CITY OF BULLHEAD CITY, ARIZONA
UTILITIES DEPARTMENT

Blower Buildings Improvements

PROJECT NUMBER 27-U-001

ADDENDUM NO. 4

September 9, 2026

27-U-001

Blower Buildings Improvements

Addendum No. 4

The attention of the bidders is called to the following changes and clarifications to the original contract specifications, and they shall be taken into account in preparing proposals and shall be part of the Bid/Contract Documents.

The following changes and clarifications are to be made and become part of the Bid/Contract Documents. The changes and clarifications are as follows:

Questions received, clarifications provided:

1. **The Bid Opening Date has been extended to September 17, 2026, at 3:00 PM Arizona Time**.

2. Section 43 05 50: Page 887, 889, 890 from the Specs are corrupted files. The information on the pages is skewed making it difficult to read/comprehend. Please replace those pages so the correction information can be extracted. (Spec 43 05 50).

   Response: Replacement pages for 887, 889, and 890 (Aerzen USA Corporation, pages 1-4) are included with this addendum.

3. Section 40 60 10.01, 1.03.D: Installation of Screening Equipment – is the screening equipment installation itself to be part of the Contractor's bid proposal? And if so, what bid item should it be coded to? Additionally, the specs referenced in D are not part of the overall projects specs provided. (46 05 50).

   Response: The screening equipment is not part of this project. This paragraph will be deleted.

4. General: Please provide a complete list of the owner provided equipment that is expected to be installed. The information provided between drawings and specs suggests there may be additional items. Complete clarity on what is already purchased and on hand vs. what is to be procured by the Contractor would be very helpful.

   Response: Two Aerzen turbo blowers exist and will be moved from their current location in the existing blower building to the new Aeration Basin Blower Building as part of this project. The existing installation includes check and isolation valves that the Contractor may reuse at their discretion.

   A dual air compressor and air dryer are existing and will be moved from their current location in the existing blower building to their new location in the new Aeration Basin Blower Building as part of this project.

All other equipment and materials shown on the plans shall be procured by the Contractor.

5. Drawings M-1 and M-2: Air Compressors (2) are called out on the plans and are not clearly defined as to type/performance in specs or plans. Please clarify.

   Response: Please note the updated drawings in Addendum 1. This dual air compressor is considered existing and is therefore not specified.

6. Section 07 32 13: There are many colors and styles available for the clay tile roofing which impact the overall cost, please clarify the exact color and style for the aeration basin blower building.

   Response: See response to Comment No. 10 below.

7. Drawings M-4 and M-5: There are some discrepancies between the blowers named as well as the processed air (PA) sizing. On M-4 to M-5 the blowers depicted (2-4) do not match up; as well as the processed air piping shows 12" on M-4 and then changes to 16" on M-5. Please clarify the equipment labeling (also on M-2) and confirm the processed air piping sizing.

   Response: The blower shown in Section A on M-5 is Blower 4, (B-2-4). The 12-inch callout on M-4 is correct and will be corrected to be consistent on M-5.

   On M-1 and M-2, the turbo blower intake piping is 16” diameter. Coordinate with Aerzen for connection to the blowers. All other pipe sizes and equipment labels are called out correctly.

8. Drawing C-2: The 24" V530 is called out, however this item is buried and the V531 is typically intended for buried use. Should we use the V531 due to the circumstances or should we keep things as is?

   Response: Please provide V531 for buried service.

9. Section 08 71 00 and Drawing C-12: Are the door hardware groups being rewritten / revised with panic hardware noted? Return to the AHC. Groups noted on C-12 and 08 71 00 Pages 12-13.

   Response: Doors to and from the electrical rooms will use panic hardware. The door schedule in C-12 will be revised to list hardware group H3 for door A7. In Section 08 71 00, paragraph 2.04 will be deleted.

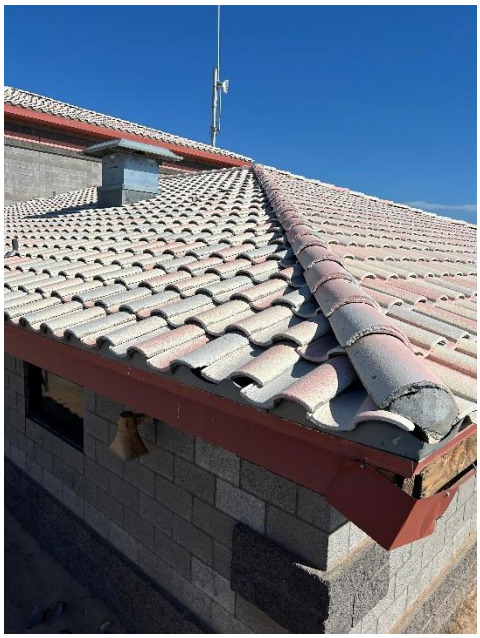
10. Section 09 90 00: It appears that the process air piping is going to be stainless steel. Will this require full painting or just bands and labels?

    Response: Bands and labels are sufficient for identification of stainless steel pipe.

11. Section 07 32 13: For the roofing, is there a tile number or a picture of what tile will need to be matched for the buildings?

    Response: See the photos provided below.

Existing clay tile on the buildings at the Section 10 WRP.



12. Drawing M-5: Per Sheet M-4, the process air piping is called out as 12" pipe; however, Sheet M-5 shows the same piping as 16" pipe. Also, Sheet M-4 calls out 8" pipe, while Sheet M-5 shows this piping as 6" pipe. Please confirm the correct pipe sizes for these process air piping runs.

    Response: See response to Comment No. 6 above for the 12" header. The plan view on M-4 shows the intake piping, which is 8" in diameter for both blower sizes. The discharge piping is 6-inch diameter for the smaller blower and 8-inch diameter for the larger blowers. The callout on M-5 will be revised to show an 8-inch discharge and associated fittings and valve. Also, coordinate with the blower manufacturer for inlet and discharge sizes.

13. Drawing C-4: Per Sheet C-4, Detail 1, PA Riser Detail, the detail lists a 4" WSTL 90 Bend MJ for buried piping. Please confirm whether this should be a butt weld fitting instead. The same detail also calls out both a 4" Flex Coupling and a 4" Transition Coupling. In addition, after the transition coupling off the WSTL tee, the piping still appears to be shown as WSTL until it reaches the DMJ connection. Please confirm the correct piping material, fitting types, and transition locations required for this detail.

    Response: The bend should be a butt weld bend. The "flex coupling" and "transition coupling" should be the same and be called out as "FLEX COUPLING." The piping will be welded steel as shown and called out.

14. General: Is a Geotechnical Report available?

    Response: A project-specific geotechnical report is not available for the blower buildings. Included with this addendum is a geotechnical report prepared for the clarifier near the blower buildings. Generally, soil conditions are similar to those shown in the attached geotechnical report throughout the plant site.

15. Section 09 90 00: Please confirm if all the exterior and interior masonry walls are painted.

    Response: Masonry walls do not need to be painted.

16. Drawings: Please confirm the TOC Elevations for the two blower buildings as the plans have various elevations shown. The S Plan sheets show 508.5 for both buildings yet the C Plan sheets show 504.25 for the Digestor Blower Building and 508.5 for the Aeration Basin Blower Building.

    Response: The elevations shown on the C-sheets for building floors are correct. S-sheet elevations should be adjusted accordingly.

17. Addendum 1: Is there any insulation required in the blower buildings? The Drawings do not show any but need this confirmed by the engineer.

Response: Please see the revised sheets provided with Addendum 1.

18. Section 07 11 13: We also assume no damp proofing is required on any walls. The engineer should also confirm this.

    Response: As per Section 07 11 13, provide dampproofing on all buried exterior concrete structures, including the building stem walls.

19. Section 43 11 33-2.02 requires "two (2) Aerzen Delta Hybrid Model TBD" and "one (1) Aerzen Delta Hybrid Model TBD," with no equal allowed (2.01.A). Please issue an addendum stating the required model designations (or complete performance duty points sufficient for Aerzen to certify a selection) for equipment numbers B-2-1, B-2-4, and B-2-5.

    Response: Model numbers and information for the Aerzen blowers were provided in Addendum No.1.

20. The Bid Schedule defines Item 21 by reference to both 43 11 20 and 43 11 33 (Equipment)" while Section 01 29 76 describes Item 21 as "Digester Blower Equipment" only. Please confirm by addendum: (a) which bid item carries procurement of the new Aerzen AT200-1.0S G5plus turbo blower required by 43 11 20 and 43 05 50-1.01.C; and (b) that both blower packages may be billed as materials/equipment not yet incorporated under GC 8.68 upon delivery or approved storage.

    Response: Procurement of the blower equipment shall be paid out under Bid Item No. 21. Materials/equipment delivered to the site but not yet incorporated will be paid out in accordance to GC 8.68.

21. The Agreement fixes completion at May 1, 2027 (Para. 3; SP 9.8), while GC 8.47 permits NTP up to 120 calendar days after agreement execution and GC 8.28 bars compensation for pre-NTP work; GC 8.63 makes equipment delivery delay non-excusable. Given sole-source blower and electrical-gear lead times, please confirm by addendum one of the following: (a) the date by which NTP will issue; (b) that the completion date will extend day-for-day for NTP issued after a stated date; or (c) that the successful bidder is authorized at Notice of Award to release purchase orders for the Section 43 11 20 / 43 11 33 blower equipment and Division 26 gear, with such procurement compensable under GC 8.68 notwithstanding GC 8.28. The fixed date of May 1, 2027 is not feasible due to the delivery times for material and equipment that suppliers have stated. We recommend allowing 420 Calendars for construction after Award and NTP.

    Response: It is anticipated that the Notice to Award will be issued by October 20, 2026. The project must be fully complete by June 30, 2027 at the latest.

22. GC 8.65 and Spec 01 14 16-1.05.A.2 state no geotechnical exploration was performed for this project, yet Sheet S-1 bases design on the August 7, 2002 DMJM+Harris report (borings at the oxidation ditch/clarifier/filter areas), and Spec 31 23 00 requires imported engineered structural fill "as required in Geotechnical Report." Please confirm:

(a) whether any subsurface data exists at the two blower building footprints; (b) the required thickness and lateral limits of imported structural fill beneath footings, slabs, sidewalks, and pavement; and (c) that subsurface conditions materially differing from the 2002 report will be administered as differing site conditions under GC 8.65.

Response: See geotechnical report included with this addendum.

23. Spec 01 11 00-1.12.E and 1.12.I state that delay, additional work, or extra cost caused by existing underground installations "shall not constitute a claim," while GC 8.65 provides equitable adjustment for differing subsurface conditions and Spec 01 14 16-1.05.B.1.a directs such requests to the General Conditions. Per the GC 8.82 order of precedence, please confirm GC 8.65 governs.

Response: Delay due to underground installations do not constitute a claim. Differing subsurface conditions may allow for equitable adjustment. They are not the same.

23 Demolition includes buried sodium hypochlorite (SC) and NaOH piping (Spec 02 41 10-1.01.B.2). Please confirm: (a) whether the Owner has knowledge of releases or impacted soils along these alignments; and (b) that handling, characterization, and disposal of contaminated soil or groundwater, if encountered, will be compensated under the Owner Contingency (SP 9.33) or by change order under GC 8.65.

Response: The existing chemical lines have been abandoned for some time, and therefore no release of chemicals is anticipated when the lines are removed.

24 Spec 01 14 16-1.07.C.2 states the Owner's SCADA provider will program the system "to operate the new headworks equipment"; similar headworks references appear in the miscellaneous metals provisions and Spec 31 23 00-2.02.K. Please issue an addendum (a) correcting these references, and (b) defining the division of SCADA scope for the blower systems: points list, programming, loop/functional testing responsibility, and required Contractor support, consistent with Specs 40 60 10.01/.02.

Response: No headworks equipment is included in this project. For SCADA scope of work, Sections 40 50 10, 40 60 10.01, and 40 60 10.02 shall take precedence over references to SCADA in other sections. The contractor shall coordinate with the City's SCADA provider for a complete system. Also see Addendum No. 1 for edits to the referenced specification sections.

25. Bid Item 15 lists Division 26 sections but omits 26 24 19, Motor Control Centers, which is included in the Project Manual; Bid Item 19 is missing its quantity/unit; SP 9.22 cites the 1998 MAG specifications (2007/2008 revisions) while Spec 01 11 00-1.03 cites the 2023 revision of the 2020 edition. Please issue a corrected Bid Schedule and confirm the governing MAG edition.

Response: Bid Item 15 shall include all electrical requirements of the project. Bid Item 19 is a Lump Sum unit.

26. Spec 01 14 16-3.02.B requires temporary standby generation with automatic transfer capability for any required shutdown of the standby power system. Please identify the anticipated shutdown events, expected durations, and connected loads to be supported, or confirm that no standby-power shutdowns are anticipated.

    Response: The Contractor shall determine the use of standby generation during the project and provide the cost for providing and using standby generation if they deem it necessary.

27. No Davis-Bacon, Buy American, DBE, or federal grant provisions appear in the Contract Documents. Please confirm the project is funded exclusively with local/state funds and that no federal wage or procurement requirements apply.

    Response: No federal funds are anticipated to be used for this project at this time.

28. For the two Owner-furnished turbo blowers to be relocated (Spec 01 11 00-1.06; 43 05 50): please confirm (a) the Owner bears the risk of pre-existing and latent defects documented at the joint pre-move inspection; (b) the warranty status of the relocated units; and (c) that Contractor responsibility is limited to damage caused by its handling and relocation activities.

    Response: The contractor is responsible for damages caused by its handling and relocation activities. Prior to removal and relocation, the Owner and Contractor will confirm the blowers' operation and functionality.

29. Spec 01 14 16-1.07.B.6 contemplates around-the-clock connection work, while GC 8.63 requires 72-hour notice and Owner approval for work outside 6:00 a.m.-6:00 p.m. weekdays and SP 9.12 charges off-hours inspection to the Contractor (4-hour minimum). For Owner-constrained tie-in windows (including the 3-hour process-air limit of 01 14 16-1.07.C.1), please confirm advance approval will be granted and identify whether off-hours inspection costs for Owner-required windows are borne by the Owner.

    Response: Approval for work outside of the working hours designated in the project documents will be reviewed and approval granted on a case-by-case basis. It is anticipated that approval will be granted for these instances, but the Contractor is still responsible for coordinating with the Owner in these instances.

30. IFB 1.15 requires the bidder to pay "actual damages related to the cost of completion ... and liquidated damages," and GC 8.63 reserves both. Please confirm liquidated damages are the Owner's exclusive remedy for delay in completion, with actual completion-cost damages applicable only upon termination for default under GC 8.66.

Response: Confirmed.

31. GC 8.75 prohibits subcontracting in excess of 49 percent of the Contract Price without prior written Owner approval. Given the specialty equipment (sole-source Aerzen), electrical, I&C, HVAC, masonry, and roofing content of this project, will the Owner entertain pre-award or at-award approval of a subcontracting plan exceeding 49 percent where the Contractor demonstrates management and self-performed core scopes?

    Response: The Owner will consider a subcontracting plan exceeding 49 percent. The breakdown and the subcontractors completing that work should be submitted with the bid proposal, regardless of the percentage.

32. Is Bullhead City responsible for the power feed design and installation and the new electrical service transformer? Has the city considered the time for the power feed design and installation in the schedule?

    Response: See Drawing E-1, note B under Electrical Project General Notes for clarification.

33. Question: Spec 26 00 10 1.04 – Para A states Electrical Contractor to pay all permits or fees…. Yet Para C states Utility Cost and fees shall be the responsibility of the Owner. Please clarify what costs the contractor shall carry.

    Response: The Owner is responsible for paying the fees associated with the new utility service. The contractor is responsible for all other fees associated with permits, etc., to complete the work.

Modifications to the technical specifications (Volume 2):

1. Section 40 60 10.01, PICS: LOOP DESCRIPTIONS:
    a. Item 1.03 RELATED SECTIONS:
        i. **Delete** the following paragraph: “D. Section 46 05 50, 46 05 50, INSTALLATION OF OWNER FURNISHED SCREENING SYSTEM.”

2. Section 08 71 00, FINISH DOOR HARDWARE:
    a. Item 2.04 HARDWARE GROUP SETS
        i. **Delete** in its entirety.

Modifications to the construction drawings (Volume 3):

A. Drawing M-5:

a. **Modify** callouts for the common air header shown in both sections from “16” PA” to “12” PA.”

B. Drawing M-5:
   a. **Modify** callouts for the blower discharge expansion joint and BFV from “6” to “8.”

C. Drawing C-2:
   a. **Modify** callout for the buried butterfly valve from “V-530” to “V-531.”

D. Drawing C-12:
   a. **Modify** the hardware group for Door A7 from “H-2” to “H-3” (requiring panic hardware).

E. Drawing M-2:

   a. Clarify that the Owner-provided check valves apply to the two existing blowers. It is anticipated that the existing check valves will be reused for the blowers when they are moved. The Contractor will be responsible for procuring and installing the new appurtenances with the new turbo blower. Coordinate supply with Aerzen.

-end-

This addendum must be signed, and a copy included in the bid proposal for the proposal to be valid.

Acknowledgement: _____ _____
Signature Date

Aerzen USA Corporation
108 Independence Way – Coatesville, PA 19320
Tel: (610) 380-0244 Fax: (610) 380-0278
Service Hotline (800) 444-1692
e-mail:Aerzen@AerzenUSA.com website www.aerzenusa.com

Job Specific Data Package
for Aerzen Job # SO-21-00406

Date	Revision	Page
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CUSTOMER INFORMATION

CUSTOMER	City of Bullhead City
CUSTOMER PO #	2022-00001861
PROJECT NAME	Bullhead City, AZ WWTP

PACKAGE DESCRIPTION

TURBO BLOWER MODEL #	AT200-1.0S G5plus
ORDER QUANTITY	2
INLET TYPE	TYPE_B
DESCRIPTION	REMOTE AIR INTAKE & FILTER, PIPED TO THE BLOWER
TOTAL PACKAGE WEIGHT	1914 lbs. (870 kg.)
ASSEMBLY SERIAL No.	
MOTOR SERIAL No.	
INVERTER SERIAL No.	

DOCUMENTATION

GENERAL ARRANGEMENT DRAWING	G5PlusTurbo_TypeB_GB-007722-200-10_rev-
WIRING DIAGRAM No.	IB-007811-200
OPERATIONS & MAINTENANCE MANUAL	OMTB-G5P-V010-EN
WARRANTY TERMS & CONDITIONS	A2-001-USA

NAMEPLATE DATA

MEDIUM	Air			
FLOW RATE	3531	cfm	100	m^3/min
DISCHARGE PRESSURE	15	psi	1000	mbar
ROTATING SPEED	36000	rpm		
RATED VOLTAGE / FREQUENCY	460 V / 3Φ / 60 Hz""			
MOTOR RATING	200	HP	149	kW
MAXIMUM LOAD (MOTOR)	274	A		
RATED CURRENT OF DESIGN	230	A	@460 V""	
CIRCUIT BREAKER RATING	350	A		
CIRCUIT BREAKER AMPS INTERRUPTING CAPACITY	65	kA		
AMBIENT TEMPERATURE RANGE	-4 to +104		-20 to +40 ˚C	
DISCHARGE CONNECTION SIZE	10" 150# ANSI FLANGE			
INLET CONNECTION SIZE	16" 150# ANSI FLANGE			

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Job Specific Data Package
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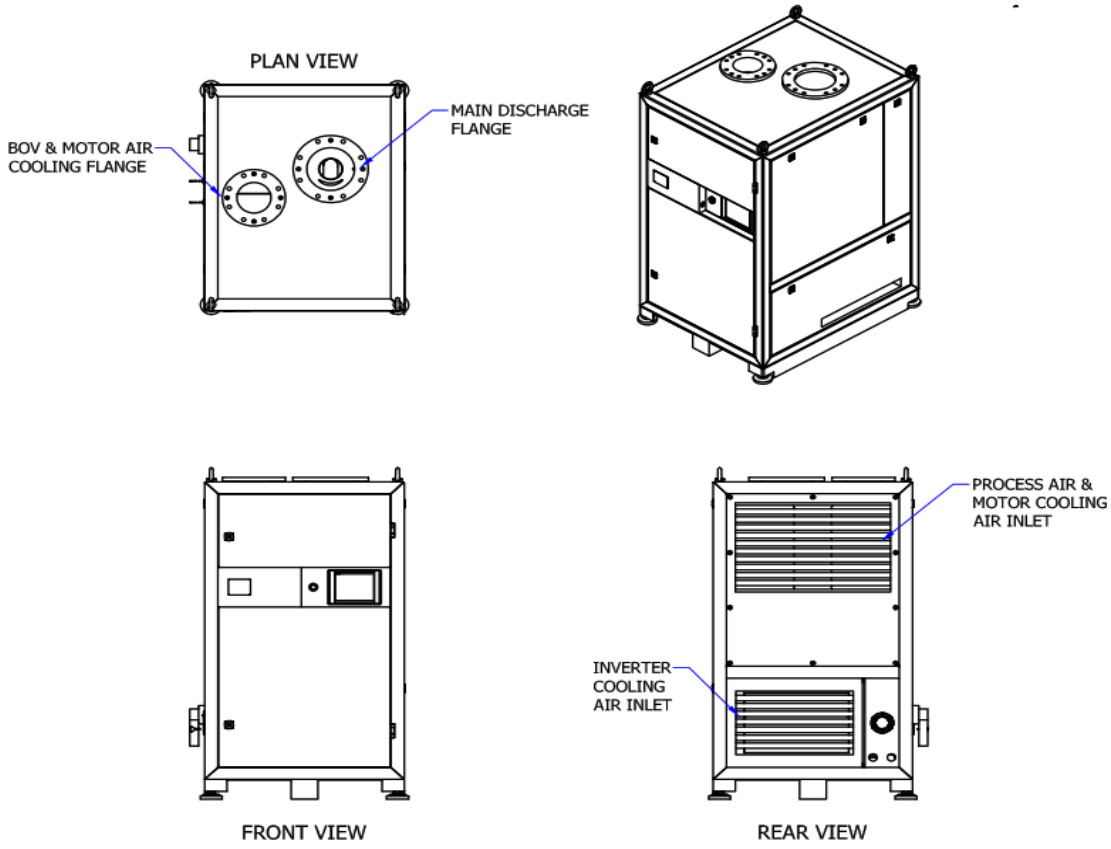
UNIT COOLING CALCULATION



FLOW, COOLING AIR

MOTOR	285.0	CFM
INVERTER	**633**	CFM

PACKAGE

AT200-1.0S G5plus

RATED HORSEPOWER

200	HP

HEAT GENERATION AT DESIGN POINT

MOTOR	449	BTU/min
INVERTER	**266**	BTU/min

CRITICAL INFORMATION / NOTES

! Read complete operator's manual and all safety instructions before using this equipment. **!**

1 Transportation

- Blowers are shipped as a complete assembly, while some components for intake/discharge could be delivered separately.
- A blower should be lifted by hand palette truck (or forklift)
- If the blower is lifted with a crane, it should not be damaged by rope or chain, and suitable guards should be necessary.
- If applicable on some machines, connect all 4 EYE-BOLTS with ropes or chains for safemovement.

