	CL	SANDY LEAN CLAY with GRAVEL
B-2	BS-1	BULK	0.0 - 5.0	NT	NT	41.3	65	88	95	100	NP	NP	NP	SM	SILTY SAND
B-2	RS-3	RING	5.0 - 6.0	20.3	97.6	80.5	96	98	98	100	55	20	35	CH	FAT CLAY with SAND
B-2	RS-5	RING	7.5 - 8.5	NT	NT	36.5	46	68	75	100	NP	NP	NP	SM	SILTY SAND with GRAVEL

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 1

Grand Canyon Elementary Retaining Wall  
100 Boulder St.  
Grand Canyon Village, Arizona  
Project No. 200451SF



# CONSOLIDATION TEST

PROJECT: Grand Canyon Elementary Retaining Wall

PROJECT NO.: 200451SF

LOCATION: 100 Boulder St.

DATE: 4/2/20

BORING NO.: B-1

SAMPLE NO.: RS-2

SAMPLE DEPTH: 2.5 to 3.5

LABORATORY NO.: ANN97

LIQUID LIMIT: 24

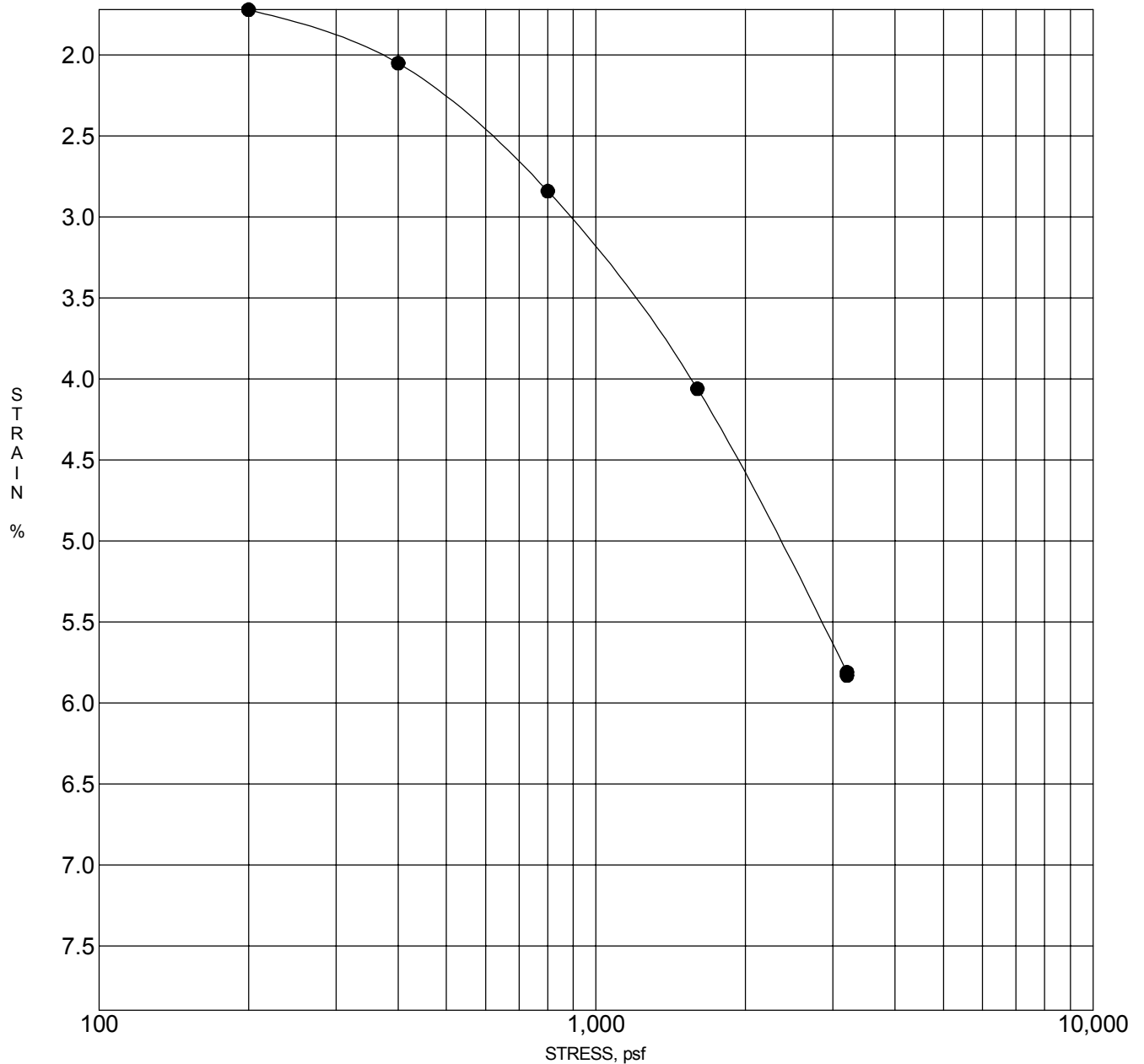
PLASTIC LIMIT: 15

PLASTICITY INDEX: 9

CLASSIFICATION: CL

ASTM SOIL DESCRIPTION:

SANDY LEAN CLAY with GRAVEL



Sample inundated at end of test at 3200 psf

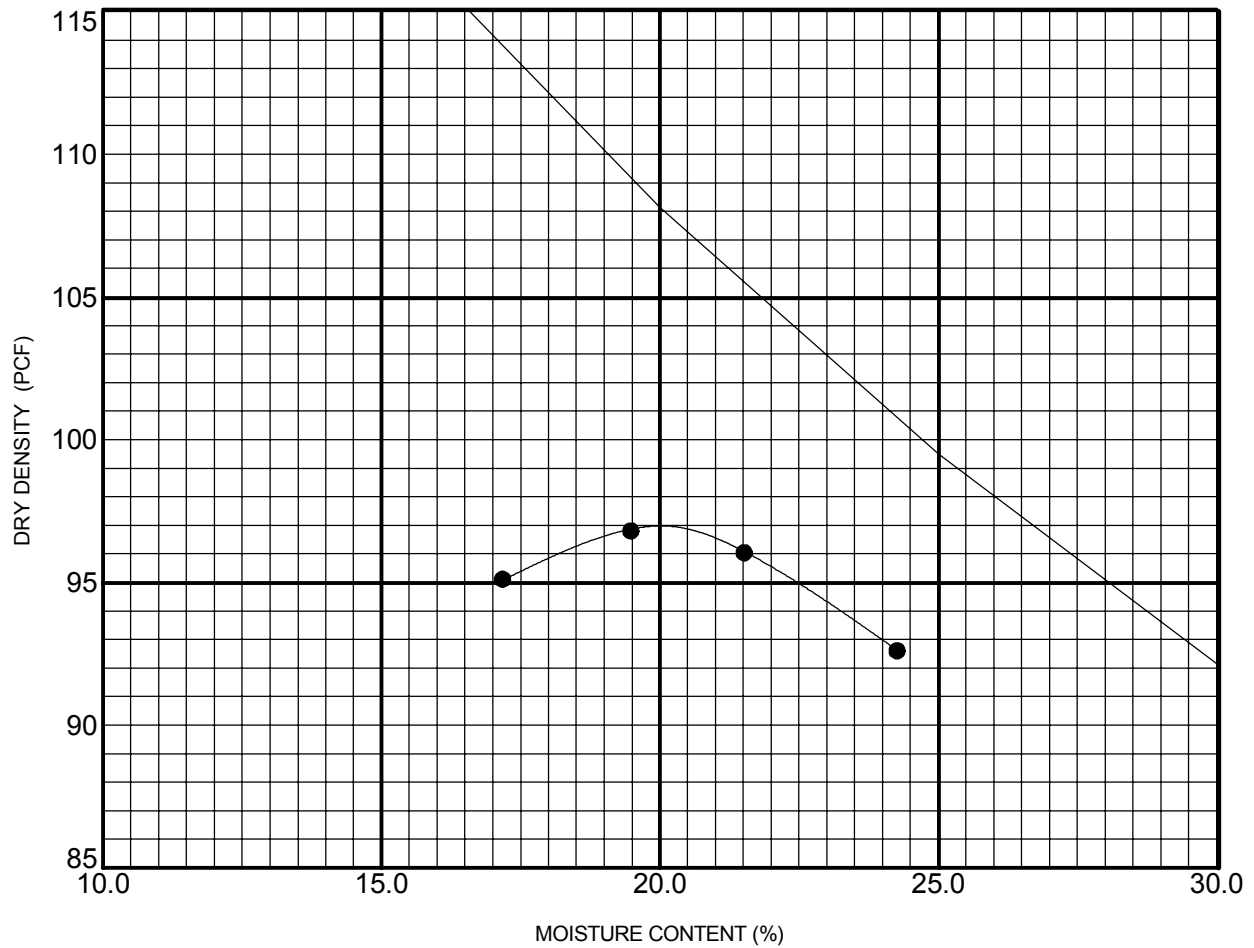
**SPEEDIE  
AND ASSOCIATES**

# MOISTURE-DENSITY RELATIONS

PROJECT: Grand Canyon Elementary Retaining Wall PROJECT NO.: 200451SF  
LOCATION: 100 Boulder St. DATE: 4/2/20  
BORING NO.: B-2 SAMPLE NO.: BS-1 SAMPLE DEPTH: 0 to 5 LABORATORY NO.: ANP03  
METHOD OF COMPACTION: D698A  
LIQUID LIMIT: NP PLASTIC LIMIT: NP PLASTICITY INDEX: NP  
CLASSIFICATION: SM ASTM SOIL DESCRIPTION: SILTY SAND

MAXIMUM DRY DENSITY: 97.0 PCF

OPTIMUM MOISTURE CONTENT: 20.1%





# 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-2, BS-1	5.0	97.0	20.1	93.2	17.4	96.0	28.7	100	2.4
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## Letter of Authorization

### Memorandum

**To:** Pamela Edwards, Transportation and Clinic Program Manager, Commercial Services Division

**From:** Erin Janicki, Environmental Protection Specialist, Planning, Environment, and Projects

**Through:** Rachel Bennett, Acting Chief, Planning, Environment, and Projects

**Subject:** Compliance Requirements for Reconstruction of the Failing Retaining Wall at Grand Canyon School Playground (PEPC 96278)

The superintendent has conditionally approved this project for compliance with the following requirements. **You must comply with the following Mitigation Requirements (please note: some may be required prior to project initiation).** These requirements are in place to protect park resources and visitor experience.

**Project Description:** This project proposes the reconstruction of the playground retaining wall located between the elementary school (Building #323) and the playground at Grand Canyon Unified School (School). The current playground retaining wall is constructed of stacked railroad ties over 6 ft in height and is in a state of failure as the railroad ties have degraded and are shifting out of place, creating a significant safety hazard. The wall is beyond its life expectancy and poses a hazard to both the school children who play on the playground near the wall and anyone who utilizes the trail. The proposed new material would be a split faced concrete masonry unit (CMU) wall that will be identical to what is currently on the Upper Elementary School, Building #323 (to the northeast and visible from the wall location) as well as the Multipurpose Building, Building #1452 (to the west of the wall location). The possibility exists that the asphalt trail will need to be removed and reinstalled back to its current location in order to accommodate support footings. There are trees that have grown up since the original railroad tie wall was constructed that would need to be removed to accommodate the foundation of the new retaining wall. The project start date is unknown based on funding availability. To mitigate current safety concerns, the School will work with the Park to coordinate temporary closure of that section of trail until the retaining wall can be replaced.

### Mitigation Requirements:

- You are responsible for ensuring that these Mitigation Requirements are followed and that these measures are incorporated into any contracts for this project and implemented by the staff assigned to undertake the work.
- If, for any reason, mitigation measures cannot be accomplished due to budget or timeframe or there is a change in project scope or project leader, you must contact the Planning, Environment, and Projects Division before proceeding with the project.

### Cultural Resources

- Although there is no surface evidence of archeological resources, clearance to proceed is recommended with the condition that if concealed archeological resources are encountered during project activities, all necessary steps will be taken to protect them and the Park Cultural Resources Manager will be notified immediately.

- Areas selected for staging equipment and materials are expected to be located in existing disturbed areas where there is no potential for archeological resource disturbance. Contact the park's Cultural Resource Program Manager before creating/utilizing any staging areas not previously addressed or reviewed for this project.

### **Vegetation**

- Vegetation removal shall be avoided during wildlife's primary breeding/nesting seasons between early-April and mid-August.
- School and Project Lead will work with Park vegetation staff to identify trees needing removal and will confirm with Park vegetation staff that there will be no significant adverse impacts resulting from removal of identified trees. Please contact Dan Boughter at Daniel\_boughter@nps.gov or (928) 638-7857 to coordinate identification and review of trees to be removed.

### **Wildlife**

- Wildlife will not be fed or approached.
- The project site will be cleaned up at the end of each day the work is being conducted (i.e. trash disposed of/secured appropriately, scrap materials picked up) to minimize the likelihood of condors visiting the site. Park wildlife program staff may conduct periodic spot checks to ensure adequate project clean-up measures are being appropriately undertaken.
- Project staff shall comply with the Migratory Bird Treaty Act (MBTA) [16 USC 703]. Any active nest shall be left in place and undisturbed until the young hatch and depart.
- Biodegradable matting with a large-diameter natural fiber shall be used to prevent entrapment of wildlife, if erosion netting is necessary. Wildlife Department personnel shall be notified/consulted when any wildlife must be disturbed or handled. They will be available to assist with moving/relocating wildlife, when necessary; and/or to make recommendations for relocating any disturbed animals.
- Grand Canyon's Parkwide Spill Response Plan will be utilized by park employees and contractors to prevent potential poisoning of condors and other wildlife as well as soil and water contamination. Project Leaders are responsible for signing and implementing this plan. It is located on the park's SharePoint site on the Planning and Compliance page
- If condors visit a project site, project activities will cease until the condors leave on their own or until permitted personnel use approved techniques that result in condors leaving the area.

### **Health and Safety**

- To prevent injury to people on the path or utilizing the playground, the School will coordinate with the NPS to temporarily close the trail that runs along the base of the retaining wall and to plan a temporary realignment until the wall can be repaired. If necessary, the area of the playground on the terrace behind the retaining wall will be closed as well.
- Hazardous Materials: If the existing retaining wall railroad ties are found to have been treated with creosote, the contractor will need to dispose of logs off-site and may require a hazardous waste hauler's permit.

### **Miscellaneous Project Requirements**

- Project Leader will invite NEPA Lead to preconstruction meeting (minimum of five (5) calendar days notice if possible).
- Paint color for the CMU retaining wall shall be submitted to the park for final review and approval.
- Complete construction drawings, details and specifications shall be submitted to the park for final review and approval. Construction drawings shall include a detailed section illustrating the footing, CMU, reinforcing, grout fill, wall cap, fence etc.

Failure to follow these requirements could result in work stoppage. For complete compliance information see PEPC Project 96278. If you have any questions, please let me know.

