Geotechnical Investigation Report
Stocker Stadium/Suplizio Field
City of Grand Junction, Colorado
RockSol Project No. 599.25

February 24, 2021

Prepared for:

City of Grand Junction
333 West Avenue, Building C
Grand Junction, Colorado 81501

Attention: Ms. Kirsten Armbruster, P.E.
Project Engineer

Prepared by:

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ATTACHMENTS

1.0 PROJECT OBJECTIVE AND DESCRIPTION

This report documents the geotechnical engineering investigation performed by RockSol Consulting Group, Inc. (RockSol) to assist with the design considerations of the Stocker Stadium/Suplizio Field Improvements in the City of Grand Junction, Colorado (see Image 1, *Site Vicinity Map*). The site includes two athletic venues: Stocker Stadium and Suplizio Field, which are located near the intersection of 12th Street and North Avenue in the Downtown area of Grand Junction.

Image 1 – Site Vicinity Map (Google Maps)

The City of Grand Junction is planning to make improvements to the Lincoln Park stadiums including: the demolition and reconstruction of existing bleachers, development of a new building with ticket office and retail/display space, water line utility improvements, and drainage improvements of the existing outfield.

The geotechnical investigation was conducted by RockSol for the City of Grand Junction. The scope of work for this geotechnical investigation included:

- Developing a drilling/sampling program to perform a subsurface investigation and implementing the program to collect soil samples for laboratory testing. Sampling to include samples for soil nutrient testing by Colorado State University.

- Performing the associated laboratory tests and analyzing the data to determine strength, allowable bearing capacity, and corrosivity of foundation material.
- Provide recommendations for foundation type and subgrade preparation.
- Provide recommendations for drainage, grading, and general earthwork.
- Evaluate potential geologic hazards at the site.
- Prepare a Geotechnical Investigation Report summarizing the subsurface conditions encountered, the results of the laboratory testing, geological hazards, geotechnical parameters for foundation design, and earthwork recommendations.

The City of Grand Junction provided a conceptual design and information for the Stadium Improvements (See Appendix A).

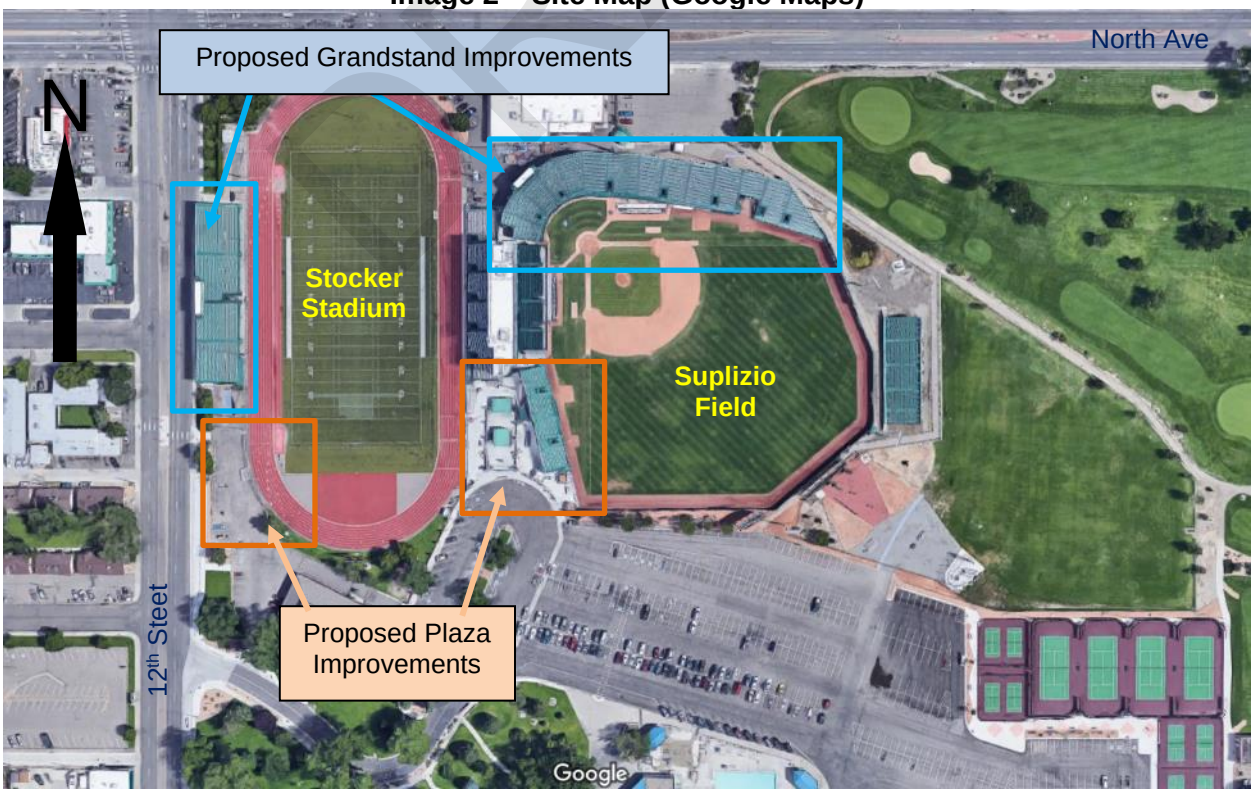
2.0 PROJECT SITE CONDITIONS

The project site is located in the northwest quadrant of Section 13, Township 1, Range 1W in the City of Grand Junction in Mesa County, Colorado.

Stocker Stadium and Suplizio Field encompass the northeast corner of Lincoln Park and are situated in the downtown area of Grand Junction. The area of the Park is considered as part of a Mixed-Use District and is particularly zoned as Community Services and Recreation. To the north the site is bounded by commercial property bordering North Avenue and to the south of the Lincoln Park area is surrounded by residential homes. Grand Junction VA Medical Center lies on the eastern border of the park.

The project site is approximately 1.5 miles north of the Colorado River. The existing topography of the site is all developed, and the slopes are considered flat and engineered for drainage.

Image 2 – Site Map (Google Maps)

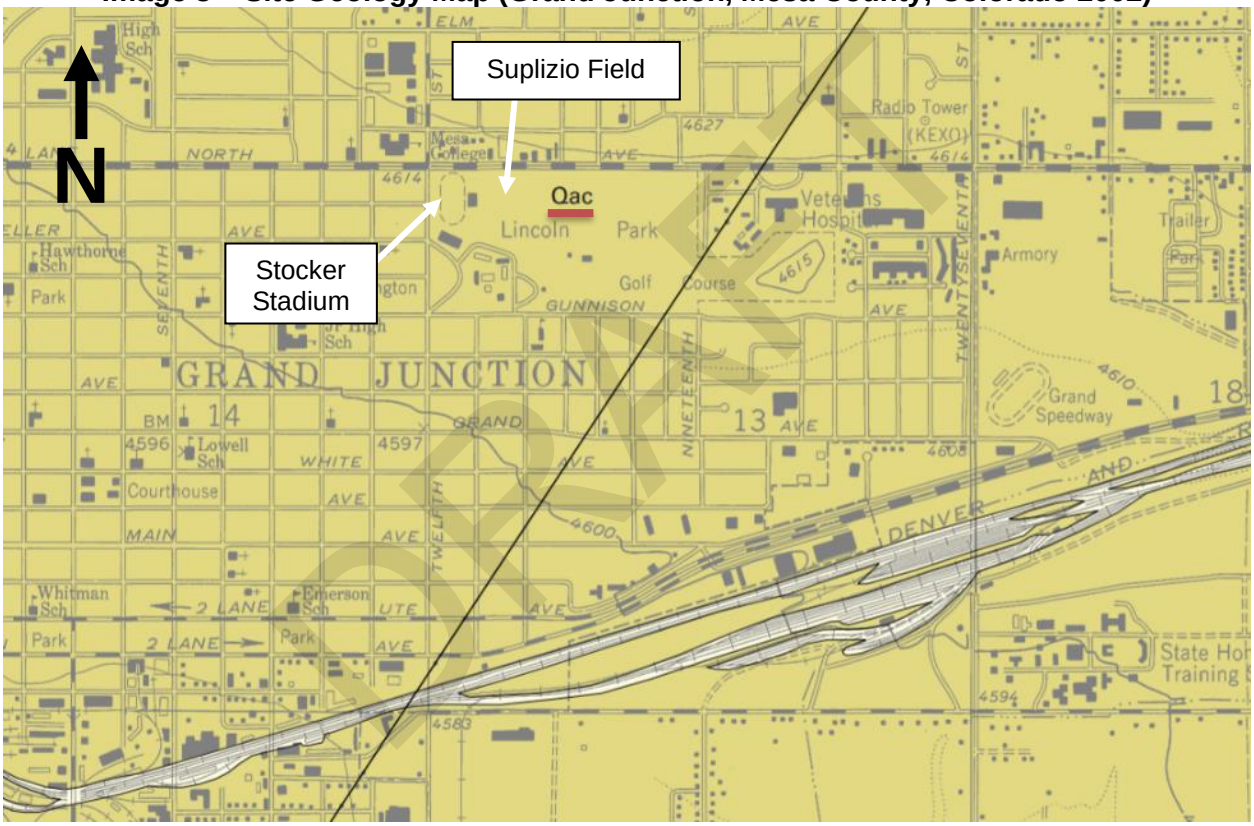


3.0 GEOLOGICAL CONDITIONS

3.1 Geologic Setting

Based on information presented in the United States Geological Survey (USGS) Geologic Map (See Image 3, *Site Geology Map*) of the Grand Junction Quadrangle, Mesa County, Colorado, by Roger B. Scott, Paul E. Carrara, William C. Hood, and Kyle E. Murray, dated 2002, alluvium and colluvium, undivided, (Holocene and late Pleistocene) (Qac) is mapped at the project site, as well as at the immediate surrounding areas. Alluvium generally consists of silt, sand and gravels and the colluvium generally consists of sandy silt, silty to clayey sand, and sandy clay. The materials identified by the USGS mapping was consistent with native soils encountered during our geotechnical investigation.

Image 3 – Site Geology Map (Grand Junction, Mesa County, Colorado 2002)



3.2 Geologic Hazards Discussion

Based on our laboratory results and understanding of the site geologic conditions, expansive soils were not encountered at this site that would impact the proposed development. Native clays with low bearing resistance have been identified and they present a risk of potential settlement for heavily loaded structural elements.

Due to the topography of the site, slope instability is not considered a site geologic hazard; however, any site excavation must consider potential shoring and stabilization requirements due to soft, very moist to wet clay soils.

4.0 SUBSURFACE EXPLORATION SUMMARY

For this investigation, RockSol completed a total of 8 boreholes between the dates of February 8 through 10, 2021 and are identified as Boreholes B-1 through B-8. Additionally, four shallow hand auger samples identified as F-1 to F-4 were obtained and submitted to Ward Laboratories for soil nutrient testing. The locations of the borehole and soil samples are shown in Figure B1, in Appendix B.

Boreholes B-1 and B-2 were located at the West Grandstands of Stocker Stadium and were drilled to maximum depths of approximately 50 feet to 55 feet below existing grades where practical auger refusal on cobbles was encountered.

Boreholes B-3, B-4 and B-5 were located underneath the Northern Grandstands of Suplizio Field from east to west. Borehole B-5 is located just inside the equipment access to Suplizio Field. These holes were drilled to maximum depths of approximately 52 feet to 68 feet below existing grades. Borehole B-4 was advanced into sedimentary bedrock, encountered at an approximate depth of 66 feet below existing grade.

Borehole B-6 and B-7 were located at the southern gates to each entrance of the Stocker Field and Suplizio Field, respectively. Borehole B-7 started by coring through the existing concrete slab and then both B-6 and B-7 were advanced to an approximate depth of 20 feet below existing grades to provide subsurface information for the intended new plaza entries and proposed new ticketing buildings.

Borehole B-8 was located in the northern parking lot of the Lincoln Park facility. The borehole was located near an existing light pole and was provided to establish geotechnical conditions for proposed future lighting improvements in the parking lot. Borehole B-8 was advanced to a maximum depth of 55 feet below existing grade.

The geotechnical boreholes were advanced with a CME 55 track mounted drill rig using 6.25-inch outside diameter hollow stem augers. The boreholes were logged in the field by a representative of RockSol with the depth to groundwater, if encountered, noted at the time of drilling. The boreholes were backfilled at the completion of drilling and groundwater level checks and patched with surface asphalt patch mix when drilled within existing pavement. The concrete walkway at Borehole B-7 was patched with concrete mix.

Subsurface materials were sampled and resistance of the soil to penetration of the sampler was performed using Modified California barrel and standard split spoon samplers. The Modified California barrel sampler has an outside diameter of approximately 2.5 inches and an inside diameter of 2 inches. Brass tube liners are used with the Modified California barrel sampler to retain relatively undisturbed samples for in-place density, unconfined compressive strength, and swell/consolidation testing. The brass tube liners have an inside diameter of approximately 1.95 inches and a length of 4 inches. A total of 4 brass liners are placed in the Modified California sampler with the first two closest to the drive head tip typically used for testing.

Penetration Tests (PT) were performed using the Modified California barrel sampler driven with an automatic hammer lift system and a standard hammer weighing 140 pounds falling 30 inches per ASTM D3550. The PT test is performed to obtain soil samples and to obtain penetration resistance values (blow counts) for each sampling event. Each drop of the hammer is considered one blow count. For the PT test, blow counts are typically recorded for two 6-inch advancement intervals, or the length achieved if less than 12 inches is penetrated when 50 blows have been applied.

The Modified California Barrel sampling method is similar to the Standard Penetration Test (SPT) described by ASTM Method D-1586, with the difference being the sampler dimensions and the number of 6-inch intervals driven with the hammer. Brass tube liners are not used with the SPT sampler. It is RockSol's experience that blow counts obtained with the Modified California sampler tend to be slightly greater than a standard split spoon sampler due to the slightly larger sampler size.

Penetration resistance values (blow counts) were recorded for each sampling event. Blow counts, when properly evaluated, indicate the relative density or consistency of the soils. Depths at which the samples were taken, the type of sampler used, and the blow counts that were obtained are shown on the Borehole Logs (See Appendix C).

In addition, four shallow hand auger samples, identified as F-1 through F-4, were obtained at various locations within outfield of Suplizio field. Samples were taken starting in the Left field and working toward Right Field. Each sample consisted of hand augering to an approximate depth of 10 inches below existing grades at four different increments extending 15 feet, 50 feet, 75 feet, and 100 feet from the edge of the infield (See Figure B2 in Appendix B). These hand auger samples were submitted to Ward Laboratories for soil nutrient testing.

5.0 LABORATORY TESTING

Soil samples retrieved from the borehole locations were examined by the project geotechnical engineer in the RockSol laboratory. The following laboratory tests were performed in accordance with the American Society for Testing and Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO), and current local practices:

- Natural Moisture Content (ASTM D-2216)
- Percent Passing No. 200 Sieve (ASTM D-1140)
- Liquid and Plastic Limits (ASTM D-4318)
- Dry Density (ASTM D-2937)
- Gradation (ASTM D 6913)
- Water-Soluble Sulfates (CDOT CP-L 2103)
- Water-Soluble Chloride Content (AASHTO T291-91)
- Standard Test Method for pH of Soils (ASTM D4972-01)
- Soil Resistivity (ASTM G187 - Soil Box)
- Soil Classification (ASTM D-2487, ASTM D-2488, and AASHTO M145)
- Swell Test (ASTM D-4546)

Selected samples were tested and classified per AASHTO M145 Soil Classification System. The results of all Laboratory tests performed are summarized in Appendix D.

6.0 SUBGRADE CHARACTERIZATION

Laboratory test results were used to characterize the engineering properties of the subsurface material encountered. For soil classification, RockSol conducted sieve analyses and Atterberg Limits tests. Swell tests were used to determine the swell or consolidation characteristics of the subsurface materials. Lab testing was also performed on selected samples to determine the

water-soluble sulfate content of subsurface materials to assist with cement type recommendations.