2 Storage within 120 days

- If products are stored where temperature and humidity is controllable, special means for storage is not necessary.
- Ventilation may be necessary for the maintenance of electric isolation if humidity is high.

3 Important safety regulations

- Do **not** modify components or structures, abnormal operation may cause serious injury.
- Do **not** exchange intake filters during operation
- Do **not** exceed max. pressure on data plate..
- Do **not** close the main valve on operation, unexpected surge may take place.
- Do **not** perform any maintenance during operation.
- Electric current inside inverter is still alive for 10 minutes after machine stops.
- Electric current at lamps and displays of a filter panel is still alive regardless of the status of the main breaker.
- Do **not** insert unauthorized circuit inside control panel.
- All grounding should be performed according international electric standard. Use the special type 3 grounding method
  (Ground impedance : below 10Ω for 460V class).

4 Recommended working spaces

- Allow approximately 1067 mm [42 inches] of working space on all four sides around the blower for operations and maintenance activities.

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SCOPE OF SUPPLY

QTY	DESCRIPTION	REMARKS
2	Turbo Model AT200-1.0S G5plus -Complete Assembly consisting of:	
	High Speed PM Motor	
	• bump air foil bearings	
	• impellers	
	• integrated motor cooling system	
	Inverter	
	Enclosure	
	• integrated air filtration system	
	• Blow Off Valve	
	• BOV silencer	
	Control System	
	• CPU	
	• LCP (MICOM control, Touch Screen)	
	• temperature and pressure sensors	
	ACCESSORIES/SPARES SHIPPED LOOSE (unless noted otherwise)	
2	Discharge Expansion Joint w/ 10" 150# ANSI FLANGE	21-004426-10
2	Butterfly Isolation Valve - 10 INCH	21-001741-10-07
2	Check Valve - 10 INCH	21-001713-10-02
2	Inlet Expansion Joint- 16 INCH	21-004426-16
2	Motor Cooling/ BOV Connection: 6 INCH Expansion Joint	21-004426-06
2	Remote Filter Unit w/ 16 INCH Flange	21-004547-16
2	Set(s) of Replacement Air Filter Elements	21-007241
2	Passive Harmonic Filter	21-004634-200
2	Communication Gateway **(installed)**	21-004395-11
2	Seismic Footing Clamp	21-007027
	ON SITE SERVICES	
	1 trip, 3 days: installation inspection and startup	

SUNBELT ENGINEERING & TESTING, LLP

Geotechnical, Environmental,
Materials Testing & Inspection, QA/QC,
Building Condition Survey

GEOTECHNICAL ENGINEERING EXPLORATION
FOR PROPOSED NEW CLARIFIER
SECTION 10 WASTEWATER TREATMENT PLANT
LOCATED 901 RICHARDO AVE.
BULLHEAD CITY, ARIZONA

PREPARED FOR:

BULLHEAD CITY UTILITIES DEPARTMENT
2355 TRANE ROAD
BULLHEAD CITY, AZ 86442

File No. AZ25061
August 13, 2025

4140 S. Lynn Drive, Suite 111 * Fort Mohave, Arizona 86426
Phone (928) 704-7555

SUNBELT ENGINEERING & TESTING, LLP

Geotechnical, Environmental,
Materials Testing & Inspection, QA/QC,
Building Condition Survey

August 13, 2025
File No. AZ25061

Bullhead City Utilities Department
2355 Trane Road
Bullhead City, AZ 86442

Attn: Ryan Farnell

At your request, we have now completed the geotechnical engineering exploration for the proposed commercial development located at 901 Richardo Ave., Bullhead City, Arizona on approximately ± 0.28-acre lot.

Transmitted herein are the results of our geotechnical exploration, laboratory testing program and recommendations for use in the design of foundations, concrete slab-on-grade, retaining walls, preliminary asphalt concrete pavement, and information pertaining to grading, excavation difficulties and soil corrosion for the proposed project.

We wish to thank you for the opportunity given to us to conduct this exploration and will be available to discuss any questions you may have in this regard.

Respectfully submitted,
Sunbelt Engineering & Testing, LLP

Michael Vela
Project Geologist

James A. Wilson
James A. Wilson
Director of Operations

Reviewed by:

EXP. _____

Robert Kalinski, Ph.D., P.E.
Principal Engineer

4140 S. Lynn Drive, Suite 111 * Fort Mohave, Arizona 86426
Phone (928) 704-7555

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1. INTRODUCTION

1.1. GENERAL

This report presents the results of our geotechnical engineering exploration for the proposed new commercial development, located at 901 Richardo Ave., Bullhead City, Arizona, (please see the enclosed location Map, Plate 1, Appendix C). The proposed construction is to consist of a new Clarifier, consisting of concrete slab on grade foundations and wood framed superstructures with associated underground utilities on an approximately ± 0.28-acre lot (See Plate 2, Appendix C).

1.2 PURPOSE AND SCOPE

The purpose of this geotechnical report is to present the surface and subsurface conditions as related to the engineering properties of the site soils to provide general geotechnical design criteria and construction recommendations for the proposed site development. The scope of this investigation included subsurface exploration, soil sampling, laboratory testing of selected soil samples, engineering analysis, research of pertinent information and preparation of this report. In accordance with this, we have provided information and recommendations concerning:

- General Geology and Seismicity
- Subsurface material & Conditions
- Site Preparation and Earthwork
- Construction Considerations
- Foundation Recommendations
- Suitability of Native Material as Structural Fill
- Engineering properties of the soils, which will influence the design of the future structures, including:
  Bearing Capacity
  Settlement and/or Swelling Potential
  Lateral Earth Pressures
  Seismic Design Criteria

We recommend that a pre-construction meeting be held. The owner or the owner's representative, the civil engineer, the geotechnical consultant, the grading and general contractor should attend this meeting to discuss the plans, geotechnical report, and coordination in various construction activities associated with the project.

1.3 PROJECT DESCRIPTION

As mentioned earlier, the proposed project, proposed commercial development, is to consist of new water treatment plant clarifier, with associated underground utilities, roadways and sitework, etc. on approximately ± 0.28-acre parcel of land. The clarifier structure will consist of prestressed concrete tank. Maximum dead plus long-term live loads for proposed development have been estimated at 15.0 kips per foot for walls and 50 kips for footings.

Grading plans were not available at the time of preparation of this report; however, grading is likely to include cuts and fills of approximately between 1 to 10 feet.

1.4 SITE DESCRIPTION

As mentioned earlier, the site is located within the Section 10 Wastewater Treatment Plant located at 901 Richardo Ave., Bullhead City, Arizona (please refer to Plate 1). The project area consists of the Wastewater Treatment Plant. The topography of the site is generally flat with areas of undulating terrain where not improved, with sparce to thick desert vegetation, sloping gently to the west. As a result, drainage, which occurs primarily in the form of overland sheet low, is directed towards the west.

1.5 FIELD INVESTIGATION

The subsurface conditions at the site were explored by drilling three (3) borings in August of 2025. Plate 2 presents a site plan showing approximate locations of the borings.

The borings were drilled with a boring diameter of approximately 8 inches using a Dietrich D-50 all-terrain access drill rig utilizing hollow-stem augers to maintain the holes and the boring was advanced to a depth of twenty-six (26') feet below the existing ground surface. Soil samples and penetration blow counts were obtained with a Standard Penetration Test (SPT) sampler. The SPT sampler was driven with a 140-pound hammer and 30-inch fall. The penetration resistance obtained from the soil sampler was used to evaluate consistency and density of the in-situ soil. The soils encountered were classified in the field and through further examination in the laboratory in general accordance with the Unified Soil Classification System for site development.

1.6 LABORATORY TESTING

The laboratory testing program consisted of tests to classify site soils and to determine their engineering properties related to this project. The tests performed are presented below.

Test	Purpose
Atterberg Limits	Classification, foundation design criteria.
Sieve Analysis	Classification, grading and foundation recommendations.
Natural Moisture Content	Moisture determination.
Chemical Solubility	Settlement potential & Cement type in concrete.

Test results are presented in Table 5 and Figures 1 - 25 of Appendix B. Detailed descriptions of the laboratory testing program are presented in Appendix B under the appropriate test headings.

2. DISCUSSION

2.1 GENERAL

As mentioned earlier, the project is located within the Section 10 WWTP at 901 Richardo Ave., Bullhead City, Mohave County, Arizona, in Section 10, Township 19 North, Range 22 West of the Gila and Salt River Meridian, (see enclosed Site Location Map, Plate 1).

2.2 GENERAL GEOLOGY AND SEISMICITY

The site lies on a young eroded basin fill. Sediments deposited in this area are Quaternary in age and generally granular. They are often cemented in varying degrees and depths and may contain soluble chemicals. Generally, the grading of the sediments becomes increasingly finer with distance from the source area and with decreasing elevation. Within the project area, the upper sediments appear to consist primarily of silts, sands, and gravels of alluvial origin. According to the "Geologic Map of Mohave County, Arizona" by Eldred D. Wilson and Richard T. Moore (1959) the project area appears to be underlain by Rhyolite includes tuff and agglomerate (Tr) deposited in the Quaternary and Tertiary respectively. Cemented layers of petrocalcic carbonate (caliche) were not encountered in any of the test pits. However, horizons of "Caliche" could exist within the subsurface of the project area and simply were not detected due to the discontinuous nature of "caliche" and the underlining limited nature of the investigation.

No geomorphic evidence for faulting or fissuring could be established either on the surface or in the subsurface borings. A further review of the available geologic maps and published literature, including the Geologic Map of Mohave County, Arizona by Eldred D. Wilson and Richard T. Moore (1959) and Earthquake Hazards in Arizona by Philip A. Pearthree and Douglas B. Bausch (1999) **did not establish a *mapped fault, inferred fault, or mapped fissure zone into or across the property boundaries*** or within 2,000' feet of the project area.

Liquefaction potential was qualitatively evaluated for the subject site. For liquefaction to occur, soils must be granular in nature, loosely compacted, and saturated. These conditions are not present within the site soils, as groundwater was encountered in all of the borings at a depth of twenty-six (26') feet, with twenty-six and one-half (26.5') feet, the maximum depth explored. Liquefaction potential at the subject site is considered low.

Using the *National Map Viewer*, provided by the United States Geological Survey (USGS) (https://viewer.nationalmap.gov/advanced-viewer/) we have located the center of the site to be at approximately LATITUDE **35.0503782** N LONGITUDE **-114.6015802** W. However, it is the responsibility of structural engineer of record for any future development regarding this geotechnical report to verify the exact coordinates for the purpose of his seismic acceleration calculations.

Using the *Seismic Hazard Curves and Uniform Hazard Response Spectra*, provided by the United States Geological Survey (USGS) (http://earthquake.usgs.gov/hazards/designmaps/) we have estimated maximum considered earthquake spectral response accelerations for short (0.2 second) and long (1.0 second) periods for the subject site. Please see **Table 1** below.

Table 1: Seismic Design	**0.2 sec**	**1.0 sec**
Mapped Maximum Considered Earthquake Spectral Response Acceleration, S_s and S_1	0.238 g	0.118 g
Site Coefficient, F_a and F_v	1.6	2.364
Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Class Effects, S_{MS} and S_{M1}	0.381 g	0.279 g
Design Spectral Response Acceleration, S_{Ds} and S_{D1}	0.254 g	0.186 g

Site Class "D", (Stiff Soil) as given in ***Section 1613, site classification for seismic design of the International Building Code, 2018*** is considered to be "appropriate" for this site.

2.3 SUBSURFACE MATERIAL AND CONDITIONS

Exploration as presented on the boring logs indicates that the sub-soils generally consist of one type of material with indistinguishable horizons:

1. **Poorly Graded Sand with varying amounts of silt, loose to dense, slightly moist to wet, brown in color**

The engineering properties of the soils encountered are as follows:

1. **Poorly graded Sand with silt displays no plasticity and is assumed to have low swelling potential. It may be expected to consolidate under light to moderate building loads.**

Chemical analysis of composite soil sample indicates the presence of soluble salts in the native soils (please see Table 5). These soils are considered to be ***negligibly*** corrosive to metal and concrete.

2.4 GROUNDWATER

During the exploration performed for this project, groundwater was encountered during the borings excavated at the project site. It should be noted that although groundwater levels fluctuate due to seasonal variations, adjacent construction, or development, and other factors, it is unlikely that groundwater will affect the proposed development at this site, as groundwater was encountered in all of the borings at a depth of twenty-six (26') feet, twenty-six and one-half (26.5') feet the maximum depth explored.

3. RECOMMENDATIONS AND CONCLUSIONS

From a geotechnical engineering standpoint, it is our opinion that the subject site is suitable for the proposed development provided that the recommendations contained in this report, and in Appendix A, are incorporated into project design and construction. The following sections present conclusions and recommendations concerning the proposed project.

These recommendations are based on the results of the field and laboratory testing which are presented in this report and on the assumption that an adequate number of tests and inspections will be made during the construction phase of the project to verify compliance with these recommendations. Other recommendations may be possible and will be presented, if necessary, upon your request.

As discussed earlier, we recommend that a pre-construction meeting be held. The owner or the owner's representative, the civil engineer, the geotechnical consultant, the grading and general contractor should attend this meeting to discuss the plans and recommendations given in this geotechnical report, and to provide coordination among the grading and other specialty contractors assigned for the project.

3.1 SITE PREPARATION AND EARTHWORK

3.1.1 All earthwork and site preparation should be performed in accordance with the requirements and specifications of the ***2018 IBC and the Bullhead City Building Department*** and as presented in Appendix A of this report and the "Uniform Standard Specifications for Public Works' Construction, Maricopa Association of Governments," current edition, unless noted otherwise.

3.1.2 Based upon the results of our laboratory testing and engineering analyses, it is our professional opinion that the subgrade soils are not suitable for foundation, slab and/or pavement support at their present condition. In order to reduce the risk of future movement and/or cracking of the slab and foundation system it is recommended that, once screened or otherwise separated from the over-excavated surface soils, all the organic material and debris be removed from the soils and that the remaining *clean* fill soils be stockpiled for future use after testing according to Appendix A.

3.1.3 All existing surface and subsurface structures, intended to be removed within the area to be developed, should be razed and moved off site. If a septic tank is located within the project site, it is recommended that it be pumped out and removed. Any leach lines, seepage pits or other pipes associated with this structure should also be removed. If a well is encountered, the well casing should be removed to a depth of five (5') feet below existing grade and the

remainder of the well should be filled with lean concrete slurry and backfilled per Appendix A of this report. These recommendations are not meant to supersede any recommendations provided by the Public Health Department or any other government agencies.

3.1.4 ***A minimum over-excavation of three (3') feet below foundations or through any man-made fill, whichever is deeper, is required.*** The over-excavation should extend a minimum of five (5') feet beyond the footprint in plan view. The over-excavation may be stopped short if a cemented material such as "caliche" of significant hardness, thickness, and lateral extent is encountered "see item 3.1.7 for more detailed explanation". Upon completion of over-excavation, unless hard caliche is encountered, should be proof rolled and observed by Sunbelt Engineering & Testing, LLP to determine if additional over-excavation will be required due to soft and yielding soils. Once an acceptable bottom is verified, the soils shall be scarified a minimum of twelve (12") inches, moisture-conditioned to ±2% of moisture content and compacted as outlined in 3.1.6.

3.1.5 The exposed native subgrade in areas receiving structural fill for foundation support should be scarified to a minimum of twelve (12") inches, moisture-conditioned to ±2% of moisture content, the structural fill material should be placed in thin, loose lifts of eight (8") to twelve (12") inches maximum thickness and compacted to a minimum of ninety-five (95%) of Maximum Dry Density and ninety-eight (98%) percent of maximum dry density as per ASTM D-698 test method in areas where the depth of structural fill is (5') feet or more.

3.1.6 The scarification and over-excavation may stop short if hard layers of cemented deposits such as "caliche" of significant vertical and lateral extent and integrity are encountered. Furthermore, the "caliche" must be uniformly established underneath the entire extent of the building foundation. **In no case may the footings be partially supported on cemented material and partially on fill or on non-cemented material**. When this situation arises, the cemented material should be over-excavated to a minimum of twelve (12") inches and replaced by properly compacted structural fill.

3.1.7 The native material and man-made uncontrolled fill (if any encountered) at this site may be utilized as structural fill when found competent to meet the swell potential and sulfate content limitations based on laboratory tests and when properly processed and cleared of all organic matters and rocks larger than six (6") inches in diameter. The structural fill should consist of low expansive material containing a swell no greater than 4 percent, and meeting the requirements of Appendix A, section 5.0.

3.1.8 To ensure stability of the existing adjacent building foundations and for protection of workers, walls, or other structures likely to be endangered by excavation operations, support systems such as shoring, bracing or underpinning shall be specified by the responsible structural engineer, per ***section 1804 of the International Building Code, 2018 Edition***. "No excavation for any purpose shall remove lateral support from any footing or foundation without first underpinning or protecting the footing or foundation against settlement or lateral movement".

3.1.9 Per ***Section 1803.5.8 of the 2018 International Building Code***, no rock or similar irreducible material with a maximum dimension greater than 12 inches shall be buried or placed in fills within five feet, measured vertically, from the bottom of the footing or lowest finished floor elevation, whichever is lower, within the building pad. Oversize fill material shall be placed so as to assure the filling of all voids with well-graded soils. Outside of this zone, oversized materials can be placed under the direction of a Sunbelt Engineering representative only on a full-time basis.

3.1.10 Please refer to Appendix A for grading operation details.

3.1.11 Based on the encountered on-site soils in the borings we recommend that *full-time* verification and inspection of soils should be required during grading operations per ***Section 1804 of the International Building Code, 2018 Edition***.

3.2 UNDERGROUND UTILITIES

3.2.1 Utility trench backfill material and placement procedures for all on-site improvements should consist of suitable material meeting the specifications outlined in the "Uniform Standard Specifications for Public Works' Construction, Maricopa Association of Governments," current edition.

3.2.2 Trenches for utilities may stand near vertical at depths of up to two (2) feet. When increased depths are necessary, trenches should be sloped back or shored to provide adequate worker protection and prevent wall collapse. As a minimum all state, federal and local codes, as well as OSHA regulations, should be observed.

3.2.3 The utility trenches most likely will not encounter hard "caliche". However, if encountered, additional effort (use of heavy or special equipment, etc.) may be required for excavation of utility trenches. Grading and general contractors shall make their own interpretation with regard to the hardness of materials and equipment required to excavate utility trenches.

3.3 MOISTURE PROTECTION AND SURFACE DRAINAGE

We recommend that precautions be taken during and after construction to help reduce the potential for saturation of the foundation soils. ***Section 1804.4 of the 2018 IBC*** states that the ground surface should slope away from the exterior walls and adjacent to foundations of the structures at a slope not less than one unit vertical in 48 units horizontal, (2%) percent, with in the first ten (10') feet as measured perpendicular to the face of the wall. If physical obstructions or lot lines prohibit ten (10') feet of horizontal distance, a 5-percent slope shall be provided to an approved alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped a minimum of 2-percent where located within ten (10') feet of the building foundation. Impervious surfaces shall be sloped a minimum 2-percent away from the building. For paved areas a recommended slope not less than one to two percent (1%-2%) is required. Compaction tests should be performed during construction of utility lines and during backfill of utility trenches to ensure minimum settlement. We recommend that all backfill of utility lines consist of on-site soils compacted to a minimum of ninety-five (95%) percent of Maximum Dry Density (ASTM D-698) to reduce the potential for future subsurface saturation and possible settlement.

A sprinkler system should not be installed next to foundations or slabs. If a sprinkler system is installed, then the sprinkler heads should be placed so that the spray from the heads under full pressure does not fall within three (3') feet of foundations, block walls and concrete slabs. Particular care should be taken during final landscaping of the site so that no plants are adjacent to the structures. Watering of landscaped areas adjacent to any structure should be kept to a minimum.

As an alternative to avoid planting next to foundations and exterior floor slabs, it is advisable to install decorative desert landscaping. If decorative areas are installed, these areas should be underlain with a polyethylene moisture barrier "visqueen". The polyethylene should be glued to the foundation using a mastic compound. Watering of landscaped areas at this site should be kept to a minimum.

3.4 SOIL CORROSION

Based on the results of the laboratory tests (please see table 5 of appendix B), soils on this site should be considered slightly-corrosive to metal and concrete. **The on-site soils exhibit class S0 sulfate exposure, and concrete mix design for concrete in contact with Soils should be designed for S0 sulfate exposure durability per ACI 318, Table 19.3.1.1 and should be used for footings, slab-on-grade, and any other concrete in contact with soil.** As a precaution against the possibility of encountering soils corrosive to metal at greater depths, special protection

such as cathodic protection or use of PVC pipe or protective wrapping of underground metallic utility lines, should be considered for the long-term performance of underground utilities where permitted by local building codes.