Cc: Kim Park, Craig Chenevert, Catherine Lentz, Ellen Brennan, Elston Stephenson, Rosa Palarino, Adam Gibson, Gregory Holm, Rachel Bennett, Doug Lentz

**Grand Canyon National Park Partner Project**

Partner Name:

Primary Contact:

Project Title:

Short Description:

Projected Work Dates: Start date –

Estimated # Park Partner Employees Involved:

Estimated # Contractor Employees Involved:

Where are contractor employees coming from:

Can project be mitigated to meet CDC guidance for gatherings, social distancing, etc? (This includes traveling in vehicles from outside the park.)    Yes     No

Procedures on meeting CDC guidance (may be attached as a separate sheet):

IMT Concurrence:

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Signature

---

Date

On August 12, 2020 Vegetation Biologist Daniel Boughter ([daniel\\_boughter@nps.gov](mailto:daniel_boughter@nps.gov), (928) 638-7857) and Ivan Landry met on-site to discuss the Grand Canyon School Retaining Wall Replacement project and identify trees approved for removal. A total of seven trees (5 pinon pine and 2 Ponderosa pine) were identified and approved for removal. Photos of each tree are included on the following pages.





























# GRAND CANYON UNIFIED SCHOOL DISTRICT

# GRAND CANYON ELEMENTARY



## RETAINING WALL - 030204001-9999-004-BRG

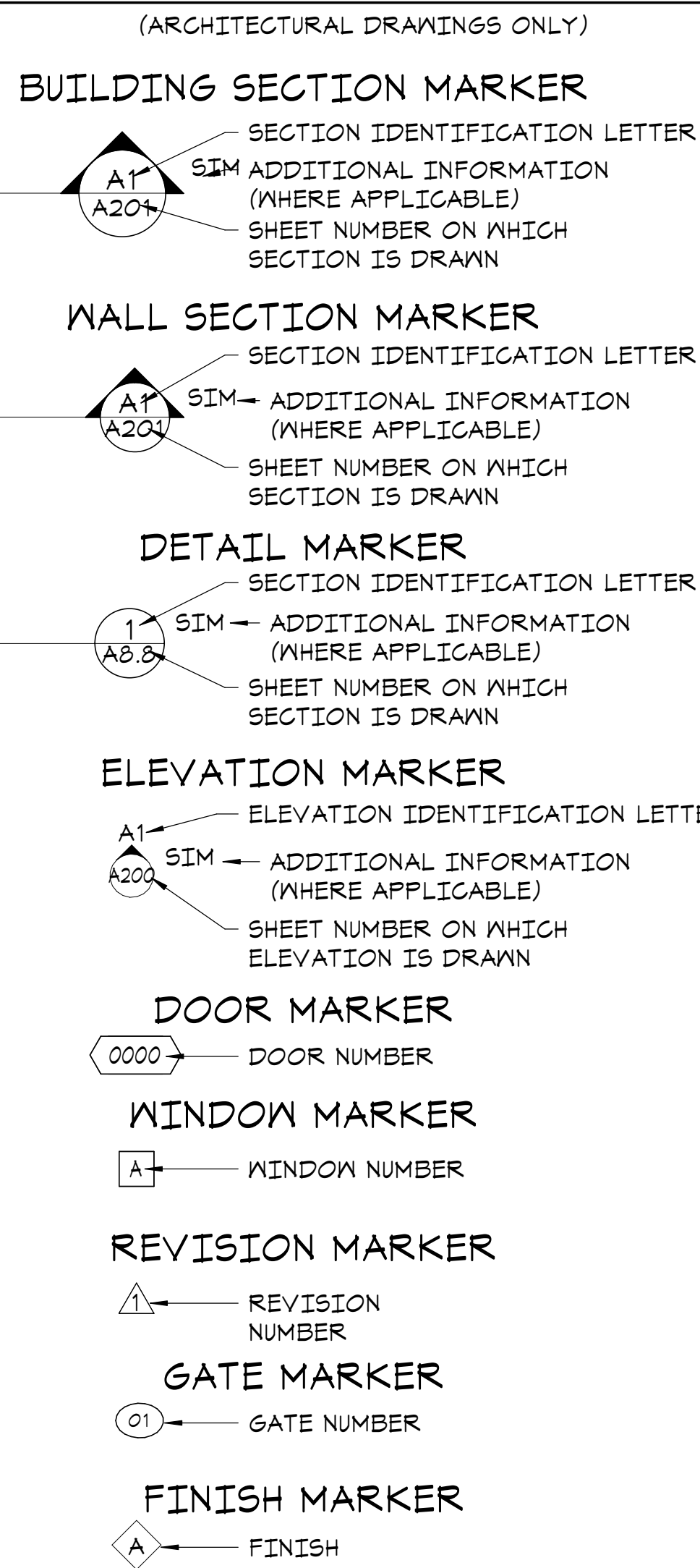


100 BOULDER STREET, GRAND CANYON VILLAGE AZ 86023

### ABBREVIATIONS

(ARCHITECTURAL DRAWINGS ONLY)			
A.B.	ANCHOR BOLT	I.B.C.	INTERNATIONAL BUILDING CODE
A/G	AGGREGATE BASE COURSE	I.E.	INVERT ELEVATION
A/F.F.	AIR CONDITIONING	INSUL.	INSULATION
A.L.T.	ABOVE FINISH FLOOR	LAM.	LAMINATE
A.C.P.	ACOUSTICAL CEILING PANEL	LAV.	LAVATORY
B.D.	BOARD	MAS.	MASONRY
B/P	BACK FLOW PREVENTER	MAT.	MATERIAL
B/DG	BUILDING	MAX.	MAXIMUM
BLKG	BLOCKING	MIN.	MINIMUM, MINUTE
BM	BEAM	MTL.	METAL
B.O.S.	BOTTOM OF STEEL	MTD.	MOUNTED
BTM	BOTTOM	N.I.C.	NOT IN CONTRACT
CAB	CABINET	N.S.	NOT TO SCALE
C.L.	CENTERLINE	N.O.	NUMBER
C.C.	CENTER TO CENTER	NOM.	NOMINAL
C.I.P.	CAST-IN-PLACE	O.C.	ON CENTER
C.J.	CONTROL JOINT	OPP.	OPPOSITE
C/G	CEILING	PCP	PORTLAND CEMENT PLASTER
C.M.U.	CONCRETE MASONRY UNIT	PL.	PLATE
C.O.	CLEAN OUT	PTD.	PAINTED
CONC.	CONCRETE	QT	QUARRY TILE
CONST.	CONSTRUCTION	REFIN.	REINFORCING
CONT.	CONTINUOUS	RM.	ROOM
CORR.	CORRIDOR	S.C.	SOLID CORE
CT	CERAMIC TILE	SCHED.	SCHEDULE
DET.	DETAIL	SECT.	SECTION
DIA.	DIAMETER	S.F.	SQUARE FOOT (FEET)
DIM	DIMENSION	SIM.	SIMILAR
EA.	EACH	SPECS.	SPECIFICATIONS
E.J.	EXPANSION JOINT	STL.	STEEL
ELEV.	ELEVATION	SUSP.	SUSPENDED
ELECT.	ELECTRIC	T.O.	TOP OF
EQ.	EQUAL	T.O.F.	TOP OF FRAMING
E.M.C.	ELECTRIC WATER COOLER	T.O.M.	TOP OF MASONRY
EXIST.	EXISTING	T.O.S.	TOP OF STEEL
EXP. BT.	EXPANSION BOLT	TLT	TOILET
EXP. STR.	EXPOSED STRUCTURE	T.S.	TUBE STEEL
EXT.	EXTERIOR	TYP.	TYPICAL
F.D.	FLOOR DRAIN	U.B.C.	UNIFORM BUILDING CODE
F.E.	FIRE EXTINGUISHER	UN.O.	UNLESS NOTED OTHERWISE
F.E.C.	FIRE EXTINGUISHER CABINET	VCT.	VINYL COMPOSITION TILE
F.F.L.	FINISH FLOOR LINE	VERT.	VERTICAL
F.F.	FINISH FLOOR	VEST	VESTIBULE
FIN.	FINISH	VAC	VINYL WALL COVERING
FLR.	FLOOR	WD.	WOOD
FT.	FOOT, FEET	W.H.	WATER HEATER
FTG.	FOOTING	W/	WITH
GA.	GUAGE	W/O	WITH OUT
G.I.	GALVANIZED IRON	WT.	WEIGHT
GALV.	GALVANIZED	W/F	WELDED WIRE FABRIC
GL.	GLASS	XFMR.	TRANSFORMER
GYP. BD.	GYP. BOARD		
H.M.	HOLLOW METAL		
H.C.	HANDICAP		
H-CONC.	HARDENED CONCRETE		
H.B.	HOSE BIBB		
H/H	HAND HOLE		
HORIZ.	HORIZONTAL		
HT.	HEIGHT		

### SYMBOLS



### MATERIALS LIST

(ARCHITECTURAL DRAWINGS ONLY)

	ASPHALTIC CONCRETE PAVING
	BASE COURSE
	CONCRETE
	EARTH
	CONCRETE MASONRY UNIT
	STEEL
	BATT OR ACOUSTICAL INSULATION
	RIGID INSULATION
	FINISH WOOD
	GYP. PLASTER, OR STUCCO
	PLYWOOD
	RESILIENT FLOORING

### GENERAL NOTES

- THE CONTRACTOR SHALL VISIT THE PREMISES TO REVIEW & UNDERSTAND EXISTING CONDITIONS UNDER WHICH HE WILL BE OBLIGED TO PERFORM THE WORK. THE CONTRACTOR SHALL HARMONIZE HIS WORK SO EACH PIECE OF EQUIPMENT WILL BE INSTALLED TO FUNCTION PROPERLY. THE CONTRACTOR SHALL COORDINATE W/OTHER TRADES. WHERE DRAWINGS INDICATE EXISTING CONDITIONS, AN ATTEMPT HAS BEEN MADE TO SHOW ELECTRICAL EQUIPMENT, BUILDING, SITE DETAILS, ETC. THE CONTRACTOR SHALL VERIFY EXACT LOCATION OF ALL EXISTING BUILDINGS, SITE DETAILS, ETC. THE CONTRACTOR SHALL PERFORM ALL TEMPORARY AND REMODELING WORK AS SHOWN ON THE DRAWINGS AND DESCRIBED IN THE SPECIFICATIONS INCLUDING MINOR ITEMS OF MATERIAL OR EQUIPMENT NECESSARY TO MEET THE REQUIREMENTS AND INTENT OF THE PROJECT.
- CONTRACTOR SHALL EXAMINE ALL DRAWINGS AND SPECIFICATIONS AND SHALL DETERMINE THE SEQUENCE OF CONSTRUCTION THROUGHOUT THE PROJECT, INCLUDING, BUT NOT LIMITED TO; EXISTING, TEMPORARY, REMODELED AND NEW AREAS. THE CONTRACTOR SHALL BE HELD FULLY RESPONSIBLE FOR THE PROPER RESTORATION OF ALL EXISTING SURFACES REQUIRING PATCHING, PLASTERING, PAINTING, AND/OR OTHER REPAIR DUE TO THE CONSTRUCTION HERE IN.
- AT THE END OF THE DAY, THE CONTRACTOR SHALL PROVIDE TRAFFIC COVERS OVER ANY EXPOSED TRENCHES. CONTRACTOR SHALL PROVIDE SUITABLE BARRICADES AND CONSTRUCTION TAPE AROUND ALL WORK AREAS MAINTAINING A SAFE ENVIRONMENT BY MEANS OF EGRESS AND ACCESSIBILITY.
- AT NO TIME SHALL THE CONTRACTOR, HIS SUB-CONTRACTOR, OR ANY PERSON IN HIS EMPLOY HAVE CONTACT WITH ANY SCHOOL STAFF, FACULTY OR STUDENTS UNLESS ABSOLUTELY NECESSARY FOR THE PROGRESS OF THE WORK.
- CONTRACTOR SHALL HAVE SOLE RESPONSIBILITY FOR ACCURACY OF ALL MEASUREMENTS, ESTIMATES OF MATERIALS QUANTITIES AND SIZES, AND SITE CONDITIONS AFFECTING THE WORK.
- PHOTOS USED FOR REFERENCE ONLY AND REPRESENT A PAST EXISTING CONDITION. CONTRACTOR TO VERIFY ALL CURRENT CONDITIONS PRIOR TO BID.
- CONTRACTOR RESPONSIBLE TO MONITOR INTERIOR AND REVIEW FOR SAFETY ALL SPACES THAT COULD POTENTIALLY BE AFFECTED BY PROJECT WORK AND RETURN THEM TO PREVIOUS USABLE CONDITION.
- CONTRACTOR RESPONSIBLE TO ABATE HAZARDOUS MATERIALS DISTURBED BY THE PROJECT WORK IN ACCORDANCE WITH HCM REPORT INCLUDED AS PART OF BID DOCUMENTS, INCLUDING ALL CERTIFICATIONS AND INSPECTIONS/ REPORTS.
- ANY ONSITE WELDING, TORCHING OR FLAME OR SPARK PRODUCING WORK WILL REQUIRE A NPS HOT WORK PERMIT. A MINIMUM THREE WORKING DAY NOTIFICATION IS REQUIRED.
- ANY EXCAVATION WILL REQUIRE NPS DIG PERMITTING PROCESS AND APPROVAL. A MINIMUM THREE WORKING DAY NOTIFICATION IS REQUIRED.

### OWNER / TENANT

**OWNER**  
**GRAND CANYON USD**  
 1 BOULDER ST  
 GRAND CANYON VILLAGE, AZ 86023  
 PHONE: (928)-638-2461  
 FAX: (928)-638-2045  
 CONTACT: FACILITIES

**TENANT**  
**GRAND CANYON ELEMENTARY SCHOOL**  
 1 BOULDER ST  
 GRAND CANYON VILLAGE, AZ 86023  
 PHONE: (928)-638-2461  
 FAX: (928)-638-2045  
 CONTACT: FACILITIES

### PROJECT INFORMATION

**GRANT FUND**  
**AZ SCHOOL FACILITIES BOARD**  
 1700 N. WASHINGTON STE 104  
 PHONE: (602)-542-6567  
 CONTACT: DAVID KENNON

**ARIZONA School Facilities BOARD**

### CONSULTANTS

**STRUCTURAL**  
**BIXLER & ASSOCIATES**  
 8360 EAST RAINTREE DRIVE, SUITE 110  
 SCOTTSDALE, AZ 85260  
 PHONE: (480)-219-2886  
 FAX: (480)-588-8584  
 CONTACT: DAVID BIXLER, P.E., S.E., PRESIDENT

SFB PROJECT: 030204001-9999-004 BRG  
 GRAND CANYON ELEMENTARY - WALL

### SHEET LIST

GENERAL	
6001	GENERAL INFORMATION & SHEET INDEX
SITE DEVELOPMENT	
SD01	SITE DEVELOPMENT PLAN
SD02	SITE DETAILS
ARCHITECTURAL	
A100	FLOOR PLAN DEMO
A101	FLOOR PLAN NEW
STRUCTURAL	
S1	GSN
S2	TYPICAL DETAILS
S3	WALL SECTIONS

**TIC #GRCA113173712**

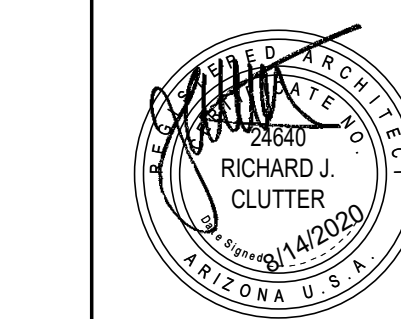
#	REVISIONS / SUBMISSIONS	DATE
2	Amendment 01	12/14/2020
1	NPS COMMENTS	10/15/2020