6.1 Subsurface Materials

Subsurface conditions generally consist of native sandy clay soils overlying gravelly sand and sandy gravel. Fill soils were encountered in the boreholes drilled within existing asphalt and generally consisted of aggregate base course material and sandy gravel pit run material. Groundwater was encountered at varying depths ranging from 10 feet to 45 feet below existing grades during drilling operations (See Table 6A for ground surface and groundwater elevations where encountered). Descriptions of the surface and subsurface conditions encountered in the boreholes are provided below and are also summarized on the Borehole Logs presented in Appendix C.

Table 6A - Approximate Ground Surface and Groundwater Elevations

Borehole	Ground Surface Elevation (ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Maximum Depth Drilled Elevation (ft)
B-1	4615.1	12.0	4603.1	4564.6
B-2	4616.8	12.0	4604.8	4561.3
B-3	4617.3	12.0	4605.3	4561.8
B-4	4617.4	12.0	4605.4	4549.1
B-5	4616.3	12.0	4604.3	4564.3
B-6	4615.4	12.0	4603.4	4595.4
B-7	4614.9	12.0	4602.9	4594.9
B-8	4614.2	12.0	4602.2	4594.2

Road Base and Fill/Pit Run Material

Approximately 4-6 inches of aggregate base course was encountered beneath the surface at six of the borehole locations. Approximately 16 inches of fill/pit run material associated with pavement grading operations was noted at Borehole B-4 and generally consisted of slightly silty to sandy gravel material.

Native Soils

Native soils encountered below the road base and pit run material generally consisted of very soft to very stiff clay with sand to very sandy clay and loose clayey sand overlying dense to very dense sandy gravel and gravelly sand with cobbles. The cobbles varied in diameter from 4-inches to 12-inches and extended from approximate depths of 40 feet down to the anticipated sedimentary bedrock encountered at an approximate depth of 66 feet below existing grade. The native soils encountered by RockSol are generally consistent with the alluvium and colluvium materials identified on the USGS Geological Map (See Image 3 – *Site Geology Map)* found in Section 3.0 of this report.

Bedrock

Bedrock was encountered in Borehole B-4 at an approximate depth of 66 feet below existing surface elevation. The sedimentary bedrock consisted of gray to dark gray, very hard claystone and shale. The Mancos Shale is identified within Grand Junction valley region underlying the native soils and is expected to remain at a relatively consistent elevation beneath the project location.

Groundwater

Groundwater was encountered in the boreholes at a depth of approximately 12 feet below existing grades at the time of drilling and immediately subsequent to drilling operations. Groundwater at this site is likely influenced primarily due to the Colorado River located to the south approx. 1.5 miles away. Furthermore, seasonal runoff/drainage conditions could also factor into groundwater elevation at the site. Long-term monitoring of groundwater elevations is required to establish groundwater fluctuations.

6.2 Subgrade Bulk Soil Classification

Subgrade bulk samples were obtained at various depths, typically 4 to 5 feet from existing surface grades and were tested for classification purposes according to AASHTO M145 soil classification. The subgrade soils were mostly consistent with A-4 AASHTO soil types. A summary of the subgrade bulk soil classifications is presented in Table 6B.

Table 6B – Subgrade Bulk Soil Classifications

Borehole Location	Depth (feet)	AASHTO Classification
B-1	0-5’	A-2-4
B-2	9”-5’	A-4
B-3	3-5’	A-4
B-4	2-5’	A-4
B-5	5”-5’	A-4
B-6	7”-4’	A-4
B-7	6”-5’	A-4
B-8	16”-5’	A-4

6.3 Swell/Consolidation Potential of Subgrade Soils

Based on swell test results and plasticity index (PI) testing, the subgrade soils encountered within the upper 10 feet of the existing surface elevation exhibit low swell potential and moderate consolidation potential (-2.5 percent consolidation to 0 percent swell). Ten swell/consolidation tests were performed on samples obtained from Boreholes B-1 to B-7 at approximate depths of 4 feet, 5 feet, 9 feet, and 10 feet below existing grades.

Based on consolidation and penetration data obtained from the boreholes drilled, special mitigation is recommended for design and construction of shallow foundation systems being considered (See Section 8.0 Geotechnical Analysis and Recommendations) due to settlement potential and constructability. Recommended mitigation consists of over excavation and replacement with CDOT Class 1 Structure Backfill material.

6.4 Cement Type/Sulfate Resistance Discussion

The City of Grand Junction uses the 2018 International Building Code (IBC 2018) for development of concrete resistance parameters. The IBC 2018 references the American Concrete Institute (ACI) for such parameters. Cementitious material requirements for concrete in contact with site soils or groundwater are based on the percentage of water-soluble sulfate in either soil or groundwater that will be in contact with concrete constructed for this project. Mix design requirements for concrete exposed to water-soluble sulfates in soils or water is considered by the ACI as shown in Table 6C and in the Building Code Requirements for Structural Concrete (ACI 318-14) (ACI Tables 19.3.1.1 & 19.3.2.1).

Table 6C - Requirements to for Concrete by Sulfate Exposure Class

Exposure Class	Water-soluble sulfate (SO_4), in dry soil, percent	Water Cementitious Ratio, maximum	Cementitious Material Requirements (ASTM C150)	Minimum Compressive Strength (psi)
S0	0.00 to <0.10	Not Applicable	No Restriction	2500
S1	0.10 to < 0.20	0.50	Type II	4000
S2	0.20 to 2.0	0.45	Type V	4500
S3	2.01 or greater	0.45	Type V plus pozzolan	4500

The concentration of water-soluble sulfates measured in soil samples obtained from RockSol's exploratory boreholes varied from 0.01 percent to 0.52 percent by weight (See Table 6D and Appendix D). Based on the results of the water-soluble sulfate testing, Exposure Class S2 is recommended for concrete in contact with subgrade materials for the project. For Exposure Class S2, Type V cement is recommended. A compressive concrete strength of 4,500 psi is also recommended for the S2 Exposure Class.

6.5 Corrosion Resistance Discussion

To determine the existing corrosivity conditions of the in-situ soil, water- soluble sulfate, chloride content, pH and electrical resistivity tests were performed and compared to *Table 1 - Guidelines for Selection of Corrosion Resistance Levels* as presented in the *CDOT Pipe Materials Selection Guide,* dated April 30, 2015. Table 6D summarizes the accumulated data.

Table 6D - Corrosion Resistance Summary

Borehole Location	Sample Depth (ft)	Water Soluble Chloride (%)	Water Soluble Sulfate (% by weight)	pH	CR Level
B-1	0-5'	--	0.01	--	CR0
B-2	9"-5'	--	**0.50**	--	CR3
B-3	3-5'	--	**0.07**	--	CR1
B-4	2-5'	--	**0.15**	--	CR2
B-5	5"-5'	0.02	**0.19**	8.24	CR2
B-6	7"-4'	0.02	**0.29**	8.06	CR3
B-7	6"-5'	0.02	**0.52**	8.36	CR4
B-8	16"-5'	--	0.01	--	CR0

Additional testing at specific structure locations may be performed to provide structure specific corrosion resistance recommendations. In Table 6D, we have used "bold" text to identify the test result variable that is contributing to the Corrosion Resistance Level above 0. It should be noted that the presence of sulfates in the soils are the driving factor for increase in Corrosion Resistance Level and based on the available data.

In addition, electrical resistivity analyses were performed in the RockSol laboratory using the soil box method (ASTM G-187). The test results were referenced against *Table 2 – Minimum Pipe Thickness For Metal Pipes Based On The Resistivity And pH Of The Adjacent Soil* as presented in the *CDOT Pipe Materials Selection Guide,* effective April 30, 2015. See Table 6E below for recommendations. Additional testing at specific structure locations should be performed to provide structure specific recommendations.

Table 6E Minimum Thickness Recommendations for Metal Pipes

Borehole Location	Sample Depth (ft)	Saturated Resistivity (ohm-cm) at Moisture content (%)	pH	Minimum Required Gauge Thickness for Metal Pipe Material
B-5	5”-5’	1,400 Ohm-cm @ 19.5%	8.24	18-gauge Polymer Coated
B-6	7”-4’	1,070 Ohm-cm @ 22.3%	8.06	18-gauge Polymer Coated
B-7	6”-5’	2,100 Ohm-cm @12.7%	8.36	18-gauge Aluminized Type 2

7.0 SEISMICITY DISCUSSION

The City of Grand Junction uses the 2018 International Building Code (IBC-2018) for development of seismic design parameters. The IBC-2018 references the American Society of Civil Engineers 7-16 (ASCE 7-16) seismic design code. Based on the subsurface conditions encountered, it is our opinion that the subject site meets criteria for Seismic Site Class E. Shear wave velocity testing was not performed by RockSol. Seismic design parameters for Seismic Site Class E are discussed below.

7.1 Seismic Design Parameters

Seismic design parameters were obtained from the United States Geological Survey (USGS) Earthquake Design Maps using the 2018 International Building Code specifications which reference ASCE 7-16. Values were obtained using the USGS site: https://seismicmaps.org. Since the proposed grandstands are structures whose primary occupancy is public assembly with an occupant load greater than 300, the grandstands qualify as risk category III per Table 1604.5 of the *IBC-2018*. Interpolated values for Peak Ground Acceleration Coefficient (PGA), Spectral Acceleration Coefficient at Period 0.2 sec (S_s), and Spectral Acceleration Coefficient at Period 1.0 sec (S_1) were obtained using the latitude and longitude for the site. The seismic acceleration coefficients obtained (data based on 0.05-degree grid spacing) are presented in Table 7A.

Table 7A – Seismic Acceleration Coefficients (IBC 2018)

Proposed Bleachers (Latitude°/Longitude°) (39° 4’ 30.51" N/ 108° 32' 43.21 "W)	Peak Ground Acceleration (PGA)	Spectral Acceleration Coefficient - S_s (Period 0.2 sec)	Spectral Acceleration Coefficient - S_1 (Period 1.0 sec)
IBC 2018 (ASCE 7-16)	0.132	0.239	0.066

The acceleration coefficients are then used to obtain Site Factors F_a, and F_v based on the defined Site Class as shown in Tables 1613.2.3(1) and 1613.2.3(2) of the *IBC-2018*. A summary of the Site Factor values obtained are shown in Table 7B.

Table 7B – Seismic Site Factor Values

Proposed Bleachers (Latitude°/Longitude°) (39° 4’ 30.51" N/ 108° 32' 43.21 "W)	F_{pga} (at zero-period on acceleration spectrum)	F_a (for short period range of acceleration spectrum)	F_v (for long period range of acceleration spectrum)
IBC 2018 (ASCE 7-16)	2.239	2.4	4.2

Table 7C summarizes the Seismic Zone determination and horizontal response spectral Acceleration Coefficients (S_{D1}) and (S_{DS}) obtained for the proposed structure. Seismic Performance Zone determination is based on the value of the horizontal response spectral Acceleration Coefficient at 1.0 Seconds, S_{D1}, as determined by *Eq. 16-39* of the IBC-2018 and the horizontal response spectral Acceleration Coefficient at 0.2 Seconds, S_{DS}, as determined by *Eq. 16-38.* Values for S_1 and F_v are presented in Tables 7A and 7B, shown above. The seismic performance zone was determined *IBC-2018* Tables 1613.2.5(1) and (2). Seismic Design output sheets are summarized in Appendix F.

Table 7C – Seismic Performance Zone

Proposed Bleachers (Latitude°/Longitude°) (39° 4' 30.51" N/ 108° 32' 43.21 "W)	Acceleration Coefficient at 1.0 seconds (S_{D1})	Acceleration Coefficient at 0.2 seconds (S_{DS})	Seismic Design Category (1)
IBC 2018 (ASCE 7-16)	0.184	0.382	C

Note (1): Seismic Design Category C (For Risk Categories I, II or III) is assigned when *$0.133g \le S_{D1} < 0.20g$ and $0.33g \le S_{DS} < 0.50g$*

8.0 GEOTECHNICAL ANALYSIS AND RECOMMENDATIONS

Proposed improvements include new stadium seating structures and new single story ticketing buildings. Heavily loaded structures are not planned; however, areas of the seating structures may result in heavier loading due to minor structure additions.

Our boreholes encountered relatively soft, compressible soils to depths on the order of 55 feet and as a result, shallow foundation systems require limited allowable bearing pressures and consideration of supporting subgrade soil improvement, depending on the foundation loading required by the new structures. A discussion of shallow foundation geotechnical parameters is presented in Section 8.1.

As an alternative to shallow foundation systems, a deep foundation alternative using helical piers is recommended. The helical piers would be required to bear on and into the deep, underlying cobble layer that is present at this site. The advantage of the helical pier system is the relative ease of installation and with little to no waste soil generated. This system does require special structural design. A discussion of helical pier geotechnical parameters is presented in Section 8.2.

As an alternative to helical piers, a deep foundation system of drilled shafts (concrete) may be considered. The drilled shaft system may result in fewer installation points than the helical pier system and provide greater lateral resistance per foundation element but the disadvantage is the amount of waste soil generated and the need for casing and specialized, heavy equipment. Construction of drilled shafts in the presence of groundwater also presents a risk of soil/water intrusion into the freshly placed concrete when pulling the protective casing. A discussion of drilled shaft geotechnical parameters is presented in Section 8.3.

8.1 Shallow Foundation System Geotechnical Parameters

Due to the presence of soft, clay soils a very low allowable bearing pressure for shallow foundations is recommended at this site to limit potential settlement. For the existing site soils, a maximum allowable bearing pressure of 750 pounds per square foot (psf) is recommended.

Ground improvement is recommended to achieve a service bearing resistance greater than 750 psf at this site. At a minimum, RockSol recommends ground improvement consisting of overexcavation of subgrade soils to a minimum depth of 2 feet below the bottom of shallow foundations (footings) and replacement with at least 2-feet of a material meeting CDOT Class 1 Structure Backfill requirements. The Class 1 Structure Backfill material shall also extend a minimum of 2 feet horizontally beyond the limits of the footing perimeter.

Placement of the backfill material should be in horizonal lifts with a maximum lift thickness of 6 inches. Compaction of each lift with vibratory methods using lightweight equipment is recommended.

With two feet (vertically) of Structural Backfill materials, RockSol considers an allowable bearing resistance of 1.0 ksf appropriate. If greater allowable bearing resistance is required, additional thickness of replaced subgrade soil is required. Bearing resistances, based on replacement thicknesses of aggregate is presented in Table 8.1.

Table 8.1 - Bearing Resistances for Shallow Foundations After Ground Improvement

Overexcavation And Replacement Thickness	Ultimate (Nominal) Resistance (ksf)	Allowable Bearing Resistance (ksf)
2 feet	4.6	1.0
3 feet	5.9	1.5
4 feet	7.7	2.0

Allowable bearing resistance is estimated to correspond to a total settlement of less than 1-inch. RockSol assumes a minimum foundation width of 4 feet for all footings. The bottom of all footings shall be a minimum of 3 feet below finished grade for frost considerations.

A representative of the geotechnical engineer should observe all foundation excavations prior to placement of the geotextile and aggregate material.

8.2 Helical Pier Foundation System

Helical piers are an alternative to shallow foundations, especially if greater bearing resistance is required. The helical piers would need to bear in the dense cobble layer encountered in our boreholes. The depth to the cobbles may vary slightly across the site therefore some allowance for variations in the total length of the helical piers must be considered. RockSol anticipates that a single large diameter plate for each pier will be needed with a minimum plate diameter of 16-inches anticipated.