3.5 MATERIAL VOLUME CHANGES

There will be a reduction of volume when native soils are compacted. Shrinkage of native soils is estimated to be in the range of 15% to 20% when compacted to ninety-five (95%) percent of the soils Maximum Dry Density as per ASTM D-698 Test Method.

3.6 FILL MATERIAL

3.6.1 Fill soils placed in areas underlying slabs, foundations or other improvements should be compacted to a minimum of ninety-five (95%) percent of the soils' Maximum Dry Density as determined by ASTM D-698 Test Method, or ninety-eight (98%) percent of soils Maximum Dry Density when the depth of fill is five (5') feet or more, unless otherwise noted in this report.

3.6.2 The native material with an expansion potential of less than 4% percent may be utilized as structural fill when properly processed and cleared of all organic matter and rocks larger than six (6") inches in diameter.

3.6.3 Imported materials to be used as structural fill should conform to the requirements set forth in the earthwork specifications in Appendix A, Section 5.1. Samples of all materials proposed for use as structural fill shall be submitted to the soils engineer for testing and approval prior to being transported to the site.

3.7 FOUNDATIONS – **CONVENTIONAL (SLAB ON GRADE)**

3.7.1 The competent structural fill soils conforming to the grading specifications should be moisture conditioned and compacted to ninety-five (95%) percent of Maximum Dry Density (ASTM D-698). The structure should be founded on conventional spread footings designed for a maximum net allowable bearing capacity of 1,500 pounds per square foot (PSF) based on a minimum twelve (12") inch wide by twelve (12") inch deep footing. The bearing capacity may be increased by 250 psf for each additional six (6") inches of width and embedment and is permitted to be increased 1/3 when considering load combinations, including wind, and earthquake loads. However, the net bearing capacity should in no case exceed 2,250 psf.

MODULUS OF SUBGRADE REACTION For the loose to dense sandy soils encountered, a modulus of subgrade reaction value of 120 pci /in. can be assumed for the design of footing

and/or floor slabs placed directly on native soils or re-worked soil. For floor slabs and/or footings placed on a minimum 8-inch-thick base of compacted aggregate base, a modulus of subgrade reaction value of 150 pci/in. can be assumed.

The expected total settlement is estimated to be one inch, and the differential settlement is estimated to be half of the magnitude of the total settlement or approximately ½ inch.

3.7.2 Minimum footing width and thickness is based on the table given below. In addition, footings should be proportioned as much as practical to minimize differential settlement (Table 2).

Table 2: Minimum Footing Dimensions- Low Expansive

Number of Floors supported by the footing	Width of Footing (inches)	Thickness of Footing (inches)
1	12	15 w/ 2 #4 bars top & bottom minimum
2	15	18 w/ 2 #4 bars top & bottom minimum
3	15	24 w/ 2 #4 bars top & bottom minimum

3.7.3 All exterior footings should be placed a minimum of fifteen (15”) inches below the lowest adjacent finished grade below the lowest adjacent finished grade to provide for confinement and to minimize settlement. The estimated friction coefficient is 0.35 for sliding.

3.7.4 The footings should be inspected for moisture content and compaction prior to placement of concrete. Any loose, disturbed soils should be removed before placing footings. Backfill placed around the footing excavation or formed footings should be compacted to be at least ninety (90%) percent of the soil Maximum Dry Density per ASTM D-698.

3.7.5 The extent and conditions of the excavations shall be verified by the soils engineer as outlined in Section 2.2 of Appendix A of this report.

3.8 CONCRETE SLAB-ON-GRADE AND FLATWORK CONSTRUCTION

3.8.1 All conventional concrete slabs on grade shall be at least five (5”) inches in thickness. The actual thickness and reinforcement requirements shall be designed by the structural engineer. **Type V Portland Cement is recommended to be used in all slabs, footings, and flatwork construction**.

3.8.2 All reinforced concrete slabs on grade and foundations for columns (if any) and walls shall be supported on a minimum eight (8”) inch thick aggregate base course, compacted to

at least 95% of the maximum Dry Density per ASTM D-698. A minimum eight (8") inch base course of aggregate base materials should also be placed below exterior concrete flatwork, which should be properly reinforced.

3.8.3 To facilitate curing of slabs, base materials shall be kept moist prior to the placement of concrete.

3.8.4 Excessive slump (due to a high water-cement ratio) of the concrete and/or improper curing procedures could lead to excessive drying, shrinkage, cracking or curing of slabs and other flatwork. All concrete placements and curing operations shall therefore be performed in accordance with the American Concrete Institute (ACI) Manual of Concrete Practice.

3.8.5 Concrete slabs should be designed to minimize cracking as a result of shrinkage. Saw cut or control joints should be used to control the location of shrinkage cracks in conventional slabs. If used, they should be spaced twelve (12') feet or less apart and in accordance with the American Concrete Institute (ACI) manual of Concrete Practice.

3.8.6 A moisture barrier is recommended beneath the concrete slab and shall consist of a minimum 10-mil thick polyethylene "visqueen" plastic sheet in locations where moisture sensitive flooring, or impervious coverings will be applied or where equipment will be affixed to the slab that is moisture sensitive. When conditions warrant the use of a vapor barrier, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder. Care should be taken not to puncture the vapor retarder during compaction activity. It is acceptable to "patch" back the visqueen in case of trench excavation by the utility contractor. A twelve (12") inch overlap on each side of the trench should be provided in this case.

3.9 RETAINING WALLS AND BLOCK WALLS

3.9.1 Footings for retaining walls and block walls may be established on compacted structural fill and may be designed for a dead plus long-term live bearing capacity of no more than 1,500 pounds per square foot.

3.9.2 The footings for retaining walls and block walls should be placed a minimum of fifteen (15") inches below the lowest adjacent finished grade to provide for proper confinement and to minimize settlement.

3.9.3 If waterproofing is determined to be necessary, it should be provided per ***section 1805.3 of the International Building Code, 2018 Edition***

3.9.4 The footings for retaining walls and block walls should be placed neatly against undisturbed soils if possible. If forms are used for the footings, the pockets resulting from removal of forms should be backfilled with non-expansive material meeting the requirements set forth in Appendix A and compacted to a minimum of ninety (95%) percent of the soil Maximum Dry Density as per ASTM D-698.

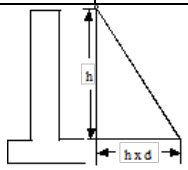
3.9.5 All backfill should be re-compacted to a minimum of ninety-five (95%) percent relative compaction, as per ASTM D-698 test method, using light hand operated equipment. The use of heavy compaction equipment could cause loads exceeding the designed lateral pressures and result in wall failure. Weep holes and a drain system should be provided to minimize the possibility of hydrostatic pressure. Waterproofing will be required for all areas below grade, it should be provided per ***section 1805 of the International Building Code, 2018***.

3.9.6 Resistance to lateral loads may be calculated using passive lateral support based upon an equivalent fluid weight of 250 pounds per cubic foot and a base coefficient of friction of 0.35.

3.9.7 Unrestrained cantilever retaining walls with level backfill to a height of up to 10 feet high may be designed using active pressure based upon an equivalent fluid weight. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given on the next page for specific slope gradients of the retained material.

Table 3: Earthquake Induced Forces on Retaining Wall

Surface Slope of Retained Material (H:V)	Equivalent Fluid Weight (pcf)
Level	35
3 to 1	50
2 to 1	65



Lateral Earth Pressure Diagram for Retaining Wall

Where d = equivalent fluid density - **See Table 3 above**

(Example: Total Horizontal force on wall = $dh^2/2 = 35 \times h^2/2$ and will act at 1/3 h from bottom of the wall.)

3.9.8 In addition to active pressure from the soil, the effects of any structures or roadways should be included in calculating lateral pressures on retaining walls.

3.9.9 The footings should be inspected for moisture content and compaction prior to placement of concrete. Any loose disturbed soils should be removed before placing footings. Backfill placed around the footing excavation or formed footings should be compacted to at least ninety-five (95%) of the soil Maximum Dry Density.

3.9.10 The extent and conditions of the excavations shall be verified by the soils engineer as outlined in Section 2.2 of Appendix A of this report.

3.10 PRELIMINARY ASPHALT CONCRETE PAVEMENT

3.10.1 The asphalt concrete material and placement procedures shall conform to the appropriate section of the "Standard Specifications". This design is based upon an assumed subgrade R-value of 60 for the onsite material; **however, the actual subgrade R-value must be determined by a qualified Sunbelt Engineering & Testing, LLP representative once grading operations have begun.** The following is the minimum asphalt concrete pavement design sections. These sections are designed for an average design period of 20 years.

Table 4: Recommended Onsite Asphalt Pavement Design

	R-VALUE	ASPHALT CONCRETE THICKNESS (Inches)	AGGREGATE BASE THICKNESS (Inches)	Processed Subgrade (Inches)
100’ ROW	Minimum 50	5.0 Normal 5.5 Heavy	6.0	12.0
80’ ROW	---	4.0 Normal 4.5 Heavy	6.0	12.0
60’ ROW	---	3.0 Normal 3.0 Heavy	6.0	12.0
40’ ROW Onsite Roadways	---	2.0 Normal 2.0 Heavy	6.0	12.0

3.10.2 The pavement sections provided are based upon the assumption that any existing unsuitable deposits will be removed below the base of the structural section in addition to twelve (12”) inches of scarification, moisture-conditioned to ±2% of moisture content and compaction to ninety (95%) percent of Maximum Dry Density as per ASTM D-698.

3.10.3 Base and pavement materials and construction methods are to meet the qualifications set forth in the "Uniform Standard Specifications for Public Works Construction Off-Site Improvements, Maricopa, Arizona" current edition.

3.10.4 The ABC material should be moisture conditioned as noted above and compacted to a minimum of ninety-five (98 %) percent of Proctor Density (ASTM D-698).

3.10.5 Upon completion of grading operation, Sunbelt Engineering & Testing, LLP should be called to perform street pavement designs for both off-site and on-site streets to determine the actual pavement sections if required.

4. LIMITATIONS

The recommendations contained in this report are based on field exploration, laboratory testing, research of pertinent maps and literature and our understanding of the proposed construction. The soils and geologic data used in the preparation of this report were obtained from test holes drilled. It is possible that variations in the soils could exist between the points explored. Therefore, if any soil conditions are encountered on the site, which is different from the ones outlined in this report, Sunbelt Engineering & Testing, LLP should be immediately notified so that we may review the situation that exists and change our recommendations or make supplementary recommendations as needed. In addition, if the scope of the proposed construction, including proposed loading or structural locations, changes from what is described in this report, our firm should be notified.

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by geotechnical engineers who then render an opinion about the overall subsurface conditions, their likely reaction to the proposed construction and appropriate foundation design. Even under optimal circumstances, actual conditions may differ from those inferred to exist because no geotechnical engineer, no matter how qualified he may be, and no subsurface exploration program, no matter how comprehensive it may be, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact. For this reason, most experienced owners retain their geotechnical consultants through the construction stage to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Subsurface conditions may be modified by constantly changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.

As stated earlier, Sunbelt Engineering & Testing, LLP performed the service described in this report to develop engineering information for the purposes defined in Section 1.B of this report, "Purpose and Scope". We did not intend to uncover nor identify any contaminated substances or materials that may be classified as hazardous or flammable substances. Identification of such substances requires specialized exploration techniques and analysis, which were not used in this exploration.

We recommend that a pre-construction meeting be held. The owner or the owner's representative, the civil engineer, the geotechnical consultant, and the contractor should be in attendance to discuss the plans, geotechnical report, and the project plans and specifications.

The recommendations provided in this report assume that Sunbelt Engineering & Testing, LLP will be retained as the geotechnical consultant during the construction phase of the project. It is understood and agreed that if Sunbelt Engineering & Testing, LLP does not provide observation and review of construction phase services, as related to the project's geotechnical aspects, then the OWNER assumes all responsibility for interpretation of the Geotechnical report and for construction observation or review and waives any claims against the Geotechnical Engineer that may be in any way connected with this report's usage. The Geotechnical Engineer shall be responsible for its professional opinions and interpretations provided during construction upon request by OWNER.

Sunbelt Engineering & Testing, LLP should be retained to provide the following:

- Review of site construction plans for conformance with the soil's investigations.
- Observation and testing during site preparation, grading, excavation and placement of fill, footing excavations, base section placement, and concrete placement.
- Consultation as may be required during construction.

APPENDIX A
EARTHWORK SPECIFICATIONS

APPENDIX A

GEOTECHNICAL ENGINEERING EXPLORATION
PROPOSED NEW CLARIFIER
SECTION 10 WASTE WATER TREATMENT PLANT
LOCATED 901 RICHARDO AVE.
BULLHEAD CITY, ARIZONA

A1.0 GENERAL

A1.1 Standard Specifications - Where referred to in these specifications, "Standard Specifications" shall mean the " Uniform Standard Specifications for Public Works' Construction, Maricopa Association of Governments" current edition.

A1.2 Scope - The work done under these specifications shall include clearing, stripping, removal of unsuitable materials, excavation, preparation of natural soils, placement and compaction of on-site and imported fill materials.

A1.3 Soils Engineer - The work covered by these specifications shall be inspected by a Soils Engineer. The Soils Engineer will be present during site preparation and grading operations to inspect the work and to perform the tests necessary to evaluate material quality and placement. The Soils Engineer shall submit a report to the Owner, including tabulation of all tests performed.

A1.4 Soils Report - A Geotechnical Engineering Exploration report for a proposed residential development prepared by ***SUNBELT ENGINEERING & TESTING, LLP*** is available for review and may be used as a reference to the surface and subsurface soil and groundwater conditions on this project. The Contractor shall make his own interpretation with regard to the methods and equipment necessary to perform excavation.

A1.5 Compaction Test Method - Where referred to herein, percent of compaction shall mean the in-place dry density of a soil expressed as a percentage of the Maximum Dry Density of that same soil as determined by the ASTM D-1557 Compaction Test method. Optimum moisture content shall mean the moisture content necessary to obtain the maximum dry density as determined above. Any approved ASTM method determining moisture and compaction may be used. Density tests shall be performed at a minimum of 1 test for each vertical foot of fill and for each approximately 5000 square feet of material placed.

A2.0 SITE PREPARATION

A2.1 Clearing - Areas to be graded shall be cleared of all brush, debris and loose material. These materials shall be removed from the site by the Contractor or stockpiled in a non-structural location designated by the Owner.

A2.2 Over excavation - Uncontrolled fill materials and native soils which are found to be soft, loose, collapsible, highly soluble and/or expansive and which underlie areas on the site where improvements are proposed, shall be over excavated as described in the soils report. After over excavation and before placing fill, the Contractor shall obtain the Soil Engineer's approval of over excavation and site preparation in each area.

A2.3 Dust Control - The contractor shall prevent and maintain control of all dust generated during construction in compliance with all federal, state, county, and city regulations. The project specification should include an indemnification by the contractor to the engineer and owner for all dust generated during the entire construction period.

A3.0 EXCAVATION & CONSTRUCTION CONSIDERATION

A3.1 Extent - Excavation shall be performed to the lines and grades indicated on the plans unless otherwise indicated by the soils report. Shallow excavations into the natural site soils should be possible with conventional excavating equipment but cemented soils (caliche) may require specialized excavation equipment, if encountered. Caving and raveling should be expected in open excavations. Excavations and utility trench excavations should be braced or sloped as required to provide personnel safety and satisfy local, state and Federal safety code regulations. The bracing should be done prior to excavation.

A3.2 Unsuitable Materials - All material not suitable for use in compacted fill, and all oversize rocks and boulders that cannot be incorporated into site grading by being placed in deep fill, embankments or used as rip-rap or for other purposes shall be removed from the site by the Contractor. The Soils Engineer shall determine the suitability of material for use as structural fill.

A4.0 SUBGRADE PREPARATION

A4.1 Ground Surface - The ground surface exposed by stripping and over-excavation shall be scarified to a depth of 12 inches (unless otherwise noted, such as pavement areas) moisture conditioned and compacted as required for engineered fill. Compaction shall be approved by the Soils Engineer prior to placing additional fill.

A5.0 STRUCTURAL FILL

A5.1 Materials - Imported fill materials shall consist of suitable moderately expansive soil. All materials used for structural fill shall be free of deleterious material, have a liquid limit less than 35, a plasticity index of less than 15, contain less than 0.1% soluble sodium sulfate salts, have less than 2% solubility, have no less than 20% passing the #200 sieve, and 100% pass a 3-inch sieve. Material not meeting the above requirements may be suitable for use as structural fill at the discretion of the Soils Engineer. Samples of imported material proposed for use as structural fill shall be submitted to the Soils Engineer for testing and approval before it is imported to the site.

A5.2 Placement - All fill materials shall be placed in layers 6 to 8 inches or less in loose thickness, properly and uniformly moisture conditioned, and compacted to at least 90 percent compaction, 95 percent in areas where the depth of structural fill is 5 feet or more. Fill placed on slopes of 5 horizontal to 1 vertical or steeper shall be keyed into firm, natural soil, rock or caliche by a series of benches. Keying can be performed simultaneously with placement of fill. The method and extent of keying shall be observed and approved by the Soils Engineer.

A5.3 Compaction Equipment - The Contractor shall provide and use equipment of a type and weight suitable for the conditions encountered in the field. The equipment shall be capable of obtaining the required percent of compaction in all areas including those that are inaccessible to ordinary rolling equipment.

A5.4 Reworking - When, in the judgement of the Soils Engineer, sufficient compaction effort has not been used, or where the field density tests indicate that the required compaction or moisture content has not been obtained, or if indications of instability are noted, fill materials shall be reworked and compacted to obtain the required density and moisture content prior to the placement of additional fill materials.

A6.0 UTILITY TRENCH BACKFILL

A6.1 Material - Material for use as bedding shall consist of either sand or aggregate base. Backfill in the remainder of the trench shall consist of material meeting the requirements for structural fill. The native material may be utilized as structural fill between the pipe zone and street section upon approval by the governing agency and compliance with the following recommendations:

1. Backfill should be placed in layers not exceeding 8 inches in thickness, moisture-conditioned and mechanically compacted, as required.

2. No jetting and/or ponding are permitted.

3. Full-time observation and testing will be required.

A6.2 Placement and Compaction - Pipe bedding and all backfill material within six inches of the pipe shall be placed in thin layers not exceeding eight inches in loose thickness and compacted to at least 90%. All other trench backfill shall be placed in layers not exceeding eight inches in loose thickness, moisture conditioned, and compacted as required for adjacent fill, or if this is not specified, to at least 90% compaction under structures, utilities, roadways, parking areas, and concrete flatwork. Backfill shall be placed to 90% compaction in undeveloped areas.

A7.0 SUBGRADE AND AGGREGATE BASE MATERIALS IN ROADWAY

A7.1 Subgrade Preparation - After completion of the utility trench backfill, over-excavation, and prior to the placement of aggregate base components, the upper 6 inches (12 inches when native is used in lieu of Type I aggregate base course) of non-cemented subgrade soil shall be moisture-conditioned and uniformly compacted to at least 90% or as noted in the soils report. This may require scarifying, moisture conditioning, and compaction in both cut and fill areas.

A7.2 Aggregate Base Rock - After the subgrade is properly prepared, aggregate base shall be placed in layers, properly moisture conditioned and compacted to at least 95% maximum dry density. Compacted thickness of aggregate base materials must be approved by the Soils Engineer prior to their incorporation into the pavement structure. In addition, aggregate materials shall meet the requirements of the appropriate section of the “Standard Specifications” for Type II Aggregate Base.

A7.3 Aggregate Sub-Base - Sub-base materials shall consist of materials meeting the requirements of the appropriate section of the “Standard Specifications” or otherwise approved by the soils engineer.

A8.0 ASPHALT CONCRETE PAVEMENT

A8.1 Material and Procedure - The asphalt concrete material and placement procedures shall conform to appropriate sections of the "Standard Specifications". The compacted thickness of the asphalt concrete shall be as shown on the plans. Aggregate materials for asphalt concrete shall conform to the appropriate sections of the "Standard Specifications”. The Contractor shall submit a proposed asphalt-concrete mix design to the Soils Engineer for review and approval prior to paving. The mix design shall be based on the Marshall Method.

APPENDIX B
LABORATORY TESTING

LABORATORY TESTING

B.1 Atterberg Limits

Eighteen (18) Atterberg limits were performed in accordance with ASTM D-4318-93. The test is performed by placing a soil pat in a cup and making a standard-sized groove in the pat. The cup is then dropped onto a hard surface from a height of 10 mm. The liquid limit is defined as the water content when the groove closes on 12.7 mm at 25 blows. The lowest water content at which the soil is in a liquid state is called the liquid limit (LL). The lowest water content at which a soil is considered to be in a plastic state is the plastic limit (PL). The plastic limit is determined by rolling a pat of soil into a thread. When the thread begins to crumble at a diameter of 3.18 mm, the water content is the plastic limit. The difference between the liquid limit and the plastic limit is the plastic index (PI) and represents the range of water content over which the soil behaves in a plastic state. The results of these tests are shown in the figures.

B.2 Sieve Analysis

Eighteen (18) sieve analyses were performed in accordance with ASTM D-422-90. The sample was placed on the top of nest sieves (largest openings are on the top sieve with progressively smaller openings on lower sieves), and the nest of sieves was vibrated to allow the individual particles to fall through the sieve openings. The grain-size distribution (particle-size distribution) of the soil was then determined by measuring the dry weight of material retained on each sieve. The results of these tests are shown in the figures.

B.3 Moisture Content

Moisture contents were determined for selected samples. The samples were wet weight and then were oven-dried in accordance with ASTM D-2216-92. After drying, the weight of each sample was measured, and moisture content calculated. Moisture content values are presented in Table 5 below and on the boring logs.

B.4 Chemical Solubility Test Procedure Corrosivity

One (1) chemical solubility test was performed to determine the presence and concentrations of Sodium-Sulfate in soils proposed for engineering fill. Evaluation of such concentrations provides crucial information for determining possible soil corrosiveness to metal and concrete of the 2018 IBC. Veritas Laboratories, using EPA testing method 200.7 and SM 4500 E, performed all chemical solubility testing under contract.