GRAND CANYON UNIFIED SCHOOL DISTRICT  
**GRAND CANYON ELEMENTARY**  
**RETAINING WALL - 030204001-9999-004-BRG**  
 100 BOULDER STREET, GRAND CANYON VILLAGE AZ 86023

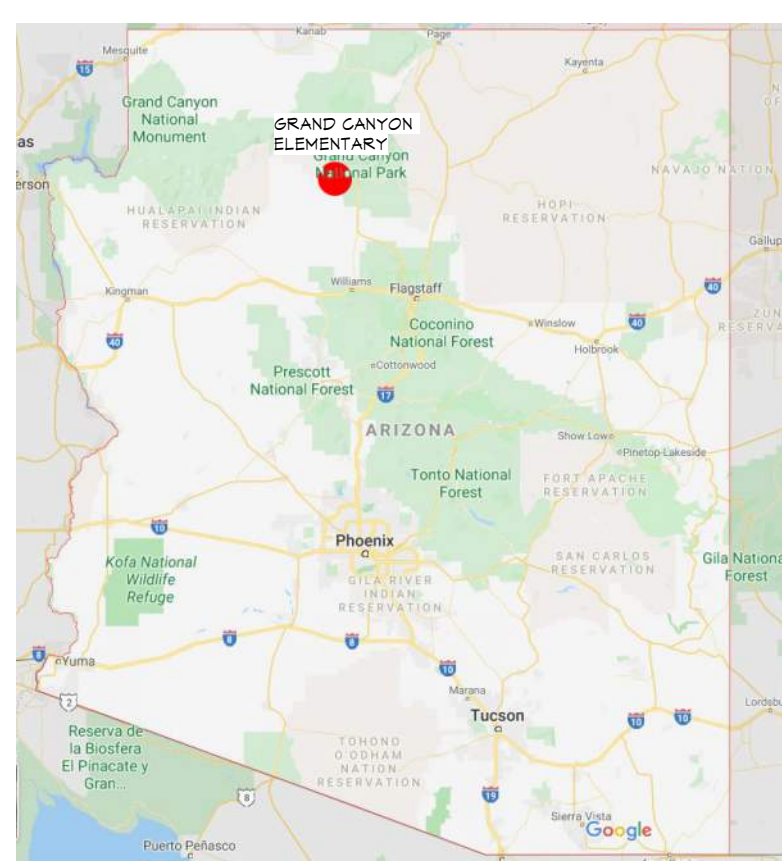
**Emc2**  
 Architects ■ Planners, PC  
 Emc2 Group Architects/Planners, PC  
 1635 N. Greenfield Road, Suite 144  
 Mesa, Arizona 85205  
 P 480 830 3838  
 F 480 830 3860  
 www.emc2architects.com

DRAWING TITLE:  
**GENERAL INFORMATION & SHEET INDEX**

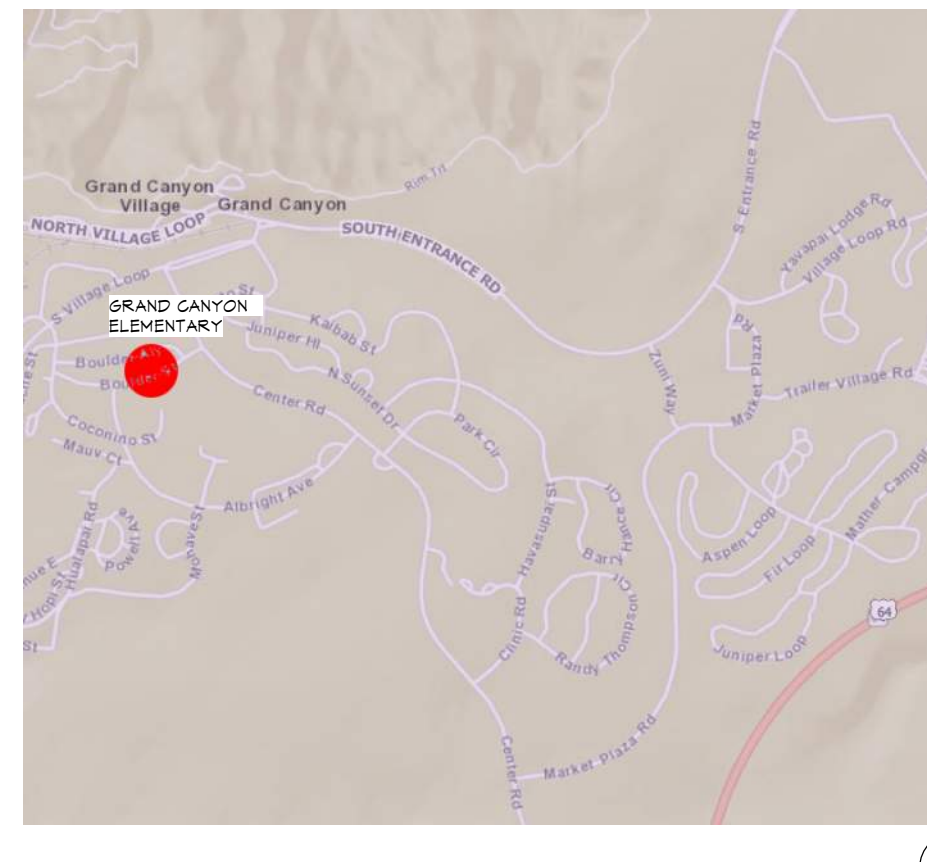
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CHECKED BY: RICHARD J. CLUTTER	DRAWING NO.
DATE: 06-08-2020	<b>G001</b>
DATA FILE: 710 Grand Canyon ES Wall.rvt	



### STATE MAP



### VICINITY MAP



### PROJECT MAP







N1 PHOTO 1  
12" = 1'-0"



N5 PHOTO 2  
12" = 1'-0"



N9 PHOTO 3  
12" = 1'-0"



N13 PHOTO 4  
12" = 1'-0"



N17 PHOTO 5  
12" = 1'-0"



J1 PHOTO 6  
12" = 1'-0"



J5 PHOTO 7  
12" = 1'-0"



J9 PHOTO 8  
12" = 1'-0"



J13 PHOTO 9  
12" = 1'-0"



J17 PHOTO 10  
12" = 1'-0"



A1 REFERENCE SITE PLAN  
1" = 100'-0"



E13 PHOTO 11  
12" = 1'-0"



E17 PHOTO 12  
12" = 1'-0"

e TIC #GRCA113173712

#	REVISIONS / SUBMISSIONS	DATE
1	NPS COMMENTS	10/15/2020

GRAND CANYON UNIFIED SCHOOL DISTRICT  
**GRAND CANYON ELEMENTARY**  
 RETAINING WALL - 030204001-9999-004-BRG

100 BOULDER STREET, GRAND CANYON VILLAGE AZ 86023

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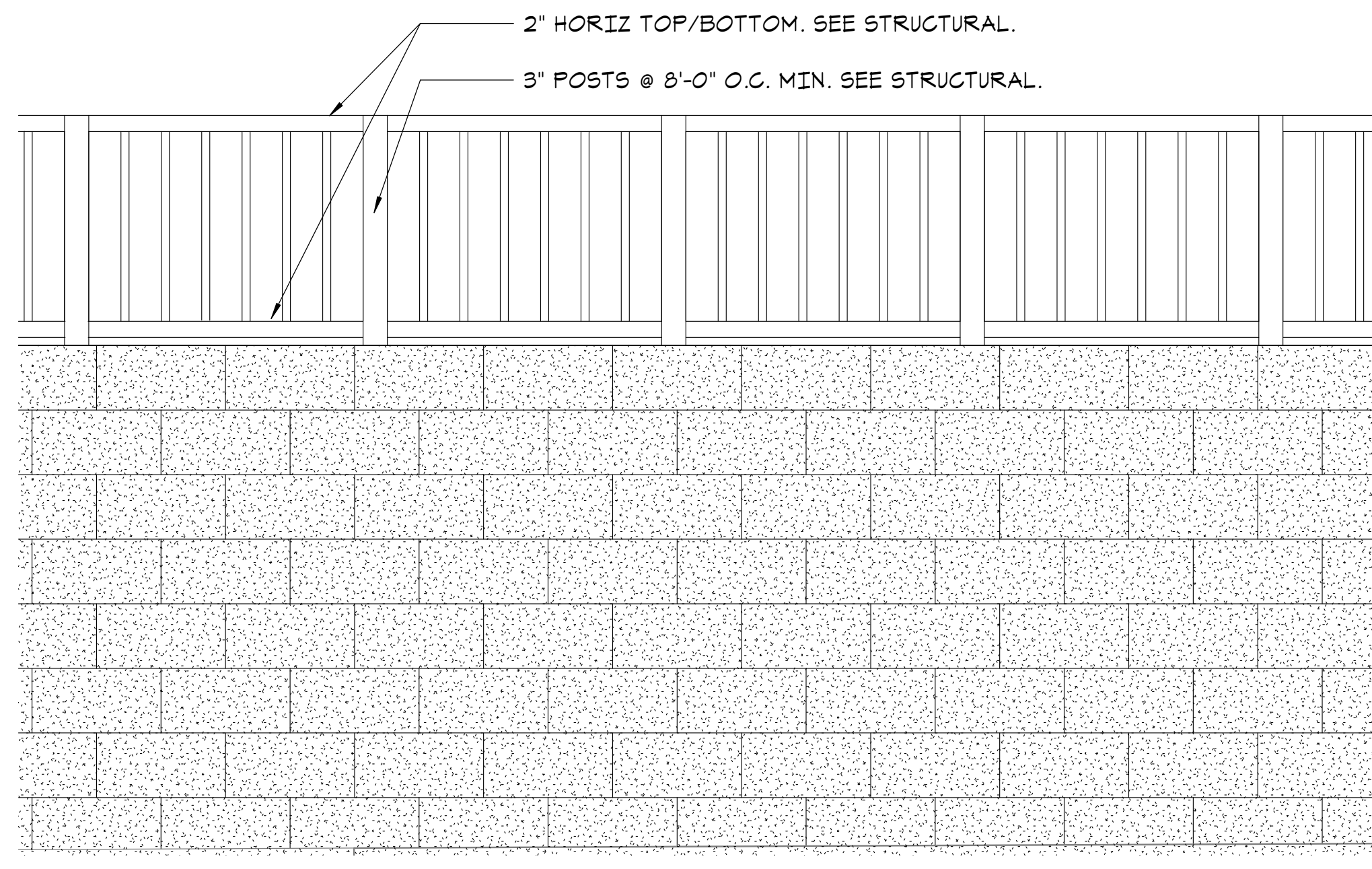
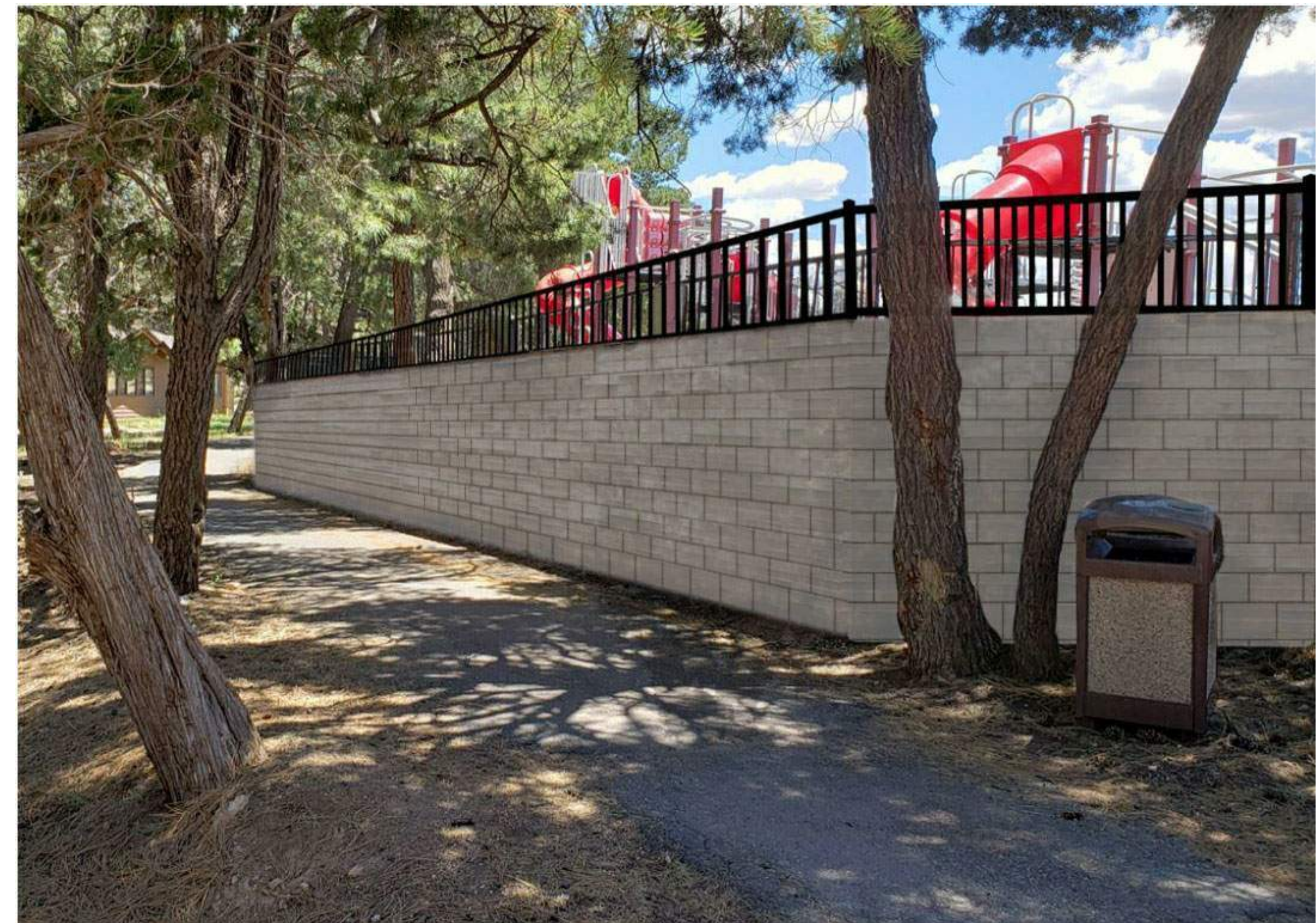
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	CHECKED BY: DMM	DRAWING NO. <b>SD01</b>
	DATE: 06-08-2020	