For helical pier capacity estimating, the bearing stratum of cobbles should be modeled as a cohesionless material with an effective friction angle of 45 degrees and with a total unit weight of 140 pcf and a submerged unit weight of 77 pcf. The overburden soils above the bearing layer should be modeled with a total unit weight of 125 pcf and a submerged unit weight of 62 pcf with groundwater modeled at a depth of 12 feet.

8.3 Drilled Shaft Foundation System

Drilled shafts will provide support by embedment into sedimentary bedrock. Based on our evaluation, recommended nominal (unfactored) and allowable (factored) base resistance and side resistance values for the bedrock material are presented in Table 8.2.

Table 8.2: Base and Side Resistance Values for Drilled Shafts in Bedrock

Ultimate (Nominal) Resistance		Allowable (Factored) Resistance	
Base (ksf)	Side (ksf)	Bearing (ksf)	Side (ksf)
138	11.3	47	3.8

The side resistance is applicable to the portion of the shaft embedded in competent bedrock. When evaluating the side resistance of the drilled shaft, the lower 1.0-diameter length above the shaft tip should be ignored. Side resistance in the soil zone above competent bedrock should be neglected when calculating axial resistance.

For axial bearing, a minimum shaft embedment into bedrock of 5 feet is recommended.

Drilled shaft diameters shall be sufficient to satisfy axial, bending, and lateral load resistance requirements. In addition, the shaft diameters shall be sufficient to allow for use of casing, if required, and placement of reinforcement with adequate concrete cover.

Additional design and construction considerations for drilled shafts are presented below.

(a) The construction of the drilled shafts should follow the guidelines specified in the "CDOT Standard Specifications for Road and Bridge Construction (SSRBC), Section 503, 2019."

(b) During construction of drilled shafts, casing or slurry methods may be required to support the excavation where holes are unstable due to soil and groundwater conditions. Groundwater was encountered at an approximate depth of 12 feet below the existing ground surface during drilling operations.

(c) Prior to the placement of the concrete, the drilled shaft excavation, including the bottom, should be cleaned of all loose material. For wet conditions (more than two inches of water), concrete placement by "tremie" methods should be used.

(d) Lateral load capacity of the drilled shafts should be evaluated. Geotechnical parameters for evaluation of lateral load capacity are provided in Table 8.3.

(e) Drilled shafts should be constructed with spacing at least four shaft diameters center to center. For closely spaced drilled shafts, the axial and lateral capacities should be appropriately reduced. Group action of drilled shafts should be analyzed on an individual basis to assess the appropriate reduction.

Lateral Resistance Parameters (Drilled Shaft Foundations)

Recommended lateral resistance parameters for drilled shafts constructed are presented in Table 8.3. The parameters listed are for use with LPILE® or equivalent software.

Table 8.3 Drilled Shaft Lateral Resistance Parameters

Borehole Material	L-Pile Soil Type	Undrained Shear Strength (psf)	Angle of Internal Friction (degrees)	Subgrade Reaction Coefficient (pci)	Strain Factor ε_{50} (%)	Unit Weight (pcf)
CLAY, silty to sandy, above water table	Stiff clay w/o free water	500	0	500	0.015	125 (Total)
CLAY, silty to sandy, below water table	Stiff clay w/ free water	250	0	100	0.025	63 (Submerged)
GRAVEL, silty to sandy, Below water table	Sand	0	45	60	--	63 (Submerged)
Claystone/Shale Bedrock	Stiff clay w/o free water	8,000	0	2,000	0.004	125 (Total)

Total unit weight indicated in the table above includes soil plus moisture content. Depths at which groundwater were encountered are indicated on the attached borehole logs.

9.0 EARTHWORK

Materials used to construct structure backfill and aggregate base course materials should meet the material and moisture density control requirements specified in Article IV of the Mesa County Standard Specifications for Road and Bridge Construction and City of Grand Junction Transportation Engineering Design Standards (current editions).

Prior to construction of new concrete flatwork or asphalt surfaces on subgrade soils, the underlying subgrade should be properly prepared by removal of all organic matter (topsoil), debris, loose material, and any deleterious material followed by scarification, moisture conditioning and recompaction. The minimum depth of scarification, moisture conditioning and re-compaction in all cases shall be 6 inches. Cobbles greater than 6 inches in diameter, if encountered, should be removed from the scarification zone.

Broken concrete, broken asphalt, or other solid materials more than 6 inches in greatest dimension shall not be placed within subgrade areas supporting concrete flatwork and pavement structures. Material excavated from utility trenches may be used for backfilling provided it does not contain unsuitable material or particles larger than 3 inches. Unsuitable material includes, but is limited to, topsoil, vegetation, brush, sod, trash, and other deleterious substances.

10.0 OTHER DESIGN AND CONSTRUCTION CONSIDERATIONS

Proper construction practices, in accordance with City of Grand Junction Transportation Engineering Design Standards and Mesa County Standard Specifications for Road and Bridge Construction (current editions), should be followed during site preparation, structure and earthwork excavations for the suitable long-term performance of the proposed improvements. Excavation support should be provided to maintain onsite safety and the stability of excavations and slopes. Excavations shall be constructed in accordance with local, state and federal

regulations including OSHA guidelines. The contractor must provide a competent person to determine compliance with OSHA excavation requirements. For preliminary planning, existing fill material and native soils may be considered as OSHA Type C soils.

Surface drainage patterns may be altered during construction and local landscape irrigation (if any) must be controlled to prevent excessive moisture infiltration into the subgrade soils during and after construction.

Environmentally contaminated material, if encountered, should be characterized and removed under the direction of the project environmental consultant. Design and construction plans should be reviewed, and onsite construction should be observed by the professional engineers.

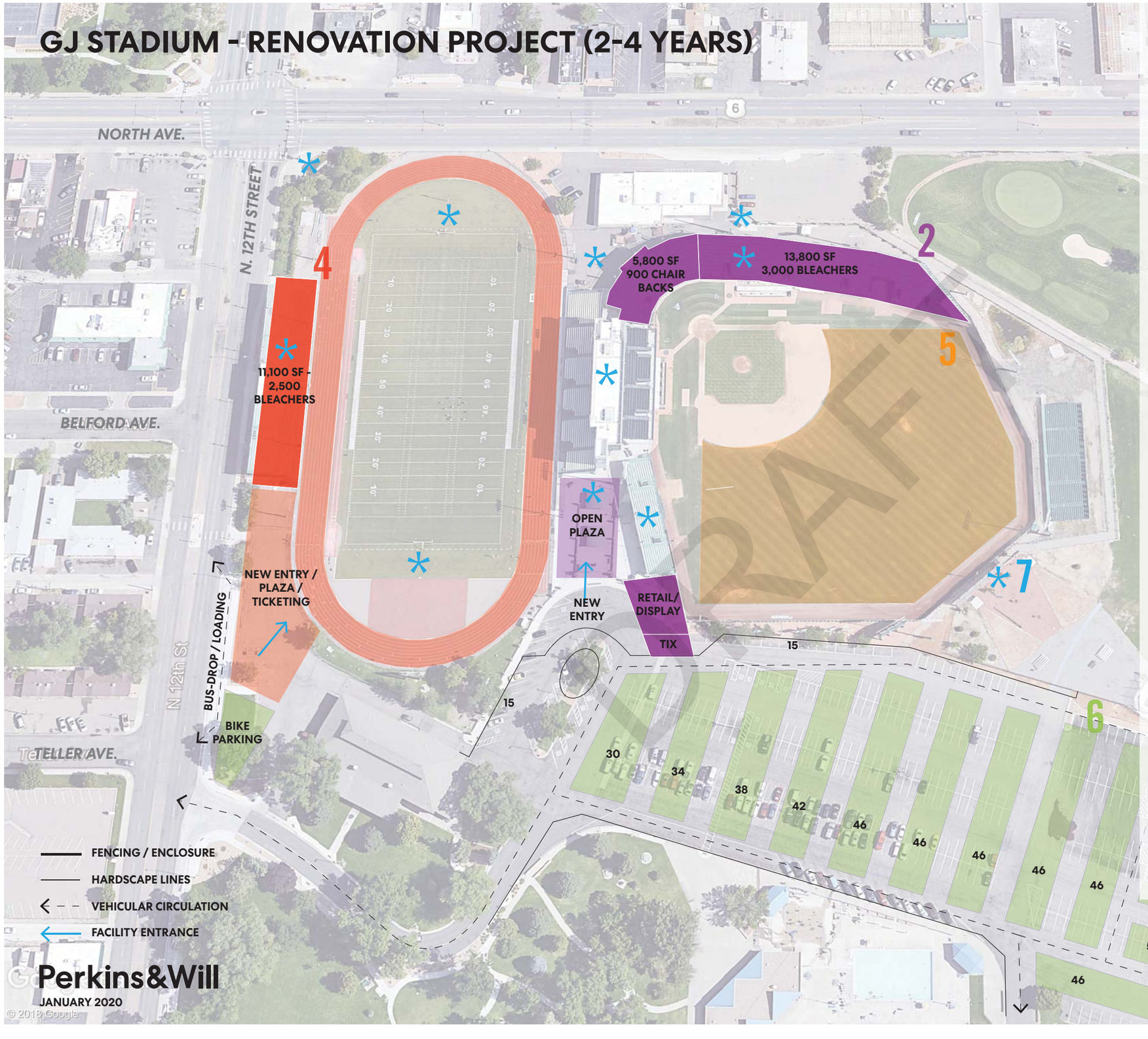
11.0 LIMITATIONS

This geotechnical investigation was conducted in general accordance with the scope of work. RockSol's geotechnical practices are similar to those used in Colorado with similar soil conditions and based on our understanding of the proposed work. This report has been prepared for use by the City of Grand Junction for the project described in this report. The report is based on our exploratory boreholes and does not consider variations in the subsurface conditions that may exist between boreholes. Additional investigation is required to address such variation. If during construction activities, materials or water conditions appear to be different from those described herein, RockSol should be advised at once so that a re-evaluation of the recommendations presented in this report can be made. RockSol is not responsible for liability associated with interpretation of subsurface data by others.

APPENDIX A

STADIUM RENOVATION AND MASTER PLAN
PREPARED BY PERKINS & WILL, JANUARY 2020

GJ STADIUM - RENOVATION PROJECT (2-4 YEARS)



Perkins&Will
JANUARY 2020

2 - ENHANCED ENTRY / CIRCULATION / SEATING.
$4.4 - $4.8 MILLION
-Demolish existing north stands from home plate all the way east. Build new bleachers to include 900 chair back seats behind home plate and 3,000 new bleacher seating. New seating section to include distributed ADA seating and accommodations, camera platform, scorers box, and appropriate draining.
-Demolish current ticket booth and entry gates to create a new grand entry with open plaza / festival area south of the Lincoln Tower. Include upgraded security.
-Develop a new building with access from parking lot and entry plaza to include a new ticket office and retail / display space on ground level.

4 - UPGRADES TO STOCKER STADIUM.
$1.9 - $2.3 MILLION
-Resurface track.
-Replace water main under football field. Remove old one and re-plumb new one on the 40 yard line of west stands.
-Create new festival plaza / ticketing experience at the southwest entrance. Include upgraded security.
-Demolish existing west stands and build new bleachers to include 2,500 new bleacher seating, football-oriented sight lines, distributed ADA seating and accommodations, and relocation of light poles.
-Plan for more spectator amenities in later phase with permanent support spaces below.

5 - OUTFIELD SURFACE REPLACEMENT & DRAINAGE.
$300,000 - $500,000

6 - SITE DEVELOPMENT.
$300,000 - $500,000
-Reconfigure south lot to maximize parking count (105 net space increase) and create safer pedestrian access.
-Dedicated bicycle parking and shuttle drop-off to encourage alternate modes of transportation and clear congestion.

7 - IT / ELECTRICAL / AV INFRASTRUCTURE UPGRADES.
$2.5 - $2.9 MILLION
-IT needs at all ticketing locations (north, west, and south).
-IT needs at Lincoln Tower press box .
-Upgrade all lighting to LED, at stadium and field.
-Electrical needs with all new bleacher sections for food vendors (220 amp connections).
-Electrical needs at football end-zones for VIP booths / seating.
-Upgrade sound system.
-Addition of camera platforms and camera plug-in capabilities.
-Upgrade existing scoreboard and northwest corner marquee.

TOTAL PROJECT COSTS : $9.4 - $11 MILLION

	RENOVATION PROJECT (2-4 YEARS)						BY PROJECT AREA		
		Comments	*NSF*	*GSF*	*$/SF*	*Const. $*	*Stocker*	*Suplizio*	*Shared*
2	*Enhanced Entry / Circulation / Seating*								
	Demo Existing North Bleachers		19,600	19,600	$3.00	$58,800		$76,440	
	Reconstruct North Bleachers - Behind Home Plate	900 chairback seats, include ADA, drainage	900	900	$345.00	$310,500		$403,650	
	Reconstruct North Bleachers - Home Plate to East	3,000 bleacher seats, include ADA, drainage	3,000	3,000	$240.00	$720,000		$936,000	
	Camera Platform & Prefab Scorers Box		300	420	$300.00	$126,000		$163,800	
	Reno Main Entry - Create Open Plaza	demo and new south grand entry, include security	7,000	7,000	$65.00	$455,000			$591,500
	New Ticketing and Retail / Display Building		3,800	4,750	$400.00	$1,900,000			$2,470,000
	Total		**34,600**	**35,670**	**-**	**$3,570,300**			
	Total Project Costs	*1.3*				**$4,641,390**	**$0**	**$1,579,890**	**$3,061,500**
4	*Upgrades to Stocker Stadium*								
	Resurface Track	recycled	40,000	40,000	$8.00	$320,000	$416,000		
	Replace Water Main Under Football Field	remove old and re-plume new one @ 40yd line	-	-	-	$25,000	$32,500		
	New Entry Plaza / Ticketing - West Stadia	southwest corner, include security	25,000	25,000	$25.00	$312,500	$406,250		
	Demo Existing West Bleachers		11,100	11,100	$5.50	$61,050	$79,365		
	Relocate Light Poles	relocate for sightlines	2	2	$22,000.00	$44,000	$57,200		
	Reconstruct West Bleachers	2,500 bleacher seats, include ADA ramps, etc.	2,500	2,500	$330.00	$825,000	$1,072,500		
	Total		**78,602**	**78,602**	**-**	**$1,587,550**			
	Total Project Costs	*1.3*				**$2,063,815**	**$2,063,815**	**$0**	**$0**
5	*Outfield Surface Replacement*								
	Outfield Surface Replacement	including drainage	78,000	78,000	$4.00	$312,000		$405,600	
	Total		**78,000**	**78,000**	**-**	**$312,000**			
	Total Project Costs	*1.3*				**$405,600**	**$0**	**$405,600**	**$0**
6	*Site Development*								
	Reconfigure Parking - South Lot	restripe for 500 spaces	135,000	135,000	$2.00	$270,000			$351,000
	Total		**135,000**	**135,000**	**-**	**$270,000**			
	Total Project Costs	*1.3*				**$351,000**	**$0**	**$0**	**$351,000**
7	*IT / Electrical / AV Infrastructure Upgrades*								
	Upgrade IT - All Ticketing Locations		-	-	-	$40,000			$52,000
	Upgrade IT - Lincoln Tower Press Box		-	-	-	$90,000			$117,000
	Upgrade Lighting - All LED	at stadium and field	-	-	-	$900,000			$1,170,000
	Upgrade Electrical - Under North Bleachers	food vendor support, 220 amp connection	-	-	-	$500,000		$650,000	
	Add Electrical - Football Endzones for VIP		-	-	-	$100,000	$130,000		
	Upgrade AV - Sound System		-	-	-	$200,000			$260,000
	Upgrade AV - Add Camera Platforms & Plug-ins		-	-	-	$50,000			$65,000
	Upgrade AV - Existing Scoreboard & Marquee	Suplizio outfield & corner of North Ave / 12th	-	-	-	$160,000			$208,000
	Total		**0**	**0**	**-**	**$2,040,000**			
	Total Project Costs	*1.3*				**$2,652,000**	**$130,000**	**$650,000**	**$1,872,000**
	RENOVATION PROJECT TOTAL (2-4 YEARS)		326,202	327,272	-	$7,779,850			
	Total Project Cost	*1.3*				$10,113,805	$2,193,815	$2,635,490	$5,284,500