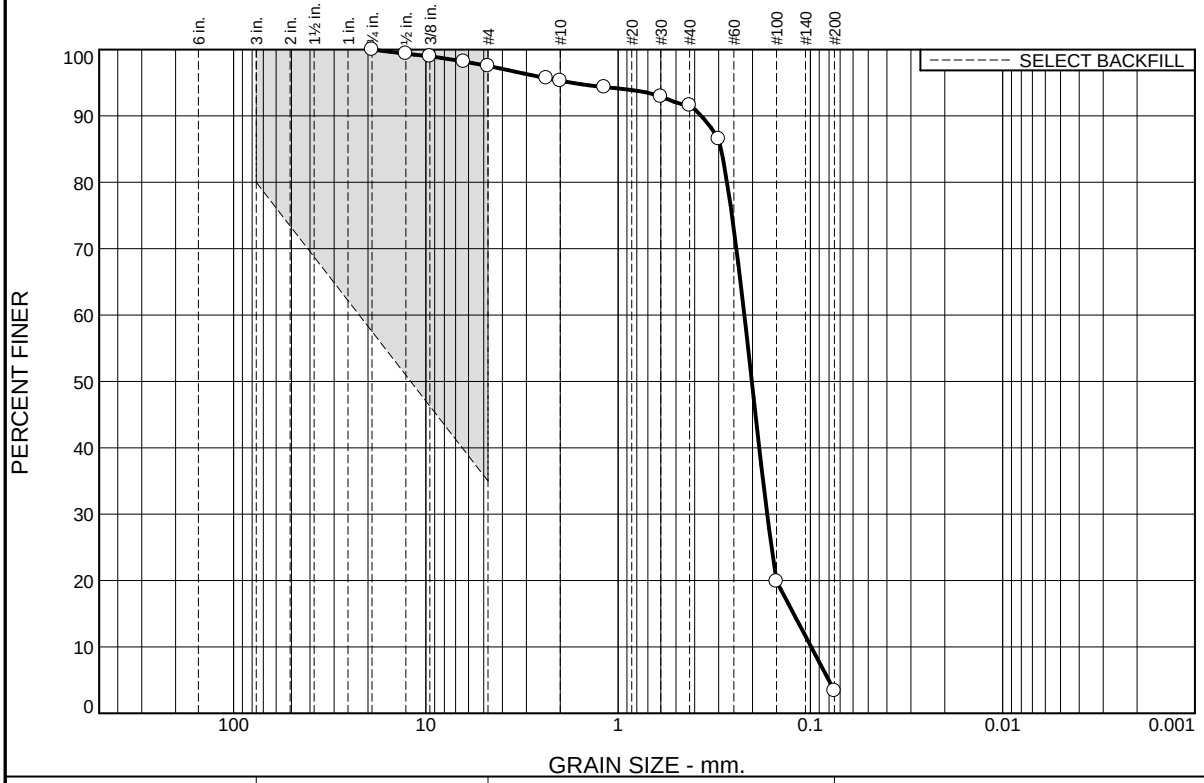
B.5 Laboratory Test Results

TABLE 5: Chemical Analysis

Performed by Veritas Laboratories An approved CCBD agency	SODIUM	SULFATE	SODUIM-SULFATE	SOLUBILITY	MOISTURE CONTENT
B-1 @ 2.5'-3.5'	0.0043	0.0073	0.011	0.024	2.3%

A. Test Method Used – Sodium analyzed with method ASTM D2791, Sulfate was determined using SM 4500 SO4 E, Sodium Sulfate was determined by way of calculations.
B. Sample was obtained per ASTM D1587
C. Sample location and moisture content – Please see Table 5 above
D. Sample was obtained by Michael Vela
E. For results of testing, please see Table 5 above

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.5	2.2	3.7	88.2	3.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	100.0		
0.5	99.4		
0.375	99.0		
0.25	98.2		
#4	97.5	35.0 - 100.0	
#8	95.7		
#10	95.3		
#16	94.3		
#30	92.9		
#40	91.6		
#50	86.5		
#100	19.9		
#200	3.4		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3687 D_{85}= 0.2916 D_{60}= 0.2205
D_{50}= 0.2017 D_{30}= 0.1678 D_{15}= 0.1222
D_{10}= 0.0990 C_u= 2.23 C_c= 1.29

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 1 **Depth:** 2.5

Date: 08/2025

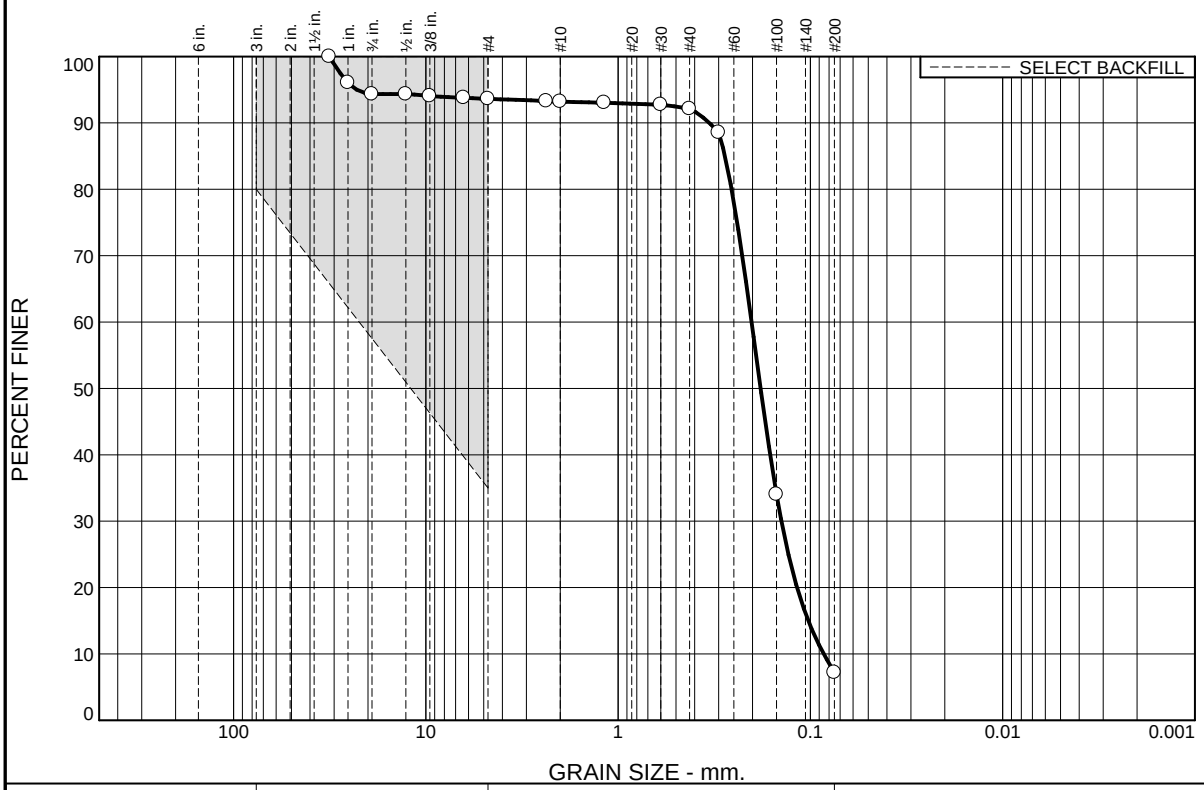
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 1

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.7	0.7	0.4	1.1	84.9	7.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.25	100.0		
1	96.0		
0.75	94.3		
0.5	94.3		
0.375	94.1		
0.25	93.8		
#4	93.6	35.0 - 100.0	
#8	93.3		
#10	93.2		
#16	93.0		
#30	92.7		
#40	92.1		
#50	88.5		
#100	34.0		
#200	7.2		

* SELECT BACKFILL

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3349 D_{85}= 0.2781 D_{60}= 0.2023
D_{50}= 0.1815 D_{30}= 0.1415 D_{15}= 0.1025
D_{10}= 0.0852 C_u= 2.37 C_c= 1.16

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Source of Sample: 1 **Depth:** 5
Sample Number: 2

Date: 08/2025

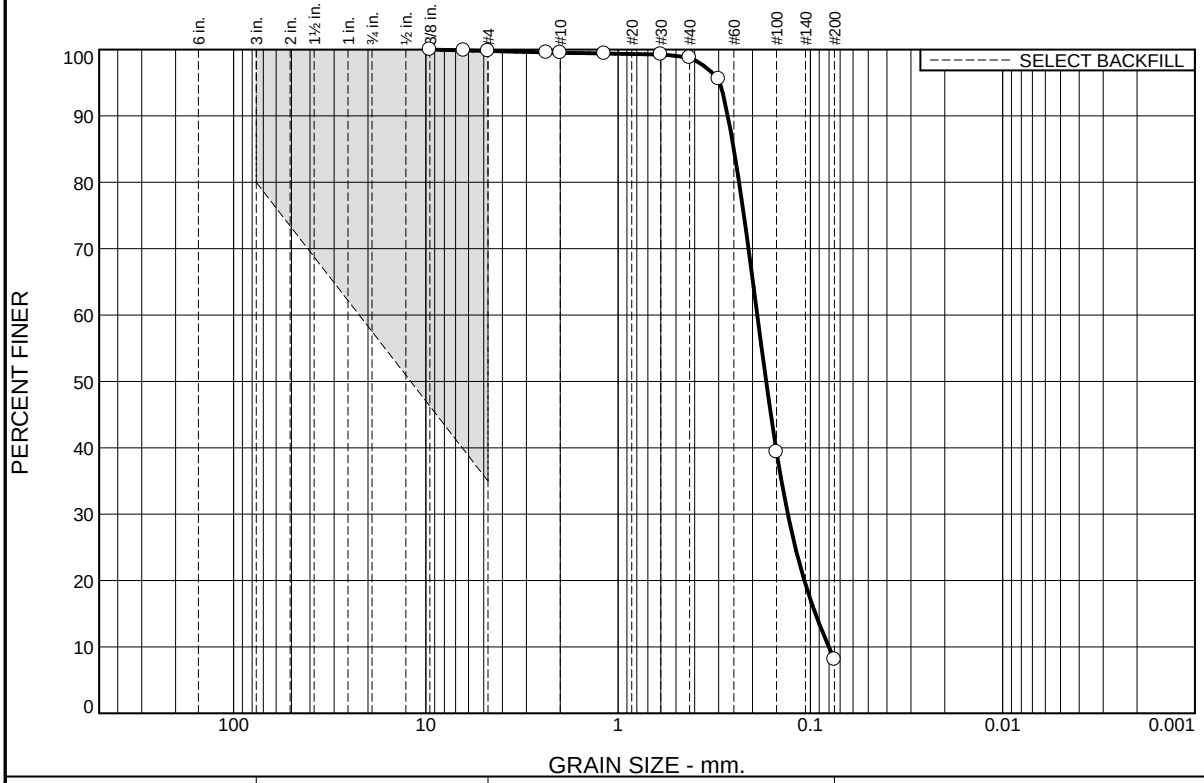
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 2

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.3	0.7	90.7	8.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
0.25	99.9		
#4	99.8	35.0 - 100.0	
#8	99.6		
#10	99.5		
#16	99.4		
#30	99.3		
#40	98.8		
#50	95.6		
#100	39.4		
#200	8.1		

* SELECT BACKFILL

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2686 D_{85}= 0.2499 D_{60}= 0.1889
D_{50}= 0.1698 D_{30}= 0.1310 D_{15}= 0.0941
D_{10}= 0.0801 C_u= 2.36 C_c= 1.13

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Source of Sample: 1 **Depth:** 10
Sample Number: 3

Date: 08/2025

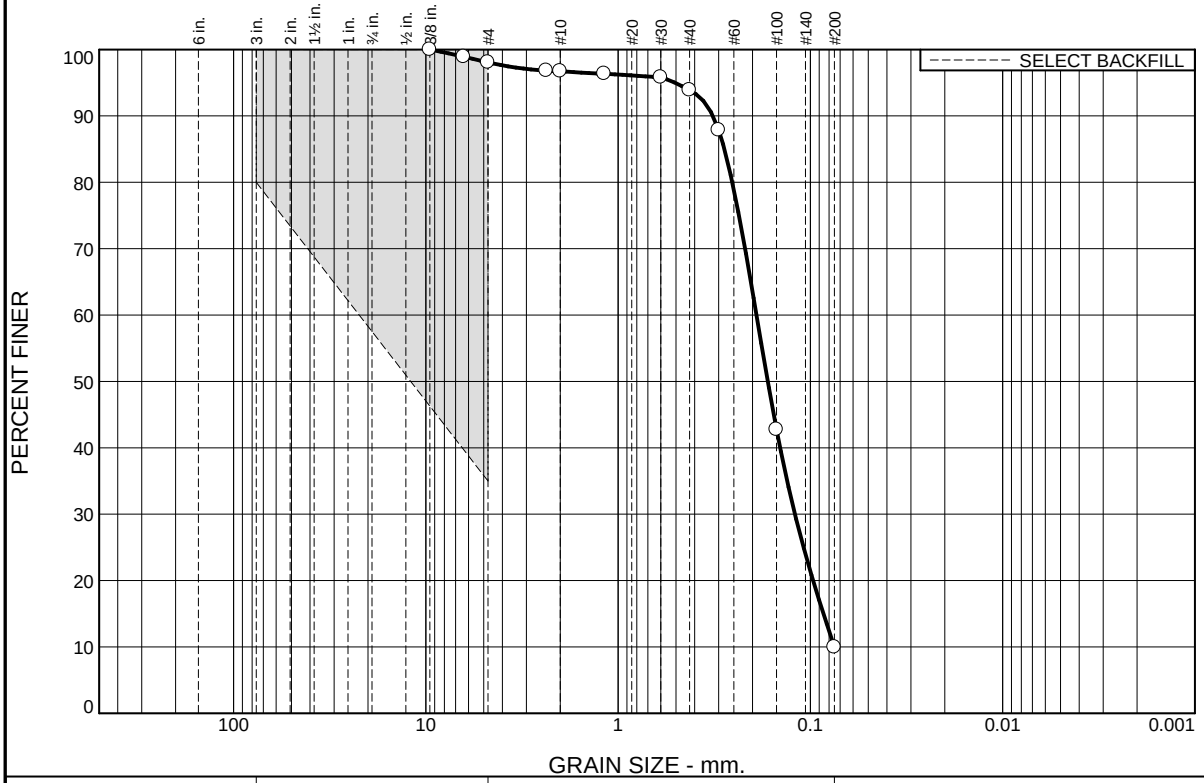
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 3

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.9	1.4	2.8	83.9	10.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
0.25	98.9		
#4	98.1	35.0 - 100.0	
#8	96.8		
#10	96.7		
#16	96.4		
#30	95.8		
#40	93.9		
#50	87.9		
#100	42.8		
#200	10.0		

* SELECT BACKFILL

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3211 D_{85}= 0.2801 D_{60}= 0.1907
D_{50}= 0.1666 D_{30}= 0.1203 D_{15}= 0.0855
D_{10}= 0.0751 C_u= 2.54 C_c= 1.01

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Source of Sample: 1 **Depth:** 15
Sample Number: 4

Date: 08/2025NV

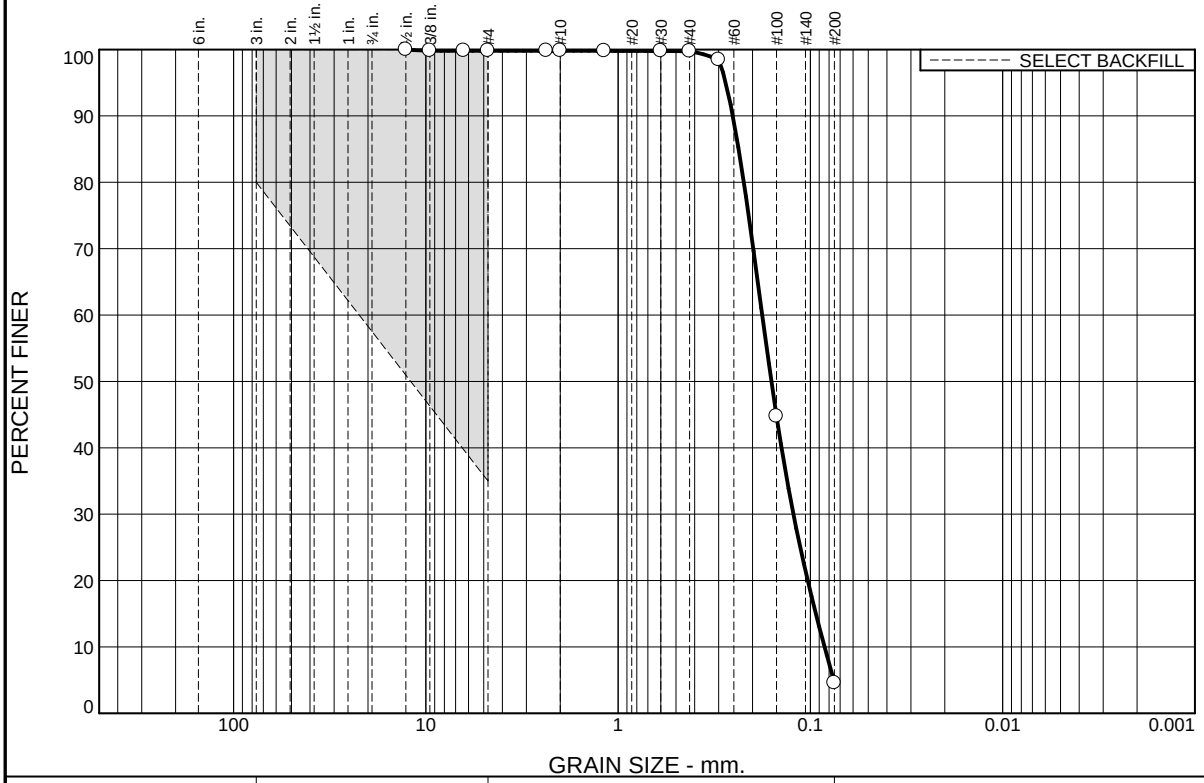
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 4

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.0	0.1	95.1	4.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	99.8		
0.25	99.8		
#4	99.8	35.0 - 100.0	
#8	99.8		
#10	99.8		
#16	99.8		
#30	99.8		
#40	99.7		
#50	98.5		
#100	44.7		
#200	4.6		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2531 D_{85}= 0.2361 D_{60}= 0.1780
D_{50}= 0.1595 D_{30}= 0.1225 D_{15}= 0.0936
D_{10}= 0.0844 C_u= 2.11 C_c= 1.00

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 1 **Depth:** 20
Sample Number: 5

Date: 08/2025

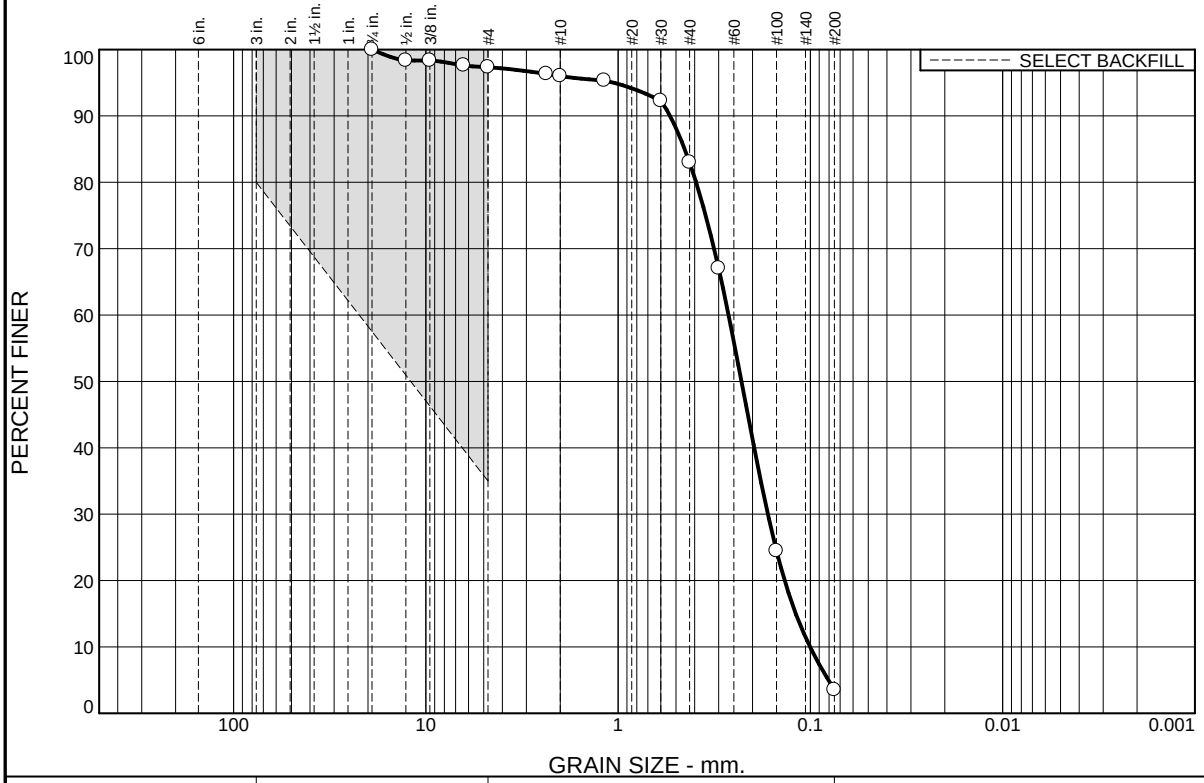
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 5

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	1.3	13.0	79.5	3.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	100.0		
0.5	98.4		
0.375	98.4		
0.25	97.6		
#4	97.3	35.0 - 100.0	
#8	96.3		
#10	96.0		
#16	95.3		
#30	92.3		
#40	83.0		
#50	67.0		
#100	24.5		
#200	3.5		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.5366 D_{85}= 0.4504 D_{60}= 0.2665
D_{50}= 0.2282 D_{30}= 0.1664 D_{15}= 0.1191
D_{10}= 0.1004 C_u= 2.66 C_c= 1.04