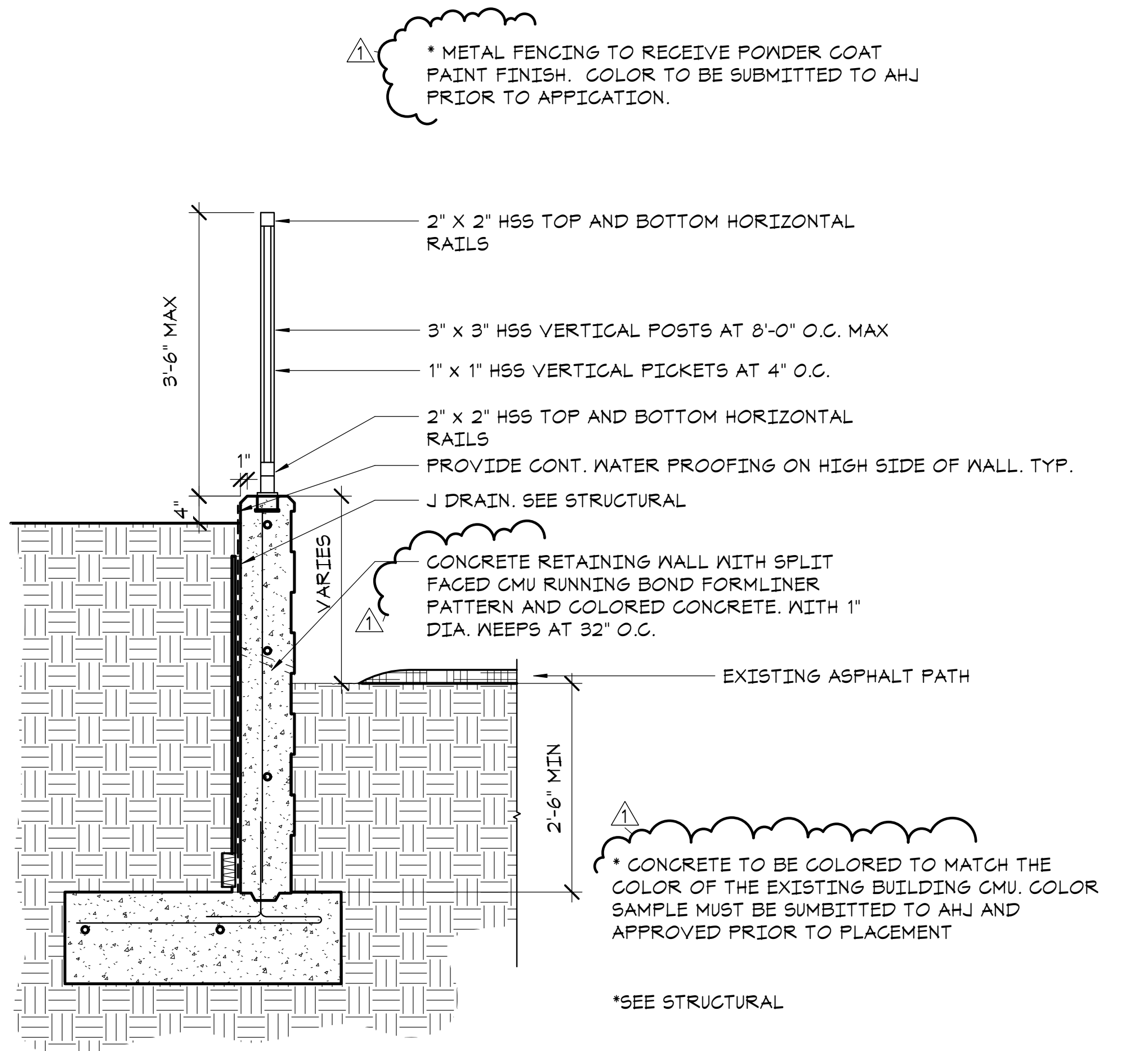
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710 Grand Canyon ES Wall.rvt



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J13 TYPICAL ELEVATION  
3/4" = 1'-0"



A13 SLOPED CONCRETE SITE WALL WITH SLAB / SIDEWALK / RAMP  
3/4" = 1'-0"

**GENERAL NOTES**

- A. ALL FIRE LANES MUST REMAIN ACCESSIBLE DURING CONSTRUCTION.
- B. CONSTRUCTION ACCESS TO ROOF TO BE AS INDICATED UNLESS APPROVED BY DISTRICT.
- C. PROVIDE SAFETY PROTECTION FROM ALL STUDENT AREAS ADJACENT TO THE WORK.
- D. SCHOOL MUST REMAIN IN SESSION DURING THIS PROJECT. THE CONTRACTOR MUST LIMIT THE IMPACT OF THIS PROJECT DURING IN SCHOOL HOURS. 2 CLASSROOMS AT A TIME MAY BE RENDERED UNUSABLE FOR PROJECT RELATED REASONS (NOISE, FUMES, HVAC DISCONNECTION, ETC.) WITH MIN. 3 DAY NOTICE TO DISTRICT.
- E. CONTRACTOR RESPONSIBLE FOR ASSESSING CONDITION OF SIDEWALKS AND STAGING AREAS, AND ENSURE THEY ARE RETURNED TO ORIGINAL CONDITION AT PROJECT COMPLETION, INCLUDING THE REPLACEMENT, REPAIR OR CLEANING OF DAMAGED SIDEWALKS, LANDSCAPE AREAS AND IRRIGATION.
- F. OCCUPANT EGRESS AND PEDESTRIAN ACCESS MUST BE ACCOMMODATED THROUGHOUT PROJECT DURATION.
- G. CONTRACTOR TO COORDINATE WITH STAGING AND STORAGE AREAS WITH DISTRICT. DISTRICT TO APPROVE ALL MATERIAL AND EQUIPMENT DELIVERY TIMES AND LOCATION.
- H. CITY TO BE NOTIFIED IF ANY RIGHT OF WAY WORK IS REQUIRED.

**e TIC #GRCA113173712**

#	REVISIONS / SUBMISSIONS	DATE
1	NPS COMMENTS	10/15/2020

GRAND CANYON UNIFIED SCHOOL DISTRICT  
**GRAND CANYON ELEMENTARY**  
 RETAINING WALL - 030204001-9999-004-BRG  
 100 BOULDER STREET, GRAND CANYON VILLAGE AZ 86023

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 Mesa, Arizona 85205  
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DRAWING TITLE:  
**SITE DETAILS**

DESIGNED BY: EMC2	PROJECT NO. 14819710
DRAWN BY: JV,CW,MV	SCALE: 3/4" = 1'-0"
CHECKED BY: DMM	DRAWING NO. <b>SD02</b>
DATE: 06-08-2020	
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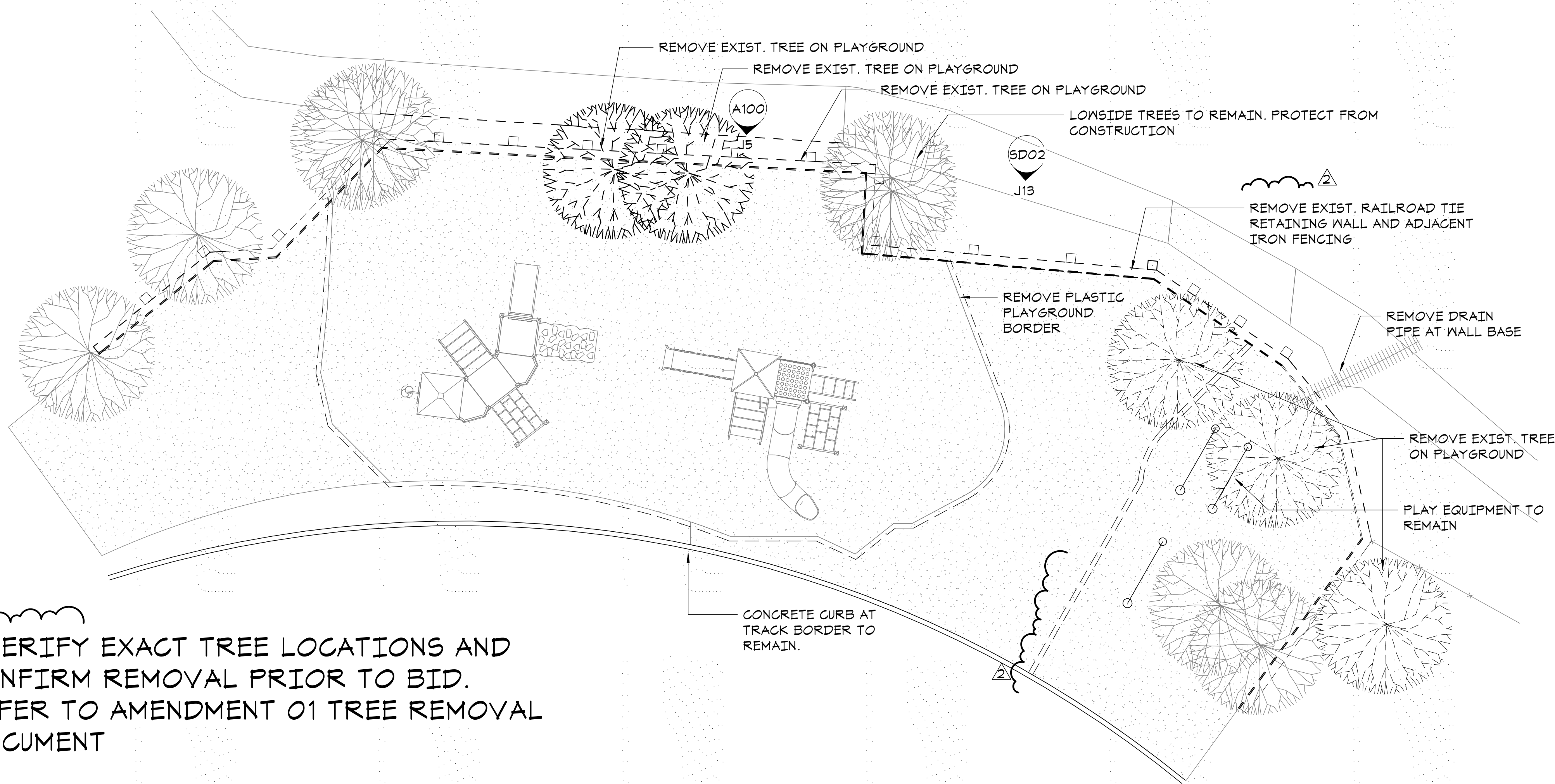


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B  
A



J5 WALL ELEVATION - DEMO

1/8" = 1'-0"



A5 FLOOR PLAN DEMO

1/8" = 1'-0"

**e TIC #GRCA113173712**

#	REVISIONS / SUBMISSIONS	DATE
2	Amendment 01	12/14/2020
1	NPS COMMENTS	10/15/2020

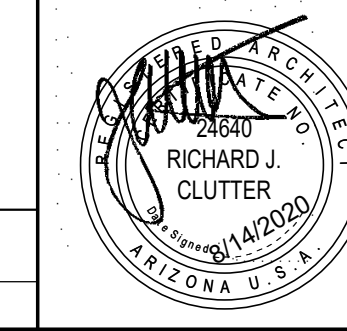
GRAND CANYON UNIFIED SCHOOL DISTRICT  
**GRAND CANYON ELEMENTARY**  
 RETAINING WALL - 030204001-9999-004-BRG

100 BOULDER STREET, GRAND CANYON VILLAGE AZ 86023

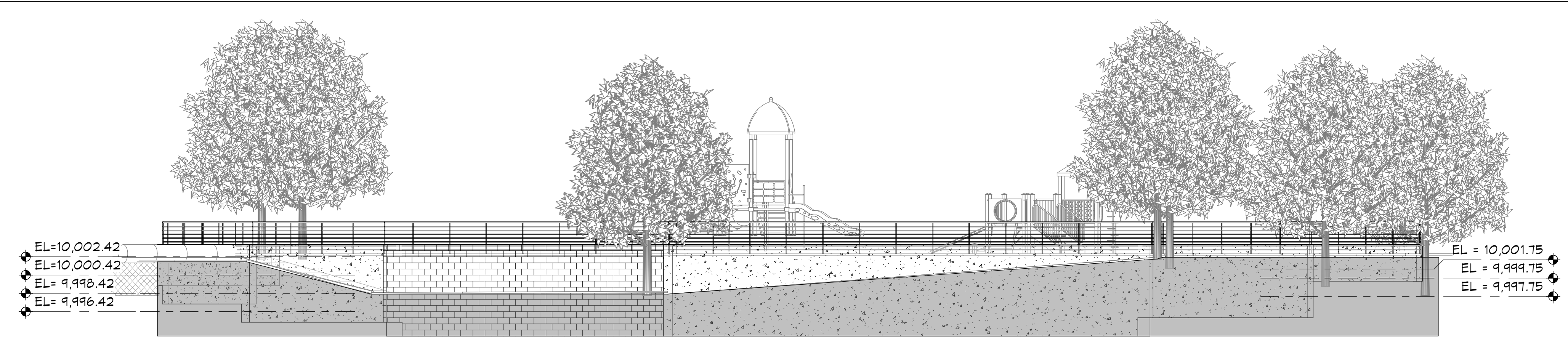
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 Mesa, Arizona 85205  
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 F 480 830 3860  
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DRAWING TITLE:  
**FLOOR PLAN DEMO**

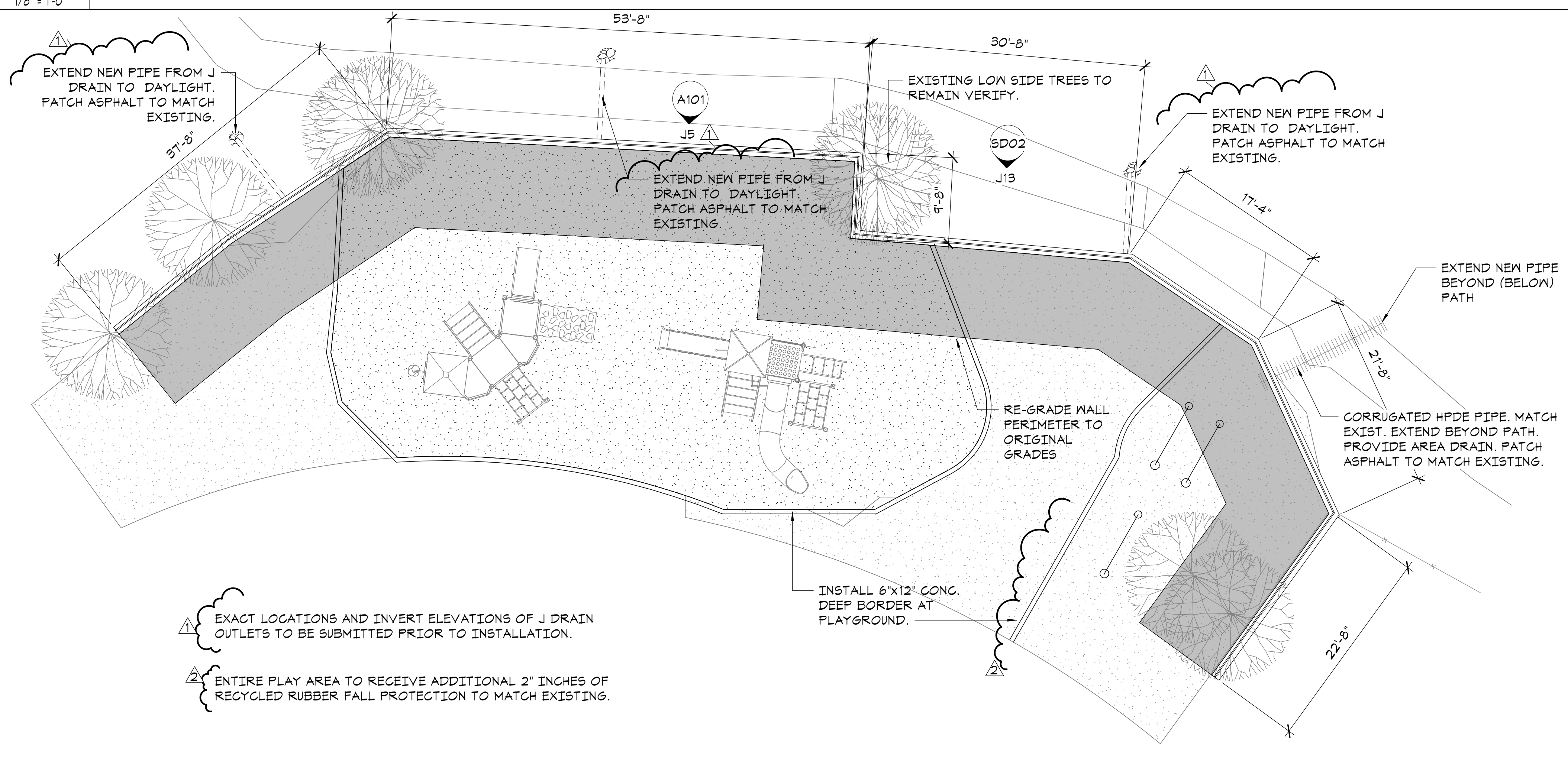
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CHECKED BY: RICHARD J. CLUTTER	DRAWING NO. <b>A100</b>
DATE: 06-08-2020	
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J5 WALL ELEVATION - NEW  
1/8" = 1'-0"