APPENDIX B

GEOTECHNICAL BOREHOLE LOCATION PLAN

AND

SOIL NUTRIENT SAMPLING LOCATION PLAN

Figure B1- Borehole Location Plan

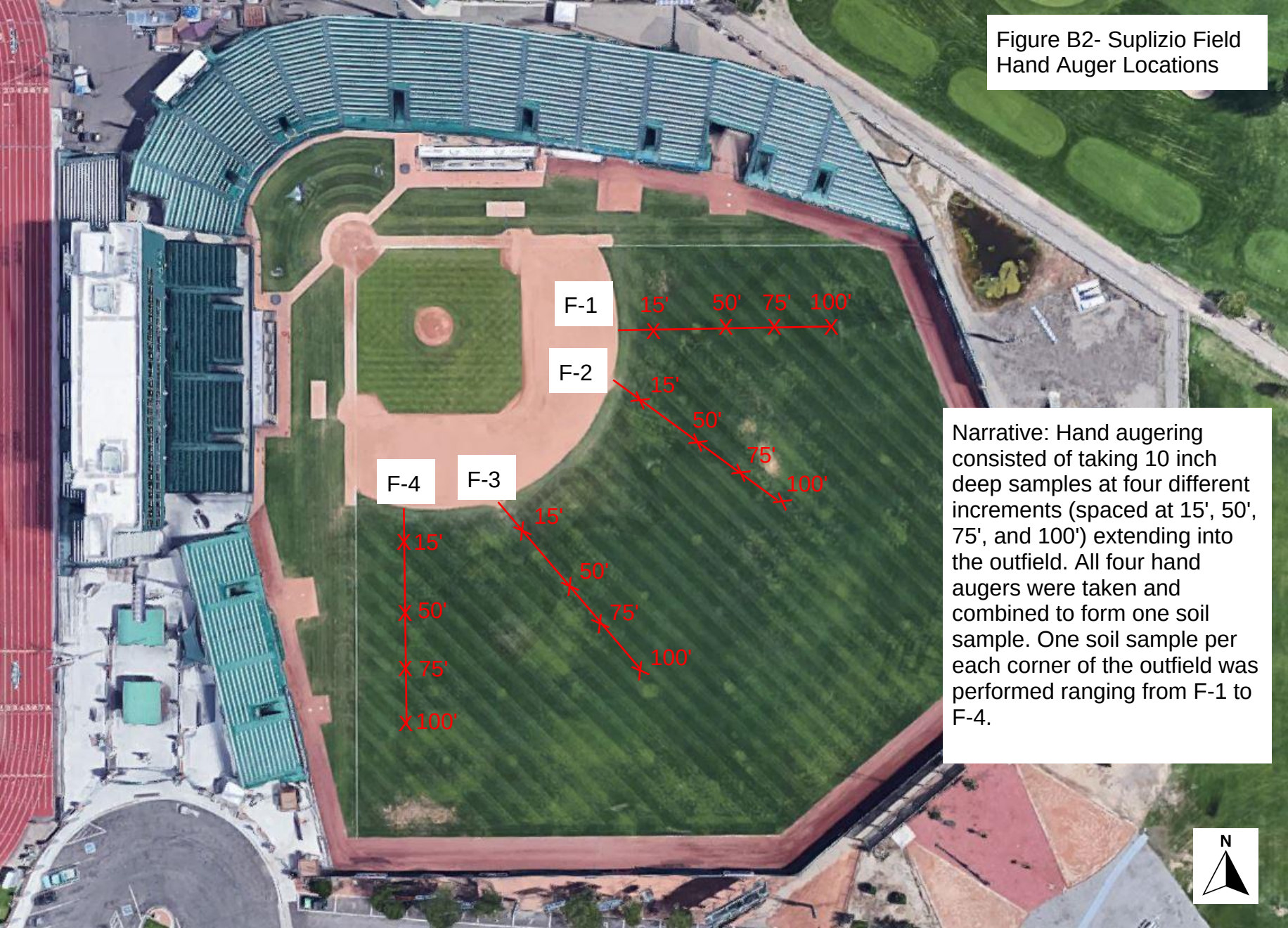


Figure B2- Suplizio Field Hand Auger Locations

Narrative: Hand augering consisted of taking 10 inch deep samples at four different increments (spaced at 15', 50', 75', and 100') extending into the outfield. All four hand augers were taken and combined to form one soil sample. One soil sample per each corner of the outfield was performed ranging from F-1 to F-4.

APPENDIX C

LEGEND AND INDIVIDUAL SOIL BOREHOLE LOGS

RockSol Consulting Group, Inc.

LEGEND

CLIENT City of Grand Junction
PROJECT NAME Stocker Stadium Suplizio Field
PROJECT NUMBER 599.25
PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado

LITHOLOGY

- Asphalt Pavement
- Concrete
- Fill - Aggregate Base Course
- Fill - GRAVEL
- Native - SAND
- Native - SAND, gravelly
- Native - SAND, clayey
- Native - CLAY
- Native - CLAY, silty
- Native - CLAY, sandy
- Native - GRAVEL, silty
- Bedrock - SHALE

SAMPLE TYPE

- Auger Cuttings
- GRAB SAMPLE FROM CUTTINGS
- MODIFIED CALIFORNIA SAMPLER 2.5" O.D. AND 2" I.D. WITH BRASS LINERS INCLUDED
- SPLIT SPOON SAMPLER 2" O.D. AND 1 3/8" I.D. NO LINERS

Fines Content indicates amount of material, by weight, passing the US No 200 Sieve (%)

15/12 Indicates 15 blows of a 140 pound hammer falling 30 inches was required to drive the sampler 12 inches.

50/11 Indicates 50 blows of a 140 pound hammer falling 30 inches was required to drive the sampler 11 inches.

5,5,5 Indicates 5 blows, 5 blows, 5 blows of a 140 pound hammer falling 30 inches was required to drive the sampler 18 inches.

- GROUND WATER LEVEL 1ST DEPTH, AT TIME OF DRILLING
- GROUND WATER LEVEL 2ND DEPTH, POST DRILLING

RockSol Consulting Group, Inc.

BORING : B-1

CLIENT City of Grand Junction
PROJECT NAME Stocker Stadium Suplizio Field
PROJECT NUMBER 599.25
PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado
DATE STARTED 2/10/21 **COMPLETED** 2/10/21
GROUND ELEVATION 4615.1 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith Drilling
NORTH 39000.0 **EAST** 94751.0
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 6.25" O.D.
BORING LOCATION: SW corner of West Grand Stands, Stocker Stadium
LOGGED BY D. Compton **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES ~10' E of 12th St. pavement edge
WATER DEPTH 12.0 ft on 2/10/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4615.1	0		(Native) SAND, silty, moist to very moist, tannish brown, very soft	BULK			0.01			NP	NP	NP	34.8
				MC	4/12	-0.2		112.0	12.7				
			(Native) CLAY, with sand, very moist, brown, very stiff to soft										
4605.1	10			MC	2/12			96.6	28.5				90.8
			(Native) CLAY, trace sand in parts, wet, brown, soft to medium stiff										
				MC	2/12			96.3	25.8				
			Approximate Bulk Depth 0-5 Liquid Limit= NP Plastic Limit= NP Plasticity Index= NP Fines Content= 34.8 Sulfate= 0.01										
4595.1	20			MC	2/12			100.5	24.0				
4585.1	30			MC	6/12			99.0	24.6				
4575.1	40			MC	6/12			101.6	23.9				
			(Native) SAND, with gravel and cobbles in parts, wet, tannish brown, dense to very dense										
4565.1	50			SS	9/19/42								11.2
			Bottom of hole at 50.5 feet.										

RockSol Consulting Group, Inc.

BORING : B-2

CLIENT City of Grand Junction
PROJECT NAME Stocker Stadium Suplizio Field
PROJECT NUMBER 599.25
PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado
DATE STARTED 2/10/21 **COMPLETED** 2/10/21
GROUND ELEVATION 4616.8 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith Drilling
NORTH 39264.3 **EAST** 94791.2
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 6.25" O.D.
BORING LOCATION: NE corner of West Grand Stands, Stocker Stadium
LOGGED BY D. Compton **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES ~50' E of 12th St. pavement edge
WATER DEPTH 12.0 ft on 2/10/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4616.8	0		Asphalt pavement, approximately 3 inches thick										
			Aggregate base course, approximately 6 inches thick	BULK			0.50			24	15	9	78.7
			(Native) CLAY, with sand, moist to very moist, brown, soft to very soft	MC	2/12	-1.7		94.5	27.5				
4606.8	10		(Native) CLAY, trace sand, very moist to wet, brown, soft to very soft	MC	2/12	-1.4		90.3	30.2				97.8
			Approximate Bulk Depth 0.75-5 Liquid Limit= 24 Plastic Limit= 15 Plasticity Index= 9 Fines Content= 78.7 Sulfate= 0.5	MC	2/12			94.9	27.0				
4596.8	20		(Native) CLAY, with sand to sandy, wet, brown, soft to medium stiff	MC	3/12			97.1	27.1				
				MC	2/12			96.3	26.8				
4586.8	30			MC	7/12			102.0	23.7				
4576.8	40		(Native) CLAY, wet, brown, very stiff	MC	20/12			104.0	23.0				
4566.8	50		(Native) SAND, with gravel and cobbles, wet, brown, dense to very dense	SS	8/25/43								10.6
			Bottom of hole at 55.5 feet.										

RockSol Consulting Group, Inc.

BORING : B-3

CLIENT City of Grand Junction
PROJECT NAME Stocker Stadium Suplizio Field
PROJECT NUMBER 599.25
PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado
DATE STARTED 2/9/21 **COMPLETED** 2/9/21
GROUND ELEVATION 4617.3 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith Drilling
NORTH 39303.6 **EAST** 95125.4
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 6.25" O.D.
BORING LOCATION: NW corner of Grand Stands, Suplizio Field
LOGGED BY D. Compton **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES ~15' NW of press box
WATER DEPTH 12.0 ft on 2/9/21

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4617.3	0	Asphalt pavement, approximately 6 inches thick Aggregate base course, approximately 4 inches thick	BULK									
		(Native) CLAY, sandy to slightly sandy, very moist to wet, tannish brown, soft to very soft	BULK			0.07			26	16	10	61.2
			MC	2/12	-1.2		94.8	27.2				
		Approximate Bulk Depth 3-5 Liquid Limit= 26 Plastic Limit= 16 Plasticity Index= 10 Fines Content= 61.2 Sulfate= 0.07										
4607.3	10		MC	2/12			100.8	24.0				75.1
			MC	2/12			98.4	26.7				
4597.3	20		MC	2/12			97.4	27.1				
		(Native) SAND, clayey, wet, brown, loose										
4587.3	30		MC	5/12			96.6	23.6				
		(Native) CLAY, trace sand, wet, tannish brown, medium stiff										
4577.3	40		MC	6/12			100.9	24.1				
		(Native) SAND, with gravel and cobbles, wet, yellow-brown, dense to very dense										
4567.3	50		MC	35/12			128.7	10.0				
			SS	3/31/47								11.6
		Bottom of hole at 55.5 feet.										

RockSol Consulting Group, Inc.

BORING : B-4

CLIENT City of Grand Junction
PROJECT NAME Stocker Stadium Suplizio Field
PROJECT NUMBER 599.25
PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado
DATE STARTED 2/8/21 **COMPLETED** 2/8/21
GROUND ELEVATION 4617.4 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith Drilling
NORTH 39319.4 **EAST** 95333.2
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 6.25" O.D.
BORING LOCATION: Mid section of North Ave Grand Stands, Suplizio Fields
LOGGED BY D. Compton **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES ~8' N of bleachers, ~15' S of vehicle gate
WATER DEPTH 12.0 ft on 2/8/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4617.4	0		Asphalt pavement, approximately 4 inches thick	GB									
			Aggregate base course, approximately 4 inches thick	BULK			0.15			19	16	3	50.4
			(Fill) GRAVEL, slightly silty to sandy, slightly moist, brown, pit run	MC	2/12	-1.7		93.6	29.8				
			(Native) CLAY, sandy to slight silty, very moist, brown, soft										
4607.4	10		(Native) CLAY, with sand to sandy, wet, brown, soft to very soft	MC	2/12	-2.5		95.5	26.6				88.6
			Approximate Bulk Depth 2-5 Liquid Limit= 19 Plastic Limit= 16 Plasticity Index= 3 Fines Content= 50.4 Sulfate= 0.15	MC	2/12			94.9	27.3				
4597.4	20			MC	2/12			96.3	27.4				95.3
				MC	2/12			95.9	26.6				
4587.4	30		(Native) CLAY, with sand to sandy, wet, tannish brown, medium stiff										
				MC	5/12			100.5	24.3				
4577.4	40												
				MC	6/12			102.1	23.7				
4567.4	50		(Native) SAND, silty with gravel, large cobbles in parts, wet, multicolored, dense to very dense										
				SS	18/32/32					NP	NP	NP	12.3
4557.4	60												
			(Bedrock) SHALE, weathered										
			(Bedrock) SHALE/CLAYSTONE, moist, dark gray, very hard	SS	50/3								
			Bottom of hole at 68.3 feet.										

RockSol Consulting Group, Inc.

BORING : B-5

CLIENT City of Grand Junction
PROJECT NAME Stocker Stadium Suplizio Field
PROJECT NUMBER 599.25
PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado
DATE STARTED 2/8/21 **COMPLETED** 2/8/21
GROUND ELEVATION 4616.3 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith Drilling
NORTH 39243.8 **EAST** 95427.4
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 6.25" O.D.
BORING LOCATION: North Grand Stands, Suplizio Field
LOGGED BY D. Compton **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES At field side of equipment portal, ~20' N of outfield grass
WATER DEPTH 12.0 ft on 2/8/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4616.3	0		Asphalt pavement, approximately 2 inches thick	BULK			0.19			25	16	9	45.3
			Aggregate base course, approximately 3 inches thick										
			(Native) SAND, clayey with gravel, moist, brown										
			(Native) CLAY, sandy, very moist, brown, soft to very soft	MC	2/12	-1.5		101.5	24.8				
4606.3	10		(Native) CLAY, trace sand, very moist to wet, dark brown to light brown, very soft	MC	2/12	-1.1		103.8	21.0				
			Approximate Bulk Depth 0.5-5 Liquid Limit= 25 Plastic Limit= 16 Plasticity Index= 9 Fines Content= 45.3 Sulfate= 0.19	MC	2/12			91.7	25.6				92.2
4596.3	20		(Native) CLAY, with cobbles in parts, trace sand to sandy, gravel in parts, wet, brown, soft	MC	3/12			106.0	21.1				
4586.3	30		(Native) CLAY, sandy, wet, tannish brown, soft to medium stiff	MC	3/12								
4576.3	40			MC	5/12			103.6	23.1				
4566.3	50		(Native) GRAVEL, with large cobbles, slightly silty to silty, sandy, wet, dense to very dense	MC	50/6								
			Bottom of hole at 52.0 feet.										

RockSol Consulting Group, Inc.