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 1 **Depth:** 25
Sample Number: 6

Date: 08/2025

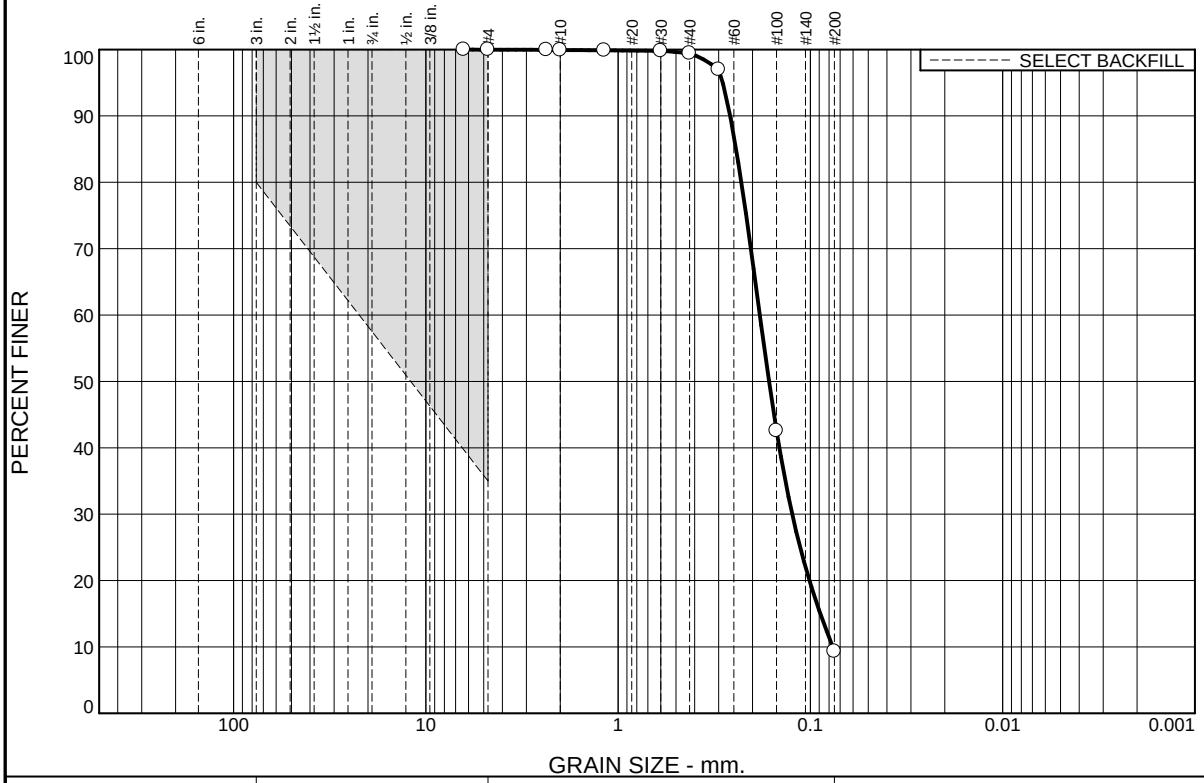
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 6

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.5	90.1	9.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.25	100.0		
#4	100.0	35.0 - 100.0	
#8	100.0		
#10	99.9		
#16	99.9		
#30	99.8		
#40	99.4		
#50	97.0		
#100	42.6		
#200	9.3		

* SELECT BACKFILL

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2612 D_{85}= 0.2433 D_{60}= 0.1832
D_{50}= 0.1641 D_{30}= 0.1243 D_{15}= 0.0887
D_{10}= 0.0765 C_u= 2.39 C_c= 1.10

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Source of Sample: 2 **Depth:** 2.5
Sample Number: 1

Date: 08/2025

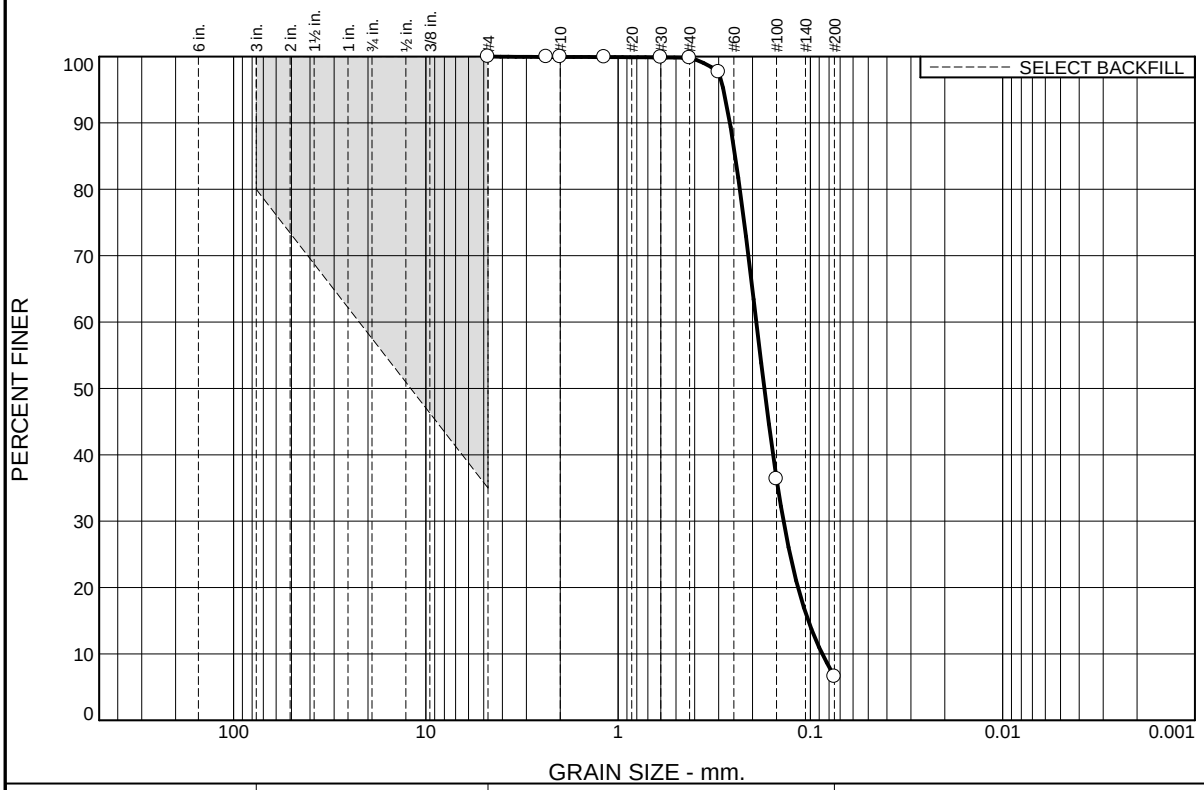
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 7

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.1	93.2	6.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0	35.0 - 100.0	
#8	99.9		
#10	99.9		
#16	99.9		
#30	99.9		
#40	99.8		
#50	97.7		
#100	36.4		
#200	6.6		

* SELECT BACKFILL

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2621 D_{85}= 0.2460 D_{60}= 0.1911
D_{50}= 0.1735 D_{30}= 0.1380 D_{15}= 0.1025
D_{10}= 0.0866 C_u= 2.21 C_c= 1.15

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Source of Sample: 2 **Depth:** 5
Sample Number: 2

Date: 08/2025

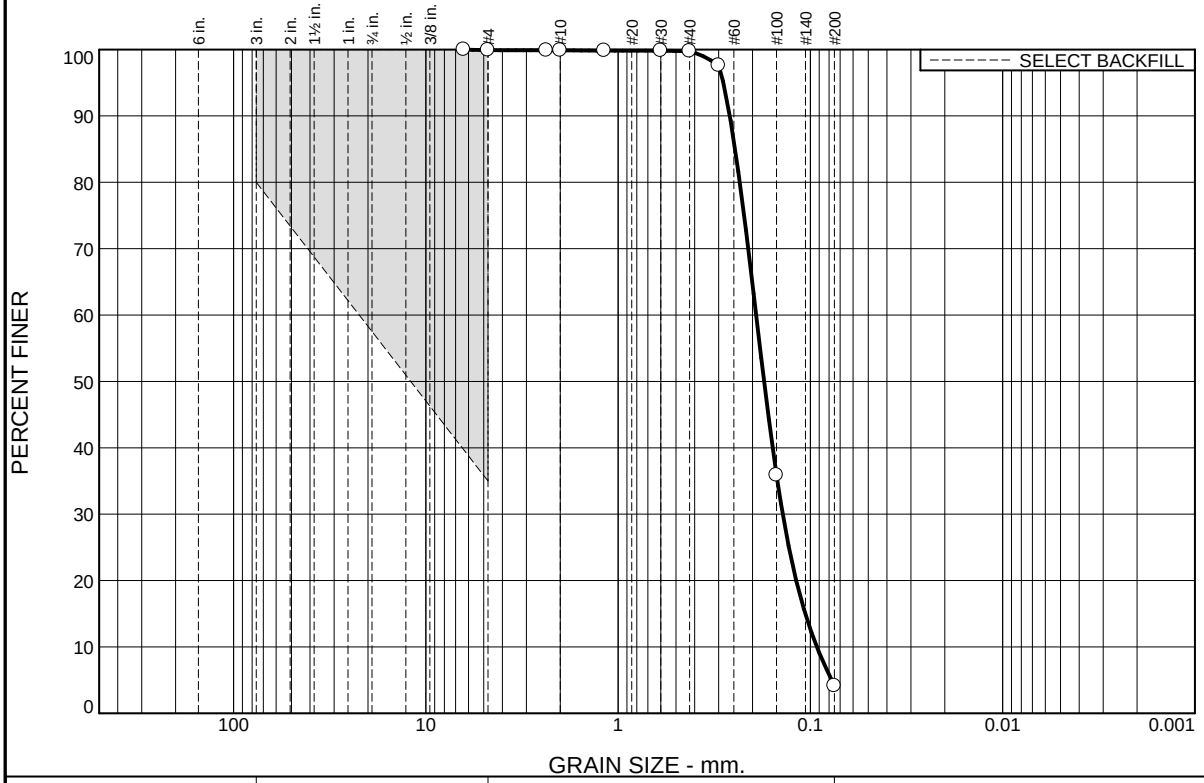
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 8

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	0.2	95.5	4.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.25	100.0		
#4	99.9	35.0 - 100.0	
#8	99.9		
#10	99.9		
#16	99.8		
#30	99.8		
#40	99.7		
#50	97.6		
#100	35.9		
#200	4.2		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2624 D_{85}= 0.2463 D_{60}= 0.1915
D_{50}= 0.1740 D_{30}= 0.1393 D_{15}= 0.1063
D_{10}= 0.0925 C_u= 2.07 C_c= 1.10

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 2 **Depth:** 10
Sample Number: 3

Date: 08/2025

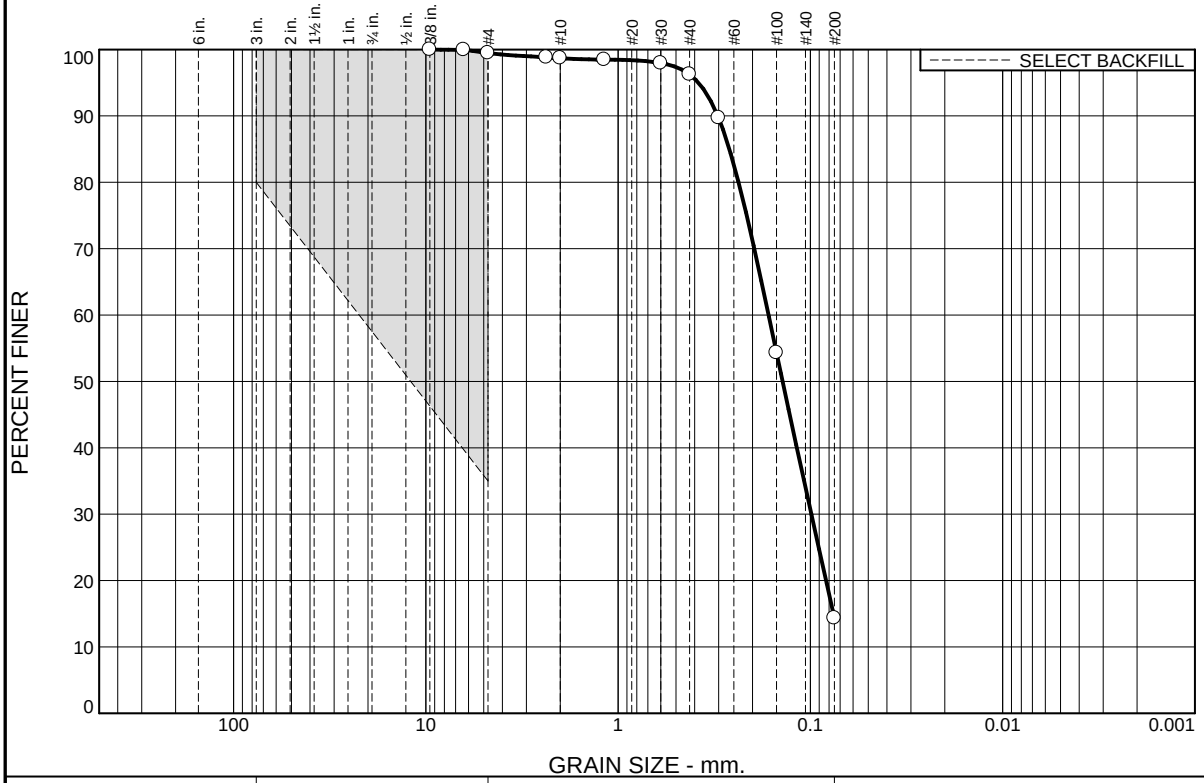
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 9

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.8	2.5	81.9	14.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
0.25	99.9		
#4	99.5	35.0 - 100.0	
#8	98.8		
#10	98.7		
#16	98.5		
#30	98.0		
#40	96.2		
#50	89.7		
#100	54.3		
#200	14.3		

* SELECT BACKFILL

Material Description

Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3030 D_{85}= 0.2639 D_{60}= 0.1650
D_{50}= 0.1395 D_{30}= 0.0988 D_{15}= 0.0759
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: 2 **Depth:** 15
Sample Number: 4

Date: 08/2025

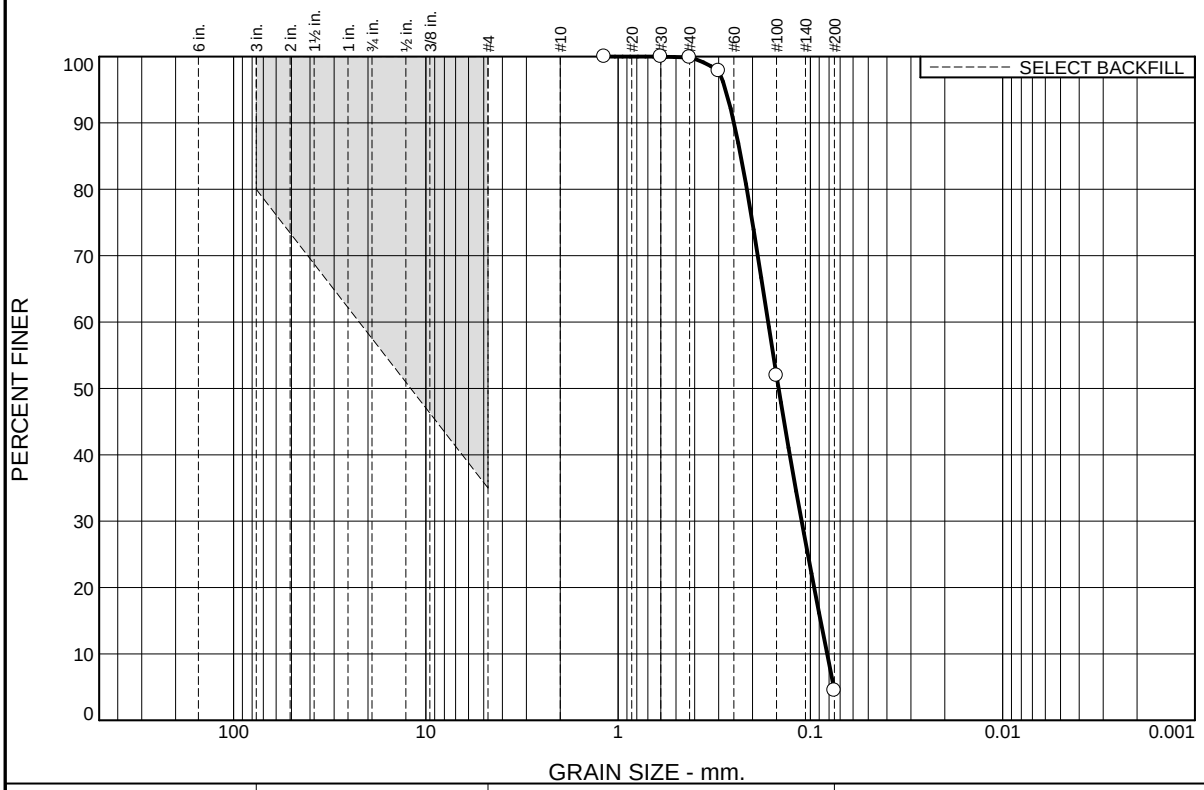
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 10

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	95.4	4.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#16	100.0		
#30	100.0		
#40	99.9		
#50	97.8		
#100	51.9		
#200	4.5		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2495 D_{85}= 0.2300 D_{60}= 0.1659
D_{50}= 0.1463 D_{30}= 0.1110 D_{15}= 0.0884
D_{10}= 0.0818 C_u= 2.03 C_c= 0.91

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 2 **Depth:** 20
Sample Number: 5

Date: 08/2025

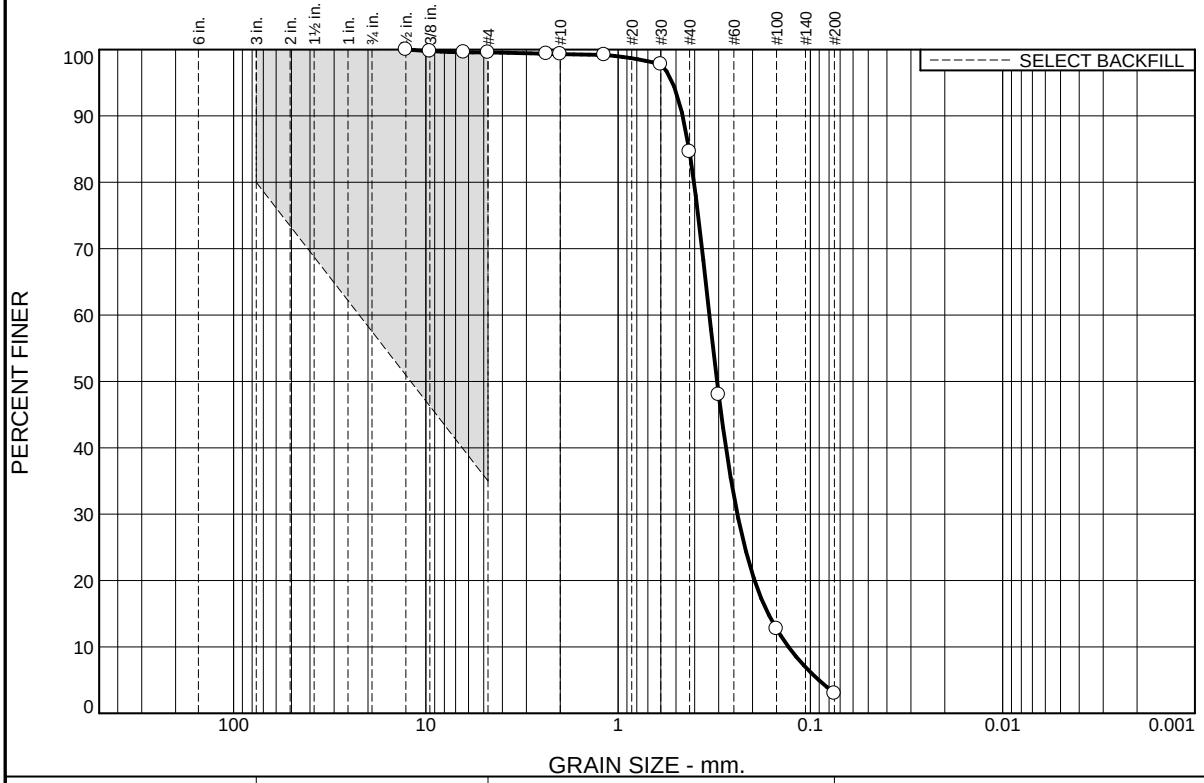
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 11

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.3	14.7	81.6	3.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	99.8		
0.25	99.6		
#4	99.6	35.0 - 100.0	
#8	99.4		
#10	99.3		
#16	99.2		
#30	97.8		
#40	84.6		
#50	48.0		
#100	12.7		
#200	3.0		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4610 D_{85}= 0.4272 D_{60}= 0.3350
D_{50}= 0.3059 D_{30}= 0.2396 D_{15}= 0.1657
D_{10}= 0.1299 C_u= 2.58 C_c= 1.32

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 2 **Depth:** 25
Sample Number: 6