A5 FLOOR PLAN NEW  
1/8" = 1'-0"

e TIC #GRCA113173712

#	REVISIONS / SUBMISSIONS	DATE
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1	NPS COMMENTS	10/15/2020

GRAND CANYON UNIFIED SCHOOL DISTRICT  
**GRAND CANYON ELEMENTARY**  
RETAINING WALL - 030204001-9999-004-BRG  
100 BOULDER STREET, GRAND CANYON VILLAGE AZ 86023

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DRAWING TITLE:  
**FLOOR PLAN NEW**

DESIGNED BY: EMC2	PROJECT NO. 14819710
DRAWN BY: JV,CW,MV	SCALE: 1/8" = 1'-0"
CHECKED BY: DMM	DRAWING NO. <b>A101</b>
DATE: 06-08-2020	
DATA FILE: 710 Grand Canyon ES Wall.rvt	





GENERAL STRUCTURAL NOTES

(APPLY UNLESS NOTED OTHERWISE)

GENERAL NOTES:

- 1. THE STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE ARCHITECTURAL, CIVIL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS... 2. THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE PROVISIONS OF THE INTERNATIONAL BUILDING CODE (IBC) 2018 EDITION WITH LOCAL AMENDMENTS... 3. THE WORK AS OUTLINED IS SUBJECT TO SPECIAL INSPECTIONS AS DESCRIBED IN CHAPTER 17 OF THE INTERNATIONAL BUILDING CODE... 4. THE CONTRACTOR SHALL FIELD VERIFY THE DIMENSIONS, ELEVATIONS, AND OTHER REQUIREMENTS NECESSARY FOR THE PROPER CONSTRUCTION AND ALIGNMENT OF THE NEW STRUCTURE... 5. WIND DESIGN CRITERIA... 6. SEISMIC DESIGN CRITERIA... 7. CONSTRUCTION MATERIAL LOADS SHALL BE PLACED SUCH THAT THE LOADS DO NOT EXCEED THE LIVE LOADS SPECIFIED ON THE CONTRACT DOCUMENTS... 8. SECTIONS AND DETAILS SHALL BE INCORPORATED AT ALL APPROPRIATE LOCATIONS... 9. THESE DOCUMENTS REPRESENT THE COMPLETED STRUCTURE. THE STRUCTURAL ENGINEER SHALL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S MEANS AND METHODS OR THE SAFETY PRECAUTIONS REQUIRED.

FOUNDATION NOTES:

- 1. FOUNDATIONS FOR THIS STRUCTURE HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RECOMMENDATIONS IN THE GEOTECHNICAL EXPLORATION REPORT, PREPARED BY SPEEDIE & ASSOC, DATED 05/27/2020, REPORT NUMBER #2004515F. 2. FOUNDATIONS HAVE BEEN DESIGNED FOR A NET ALLOWABLE SOIL BEARING PRESSURE OF 3500 PSF. 3. FOUNDATIONS SHALL BEAR ON COMPACTED FILL MATERIAL 24" IN DEPTH. SCARIFY AND RECOMPACT TOP 12 INCHES OF EXISTING SUBGRADE AND EACH 6" LAYER OF BACKFILL OR FILL SOIL MATERIAL TO A MINIMUM OF 95% MODIFIED PROCTOR IN ACCORDANCE WITH ASTM D698. 4. THE MINIMUM DEPTH OF THE TOP OF FOOTINGS BELOW THE FINISHED GRADE SHALL BE 12". 5. PRIOR TO PLACING FOUNDATION CONCRETE, ALL FOUNDATION EXCAVATIONS SHALL BE INSPECTED BY THE OWNER'S TESTING AGENCY TO EXPLORE THE EXTENT OF LOOSE, SOFT OR OTHERWISE UNSATISFACTORY SOIL MATERIAL AND TO VERIFY DESIGN BEARING PRESSURE. 6. NO UNBALANCED BACKFILL SHALL BE PLACED AGAINST MASONRY OR CONCRETE WALLS UNLESS WALLS ARE SECURELY BRACED AGAINST OVERTURNING. 7. PROVIDE PROPER DRAINAGE WITHIN 15'-0" OF THE BUILDING EXTERIOR ACCOUNT FOR SURFACE RUN-OFF OF THE BUILDING AND ADJACENT SURFACES. 8. REFER TO ARCHITECTURAL AND CIVIL DRAWINGS FOR EXTERIOR SLABS NOT SHOWN. 9. THE STRUCTURAL ENGINEER IS NOT RESPONSIBLE FOR ANY GEOTECHNICAL ASPECTS OF THIS PROJECT.

CAST-IN-PLACE CONCRETE NOTES:

- 1. ALL CONCRETE WORK SHALL CONFORM WITH THE REQUIREMENTS OF ACI 301 AND ACI 318. 2. ALL CONCRETE WORK SHALL COMPLY WITH THE FOLLOWING: CEMENT PER ASTM C150, TYPE II. AGGREGATE PER ASTM C33. CONCRETE SHALL BE NORMAL WEIGHT. CONCRETE SHALL BE READY MIXED IN ACCORDANCE WITH ASTM C94. 3. CONCRETE SHALL BE NORMAL WEIGHT AND SHALL BE DESIGNED FOR A MINIMUM 28 DAY COMPRESSIVE STRENGTH AS FOLLOWS: WALLS - 4,000 PSI FOUNDATIONS - 3,000 PSI \*DESIGNED FOR 2500 PSI 4. FLY ASH IF PERMITTED BY ARCHITECT - SHALL CONFORM TO ASTM C618, CLASS F AND SHALL BE LIMITED TO 18% OF CEMENTITIOUS MATERIALS. 5. ALL CONCRETE SHALL HAVE A MAXIMUM SLUMP OF 4". IF A SUPER PLASTICIZER IS USED, AN 8" MAXIMUM SLUMP IS ALLOWED AT THE POINT OF PLACEMENT. 6. ALL REINFORCING STEEL AND EMBEDDED ITEMS SUCH AS ANCHOR BOLTS AND WELD PLATES SHALL BE ACCURATELY PLACED IN THE POSITIONS SHOWN AND ADEQUATELY TIED AND SUPPORTED BEFORE CONCRETE IS PLACED TO PREVENT DISPLACEMENT BEYOND PERMITTED TOLERANCES. 7. MECHANICALLY VIBRATE ALL CONCRETE PER ACI.

- 8. ALL CONCRETE SLABS ON GRADE SHALL BE BOUND BY CONTROL JOINTS AS SHOWN ON THE FOUNDATION PLAN. KEYED CONTROL JOINTS ARE REQUIRED AT EXPOSED EDGES DURING POURING AND SUCH THAT NO SINGLE POUR IS LARGER THAN 400 SQUARE FEET WITHOUT APPROVAL. 9. ALL CONCRETE PLACEMENT SHALL COMPLY WITH THE HOT AND COLD WEATHER REQUIREMENTS OF ACI UNLESS APPROVED BY THE ARCHITECT. 10. ALL CONCRETE SHALL BE TESTED FOR COMPRESSIVE STRENGTH AND SLUMP PER ASTM C31, C39 AND C143. PROVIDE A MINIMUM OF 4 CYLINDERS FOR EACH DAY'S PLACEMENT OR FOR EVERY 50 CUBIC YARDS, WHICHEVER IS GREATER.

REINFORCING STEEL:

- 1. REINFORCING STEEL SHALL CONFORM TO THE LATEST ACI AND CRSI DETAILING MANUAL AND THE FOLLOWING: #4 AND LARGER DEFORMED BARS - ASTM A615 (Fy = 60 KSI) #3 AND SMALLER DEFORMED BARS - ASTM A615 (Fy = 40 KSI) ALL WELDED REINFORCING BARS - ASTM A706 WELDED WIRE FABRIC - ASTM A185 WIRE - ASTM A82 2. ACCURATELY SUPPORT ALL REINFORCING, INCLUDING WELDED WIRE FABRIC, WITH GALVANIZED METAL CHAIRS, SPACERS OR HANGERS FOR THE FOLLOWING CLEAR CONCRETE COVERAGES UNDO: CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH - 3" EXPOSED TO EARTH OR WEATHER #6 OR LARGER - 2" #5 AND SMALLER - 1 1/2" COLUMNS (TO TIES) - 1 1/2" BEAMS (TO STIRRUPS) - 1 1/2" INTERIOR FLAT SLAB - 3/4" EXTERIOR FLAT SLAB EXPOSED TO WEATHER - 1 1/2" ALL OTHER CLEARANCES SHALL COMPLY WITH THE LATEST EDITION OF ACI 318. 3. LAP SPLICES, UNLESS NOTED OTHERWISE, SHALL BE CLASS "B" TENSION LAP SPLICES PER LATEST EDITION OF ACI 318. 4. LAP SPLICES IN WELDED WIRE FABRIC SHALL BE A MINIMUM OF 8". 5. ALL SPLICE LOCATIONS SUBJECT TO APPROVAL BY THE STRUCTURAL ENGINEER. 6. REINFORCING BAR SPACING GIVEN ARE MAXIMUM ON CENTERS.

STRUCTURAL STEEL NOTES:

- 1. ALL STEEL CONSTRUCTION SHALL COMPLY WITH THE LATEST EDITION OF THE AISC HANDBOOK. 2. STRUCTURAL STEEL SHALL COMPLY WITH THE FOLLOWING SPECIFICATIONS: STRUCTURAL STEEL SHAPES, PLATES AND BARS (EXCEPT W-SHAPES) ASTM A 36, Fy = 36 KSI HOLLOW STRUCTURAL SHAPES (HSS) ASTM A 500, GRADE B, Fy = 46 KSI FOR SQUARE AND RECTANGULAR SHAPES 3. WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1, "STRUCTURAL WELDING CODE - STEEL". 4. SHOP PAINT ALL STEEL SURFACES WITH FABRICATOR'S STANDARD RUST-INHIBITTING PRIMER EXCEPT AT SURFACES ENCASED IN CONCRETE.

SHOP DRAWINGS:

- 1. SHOP DRAWINGS SHALL BE SUBMITTED FOR ALL STRUCTURAL ITEMS IN ADDITION TO ITEMS REQUIRED BY ARCHITECTURAL SPECIFICATIONS. 2. THE CONTRACTOR SHALL REVIEW ALL SHOP DRAWINGS PRIOR TO SUBMITTAL. 3. ANY CHANGES, SUBSTITUTIONS, OR DEVIATIONS FROM CONTRACT DOCUMENTS SHALL BE CLOUDED BY MANUFACTURER OR FABRICATOR. 4. THE SHOP DRAWINGS DO NOT REPLACE THE CONTRACT DOCUMENTS. 5. THE ADEQUACY OF ENGINEERING DESIGNS AND LAYOUT PERFORMED BY OTHERS RESTS WITH THE DESIGNING OR SUBMITTING AUTHORITY. 6. REVIEWING IS INTENDED ONLY AS AN AID TO THE CONTRACTOR IN OBTAINING CORRECT SHOP DRAWINGS. 7. ALLOW FIVE WORKING DAYS FOR REVIEW OF SHOP DRAWINGS BY THE STRUCTURAL ENGINEER.

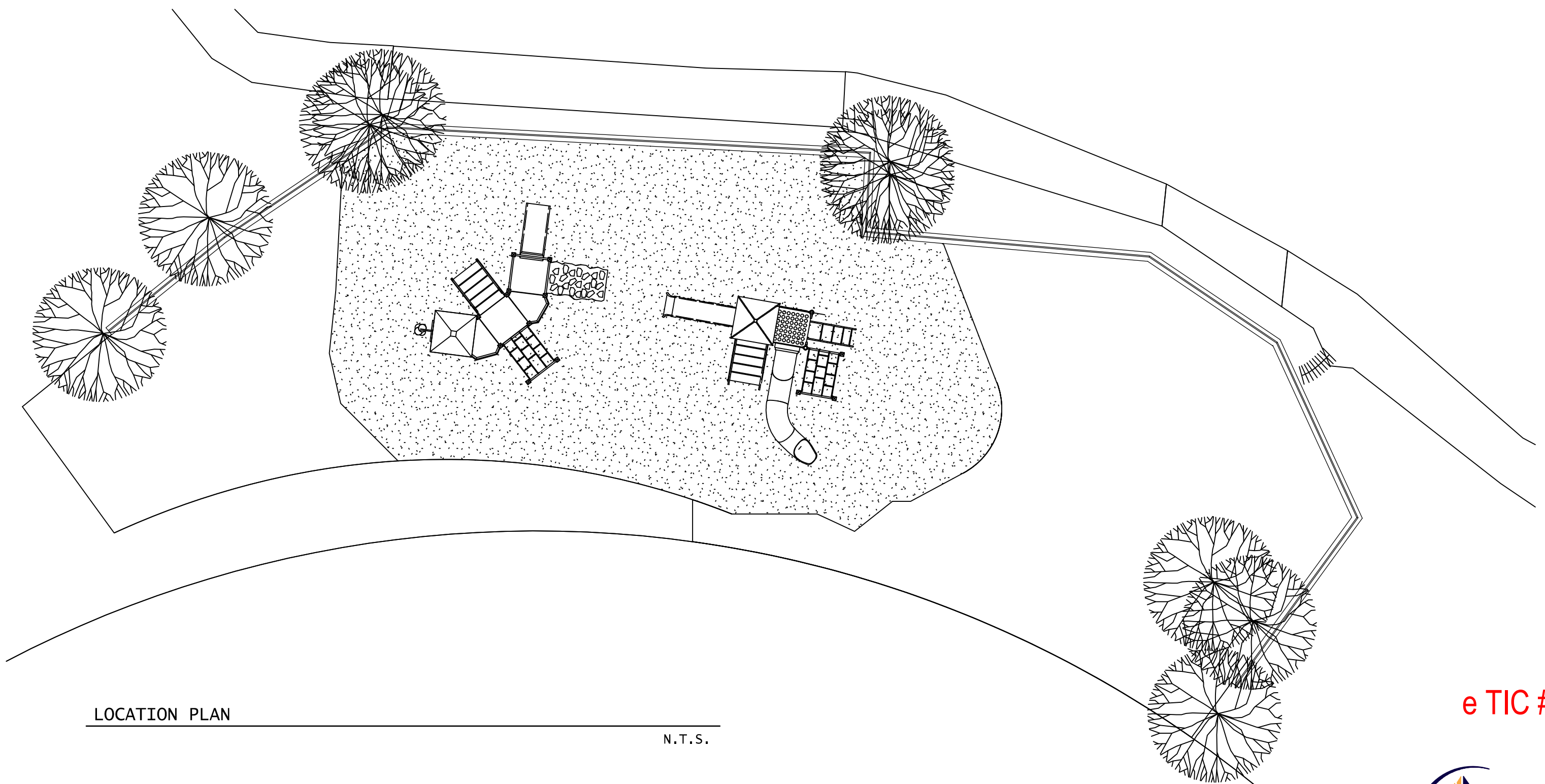
SPECIAL INSPECTION:

- 1. PER IBC CHAPTER 17, SPECIAL INSPECTION IS REQUIRED FOR THE FOLLOWING ITEMS: SOILS: PER IBC SECTION 1704.7

CONCRETE CONSTRUCTION: PER IBC SECTION 1704.4 & TABLE 1704.4. NOT REQUIRED FOR SLABS ON GRADE.