BORING : B-6

CLIENT City of Grand Junction
PROJECT NAME Stocker Stadium Suplizio Field
PROJECT NUMBER 599.25
PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado
DATE STARTED 2/9/21 **COMPLETED** 2/9/21
GROUND ELEVATION 4615.4 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith Drilling
NORTH 38904.3 **EAST** 94802.7
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 6.25" O.D.
BORING LOCATION: New entrance, SW Stocker Stadium (track)
LOGGED BY D. Compton **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES ~50' E of 12th St. bus stop curb
WATER DEPTH 12.0 ft on 2/9/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4615.4	0		Asphalt pavement, approximately 3 inches thick Aggregate base course, approximately 5 inches thick (Native) CLAY, sandy, moist, with cobbles	BULK			0.29			22	16	6	53.2
4610.4	5		(Native) CLAY, tannish brown to brown, very moist, very soft to soft **Approximate Bulk Depth 0.58-4** Liquid Limit= 22 Plastic Limit= 16 Plasticity Index= 6 Fines Content= 53.2 Sulfate= 0.29	MC	2/12	-0.2		96.9	26.3				
4605.4	10			MC	2/12			100.5	24.8				97.1
4600.4	15			MC	3/12			100.3	25.3				
4595.4	20			MC	2/12			96.1	27.0				
			Bottom of hole at 20.0 feet.										

RockSol Consulting Group, Inc.

BORING : B-7

CLIENT City of Grand Junction
PROJECT NAME Stocker Stadium Suplizio Field
PROJECT NUMBER 599.25
PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado
DATE STARTED 2/9/21 **COMPLETED** 2/9/21
GROUND ELEVATION 4614.9 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith Drilling
NORTH 38948.1 **EAST** 95163.9
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 6.25" O.D.
BORING LOCATION: SW corner of SB bleachers, Suplizio Field
LOGGED BY D. Compton **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES ~10' E of bleachers
WATER DEPTH 12.0 ft on 2/9/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4614.9	0		Concrete slab, approximately 6 inches thick										
			(Native) CLAY, sandy, moist, brown, very soft	BULK			0.52			24	16	8	63.7
			Approximate Bulk Depth 0.5-5 Liquid Limit= 24 Plastic Limit= 16 Plasticity Index= 8 Fines Content= 63.7 Sulfate= 0.52										
4609.9	5		(Native) CLAY, with sand, very moist, tannish brown, soft to very soft	MC	2/12								
4604.9	10			MC	2/12	-1.1		87.0	30.2				84.9
			(Native) CLAY, sandy to minor sand, very moist, brown, soft to very soft										
4599.9	15			MC	2/12			100.2	24.6				
4594.9	20			MC	2/12			99.2	25.1				
			Bottom of hole at 20.0 feet.										

RockSol Consulting Group, Inc.

BORING : B-8

CLIENT City of Grand Junction
PROJECT NAME Stocker Stadium Suplizio Field
PROJECT NUMBER 599.25
PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado
DATE STARTED 2/9/21 **COMPLETED** 2/9/21
GROUND ELEVATION 4614.2 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith Drilling
NORTH 38764.7 **EAST** 95266.9
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 6.25" O.D.
BORING LOCATION: Parking lot, middle parking stall row
LOGGED BY D. Compton **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES ~140' S of Suplizio Field, ~350
WATER DEPTH 12.0 ft on 2/9/21

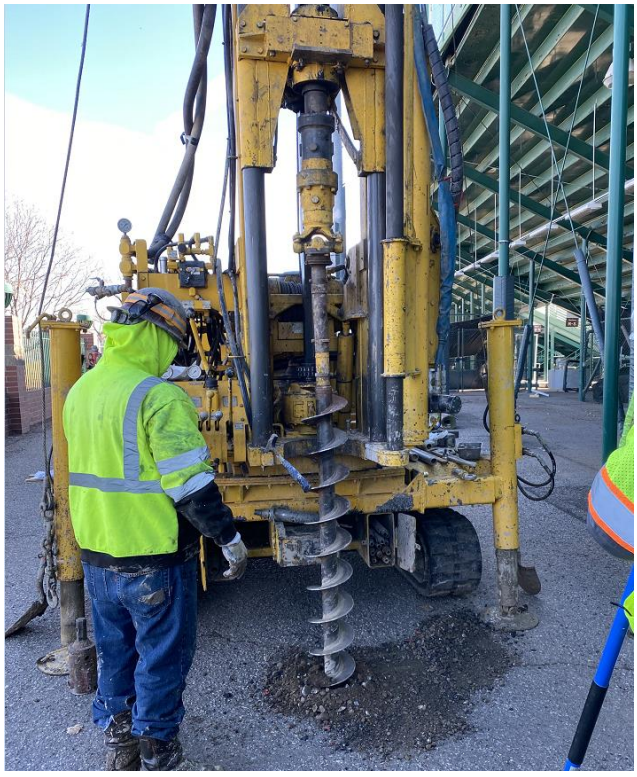
ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4614.2	0		Asphalt pavement, approximately 4 inches thick										
			Aggregate base course, approximately 12 inches thick	BULK			0.01			22	15	7	73.8
			(Native) CLAY, silty with sand, moist, brown, very soft	MC	2/12			87.3	27.1				95.9
			(Native) CLAY, with sand to sandy, very moist to wet, tannish brown to brown, very soft to soft										
4604.2	10		**Approximate Bulk Depth 1.33-5** Liquid Limit= 22 Plastic Limit= 15 Plasticity Index= 7 Fines Content= 73.8 Sulfate= 0.01	MC	2/12			108.3	25.0				86.5
				MC	2/12			96.0	25.6				
4594.2	20			MC	2/12								
				MC	3/12			100.7	24.3				
4584.2	30		(Native) CLAY, very moist to wet, light brown, medium stiff										
				MC	7/12			102.2	23.2				
4574.2	40		(Native) CLAY, sandy, wet, light brown, medium stiff										
				MC	6/12			98.0	25.6				
4564.2	50		(Native) SAND, gravelly, very dense, wet										
				SS	21/40/41								
			Bottom of hole at 55.5 feet.										

Figure C1: Borehole Log Locations

Borehole B-1

Borehole B-2

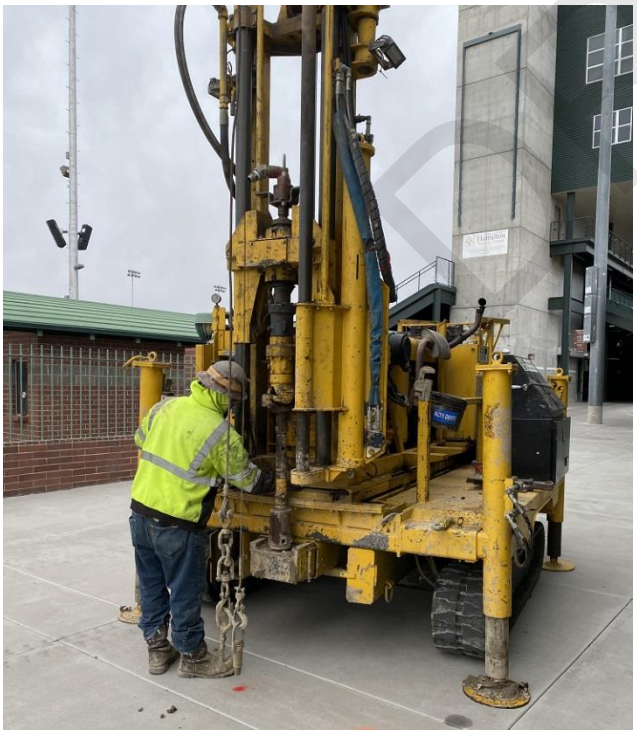
Borehole B-3



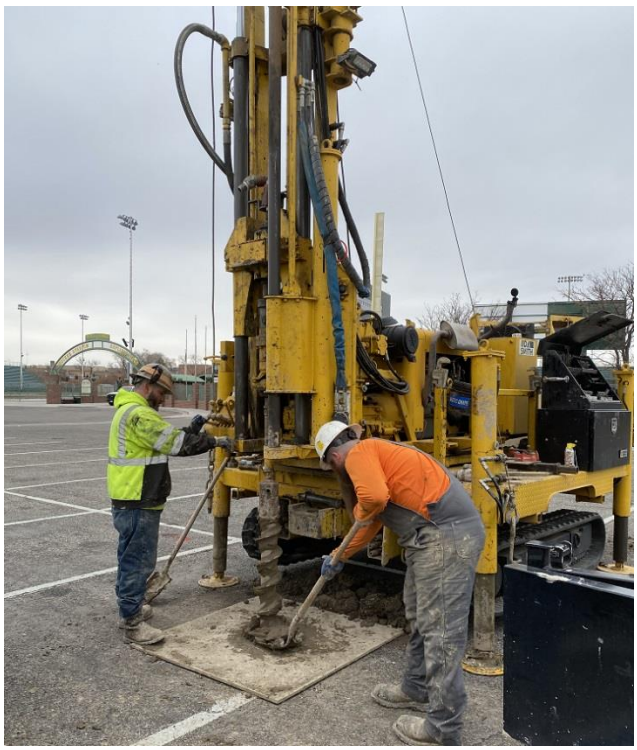
Borehole B-4

Borehole B-5

Borehole B-6



Borehole B-7



Borehole B-8

APPENDIX D

LABORATORY TEST RESULT SUMMARY

AND

TEST RESULT SHEETS

RockSol Consulting Group, Inc.

SUMMARY OF PHYSICAL & CHEMICAL TEST RESULTS

CLIENT City of Grand Junction

PROJECT NAME Stocker Stadium Suplizio Field

PROJECT NUMBER 599.25

PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado

Borehole	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	Swell Potential (%)	%<#200 Sieve	Classification		Water Content (%)	Dry Density (pcf)	Unconfined Compressive Strength (psi)	Sulfate (%)	Resistivity (ohm-cm)	pH	Chlorides (%)	Proctor S=Standard M=Modified		
							USCS	AASHTO								MDD	OMC	S/M
B-1	0-5	NP	NP	NP		35	SM	A-2-4 (0)				0.01						
B-1	4				-0.2				12.7	112.0								
B-1	9					91			28.5	96.6								
B-1	14								25.8	96.3								
B-1	19								24.0	100.5								
B-1	29								24.6	99.0								
B-1	39								23.9	101.6								
B-1	49					11												
B-2	0.75-5	24	15	9		79	CL	A-4 (5)				0.50						
B-2	4				-1.7				27.5	94.5								
B-2	9				-1.4	98			30.2	90.3								
B-2	14								27.0	94.9								
B-2	19								27.1	97.1								
B-2	24								26.8	96.3								
B-2	34								23.7	102.0								
B-2	44								23.0	104.0								
B-2	54					11												
B-3	3-5	26	16	10		61	CL	A-4 (3)				0.07						
B-3	5				-1.2				27.2	94.8								
B-3	9					75			24.0	100.8								
B-3	14								26.7	98.4								
B-3	19								27.1	97.4								
B-3	29								23.6	96.6								
B-3	39								24.1	100.9								
B-3	49								10.0	128.7								
B-3	54					12												
B-4	2-5	19	16	3		50	ML	A-4 (0)				0.15						
B-4	5				-1.7				29.8	93.6								
B-4	10				-2.5	89			26.6	95.5								
B-4	14								27.3	94.9								

RockSol Consulting Group, Inc.

SUMMARY OF PHYSICAL & CHEMICAL TEST RESULTS

CLIENT City of Grand Junction

PROJECT NAME Stocker Stadium Suplizio Field

PROJECT NUMBER 599.25

PROJECT LOCATION 12th St. and North Ave., Grand Junction, Colorado

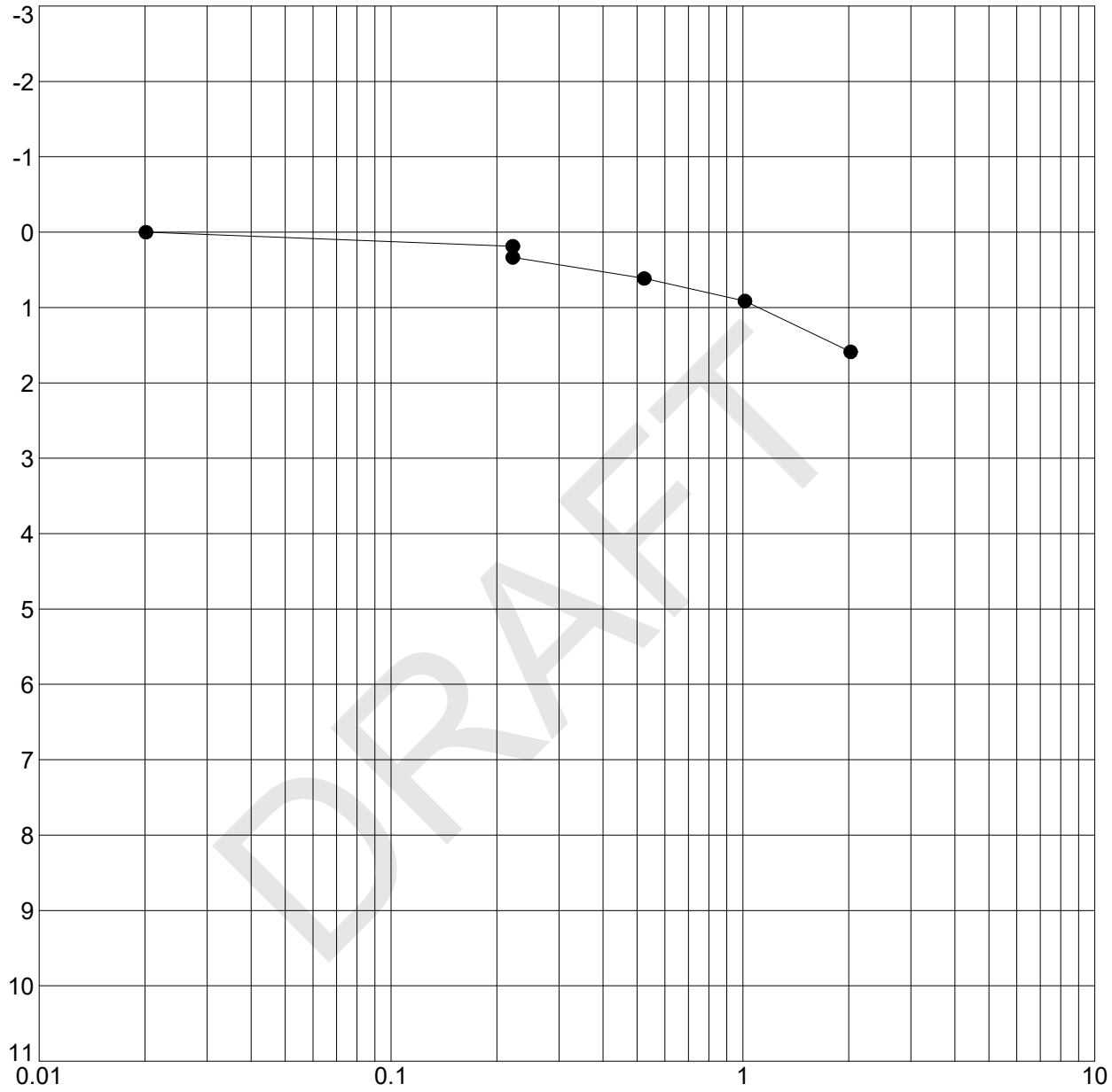
Borehole	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	Swell Potential (%)	%<#200 Sieve	Classification		Water Content (%)	Dry Density (pcf)	Unconfined Compressive Strength (psi)	Sulfate (%)	Resistivity (ohm-cm)	pH	Chlorides (%)	Proctor S=Standard M=Modified		
							USCS	AASHTO								MDD	OMC	S/M
B-4	19					95			27.4	96.3								
B-4	25								26.6	95.9								
B-4	35								24.3	100.5								
B-4	44								23.7	102.1								
B-4	54	NP	NP	NP		12	SM	A-2-4 (0)										
B-5	0.5-5	25	16	9		45	SC	A-4 (1)				0.19	1400 @ 19.5%	8.2	0.0231			
B-5	5				-1.5				24.8	101.5								
B-5	10				-1.1				21.0	103.8								
B-5	15					92			25.6	91.7								
B-5	20								21.1	106.0								
B-5	40								23.1	103.6								
B-6	0.58-4	22	16	6		53	CL-ML	A-4 (0)				0.29	1070 @ 22.3%	8.1	0.0159			
B-6	4				-0.2				26.3	96.9								
B-6	9					97			24.8	100.5								
B-6	14								25.3	100.3								
B-6	19								27.0	96.1								
B-7	0.5-5	24	16	8		64	CL	A-4 (3)				0.52	200 @ 20.3%	8.4	0.0153			
B-7	9				-1.1	85			30.2	87.0								
B-7	14								24.6	100.2								
B-7	15																	
B-7	19								25.1	99.2								
B-8	1.33-5	22	15	7		74	CL-ML	A-4 (3)				0.01						
B-8	5					96			27.1	87.3								
B-8	10					86			25.0	108.3								
B-8	15								25.6	96.0								
B-8	25								24.3	100.7								
B-8	35								23.2	102.2								
B-8	45								25.6	98.0								