Date: 08/2025

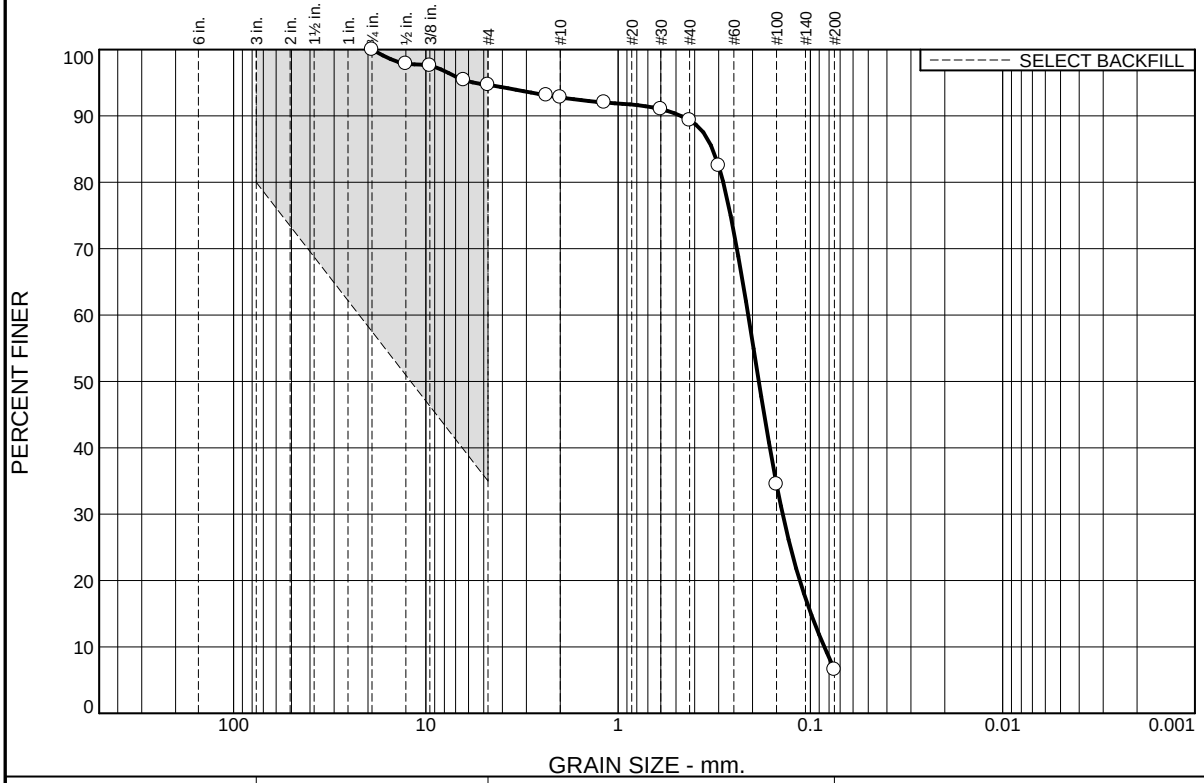
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 12

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.3	1.9	3.5	82.7	6.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	100.0		
0.5	97.9		
0.375	97.6		
0.25	95.4		
#4	94.7	35.0 - 100.0	
#8	93.1		
#10	92.8		
#16	92.0		
#30	91.0		
#40	89.3		
#50	82.5		
#100	34.5		
#200	6.6		

* SELECT BACKFILL

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4709 D_{85}= 0.3221 D_{60}= 0.2106
D_{50}= 0.1854 D_{30}= 0.1394 D_{15}= 0.0993
D_{10}= 0.0846 C_u= 2.49 C_c= 1.09

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Source of Sample: 3 **Depth:** 2.5
Sample Number: 1

Date: 08/2025

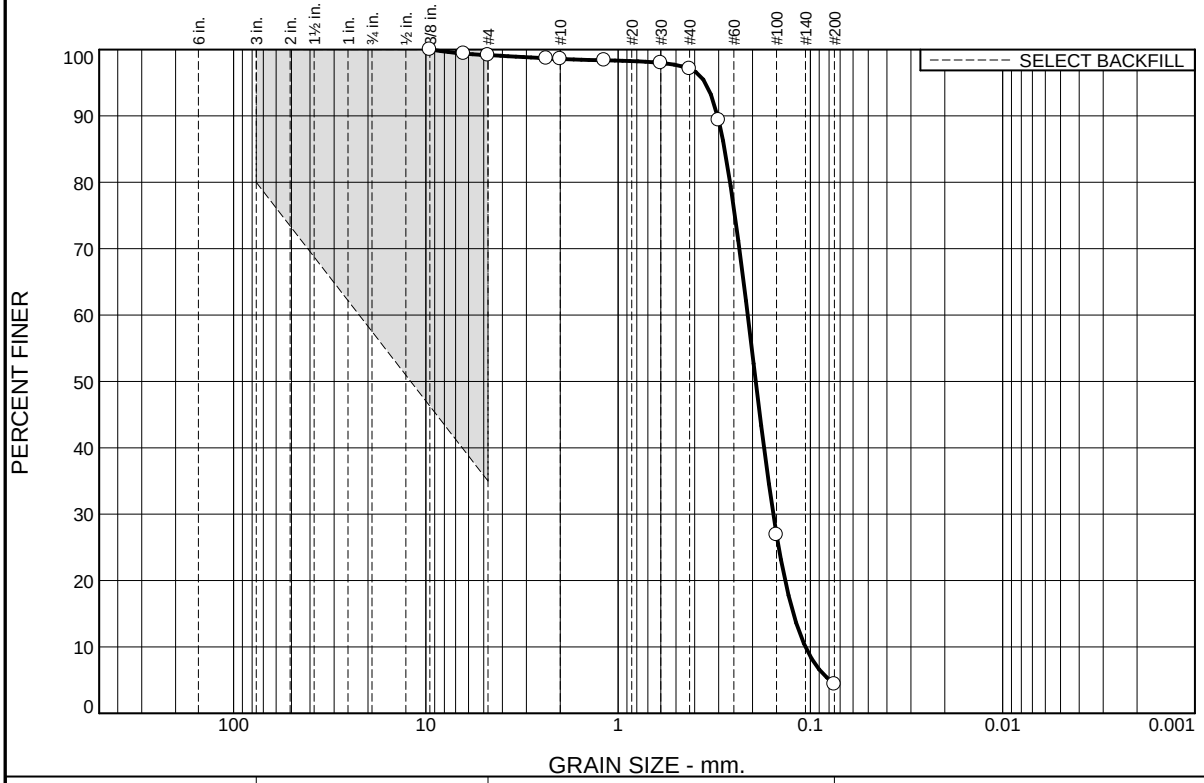
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 13

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	0.6	1.5	92.7	4.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
0.25	99.4		
#4	99.2	35.0 - 100.0	
#8	98.7		
#10	98.6		
#16	98.4		
#30	98.0		
#40	97.1		
#50	89.4		
#100	26.9		
#200	4.4		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3037 D_{85}= 0.2794 D_{60}= 0.2119
D_{50}= 0.1924 D_{30}= 0.1560 D_{15}= 0.1225
D_{10}= 0.1061 C_u= 2.00 C_c= 1.08

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 3 **Depth:** 5
Sample Number: 2

Date: 08/2025

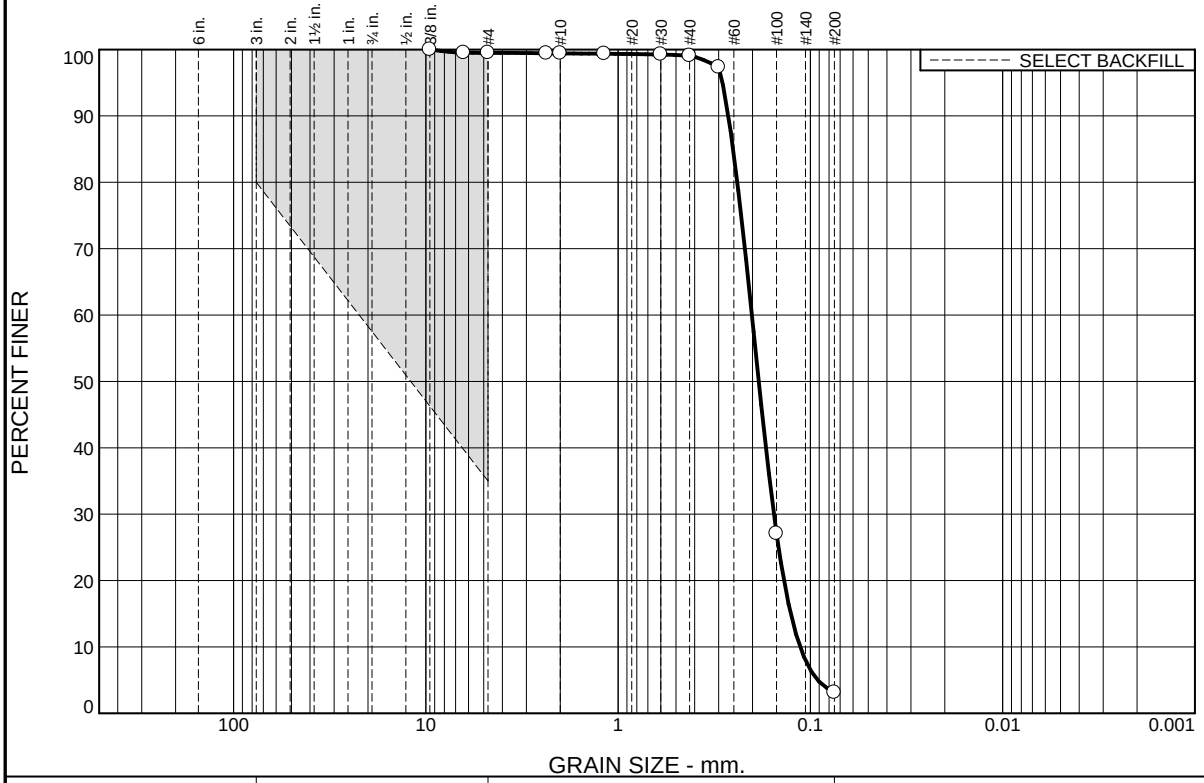
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 14

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.1	0.3	96.0	3.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
0.25	99.5		
#4	99.5	35.0 - 100.0	
#8	99.4		
#10	99.4		
#16	99.4		
#30	99.3		
#40	99.1		
#50	97.3		
#100	27.1		
#200	3.1		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2670 D_{85}= 0.2522 D_{60}= 0.2015
D_{50}= 0.1855 D_{30}= 0.1548 D_{15}= 0.1265
D_{10}= 0.1131 C_u= 1.78 C_c= 1.05

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 3 **Depth:** 10
Sample Number: 3

Date: 08/2025

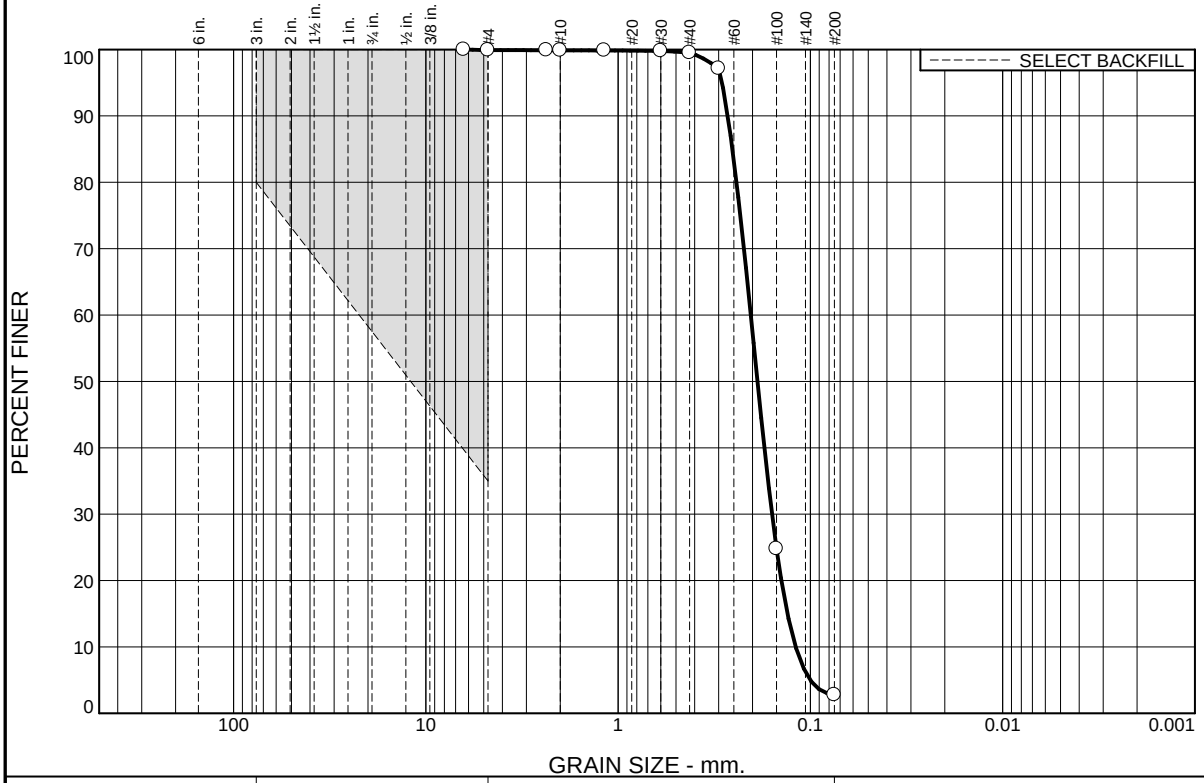
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 15

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	0.4	96.7	2.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.25	100.0		
#4	99.9	35.0 - 100.0	
#8	99.9		
#10	99.9		
#16	99.9		
#30	99.8		
#40	99.5		
#50	97.1		
#100	24.8		
#200	2.8		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2689 D_{85}= 0.2543 D_{60}= 0.2042
D_{50}= 0.1884 D_{30}= 0.1584 D_{15}= 0.1315
D_{10}= 0.1191 C_u= 1.71 C_c= 1.03

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 3 **Depth:** 15
Sample Number: 4

Date: 08/2025

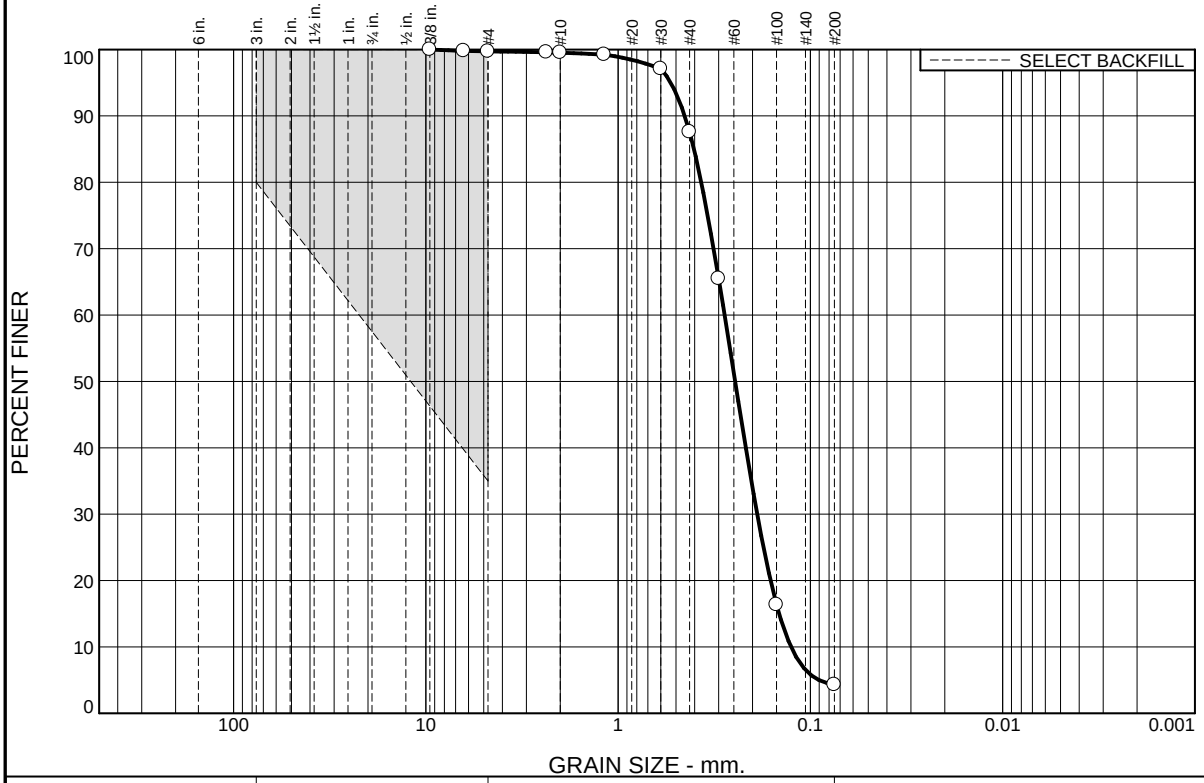
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 16

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.2	11.9	83.3	4.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
0.25	99.8		
#4	99.7	35.0 - 100.0	
#8	99.6		
#10	99.5		
#16	99.2		
#30	97.1		
#40	87.6		
#50	65.5		
#100	16.4		
#200	4.3		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4500 D_{85}= 0.4031 D_{60}= 0.2794
D_{50}= 0.2462 D_{30}= 0.1890 D_{15}= 0.1455
D_{10}= 0.1260 C_u= 2.22 C_c= 1.02

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 3 **Depth:** 20
Sample Number: 5

Date: 08/2025

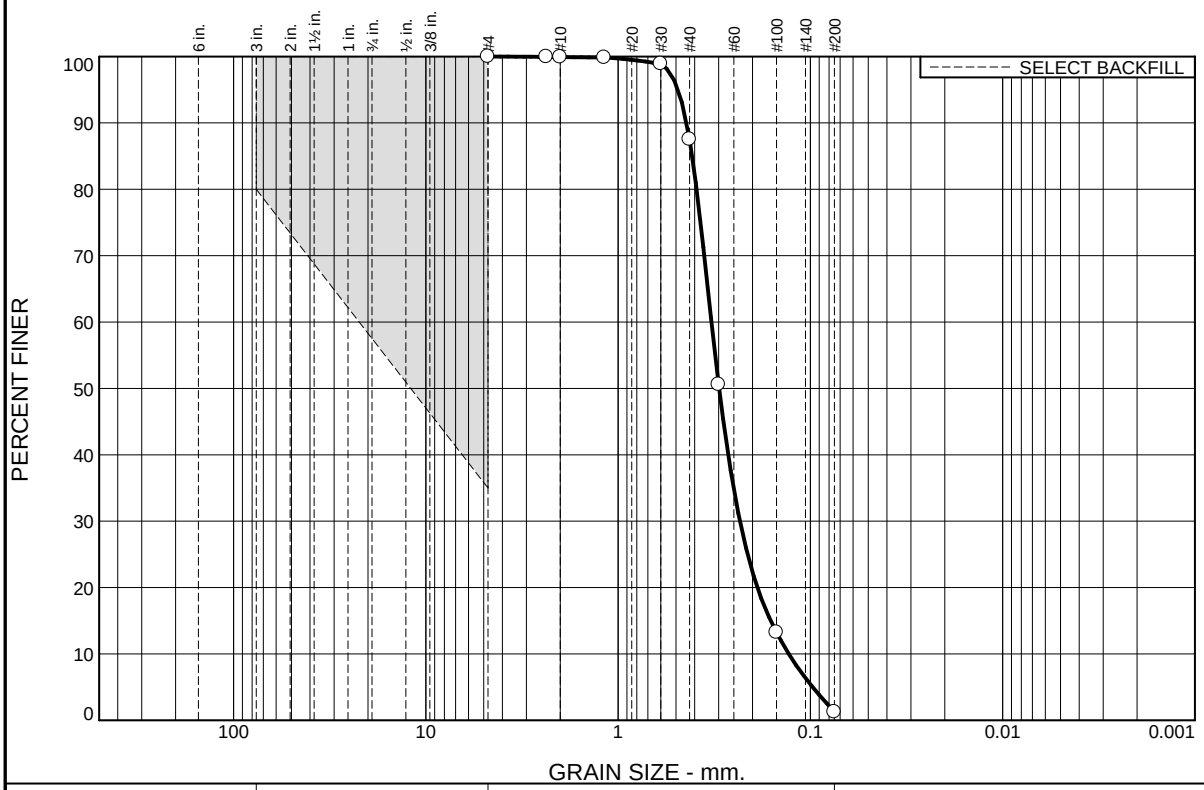
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 17

Tested By: TH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	12.4	86.2	1.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0	35.0 - 100.0	
#8	99.9		
#10	99.9		
#16	99.8		
#30	98.9		
#40	87.5		
#50	50.6		
#100	13.2		
#200	1.3		

* SELECT BACKFILL

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4403 D_{85}= 0.4121 D_{60}= 0.3268
D_{50}= 0.2983 D_{30}= 0.2324 D_{15}= 0.1609
D_{10}= 0.1295 C_u= 2.52 C_c= 1.28

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: 3 **Depth:** 25
Sample Number: 6