DUTIES AND RESPONSIBILITIES OF THE SPECIAL INSPECTOR:

THE SPECIAL INSPECTOR SHALL OBSERVE THE WORK ASSIGNED FOR CONFORMANCE WITH THE APPROVED DESIGN DRAWINGS AND SPECIFICATION. THE SPECIAL INSPECTOR SHALL FURNISH INSPECTION REPORTS TO THE BUILDING OFFICIAL IF REQUESTED, AND TO THE ENGINEER OR ARCHITECT OF RECORD. ALL DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION, THEN, IF UNCORRECTED, TO THE DESIGN AUTHORITY AND THE BUILDING OFFICIAL.



e TIC #GRCA113173712

DBAA STRUCTURAL ENGINEERING Proj. No. 19.140 15150 North Hayden Road Suite 220 Scottsdale, Arizona 85260 Phone: (480) 219-2886 Fax: (480) 588-8584 david.bixler@dbaeng.com

Table with 3 columns: #, REVISIONS / SUBMISSIONS, DATE

GRAND CANYON UNIFIED SCHOOL DISTRICT GRAND CANYON ELEMENTARY RETAINING WALL - 030204001-9999-004-BRG

100 BOULDER STREET, GRAND CANYON VILLAGE AZ 86028

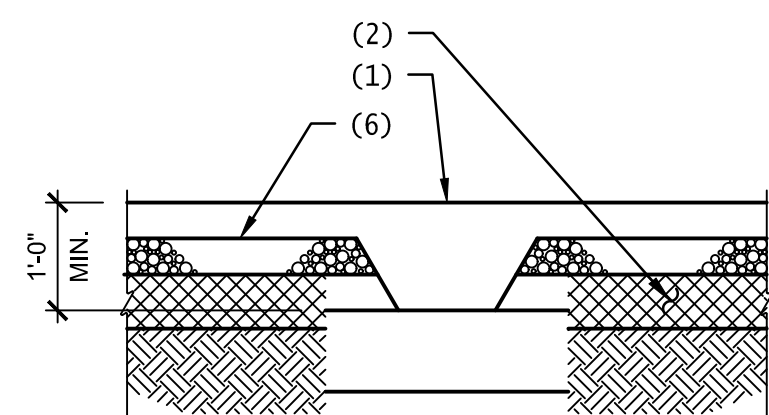
Emc2 Architects Planners, PC Emc2 GROUP ARCHITECTS PLANNERS PC 1635 N. Greenfield Road, Suite 144 Mesa, Arizona 85205 P 480 830 3838 F 480 830 3860 www.emc2architects.com

DRAWING TITLE: GENERAL STRUCTURAL NOTES

Professional Engineer Seal for David Bixler, State of Arizona, License No. 46644, Expires 6/30/23. Drawing Title: GENERAL STRUCTURAL NOTES. Scale: 1/8" = 1'-0". Drawing No. S1. Designer: EMC2, Drawn: JVCW/MV, Checked: DMM, Date: 06-08-2020, Data File: 710 Grand Canyon ES Wall.rvt, Project No: 14819710, Scale: 1/8" = 1'-0", Drawing No: S1.

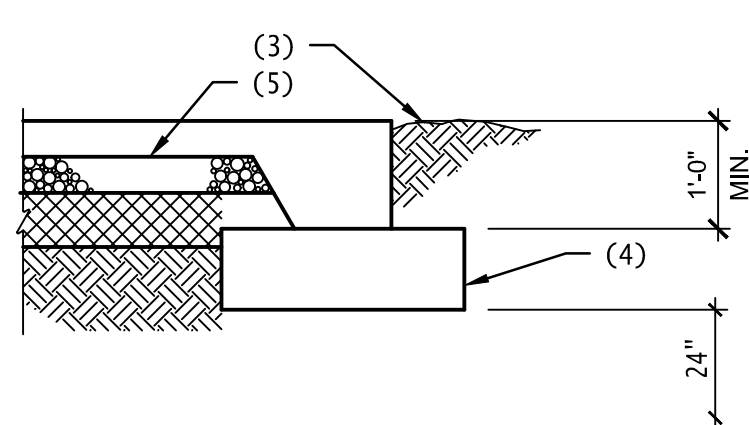


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- NOTES:
1. CONCRETE SLAB ON GRADE.
  2. SCARIFY, MOISTEN, OR DRY AS REQUIRED, AND COMPACT ALL SUB GRADE SOILS BENEATH SLABS TO A MINIMUM DEPTH OF 6".
  3. FINISHED GRADE.
  4. SEE PLANS FOR TOP OF FOOTING ELEVATION.
  5. 4" AGGREGATE BASE COURSE.

ISOLATED FOOTINGS

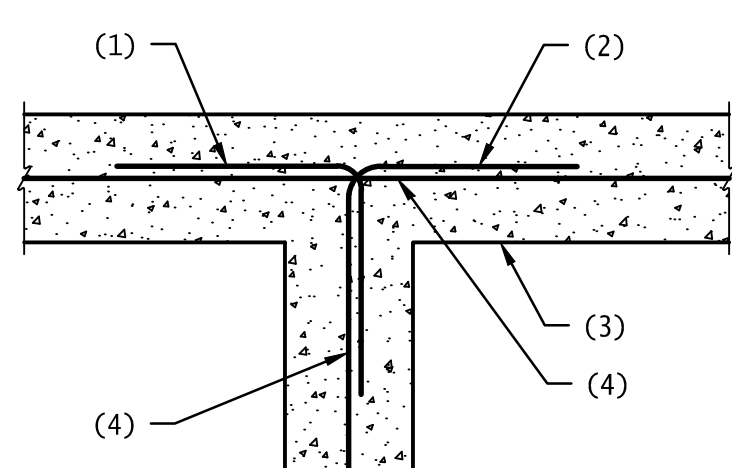


NOTE:  
SEE G.S.N. AND SOILS REPORT FOR ADDITIONAL INFORMATION.

CONTINUOUS FOOTINGS AND SLAB

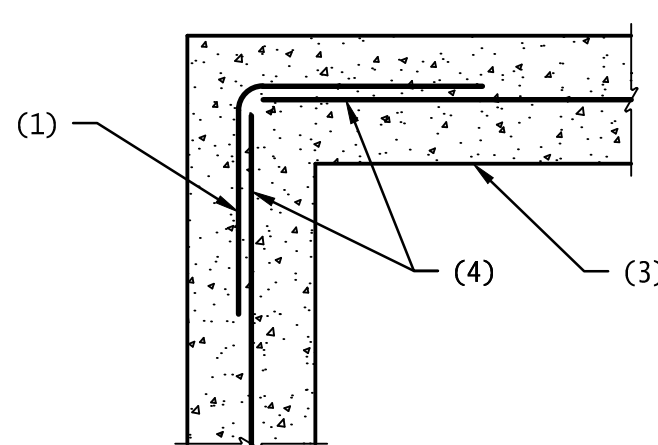
TYPICAL EARTHWORK DETAIL

N.T.S.



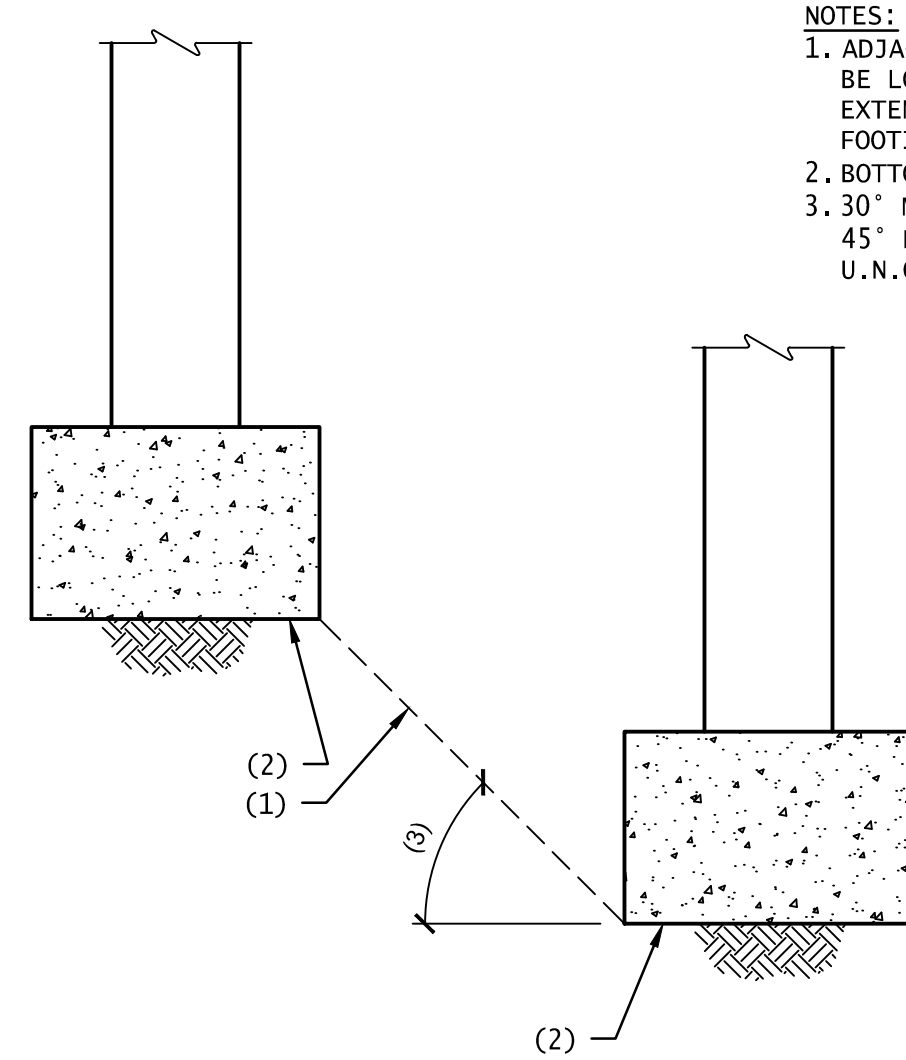
- NOTES:
1. CORNER BARS SAME SIZE AND SPACING AS HORIZONTAL REINFORCING. LAP PER G.S.N. (24" MINIMUM.)
  2. ALTERNATE BEND.
  3. CONCRETE STEM WALL OR FOOTING.
  4. REINFORCING PER PLANS AND/OR G.S.N.

INTERSECTION



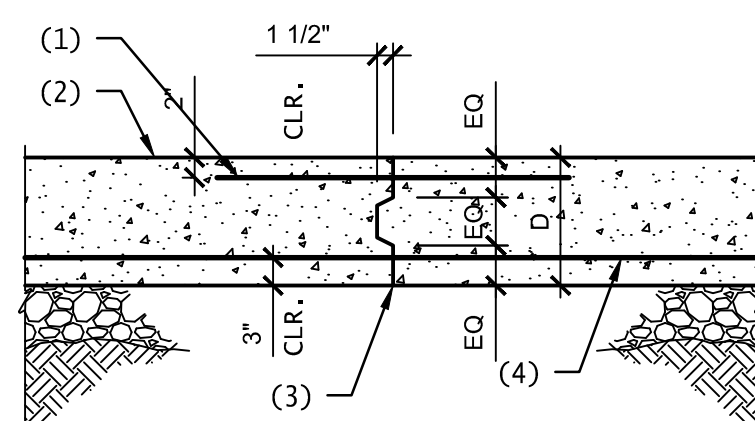
CORNER  
PLAN - CORNER REINFORCING IN CONCRETE FOOTING AND/OR STEM WALL

N.T.S.



MAXIMUM SLOPE BETWEEN ADJACENT FOOTING

N.T.S.



TYPICAL KEY IN CONCRETE

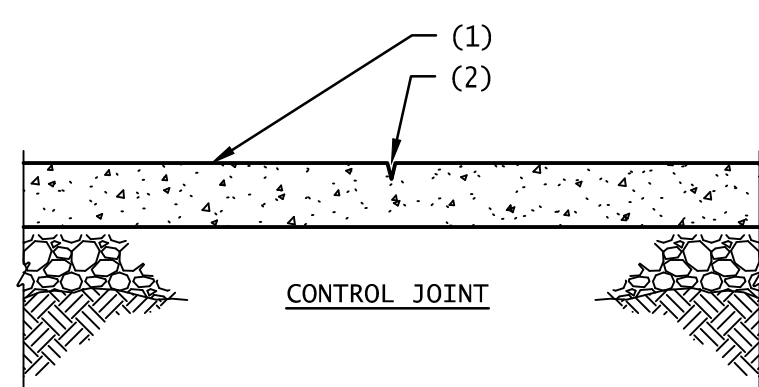
N.T.S.

- NOTES:
1. STEM WALL.
  2. CONCRETE FOOTING.
  3. 1'-6" MAXIMUM WIDTH - WHERE TRENCH EXCEEDS 1'-6" NOTIFY ENGINEER OF RECORD PRIOR TO PLACEMENT OF FOOTING.
  4. BACKFILL AND RECOMPACT TRENCH.
  5. BOTTOM OF TRENCH.

NOTE:  
FOR TRENCH DEPTHS OF 3'-6" OR LESS, SEE TYPICAL PIPE BELOW FOOTING AND AT TRENCH DETAIL.

PIPE PASSING BELOW WALL FOOTING IN DEEP TRENCH

N.T.S.



TYPICAL CONTROL JOINTS IN CONCRETE SLAB ON GRADE

N.T.S.