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



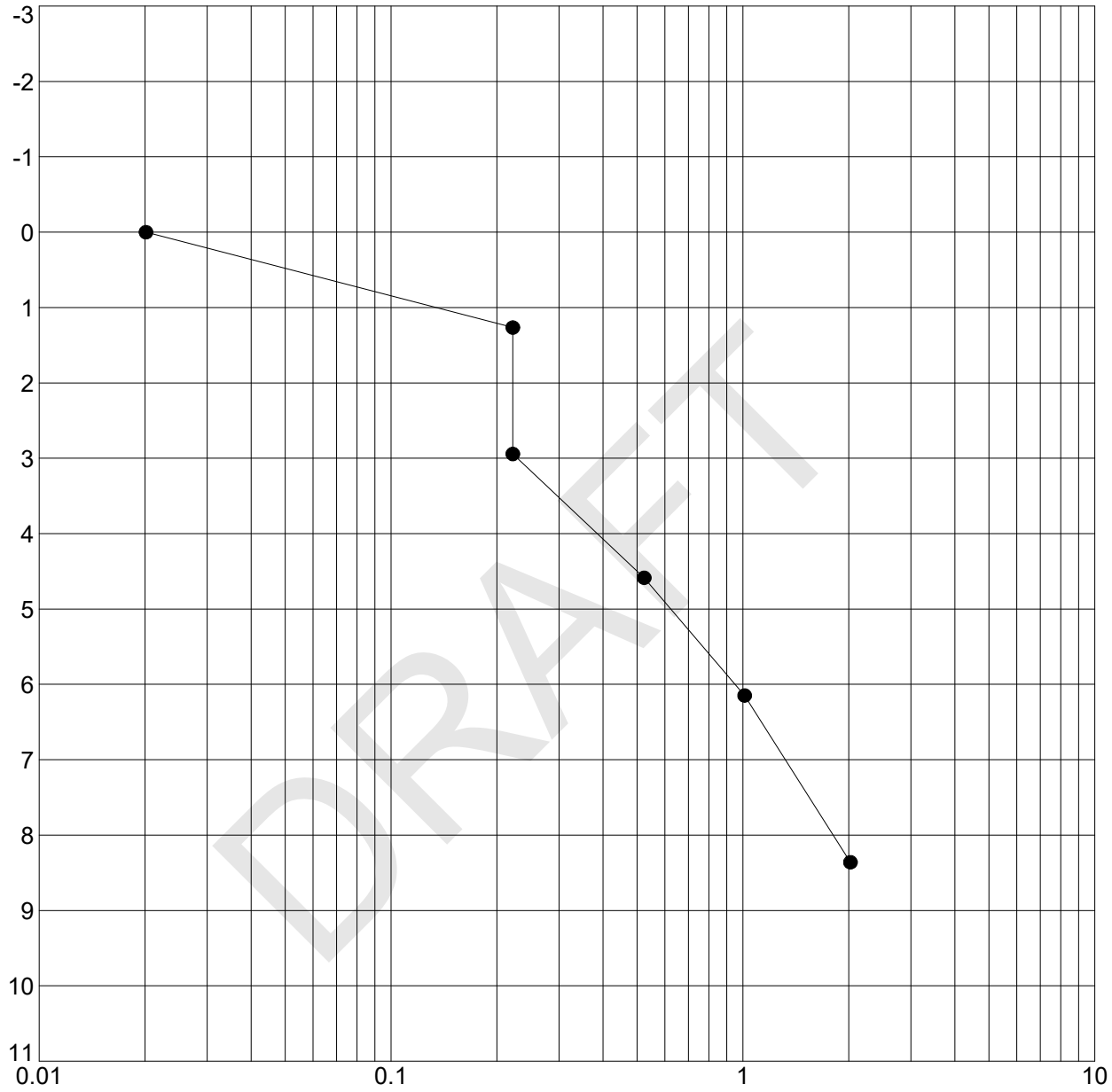
Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-1** **4**	**SAND, silty**	**-0.2**	**112.0**	**12.7**

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



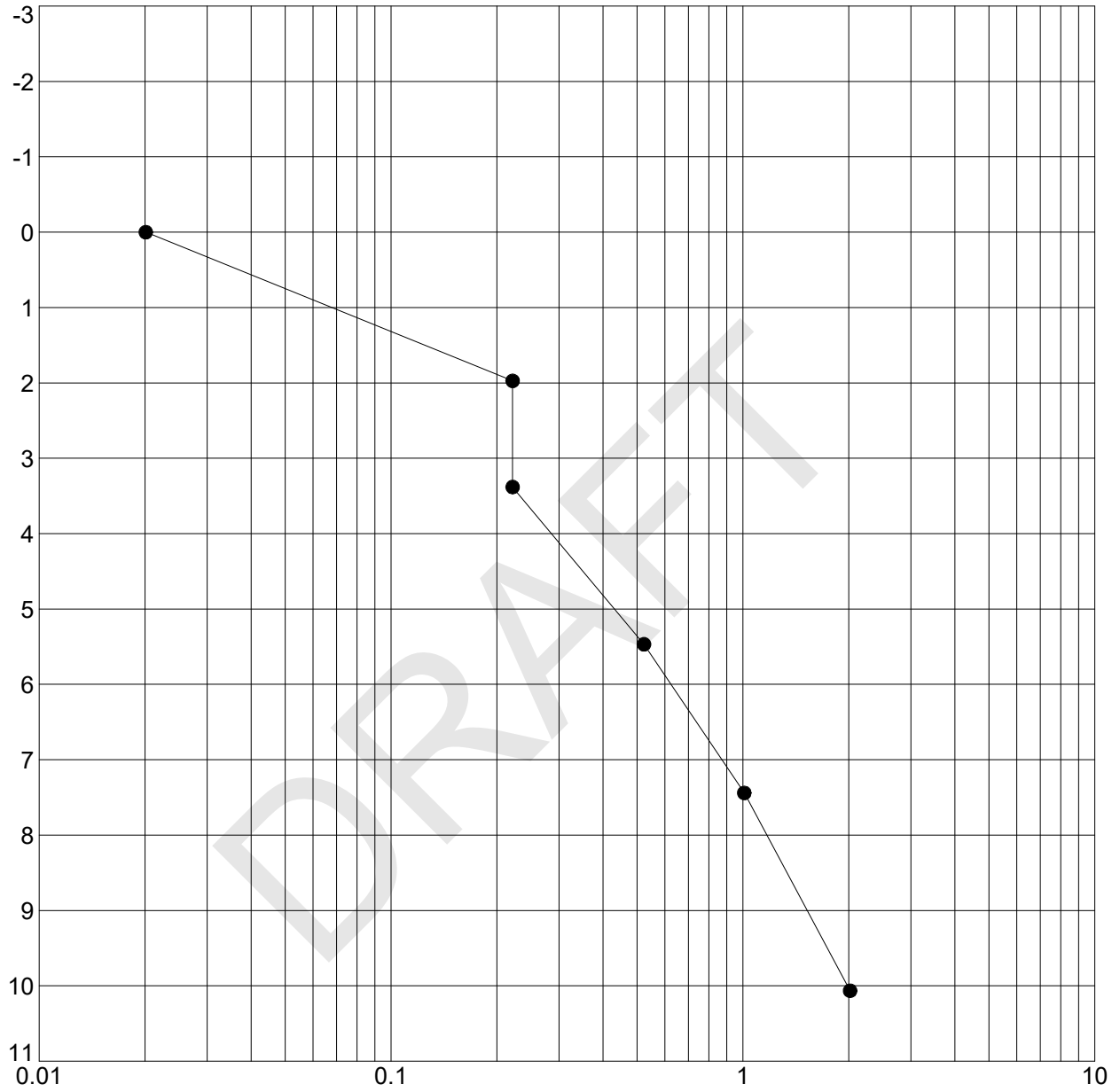
Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● B-2 4	**CLAY, with sand**	**-1.7**	**94.5**	**27.5**

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



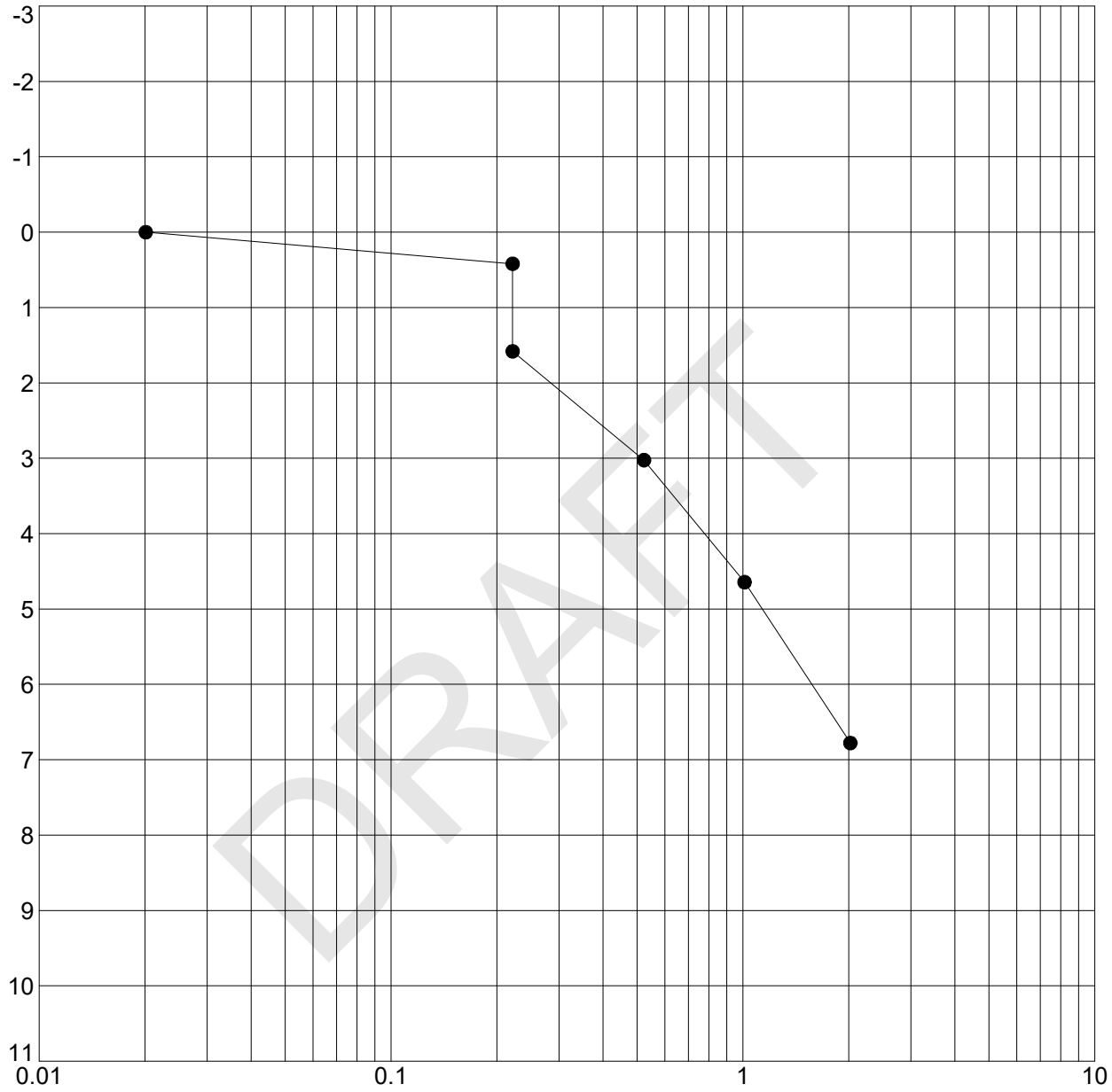
Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● B-2 9	**CLAY, with minor sand**	**-1.4**	**90.3**	**30.2**

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



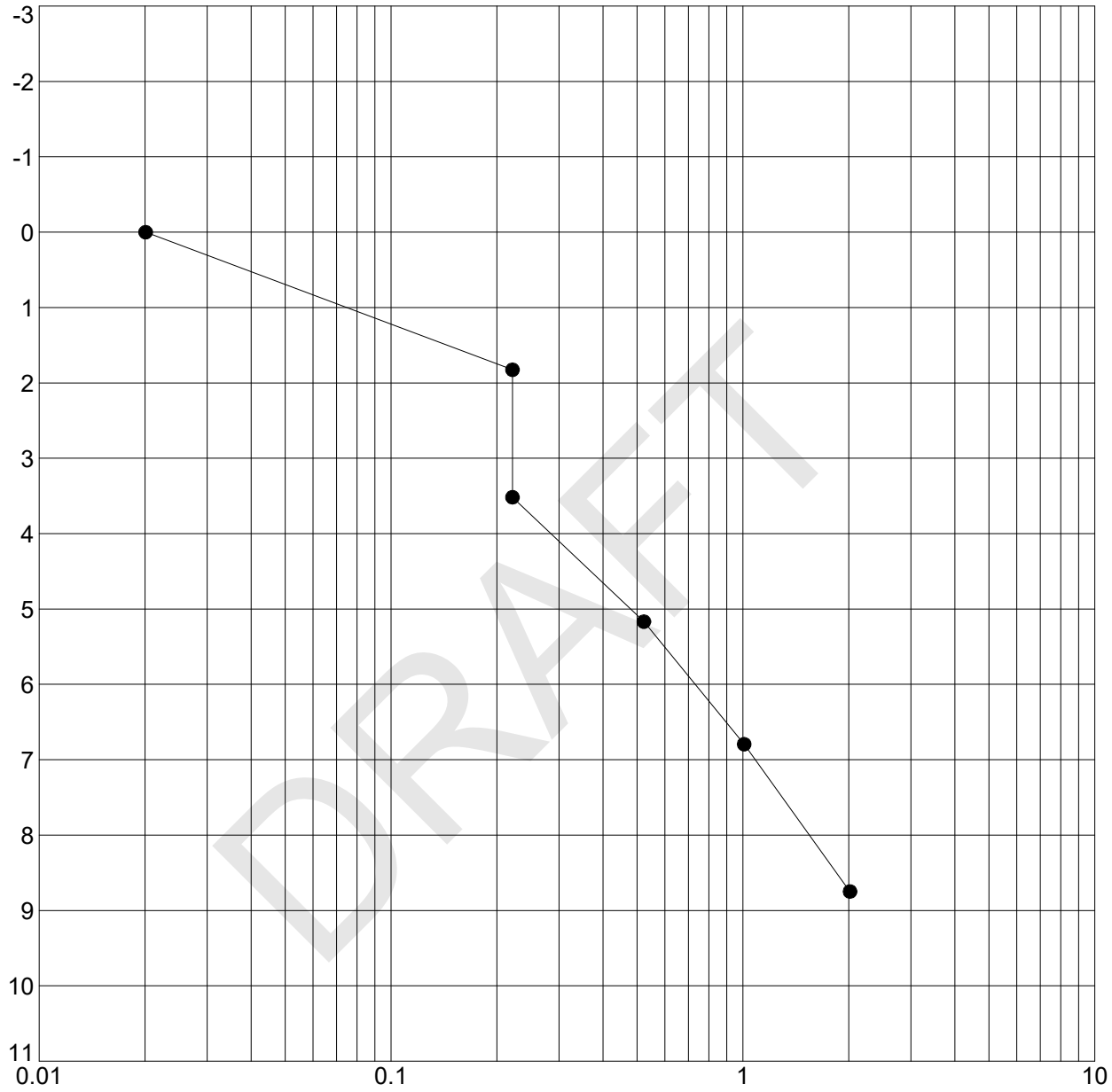
Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● B-3 5	**CLAY, sandy to slightly sandy**	**-1.2**	**94.8**	**27.2**