Date: 08/2025

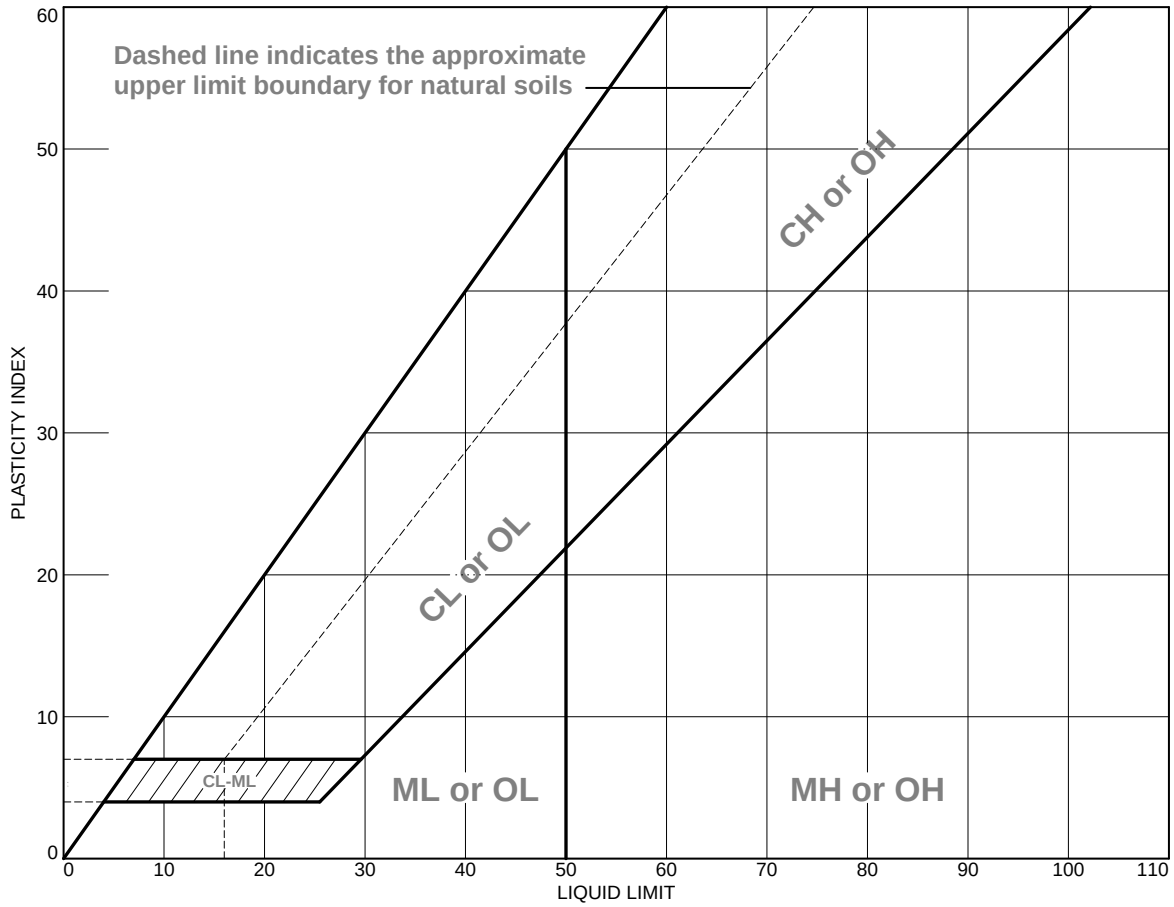
SUNBELT ENGINEERING & TESTING, LLP

Client: City of Bullhead
Project: Section 10 WTPP

Project No: AZ25061 **Figure** 18

Tested By: TH **Checked By:** JW

LIQUID AND PLASTIC LIMITS TEST REPORT



	Material Description	Sampled	Tested	Technician	LL	PL	PI	%<#40	USCS
●	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	91.6	SP
■	Poorly Graded Sand with Silt	08/2025	8/2025	TH	NV	NP	NP	92.1	SP-SM
▲	Poorly Graded Sand with Silt	08/2025	08/2025	TH	NV	NP	NP	98.8	SP-SM
◆	Poorly Graded Sand with Silt	08/ 2025NV	08/2025	TH	NV	NP	NP	93.9	SP-SM
▼	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	99.7	SP

Project No. AZ25061 **Client:** City of Bullhead

Project: Section 10 WTPP

○**Source of Sample:** 1 **Depth:** 2.5 **Sample Number:** 1

□**Source of Sample:** 1 **Depth:** 5 **Sample Number:** 2

△**Source of Sample:** 1 **Depth:** 10 **Sample Number:** 3

◇**Source of Sample:** 1 **Depth:** 15 **Sample Number:** 4

▽**Source of Sample:** 1 **Depth:** 20 **Sample Number:** 5

SUNBELT ENGINEERING & TESTING, LLP

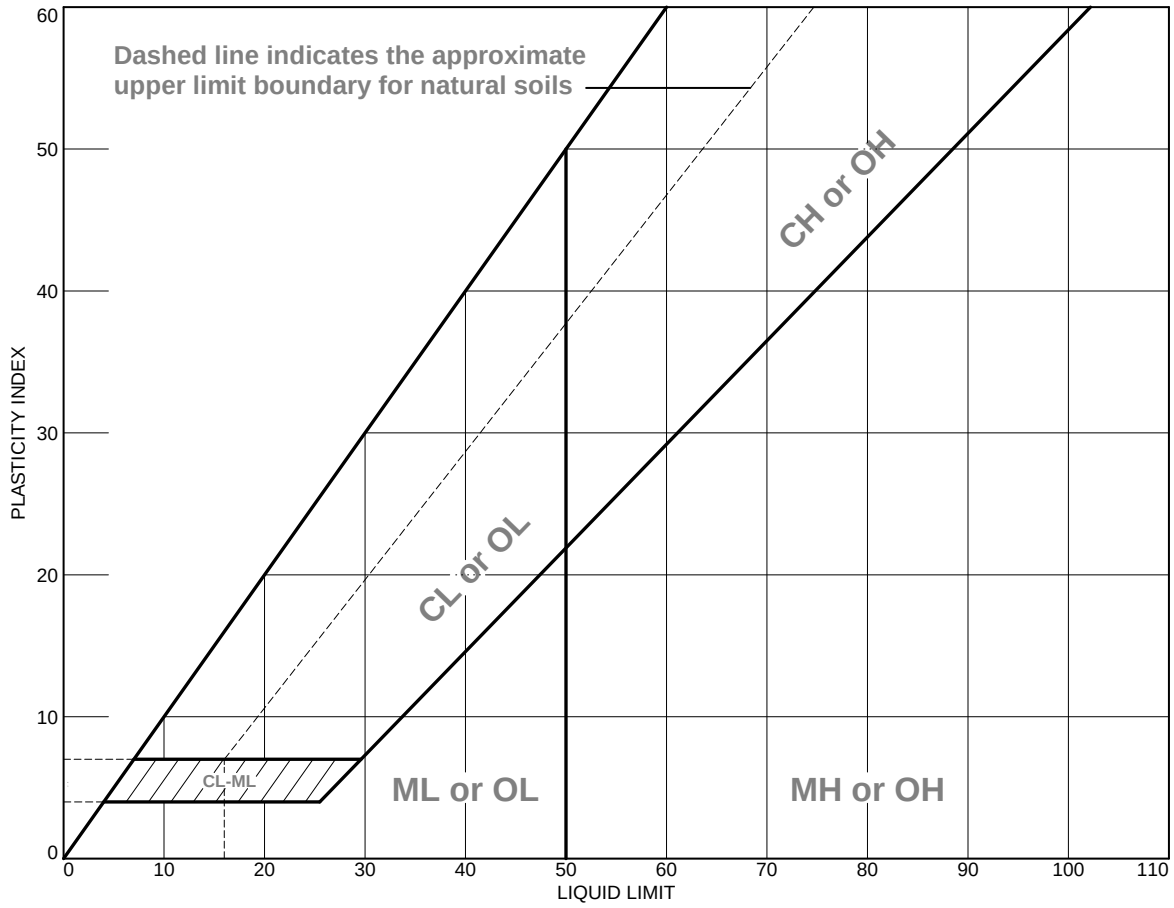
Checked by: JW

Title: Project Manager

Figure 19

Tested By: TH **Checked By:** JW

LIQUID AND PLASTIC LIMITS TEST REPORT



	Material Description	Sampled	Tested	Technician	LL	PL	PI	%<#40	USCS
●	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	83.0	SP

Project No. AZ25061 **Client:** City of Bullhead

Project: Section 10 WTPP

○**Source of Sample:** 1 **Depth:** 25 **Sample Number:** 6

SUNBELT ENGINEERING & TESTING, LLP

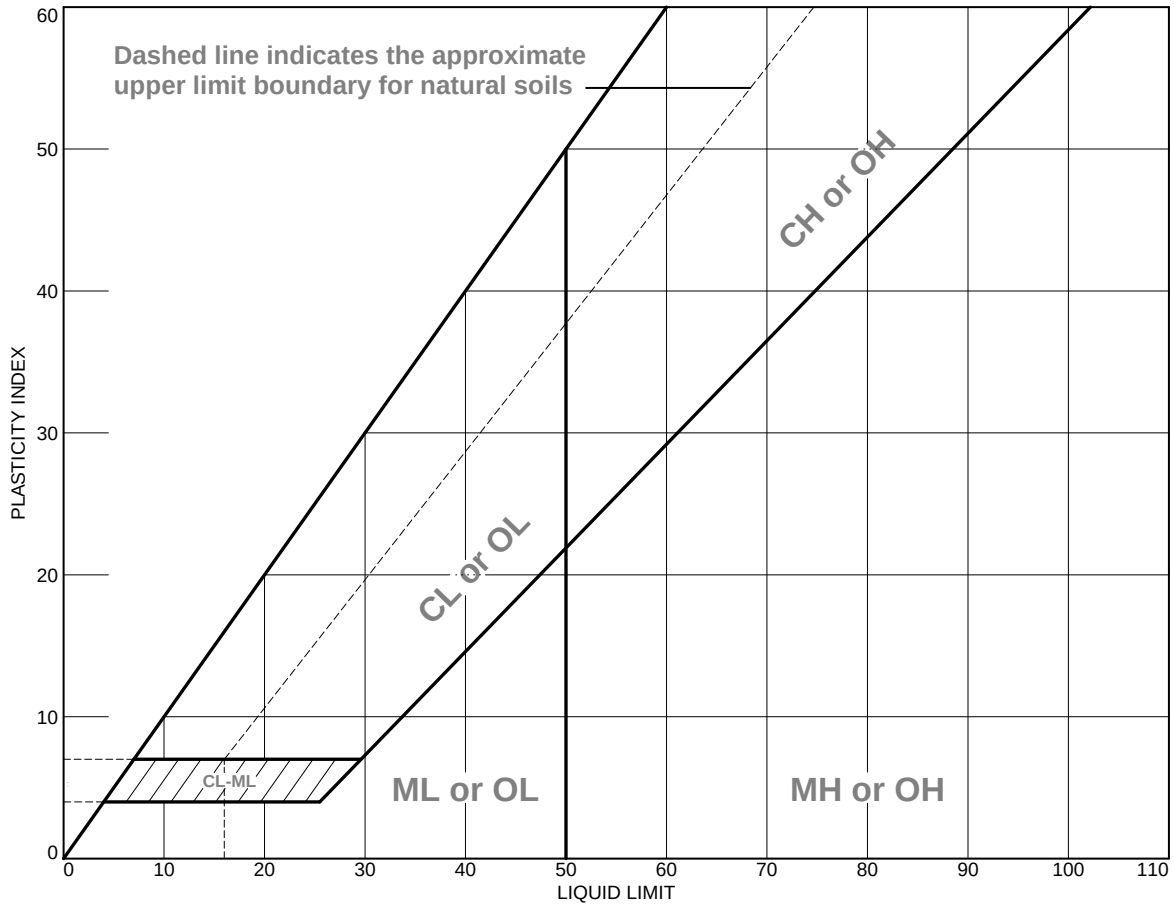
Checked by: JW

Title: Project Manager

Figure 20

Tested By: TH **Checked By:** JW

LIQUID AND PLASTIC LIMITS TEST REPORT



	Material Description	Sampled	Tested	Technician	LL	PL	PI	%<#40	USCS
●	Poorly Graded Sand with Silt	08/2025	08/2025	TH	NV	NP	NP	99.4	SP-SM
■	Poorly Graded Sand with Silt	08/2025	08/2025	TH	NV	NP	NP	99.8	SP-SM
▲	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	99.7	SP
◆	Silty Sand	08/2025	08/2025	TH	NV	NP	NP	96.2	SM
▼	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	99.9	SP

Project No. AZ25061 **Client:** City of Bullhead

Project: Section 10 WTPP

○**Source of Sample:** 2 **Depth:** 2.5 **Sample Number:** 1

□**Source of Sample:** 2 **Depth:** 5 **Sample Number:** 2

△**Source of Sample:** 2 **Depth:** 10 **Sample Number:** 3

◇**Source of Sample:** 2 **Depth:** 15 **Sample Number:** 4

▽**Source of Sample:** 2 **Depth:** 20 **Sample Number:** 5

SUNBELT ENGINEERING & TESTING, LLP

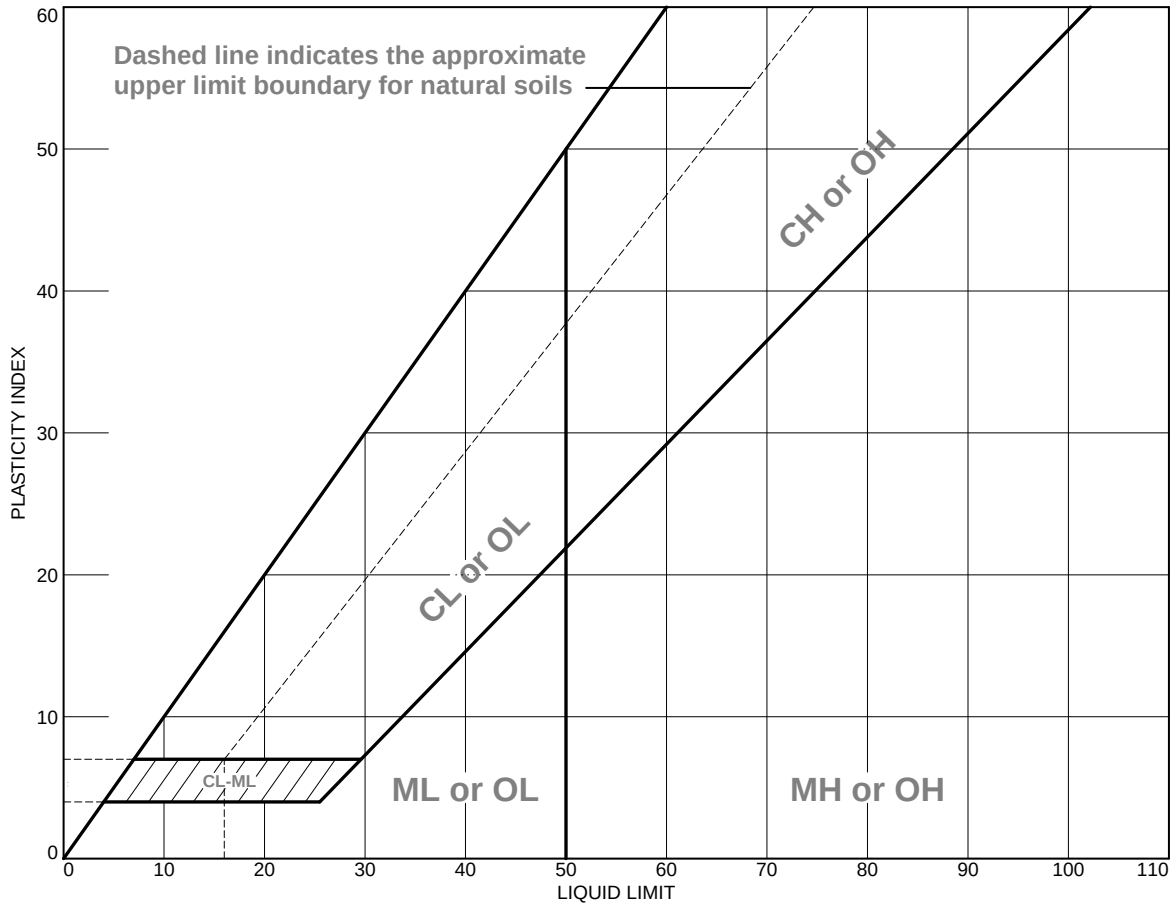
Checked by: JW

Title: Project Manager

Figure 21

Tested By: TH **Checked By:** JW

LIQUID AND PLASTIC LIMITS TEST REPORT



	Material Description	Sampled	Tested	Technician	LL	PL	PI	%<#40	USCS
●	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	84.6	SP

Project No. AZ25061 **Client:** City of Bullhead

Project: Section 10 WTPP

○**Source of Sample:** 2 **Depth:** 25 **Sample Number:** 6

SUNBELT ENGINEERING & TESTING, LLP

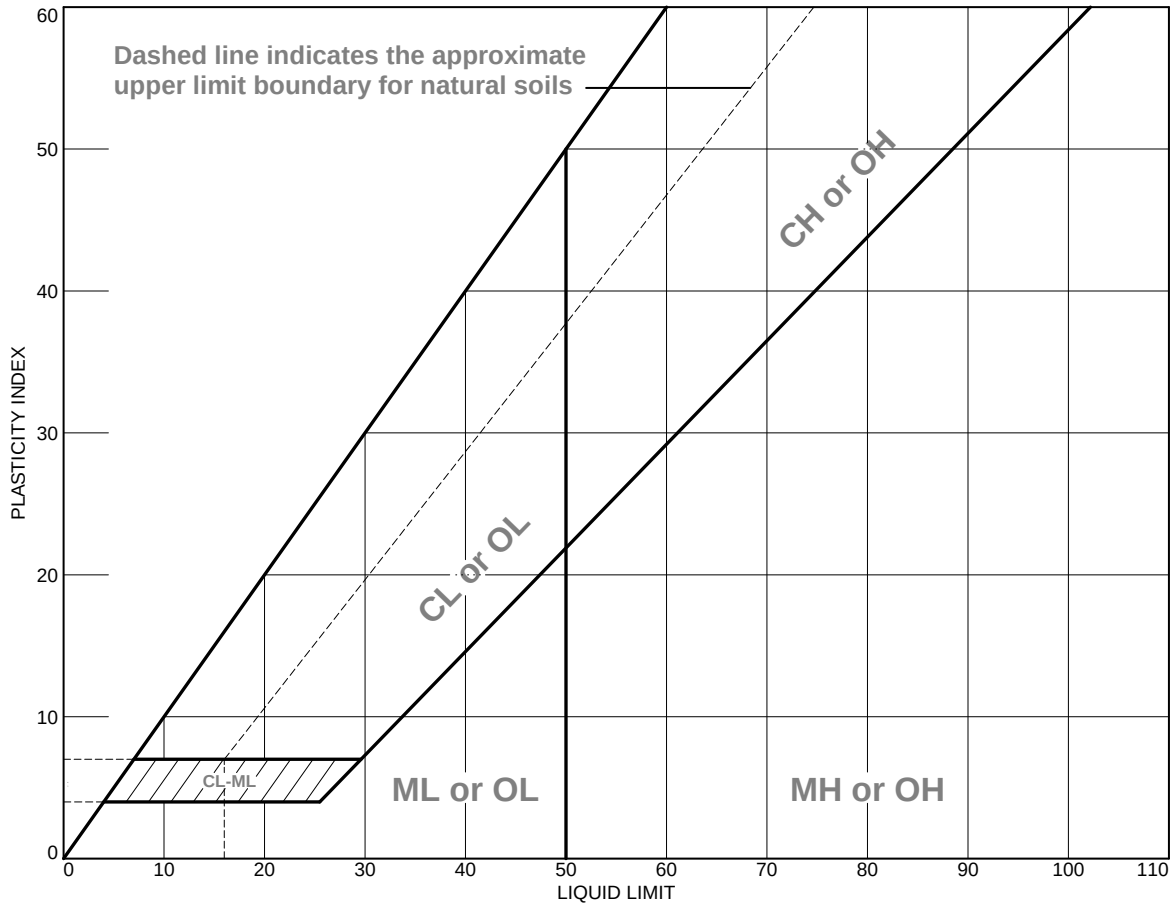
Checked by: JW

Title: Project Manager

Figure 22

Tested By: TH **Checked By:** JW

LIQUID AND PLASTIC LIMITS TEST REPORT



	Material Description	Sampled	Tested	Technician	LL	PL	PI	%<#40	USCS
●	Poorly Graded Sand with Silt	08/2025	08/2025	TH	NV	NP	NP	89.3	SP-SM
■	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	97.1	SP
▲	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	99.1	SP
◆	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	99.5	SP
▼	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	87.6	SP

Project No. AZ25061 **Client:** City of Bullhead

Project: Section 10 WTPP

○**Source of Sample:** 3 **Depth:** 2.5 **Sample Number:** 1

□**Source of Sample:** 3 **Depth:** 5 **Sample Number:** 2

△**Source of Sample:** 3 **Depth:** 10 **Sample Number:** 3

◇**Source of Sample:** 3 **Depth:** 15 **Sample Number:** 4

▽**Source of Sample:** 3 **Depth:** 20 **Sample Number:** 5

SUNBELT ENGINEERING & TESTING, LLP

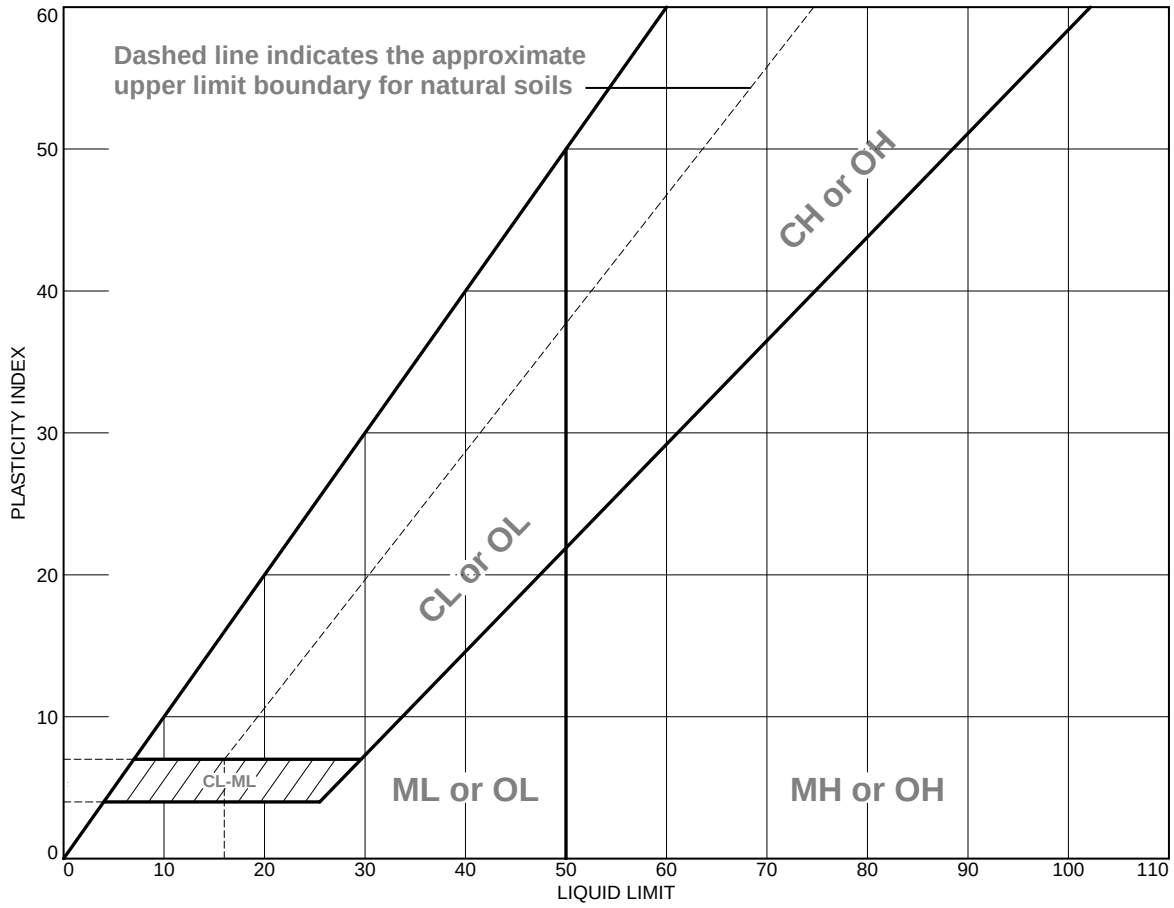
Checked by: JW

Title: Project Manager

Figure 23

Tested By: TH **Checked By:** JW

LIQUID AND PLASTIC LIMITS TEST REPORT



	Material Description	Sampled	Tested	Technician	LL	PL	PI	%<#40	USCS
●	Poorly Graded Sand	08/2025	08/2025	TH	NV	NP	NP	87.5	SP

Project No. AZ25061 **Client:** City of Bullhead

Project: Section 10 WTPP

○**Source of Sample:** 3 **Depth:** 25 **Sample Number:** 6

SUNBELT ENGINEERING & TESTING, LLP

Checked by: JW

Title: Project Manager

Figure 24

Tested By: TH **Checked By:** JW

Veritas Laboratories
Truth in Quality, Truth in Service

6245 Harrison Drive, Suite 4, Las Vegas, NV 89120

(702) 321-8315 Phone
(702) 597-2098 Fax
Email: veritaslabs@msn.com

CLIENT NAME: Sunbelt Engineering & Testing
6330 S. Sandhill Rd, Ste #2
Las Vegas, NV 89120

PROJECT MGR: Tim Harpster

CLIENT PROJECT NAME: **Section 10 WTPP**
CLIENT PROJECT NUMBER: AZ25061
VERITAS LAB ORDER ID: V25H059
DATE RECEIVED AT LAB: Aug-07-2025 09:48

Presented herein are the analytical results for samples received from the above referenced project.