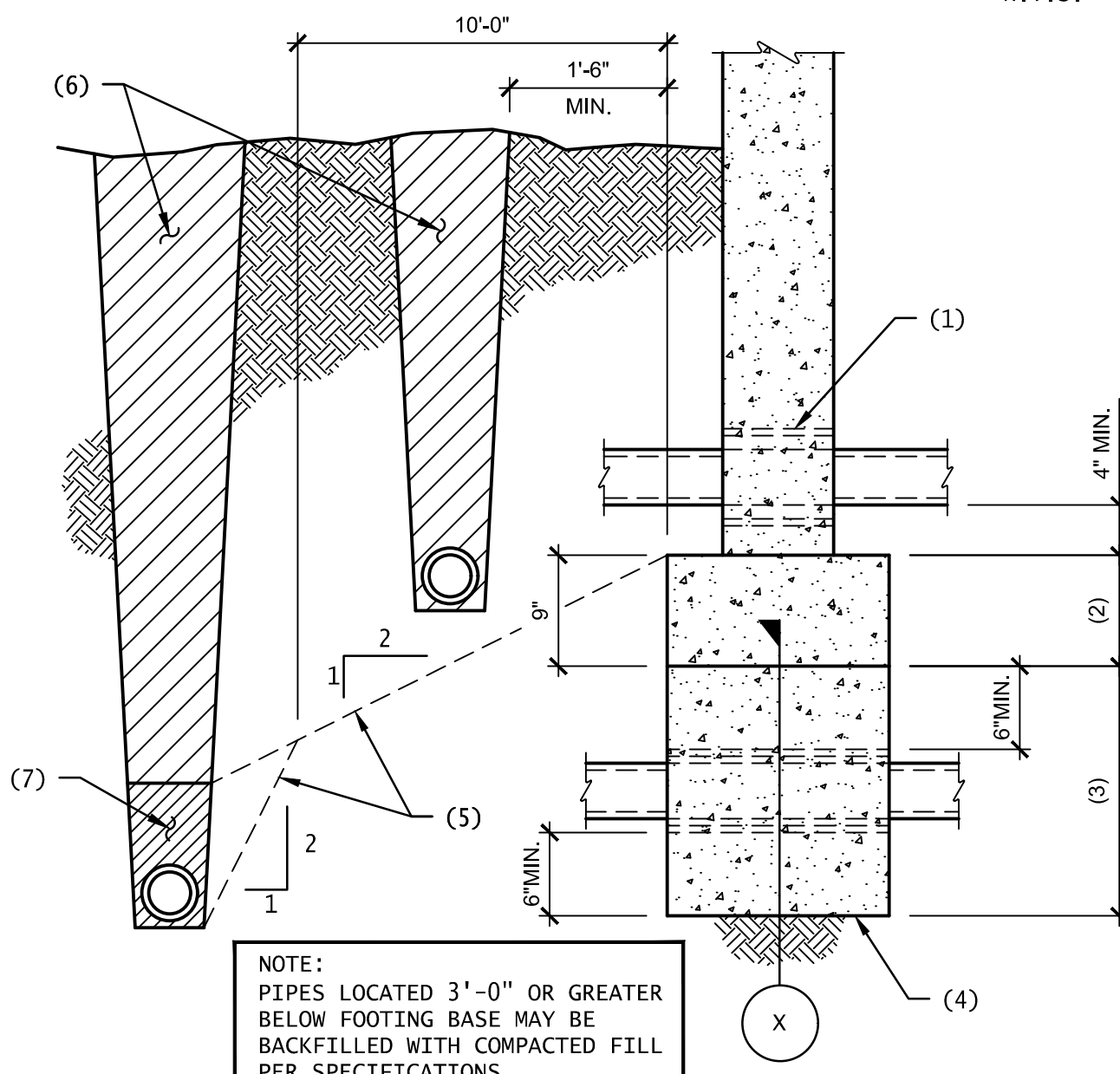
NOTE:  
PLACE CONSTRUCTION JOINTS AT 25'-0" O.C. MAX.

CONC PSI	TENSION SPLICE LENGTHS (CLASS B)										COMP. BARS			
	f'c ≤ 3,000 PSI		f'c ≤ 4,000 PSI		f'c ≤ 5,000 PSI		ALL f'c		STD LAP	ENCLOSED W/ SPIRAL TIES				
	REGULAR	TOP	REGULAR	TOP	REGULAR	TOP	REGULAR	TOP						
#3	24"	36"	31"	46"	19"	28"	25"	37"	17"	25"	22"	33"	12"	12"
#4	32"	47"	41"	61"	25"	37"	33"	49"	23"	34"	29"	44"	15"	12"
#5	39"	59"	51"	77"	31"	47"	41"	61"	28"	42"	36"	54"	19"	15"
#6	47"	71"	61"	92"	37"	56"	49"	73"	34"	50"	44"	65"	23"	18"
#7	69"	103"	89"	134"	54"	81"	71"	106"	49"	73"	63"	95"	27"	21"
#8	78"	117"	102"	153"	62"	93"	81"	121"	56"	83"	72"	108"	30"	23"
#9	88"	132"	115"	172"	70"	105"	91"	136"	63"	94"	81"	122"	34"	26"
#10	100"	149"	129"	194"	79"	118"	102"	153"	71"	106"	92"	137"	39"	30"
#11	110"	165"	143"	215"	87"	131"	114"	170"	78"	117"	102"	152"	43"	33"

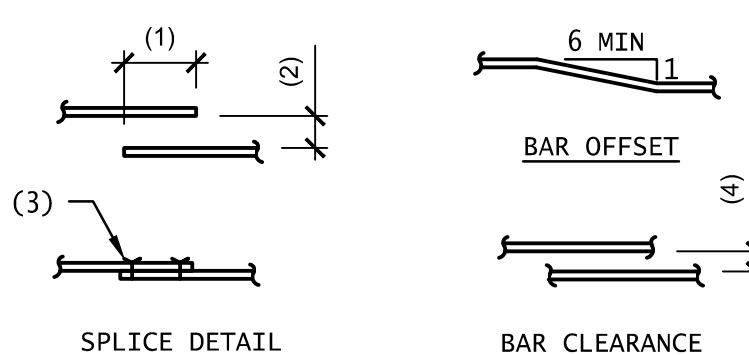
- NOTES:
1. TOP BARS ARE ANY HORIZONTAL BARS PLACED WITHIN 8" OF THE TOP OF THE MEMBER.

MINIMUM REINFORCING BAR SPLICE LENGTHS IN CAST IN PLACE CONCRETE

N.T.S.

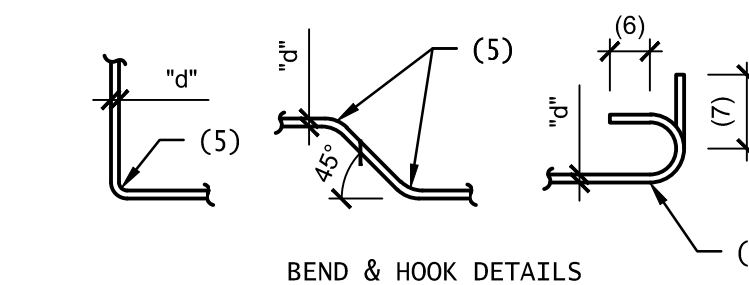


TYPICAL PIPE BELOW FOOTING AND AT TRENCH

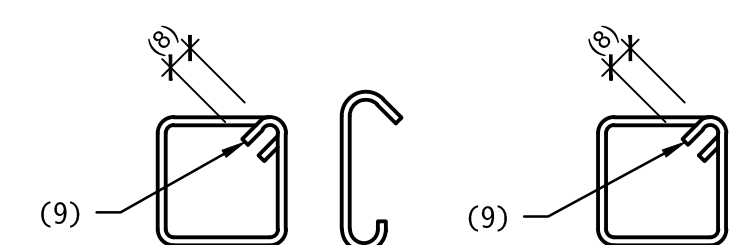


SPLICE DETAIL

BAR CLEARANCE



BEND & HOOK DETAILS

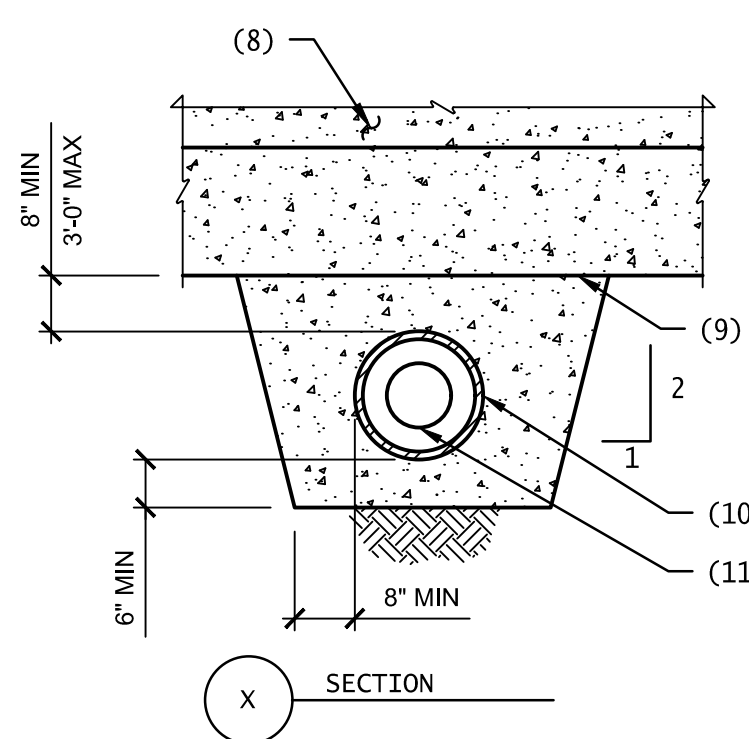


COLUMN TIES

BEAM STIRRUPS

TYPICAL CONCRETE REINFORCING BAR DETAILS

N.T.S.



NOTES:

- PIPES SHALL NOT PASS UNDER COLUMN FOOTINGS.
- FOR TRENCHES GREATER THAN 3'-6" BELOW BOTTOM OF FOOTING, SEE TYPICAL PIPE BELOW WALL FOOTING DETAIL.

- NOTES:
1. CAST IRON SLEEVE SHALL BE 2" LARGER THAN PIPE.
  2. NO SLEEVES PERMITTED IN THIS AREA OF FOOTING.
  3. 3'-0" MAXIMUM - STEP FOOTING IF NECESSARY.
  4. FILL PIPE TRENCH WITH CONCRETE.
  5. EXCAVATION BELOW THESE LINES NOT PERMITTED.
  6. BACK FILL.
  7. COMPACT TO 90% DENSITY (ASTM D-698.)
  8. STEM WALL.
  9. CONCRETE FOOTING.
  10. SLEEVE - PROVIDE 1/2" MINIMUM CLEARANCE AROUND PIPE OR CONDUIT.
  11. PIPE OR CONDUIT.

e TIC #GRCA113173712

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david.bixler@dbaaeng.com  
Proj. No. 19.140

#	REVISIONS / SUBMISSIONS	DATE

GRAND CANYON UNIFIED SCHOOL DISTRICT  
**GRAND CANYON ELEMENTARY**  
RETAINING WALL - 030204001-9999-004-BRG

100 BOULDER STREET, GRAND CANYON VILLAGE AZ 86023

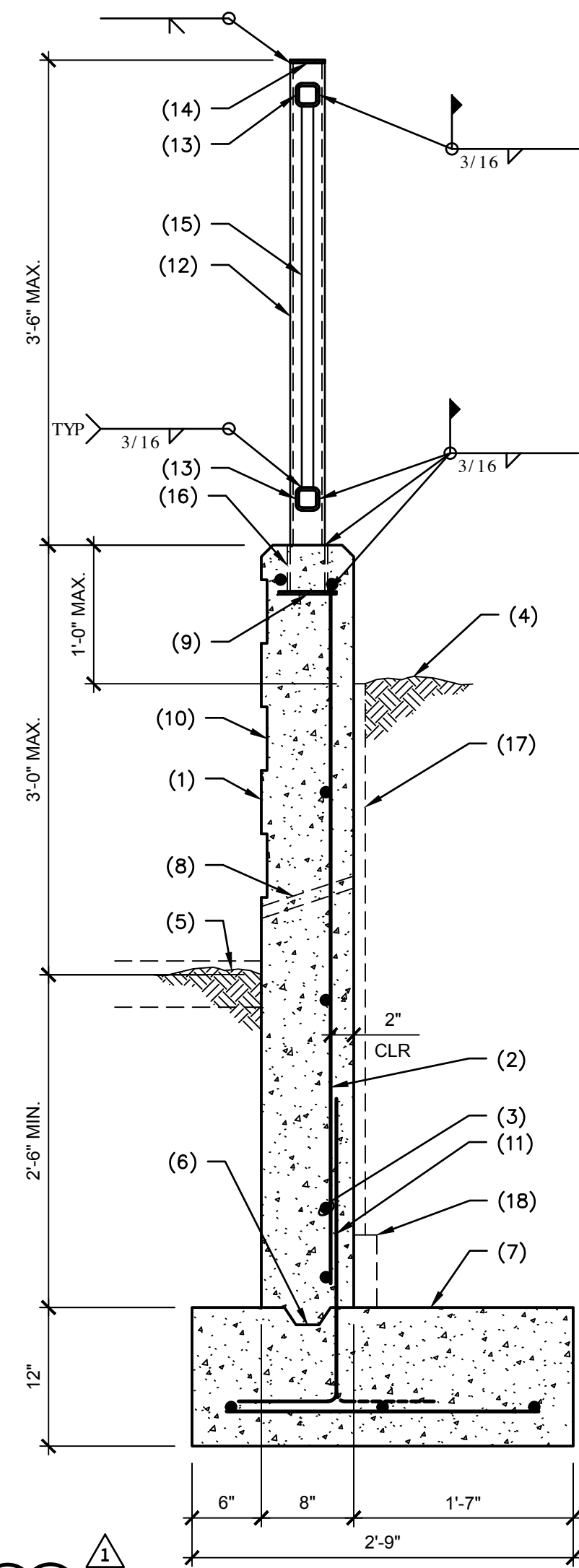
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www.emc2architects.com

DRAWING TITLE:  
TYPICAL SECTIONS & DETAILS

DESIGNED BY: EMC2	PROJECT NO. 14819710
DRAWN BY: JV,CW,MV	SCALE: 1/8" = 1'-0"
CHECKED BY: DMM	DRAWING NO. <b>S2</b>
DATE: 06-08-2020	
DATA FILE: 710 Grand Canyon ES Wall.rvt	