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



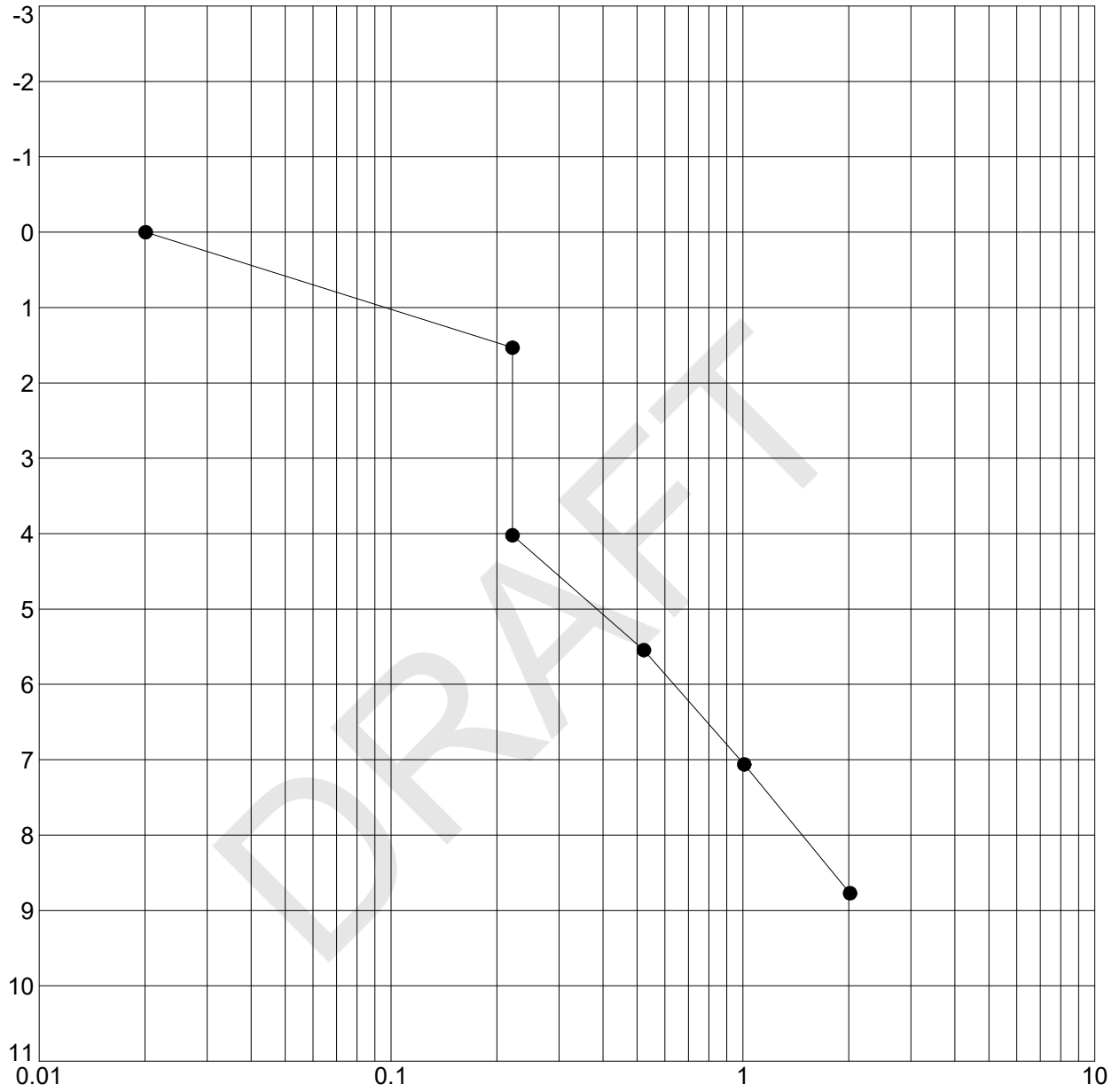
Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● B-4 5	**CLAY, sandy to slightly silty**	**-1.7**	**93.6**	**29.8**

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



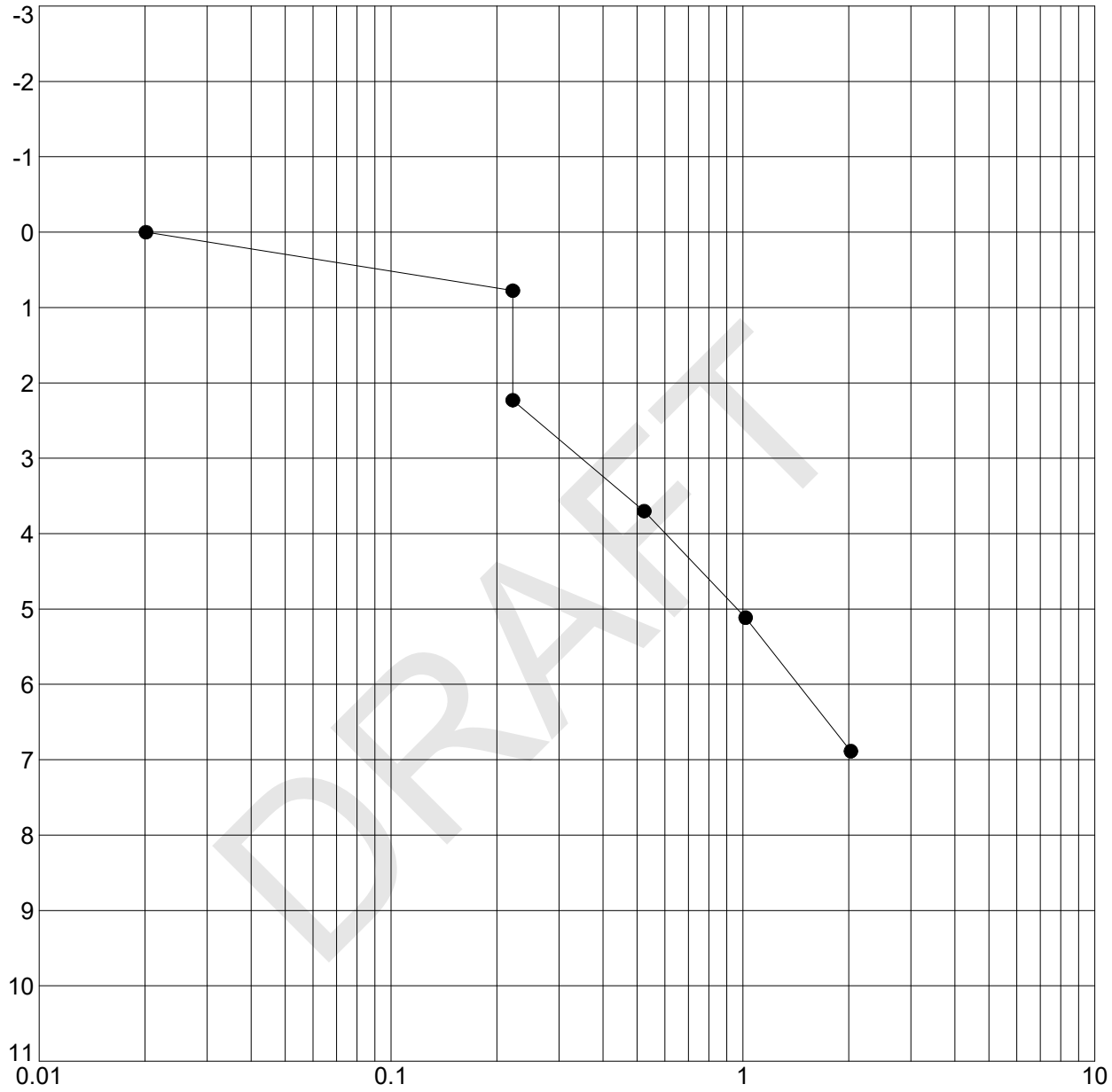
Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-4 10**	**CLAY, sandy to very sandy**	**-2.5**	**95.5**	**26.6**

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



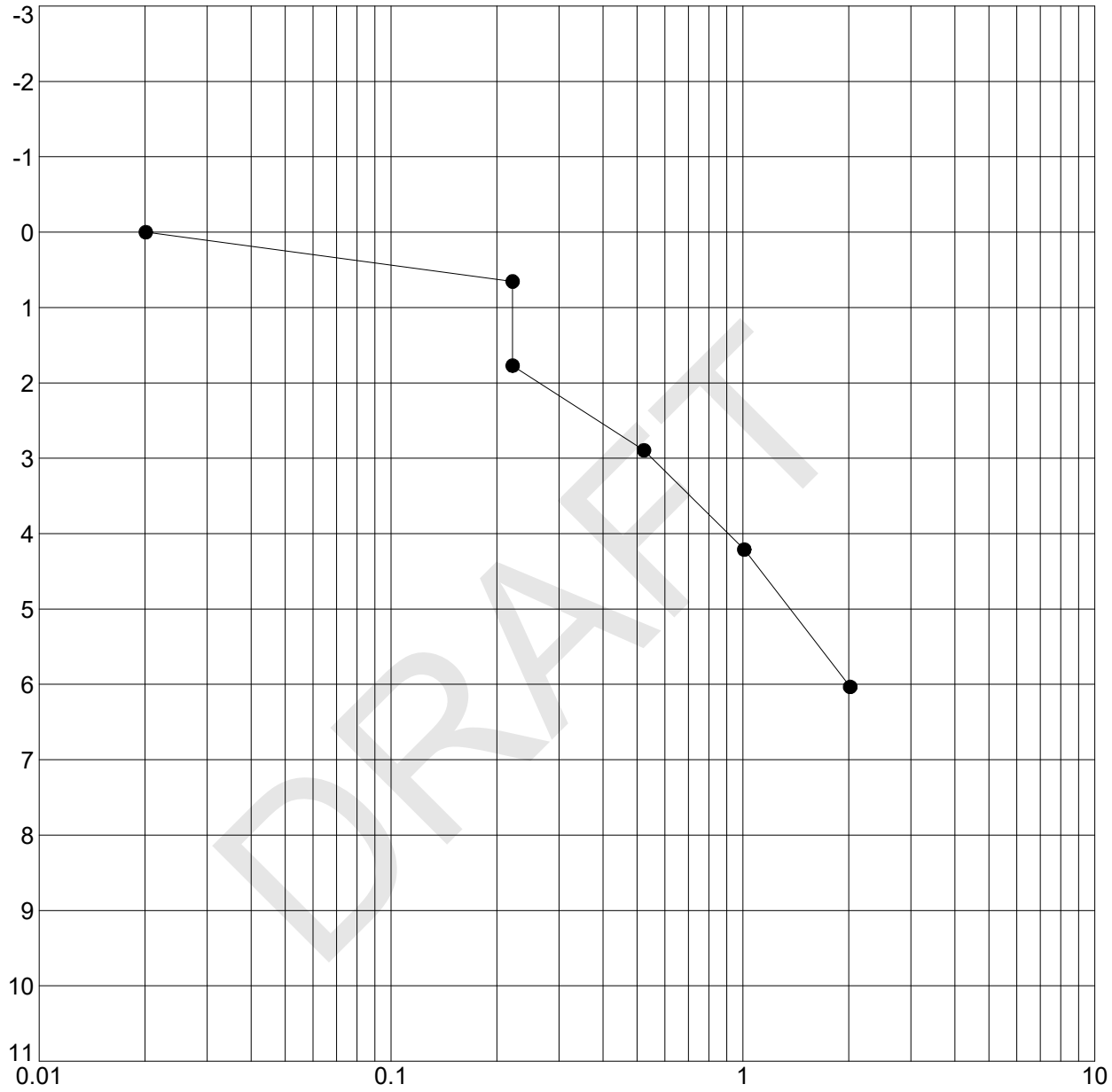
Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-5 5**	**CLAY, silty**	**-1.5**	**101.5**	**24.8**

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



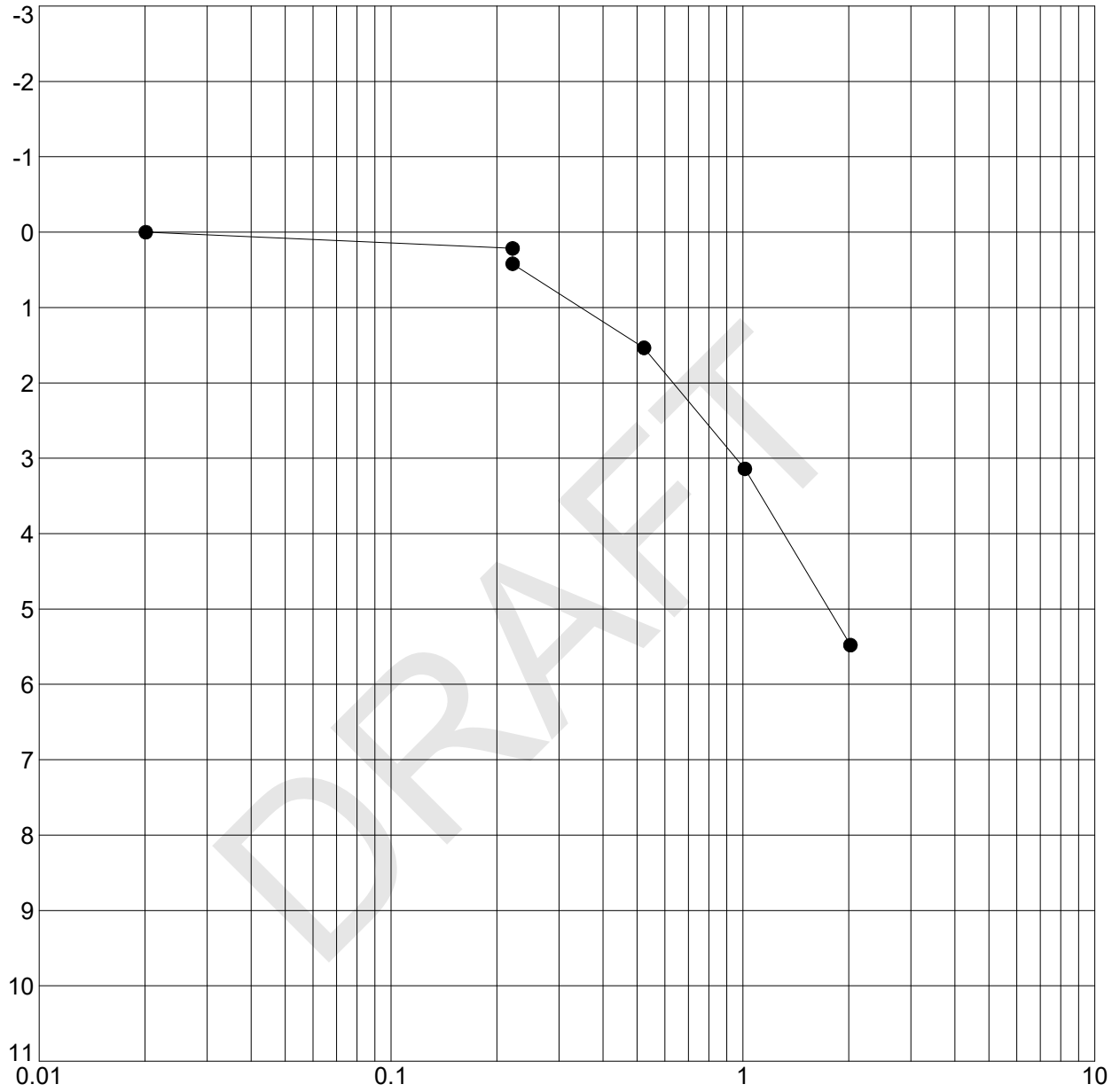
Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-5 10**	**CLAY, sandy to with minor sand**	**-1.1**	**103.8**	**21.0**