Samples submitted for this project were not sampled by Veritas Laboratories. Unless otherwise noted, samples were received by Veritas Laboratories with proper and complete documentation.

Veritas Laboratories is approved by the Clark County Department of Building as a Quality Assurance Agency (QAA) for inspection and testing services, Category G-CT.

Submitted soil samples for this project were extracted for solubilty parameters in a 1:5 (soil to water) ratio and the results corrected for this dilution.

Should you have any questions or comments regarding this report or if we can be of further service to you, please do not hesitate to contact me at (702) 321-8315.

Sincerely,

Bruce G. Cunningham
Laboratory Director
Veritas Laboratories
Nevada Lab Certification ID NV00918

8/7/25
Date

Figure 25

Veritas Laboratories
Truth in Quality, Truth in Service
6245 Harrison Drive, Suite 4, Las Vegas, NV 89120
(702) 321-8315 Phone
(702) 597-2098 Fax
Email: veritaslabs@msn.com

CLIENT COMPANY NAME: Sunbelt Engineering & Testing
CLIENT PROJECT NAME: **Section 10 WTPP**
CLIENT PROJECT NUMBER: AZ25061
VERITAS LAB ORDER ID: V25H059

ANALYTICAL RESULTS

CLIENT SAMPLE ID: **25-1754** DATE/TIME SAMPLED: 8/5/25 0:00
VERITAS SAMPLE ID: V25H059-01 DATE/TIME RECEIVED: 8/7/25 9:48

Matrix: Soil

Analysis: Soil Solubility/Corrosion Parameters

PARAMETER	RESULT	UNITS	METHOD	DATE ANALYZED
Soluble Sodium	**0.0043**	%	SM 3500-Na B	8/7/25
Soluble Sulfate	**0.0073**	%	ASTM D516	8/7/25
Total Soluble Sodium Sulfate	**0.011**	%	Calculation	8/7/25
Total Soluble Salts (Solubility)	**0.024**	%	SM 2540C	8/7/25

Figure 25

APPENDIX C
PLATES

CITY OF BULLHEAD
SECTION 10 WTPP
901 RICHARDO AVE.
LOCATED BULLHEAD CITY, ARIZONA

Source:: Google Earth

N

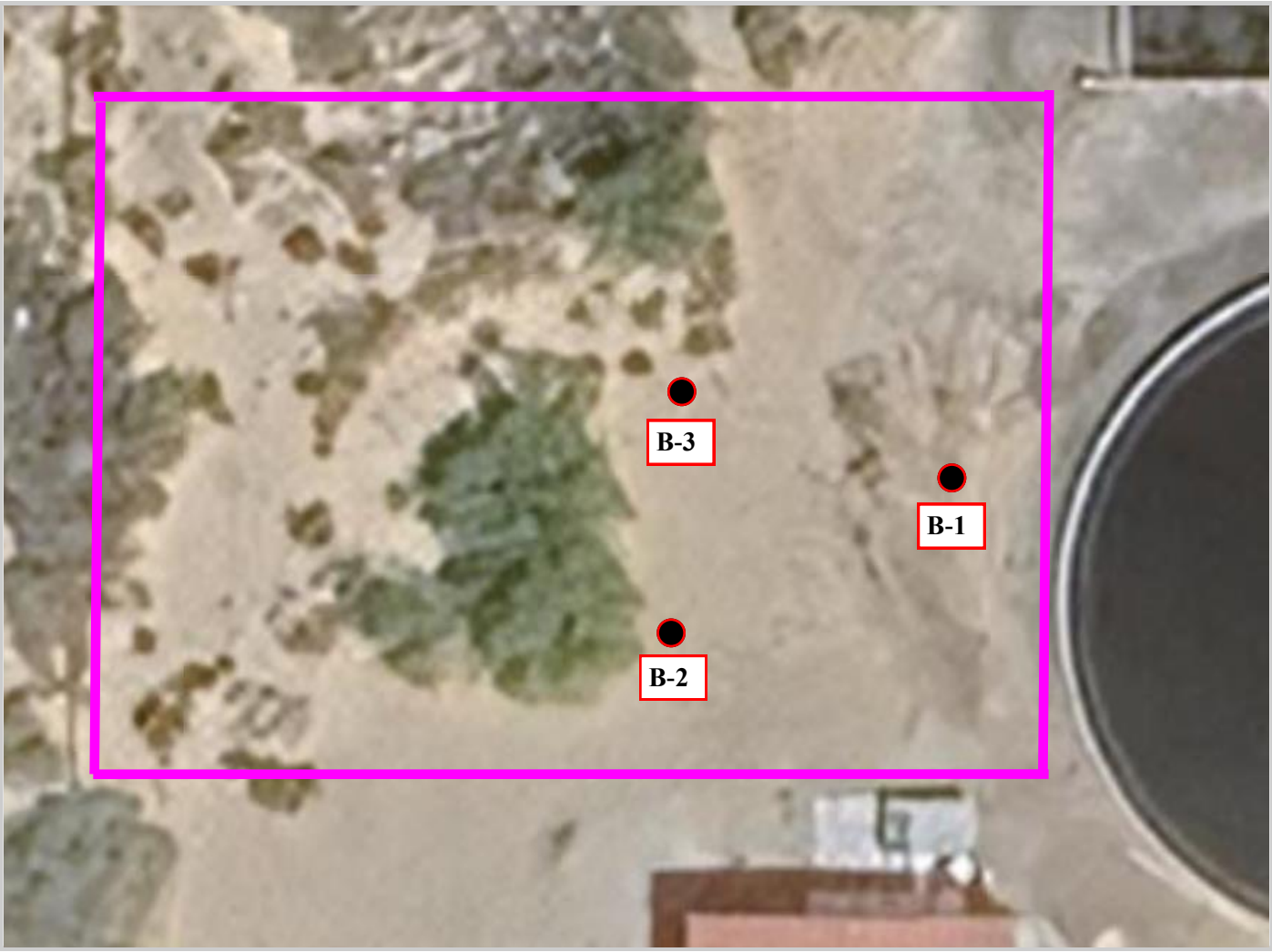
DATE 08/2025

FILE NO. AZ25061

SCALE NOT TO SCALE

PLATE 1
SITE LOCATION MAP

CITY OF BULLHEAD
SECTION 10 WTPP
901 RICHARDO AVE.
LOCATED BULLHEAD CITY, ARIZONA



N

--App. Boring Locations……..….

-- App. Project Boundaries…….

Source: Google Earth

DATE 08/2025

FILE NO. AZ25061

SCALE NOT TO SCALE

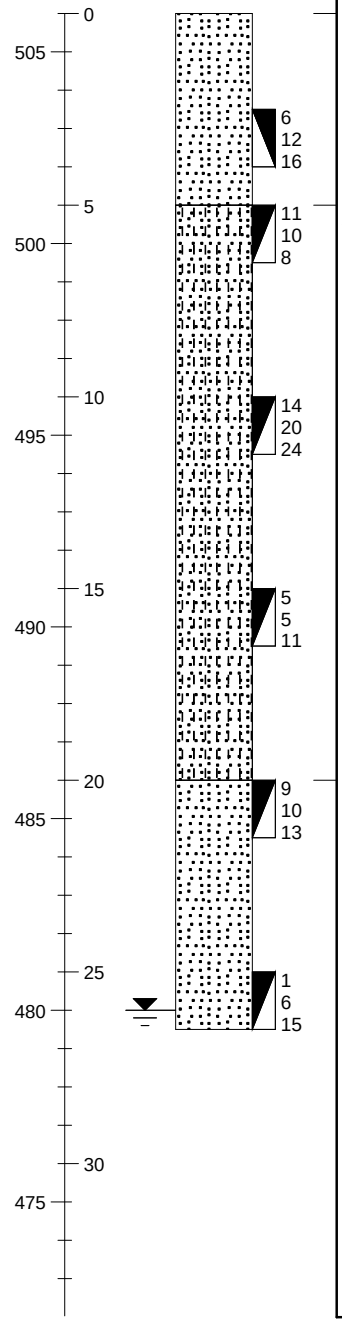
PLATE 2
BORINGS
LOCATION MAP

DRILL HOLE LOG
BORING NO.: 1

PROJECT: Section 10 WTPP
CLIENT: City of Bullhead
LOCATION: 35.0515 , -114.6022
DRILLER: Eagle
DRILL RIG: Dietrich D-50

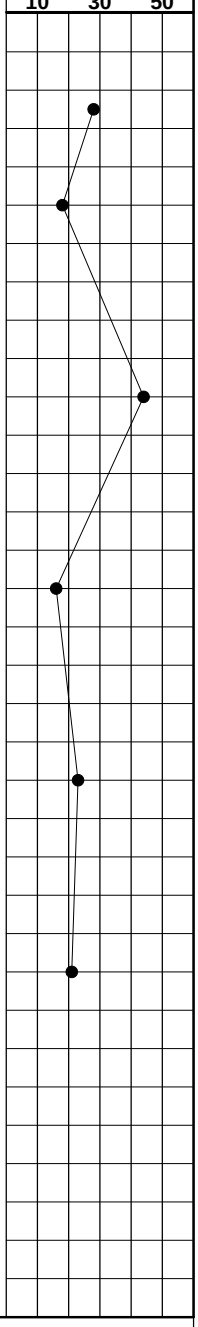
PROJECT NO.: AZ25061
DATE: 08/05/25
ELEVATION: 506 ft.
LOGGED BY: MV

DEPTH TO WATER> INITIAL ▽ : 26 ft. **AT COMPLETION ▼ :** 26 ft.



ELEVATION/ DEPTH	USCS	Description	NM	DD	STANDARD PENETRATION TEST DEPTH	N
	SP	Brown Poorly Graded Sand -Slightly Moist -Loose				
	SP	-Med. Dense	2.3		2'6"-4'	28
	SP-SM	Brown Poorly Graded Sand with Silt -Med. Dense	1.5		5'-6'6"	18
	SP-SM	-Dense	2.7		10'-11'6"	44
	SP-SM	-Med. Dense -Trace Clay	2.6		15'-16'6"	16
	SP	Poorly Graded Sand -Med. Dense -Wet	15.8		20'-21'6"	23
	SP	-Med. Dense -Wet 26.5' Total Depth Drilled Groundwater encountered at 26'	21.1		25'-26'6"	21

STANDARD PENETRATION TEST CURVE

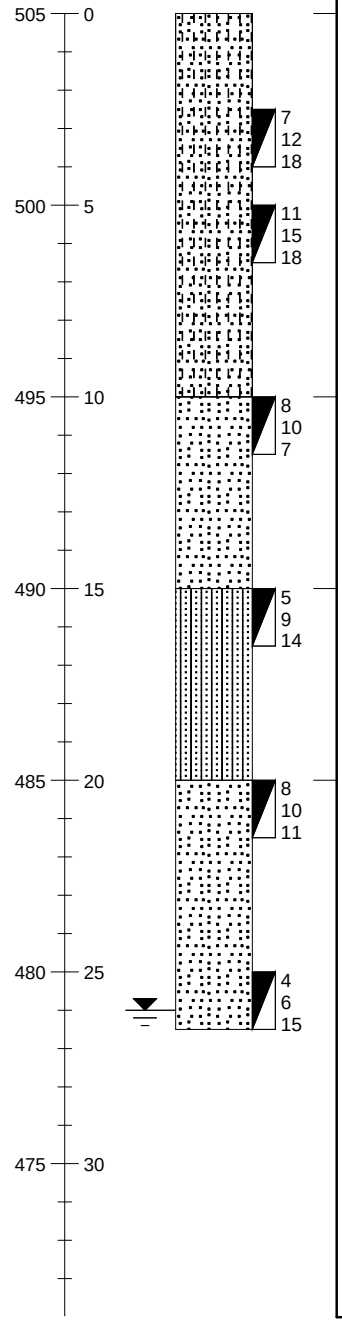


This information pertains only to this boring and should not be interpreted as being indicative of the site.

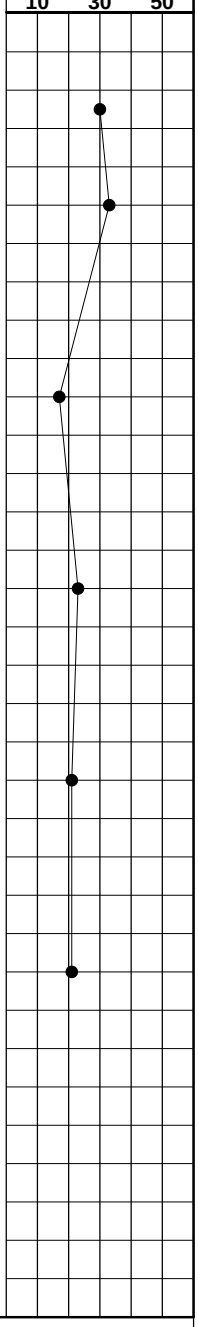
DRILL HOLE LOG
BORING NO.: 2

PROJECT: Section 10 WTPP
CLIENT: City of Bullhead
LOCATION: 35.0514 , -114.6023
DRILLER: Eagle
DRILL RIG: Dietrich, D-50
DEPTH TO WATER> INITIAL ▽ **:** 26 ft. **AT COMPLETION** ▼ **:** 26 ft.

PROJECT NO.: AZ25061
DATE: 08/05/25
ELEVATION: 505 ft.
LOGGED BY: MV



ELEVATION/ DEPTH	USCS	Description	NM	DD	STANDARD PENETRATION TEST DEPTH	STANDARD PENETRATION TEST N
0	SP-SM	Brown Poorly Graded Sand with Silt -Loose				
	SP-SM	-Slightly Moist -Med. Dense	3.3		2'6"-4'	30
5	SP-SM	-Dense	1.9		5'-6'6"	33
10	SP	-Med. Dense -Slightly Moist	1.4		10'-11'6"	17
15	SM	Brown Silty Sand	2.2		15'-16'6"	23
20	SP	Poorly Graded Sand -Med. Dense -Wet	17.6		20'-21'6"	21
25	SP	-Med. Dense -Wet	20.2		25'-26'6"	21
30		26.5' Total Depth Drilled Groundwater encountered at 26'				

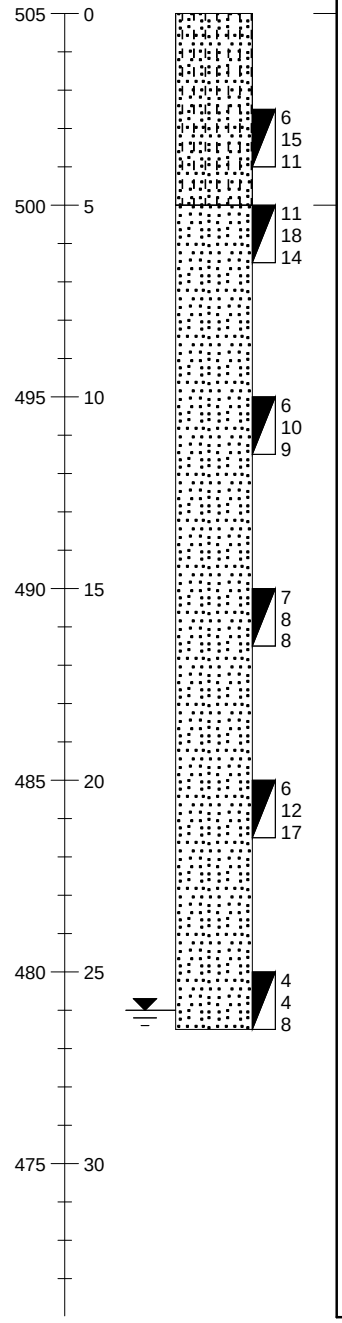


This information pertains only to this boring and should not be interpreted as being indicative of the site.

DRILL HOLE LOG
BORING NO.: 3

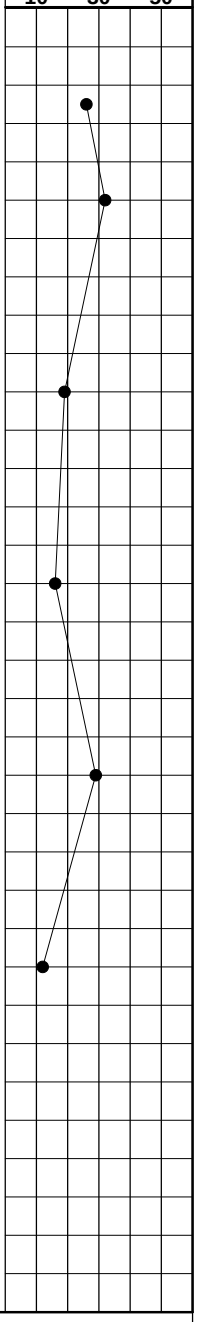
PROJECT: Section 10 WTPP
CLIENT: City of Bullhead
LOCATION: 35.0516 , -114.6022
DRILLER: Eagle
DRILL RIG: Dietrich, D-50
DEPTH TO WATER> INITIAL ▽ **:** 26 ft. **AT COMPLETION** ▼ **:** 26 ft.

PROJECT NO.: AZ25061
DATE: 08/05/25
ELEVATION: 505 ft.
LOGGED BY: MV



USCS	Description	NM	DD	STANDARD PENETRATION TEST DEPTH	N
SP-SM	Brown Poorly Graded Sand with Silt -Loose				
SP-SM	-Moist -Med. Dense	5.8		2'6"-4'	26
SP	Poorly Graded Sand -Med. Dense	1.3		5'-6'6"	32
SP	-Slightly Moist	0.7		10'-11'6"	19
SP	-Med. Dense	0.8		15'-16'6"	16
SP	-Slightly Moist -Med. Dense	1.6		20'-21'6"	29
SP	-Med. Dense -Wet	20.2		25'-26'6"	12
	26.5' Total Depth Drilled Groundwater encountered at 26'				

STANDARD PENETRATION TEST CURVE



This information pertains only to this boring and should not be interpreted as being indicative of the site.

KEY TO SYMBOLS

Symbol Description

Strata symbols

Poorly graded sand

Poorly graded sand with silt

Silty sand

Misc. Symbols

Water table during drilling

Water table at boring completion

Soil Samplers

Bulk/Grab sample

Standard penetration test

Notes:

1. Exploratory test boring was drilled 8/2025 using a truck mounted drill rig using HSA to maintain circulation and log the materials and obtain samples.

2. Free water was encountered in one of the borings at a depth of twenty-six (26') feet, with the maximum depth explored of twenty-six and one half(26.5') feet.

3. Boring locations were taped from existing features and elevations extrapolated from the final design schematic plan.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

APPENDIX D
LIST OF REFERENCES

LIST OF REFERENCES

1. IBC 2018
2. www.usace.army.mil
3. Foundation Engineering Handbook - Robert Day
4. Foundation Design - Donald Coduto
5. www.seisopt.com
6. Design of Earth retaining structures for dynamic loads - Seed & Whitman
7. ASTM for soils and rock (I)
8. American Concrete Manual of Concrete Practice
9. http://www.co.mohave.az.us/taxmaps
10. Geologic Map of Mohave County, Arizona, prepared by the Arizona Bureau of Mines.