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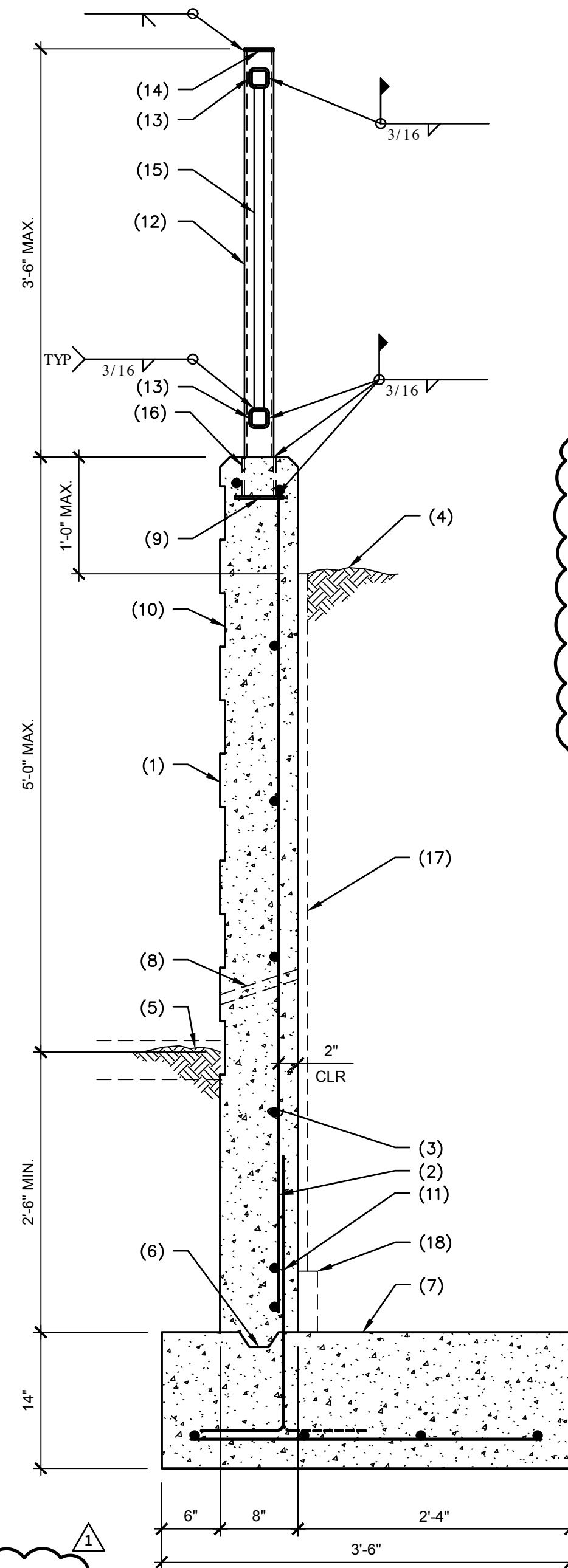




- NOTES:**
- 8" CAST IN PLACE CONCRETE RETAINING WALL.
  - #5 @ 16" O.C. VERTICAL.
  - #5 @ 18" O.C. HORIZONTAL.
  - FINISHED GRADE.
  - FINISHED GRADE OR CONCRETE SLAB AS OCCURS.
  - CONTINUOUS KEY - SEE TYPICAL KEY IN CONCRETE DETAIL.
  - CONCRETE FOOTING REINFORCED W/4-#5 LONGITUDINAL & #5 @ 24" O.C. TRANSVERSE.
  - 1" DIA. WEEP HOLES AT 3'-0" O.C.
  - 1/4"x5"x5" STEEL PLATE.
  - FORM LINER PER ARCHITECTURAL DRAWINGS. MINIMUM CONCRETE THICKNESS IS 7".
  - DOWELS TO MATCH AND LAP VERTICAL WALL REINFORCING.
  - HSS3x3x1/4 POSTS @ 8'-0" O.C. MAX.
  - CONT. HSS2x2x1/4 RAIL.
  - 1/4" STEEL POST CAP.
  - 1" SQUARE BAR PICKETS @ 4" O.C.
  - HSS3 1/2x3 1/2x1/4 x 4" LONG SLEEVE.
  - J-DRAIN 400 SERIES DRAINAGE MAT OR EQUAL.
  - J-DRAIN SWD FOUNDATION DRAIN OR EQUAL.

1 TYPICAL 3'-0" MAX. CONCRETE RETAINING WALL

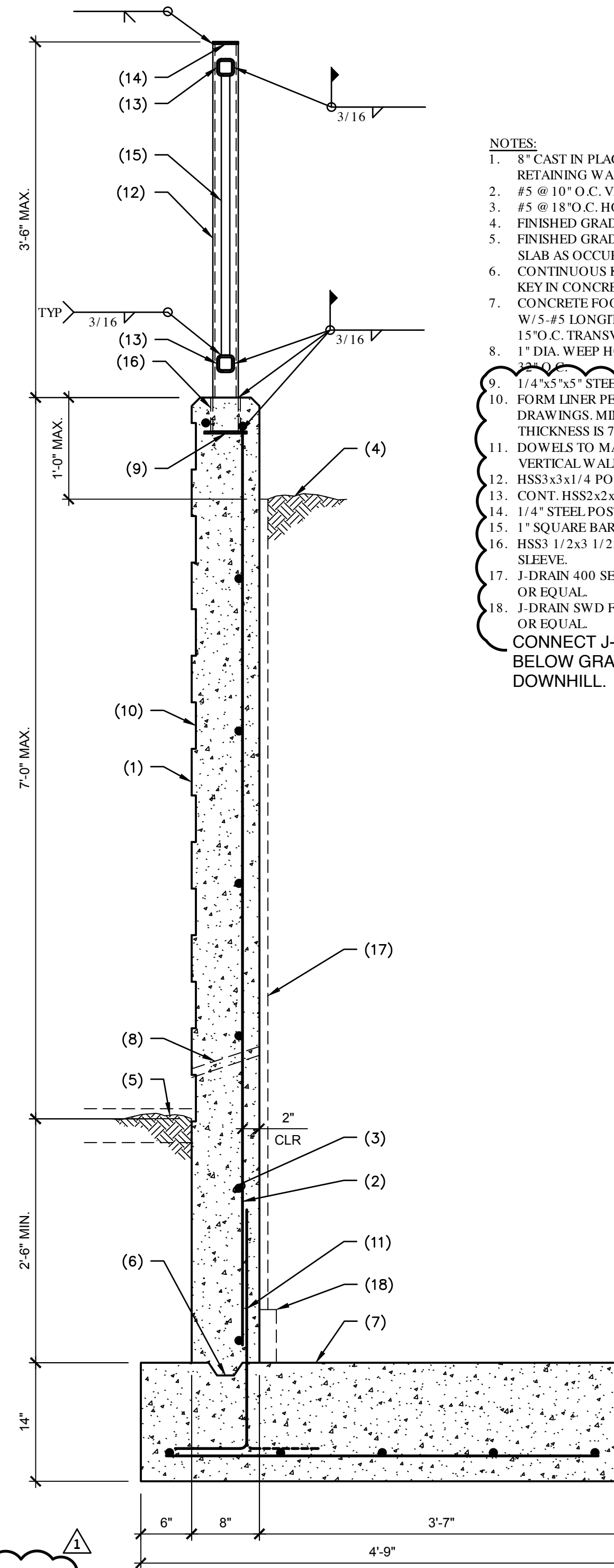
N.T.S.



- NOTES:**
- 8" CAST IN PLACE CONCRETE RETAINING WALL.
  - #5 @ 16" O.C. VERTICAL.
  - #5 @ 18" O.C. HORIZONTAL.
  - FINISHED GRADE.
  - FINISHED GRADE OR CONCRETE SLAB AS OCCURS.
  - CONTINUOUS KEY - SEE TYPICAL KEY IN CONCRETE DETAIL.
  - CONCRETE FOOTING REINFORCED W/4-#5 LONGITUDINAL & #5 @ 24" O.C. TRANSVERSE.
  - 1" DIA. WEEP HOLES AT 3'-0" O.C.
  - 1/4"x5"x5" STEEL PLATE.
  - FORM LINER PER ARCHITECTURAL DRAWINGS. MINIMUM CONCRETE THICKNESS IS 7".
  - DOWELS TO MATCH AND LAP VERTICAL WALL REINFORCING.
  - HSS3x3x1/4 POSTS @ 8'-0" O.C. MAX.
  - CONT. HSS2x2x1/4 RAIL.
  - 1/4" STEEL POST CAP.
  - 1" SQUARE BAR PICKETS @ 4" O.C.
  - HSS3 1/2x3 1/2x1/4 x 4" LONG SLEEVE.
  - J-DRAIN 400 SERIES DRAINAGE MAT OR EQUAL.
  - J-DRAIN SWD FOUNDATION DRAIN OR EQUAL.

2 TYPICAL 5'-0" MAX. CONCRETE RETAINING WALL

N.T.S.



- NOTES:**
- 8" CAST IN PLACE CONCRETE RETAINING WALL.
  - #5 @ 10" O.C. VERTICAL.
  - #5 @ 18" O.C. HORIZONTAL.
  - FINISHED GRADE.
  - FINISHED GRADE OR CONCRETE SLAB AS OCCURS.
  - CONTINUOUS KEY - SEE TYPICAL KEY IN CONCRETE DETAIL.
  - CONCRETE FOOTING REINFORCED W/5-#5 LONGITUDINAL & #5 @ 15" O.C. TRANSVERSE.
  - 1" DIA. WEEP HOLES AT 3'-0" O.C.
  - 1/4"x5"x5" STEEL PLATE.
  - FORM LINER PER ARCHITECTURAL DRAWINGS. MINIMUM CONCRETE THICKNESS IS 7".
  - DOWELS TO MATCH AND LAP VERTICAL WALL REINFORCING.
  - HSS3x3x1/4 POSTS @ 8'-0" O.C. MAX.
  - CONT. HSS2x2x1/4 RAIL.
  - 1/4" STEEL POST CAP.
  - 1" SQUARE BAR PICKETS @ 4" O.C.
  - HSS3 1/2x3 1/2x1/4 x 4" LONG SLEEVE.
  - J-DRAIN 400 SERIES DRAINAGE MAT OR EQUAL.
  - J-DRAIN SWD FOUNDATION DRAIN OR EQUAL.
- CONNECT J-DRAIN TO 4" PIPE BELOW GRADE AND DAYLIGHT DOWNHILL.

3 TYPICAL 7'-0" MAX. CONCRETE RETAINING WALL

N.T.S.

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david.bixler@dbaeng.com

Proj. No. 19.140

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

#	REVISIONS / SUBMISSIONS	DATE
1	COMMENT RESPONSE	08/10/20

GRAND CANYON UNIFIED SCHOOL DISTRICT  
**GRAND CANYON ELEMENTARY**  
RETAINING WALL - 030204001-9999-004-BRG

100 BOULDER STREET, GRAND CANYON VILLAGE AZ 86023

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DRAWING TITLE:  
**RETAINING WALL SECTIONS**

DESIGNED BY: EMC2	PROJECT NO. 14819710
DRAWN BY: JV,CW,MV	SCALE: 1/8" = 1'-0"
CHECKED BY: DMM	DRAWING NO. <b>S3</b>
DATE: 06-08-2020	
DATA FILE: 710 Grand Canyon ESWall.rvt	



## Letter of Authorization

### Memorandum

**To:** Pamela Edwards, Transportation and Clinic Program Manager, Commercial Services Division

**From:** Erin Janicki, Environmental Protection Specialist, Planning, Environment, and Projects

**Through:** Rachel Bennett, Acting Chief, Planning, Environment, and Projects

**Subject:** Compliance Requirements for Reconstruction of the Failing Retaining Wall at Grand Canyon School Playground (PEPC 96278)

The superintendent has conditionally approved this project for compliance with the following requirements. **You must comply with the following Mitigation Requirements (please note: some may be required prior to project initiation).** These requirements are in place to protect park resources and visitor experience.

**Project Description:** This project proposes the reconstruction of the playground retaining wall located between the elementary school (Building #323) and the playground at Grand Canyon Unified School (School). The current playground retaining wall is constructed of stacked railroad ties over 6 ft in height and is in a state of failure as the railroad ties have degraded and are shifting out of place, creating a significant safety hazard. The wall is beyond its life expectancy and poses a hazard to both the school children who play on the playground near the wall and anyone who utilizes the trail. The proposed new material would be a split faced concrete masonry unit (CMU) wall that will be identical to what is currently on the Upper Elementary School, Building #323 (to the northeast and visible from the wall location) as well as the Multipurpose Building, Building #1452 (to the west of the wall location). The possibility exists that the asphalt trail will need to be removed and reinstalled back to its current location in order to accommodate support footings. There are trees that have grown up since the original railroad tie wall was constructed that would need to be removed to accommodate the foundation of the new retaining wall. The project start date is unknown based on funding availability. To mitigate current safety concerns, the School will work with the Park to coordinate temporary closure of that section of trail until the retaining wall can be replaced.

### Mitigation Requirements:

- You are responsible for ensuring that these Mitigation Requirements are followed and that these measures are incorporated into any contracts for this project and implemented by the staff assigned to undertake the work.
- If, for any reason, mitigation measures cannot be accomplished due to budget or timeframe or there is a change in project scope or project leader, you must contact the Planning, Environment, and Projects Division before proceeding with the project.

### Cultural Resources

- Although there is no surface evidence of archeological resources, clearance to proceed is recommended with the condition that if concealed archeological resources are encountered during project activities, all necessary steps will be taken to protect them and the Park Cultural Resources Manager will be notified immediately.



- Areas selected for staging equipment and materials are expected to be located in existing disturbed areas where there is no potential for archeological resource disturbance. Contact the park's Cultural Resource Program Manager before creating/utilizing any staging areas not previously addressed or reviewed for this project.

### **Vegetation**

- Vegetation removal shall be avoided during wildlife's primary breeding/nesting seasons between early-April and mid-August.
- School and Project Lead will work with Park vegetation staff to identify trees needing removal and will confirm with Park vegetation staff that there will be no significant adverse impacts resulting from removal of identified trees. Please contact Dan Boughter at Daniel\_boughter@nps.gov or (928) 638-7857 to coordinate identification and review of trees to be removed.

### **Wildlife**

- Wildlife will not be fed or approached.
- The project site will be cleaned up at the end of each day the work is being conducted (i.e. trash disposed of/secured appropriately, scrap materials picked up) to minimize the likelihood of condors visiting the site. Park wildlife program staff may conduct periodic spot checks to ensure adequate project clean-up measures are being appropriately undertaken.
- Project staff shall comply with the Migratory Bird Treaty Act (MBTA) [16 USC 703]. Any active nest shall be left in place and undisturbed until the young hatch and depart.
- Biodegradable matting with a large-diameter natural fiber shall be used to prevent entrapment of wildlife, if erosion netting is necessary. Wildlife Department personnel shall be notified/consulted when any wildlife must be disturbed or handled. They will be available to assist with moving/relocating wildlife, when necessary; and/or to make recommendations for relocating any disturbed animals.
- Grand Canyon's Parkwide Spill Response Plan will be utilized by park employees and contractors to prevent potential poisoning of condors and other wildlife as well as soil and water contamination. Project Leaders are responsible for signing and implementing this plan. It is located on the park's SharePoint site on the Planning and Compliance page
- If condors visit a project site, project activities will cease until the condors leave on their own or until permitted personnel use approved techniques that result in condors leaving the area.

### **Health and Safety**

- To prevent injury to people on the path or utilizing the playground, the School will coordinate with the NPS to temporarily close the trail that runs along the base of the retaining wall and to plan a temporary realignment until the wall can be repaired. If necessary, the area of the playground on the terrace behind the retaining wall will be closed as well.
- Hazardous Materials: If the existing retaining wall railroad ties are found to have been treated with creosote, the contractor will need to dispose of logs off-site and may require a hazardous waste hauler's permit.

### **Miscellaneous Project Requirements**

- Project Leader will invite NEPA Lead to preconstruction meeting (minimum of five (5) calendar days notice if possible).
- Paint color for the CMU retaining wall shall be submitted to the park for final review and approval.
- Complete construction drawings, details and specifications shall be submitted to the park for final review and approval. Construction drawings shall include a detailed section illustrating the footing, CMU, reinforcing, grout fill, wall cap, fence etc.

Failure to follow these requirements could result in work stoppage. For complete compliance information see PEPC Project 96278. If you have any questions, please let me know.

Cc: Kim Park, Craig Chenevert, Catherine Lentz, Ellen Brennan, Elston Stephenson, Rosa Palarino, Adam Gibson, Gregory Holm, Rachel Bennett, Doug Lentz