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



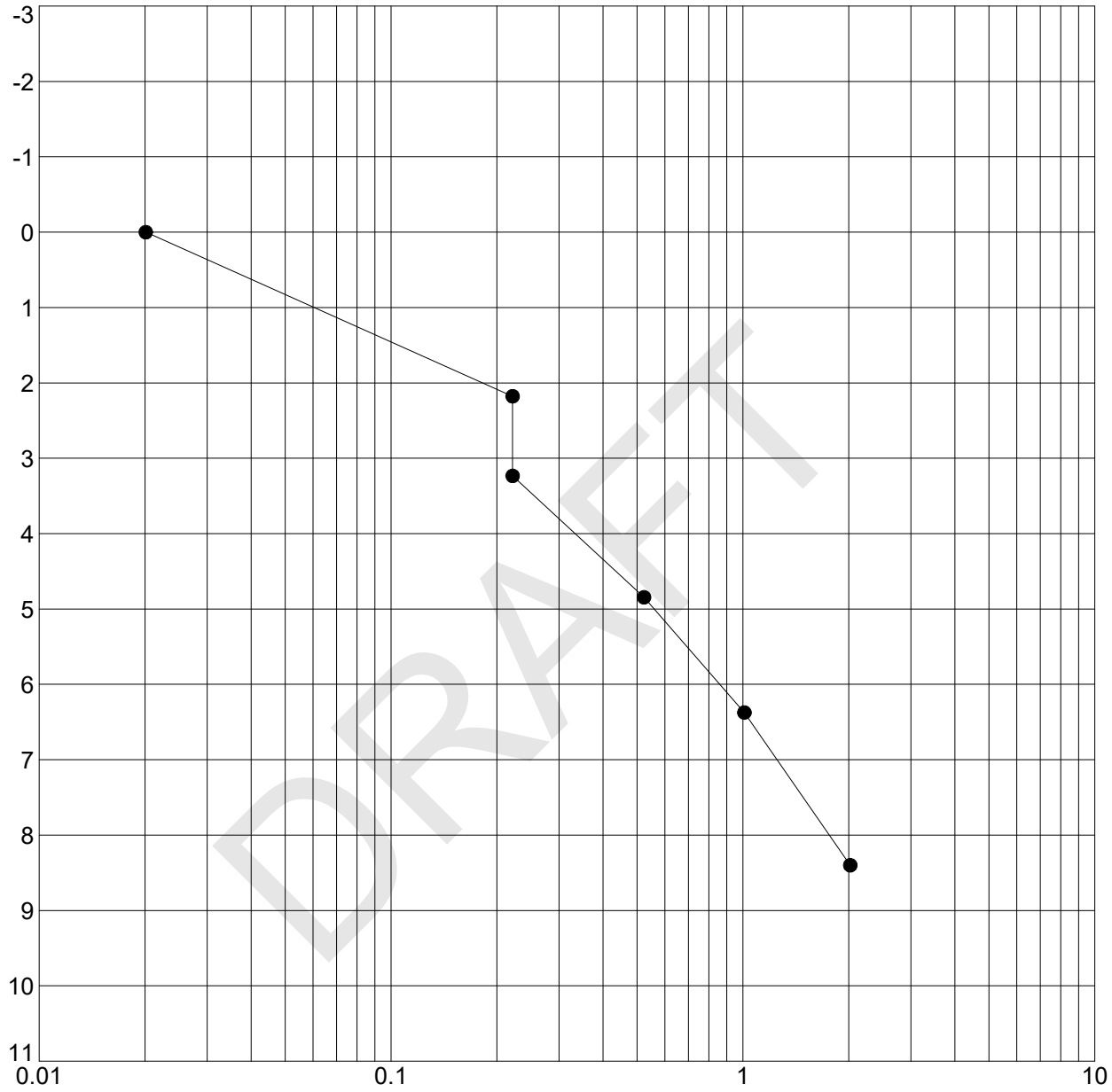
Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-6 4**	**CLAY, sandy, silty**	**-0.2**	**96.9**	**26.3**

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Stocker Stadium Suplizio Field

ROCKSOL PROJECT NUMBER 599.25 **CLIENT PROJECT NUMBER** 12th St. and North Ave., Grand Junction, Colorado



Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-7 9**	**CLAY**	**-1.1**	**87.0**	**30.2**

APPENDIX E

NUTRIENT TEST RESULTS

Soil Sample Information

WARD Laboratories, Inc.
4007 Cherry Ave
Kearney, Nebraska 68847
(308) 234-2418
www.wardlab.com

Bill To Account:
Name RockSol Consulting Group
Address 556 West Crete Circle, Suite #2
Grand Junction Colorado, 81505
Phone 970-210-8098 **email** eller@rocksol.com

S-1	NPK
S-101	NPK, OM, CEC & S
S-4	Routine
S-401	Routine + Cl
S-5	Complete
S-501	Complete + Cl
S-7	Alfalfa/Clover Special
S-9	Soil Nitrate
S-901	Subsoil Nitrate + S
S-10	Salinity
S-11	Saturated Paste + EC

You will receive a billing invoice with your results. Payment is due net 30.

PO #_____

Sample Information	
Date	02/08/2021

For Lab Use	Grower	Field	Sample ID	Depth in / cm	Test (use scroll bar to see all test options)
	City of GJ	BB Stadium Turf	Left Field F-1	1-10	S-4
	City of GJ	BB Stadium Turf	Left Center F-2	1-10	S-4
	City of GJ	BB Stadium Turf	Right Center F-3	1-10	S-4
	City of GJ	BB Stadium Turf	Right Center F-4	1-10	S-4

Comments: There are 4 Samples submitted for Routine Testing - This is from Suplizio Field Baseball Stadium - Outfield Turf is the crop

WARD Laboratories, Inc.

Ag Testing - Consulting

Soil PAP NAPT 2020

Account No. : 92115

ROCKSOL CONSULTING GROUP
556 WEST CRETE CIRCLE SUITE #2
GRAND JUNCTION, CO 81505

Soil Analysis Report

Invoice No. : 1338875
Date Received : 02/16/2021
Date Reported : 02/18/2021

Results For : CITY OF GJ
Location : BB STADIUM TURF

Sample ID / Lab No.	Soil pH 1:1	Modified WDRF BpH	Soluble Salts 1:1 mmho/cm	Excess Lime Rating	Organic Matter LOI-%	KCl Nitrate ppm N	Depth / Nitrate Lbs N/A	Method / Phosphorus ppm P	-Ammonium Acetate- K ppm	Ca ppm	Mg ppm	Na ppm	M-3 Sulfate ppm S	----------DTPA---------- Zn ppm	Fe ppm	Mn ppm	Cu ppm	Hot Water Boron ppm B	CaNO3 Chloride ppm Cl	Sum of Cations me/100g	% Base -----Saturation----- H	K	Ca	Mg	Na
LEFT FIELD F-1							0 - 10 in	O-P																	
18401	7.7		0.99	NONE	8.1	33.3	100	45.3	395	2571	422	119	112.8	14.51	36.2	2.0	1.92			17.9	0	6	71	20	3

Comment : Divide the recommendation below by 40 for the amount of nutrients for 1000 square feet. Split the N recommendation so 1/4 goes on May 1, June 1, July15, and September 1. All other nutrients can be applied with the first N application this spring. Nick

Fertilizer Recommendations In Actual Pounds of Plant Nutrients per Acre

Crop	Yield Goal	Nitrogen N	Phosphorus P_2O_5	Potassium K_2O	Sulfur S	Zinc Zn	Magnesium Mg	Iron Fe	Manganese Mn	Copper Cu	Boron B	Chloride Cl	Lime, ECC Tons/Acre
Sample ID : LEFT FIELD F-1	**Sub-Soil ID(s) | Depth(s) :**							**Past Crop :** All Other Crops				**N Credit :** 0	
(Ward) Turf T/A	4	40	0	0	0	0	0	0	4	0			

Reviewed By: Nick Ward

Bus: 308-234-2418 Fax: 308-234-1940 Web site www.wardlab.com 4007 Cherry Ave., P.O. Box 788 Kearney, Nebraska 68848-0788

WARD Laboratories, Inc.
Ag Testing - Consulting

Soil PAP NAPT 2020

Account No. : 92115

ROCKSOL CONSULTING GROUP
556 WEST CRETE CIRCLE SUITE #2
GRAND JUNCTION, CO 81505

Soil Analysis Report

Invoice No. : 1338875
Date Received : 02/16/2021
Date Reported : 02/18/2021

Results For : CITY OF GJ
Location : BB STADIUM TURF

Sample ID / Lab No.	Soil pH 1:1	Modified WDRF BpH	Soluble Salts 1:1 mmho/cm	Excess Lime Rating	Organic Matter LOI-%	KCl Nitrate ppm N	Depth / Nitrate Lbs N/A	Method / Phosphorus ppm P	-Ammonium Acetate- K ppm	Ca ppm	Mg ppm	Na ppm	M-3 Sulfate ppm S	----------DTPA---------- Zn ppm	Fe ppm	Mn ppm	Cu ppm	Hot Water Boron ppm B	CaNO3 Chloride ppm Cl	Sum of Cations me/100g	% Base -----Saturation----- H	K	Ca	Mg	Na
LEFT CENTER F-2							0 - 10 in	O-P																	
18402	7.7		1.15	NONE	7.4	28.5	86	40.3	383	2759	427	145	136.4	12.52	45.6	2.6	2.21			19.0	0	5	73	19	3
RIGHT (FIELD) F-4							0 - 10 in	O-P																	
18403	7.8		0.99	NONE	6.0	33.5	101	50.0	515	3088	427	103	87.6	8.44	27.6	3.5	1.75			20.8	0	6	74	17	2
RIGHT CENTER F-3							0 - 10 in	O-P																	
18404	7.7		1.33	NONE	5.9	38.0	114	40.6	462	3090	515	189	220.0	10.68	46.1	4.3	2.37			21.7	0	5	71	20	4

Fertilizer Recommendations In Actual Pounds of Plant Nutrients per Acre

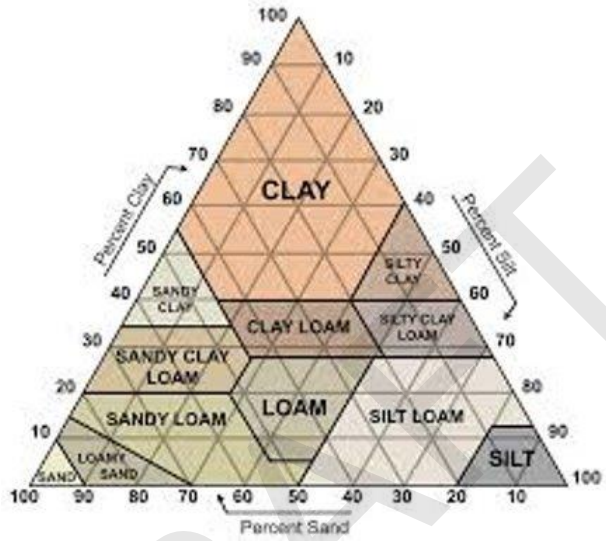
Crop	Yield Goal	Nitrogen N	Phosphorus P_2O_5	Potassium K_2O	Sulfur S	Zinc Zn	Magnesium Mg	Iron Fe	Manganese Mn	Copper Cu	Boron B	Chloride Cl	Lime, ECC Tons/Acre
Sample ID : LEFT CENTER F-2	**Sub-Soil ID(s) | Depth(s) :**							**Past Crop :** All Other Crops				**N Credit :** 0	
(Ward) Turf T/A	4	55	0	0	0	0	0	0	2	0			
Sample ID : RIGHT CENTER (FIELD) F-4	**Sub-Soil ID(s) | Depth(s) :**							**Past Crop :** All Other Crops				**N Credit :** 0	
(Ward) Turf T/A	4	40	0	0	0	0	0	0	0	0			
Sample ID : RIGHT CENTER F-3	**Sub-Soil ID(s) | Depth(s) :**							**Past Crop :** All Other Crops				**N Credit :** 0	
(Ward) Turf T/A	4	25	0	0	0	0	0	0	0	0			

Reviewed By: Nick Ward

Bus: 308-234-2418 Fax: 308-234-1940 Web site www.wardlab.com 4007 Cherry Ave., P.O. Box 788 Kearney, Nebraska 68848-0788

Follow up on Wards Lab analysis

On February 23, 2020 Beatrice Torres and Plant Physiology professor from Colorado Mesa University classified the soil from Suplizio using a hydrometer test. This sample came from left field, it was a mixture from the 15', 50', 75' and 100' location from the outfield. Results indicated that the soil was a sandy loam mixture. There was 8% silt, 76% sand and 16% clay. The Soil Textural Class Graph below was used to determine the class of the soil.



Rocksol also reached out to CSU extension to interpret the results from Ward lab and Susan Cater sent us the following.

> The pH is actually really good for here. Turf is not affected by salts until you get over 3 or greater, depending on the variety, so it is fine.
>
> The organic matter is high in all fields. I recommend they do not add any this spring. We like to see that number at optimum of 5%.
>
> They need to apply ONLY nitrogen and manganese. And manganese on only half the field (left side), Nitrogen is quick moving, and I am sure they (the city) probably applies often or should be. This has a chart for home lawns. https://extension.colostate.edu/topic-areas/yard-garden/lawn-care-7-202/
>
> A ball field should be doing more frequent lighter applications of nitrogen, if in the budget. And especially since it gets lots of use and probably mowed and watered more often.
>
> So if they need 40 lbs of nitrogen per acre, they will need to convert to pounds of actual fertilizer. That is dependent on what source they use.
>
> Avoid buying fertilizers with other nutrients that are not needed as it can throw things off.
>
> Here is a handout on how to determine the number of pounds of fertilizer/acre. https://cmg.extension.colostate.edu/Gardennotes/233.pdf

APPENDIX F

SEISMIC DESIGN CRITERIA OUTPUT

Stocker Stadium/Suplizio Field

998 N 12th St, Grand Junction, CO 81501, USA

Latitude, Longitude: 39.0764502, -108.5515464

Date	2/22/2021, 8:35:45 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	E - Soft Clay Soil

Type	Value	Description
S_S	0.239	MCE_R ground motion. (for 0.2 second period)
S_1	0.066	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.574	Site-modified spectral acceleration value
S_{M1}	0.275	Site-modified spectral acceleration value
S_{DS}	0.382	Numeric seismic design value at 0.2 second SA
S_{D1}	0.184	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	C	Seismic design category
F_a	2.4	Site amplification factor at 0.2 second
F_v	4.2	Site amplification factor at 1.0 second
PGA	0.132	MCE_G peak ground acceleration
F_{PGA}	2.24	Site amplification factor at PGA
PGA_M	0.296	Site modified peak ground acceleration
T_L	4	Long-period transition period in seconds
SsRT	0.239	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.253	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.066	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.07	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.946	Mapped value of the risk coefficient at short periods

Type	Value	Description
C_{R1}	0.932	Mapped value of the risk coefficient at a period of 1 s

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