Geotechnical Engineering Report
Spokane Transit Authority
Division Street Bus Rapid Transit
Spokane, WA

Prepared for:
Darby Watson, Senior Vice President
Parametrix
835 N. Post Street #201
Spokane, WA 99201

Prepared by:
Budinger & Associates, Inc.
1101 N. Fancher Road
Spokane Valley, WA 99212



5/2/2025

John Finnegan, PE
Geotechnical Engineer, Principal

Collin McCormick, PE
Senior Engineer

Budinger
& Associates

BAI Project Number: S23090

May 2, 2025

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CONTEXT

This report presents the results of geotechnical exploration and analysis for the Spokane Transit Authority's (STA) Division Street Bus Rapid Transit (BRT) Project. These services were contracted and coordinated with Parametrix, represented by Darby Watson, Senior Vice President.

Project Considerations

Division Street (US395) is the most heavily trafficked principal arterial in the City of Spokane, connecting downtown to retail, residential, and commercial areas to the north. The proposed Division Street BRT route consists of 45 boarding stations, divided between northbound and southbound, from STA Plaza on Riverside Avenue in downtown Spokane to the future Mead Transit Center near the intersection of E Hastings/Farwell and US 2. Project components requiring geotechnical recommendations include flexible (HMA) pavement design, rigid (PCC) pavement design, foundation design for passenger platform and shelter structures, and stormwater infiltration facility design.

Traffic Loading. Traffic loads were provided by Fehr and Peers as total ADT, truck percentage, ADT for passenger cars, trucks and buses, and total axles for the GP lane and BAT lane. *Table 1*, below, summarizes the loading information provided.

Table 1. Traffic Load Data

Location		2030 Build Conditions					
	Total ADT	Truck %	ADT			Axles	
			Passenger Cars	Trucks	Buses	GP Lane	BAT Lane
2nd Ave	11,678	3%	11,310	290	78	23,780	-
Howard St	2,128	6%	1,918	132	78	4,364	-
Sprague Ave between Browne St & Howard St	5,103	7%	4,686	339	78	10,728	-
Browne St between Spokane Falls Blvd & Sprague Ave	18,303	3%	17,724	501	78	37,452	-
Division St south of North River Dr	36,528	3%	35,539	911	78	74,723	-
Division St between North River Dr and North Foothills St	16,211	2%	15,757	376	78	33,020	234
Ruby St between North River Dr and North Foothills St	21,261	3%	20,601	583	78	43,532	234
Division St between Garland St and Magnesium St	28,628	3%	27,729	821	78	58,742	234
Division St between Holland St and Fred Meyer DRWY	26,411	2%	25,851	483	78	53,632	-
Hastings Rd between Division St and Mead Transit Center	20,453	3%	19,866	509	78	41,769	-

Structural Loads. For proposed shelter structures at loading stations, the assumed maximum foundation loads are 10 kips for isolated columns and 1 kip per lineal foot for walls.

Location

The Division Street BRT project is in Spokane County, Washington. The BRT route begins at the STA Plaza, located at 701 W Riverside Ave, in downtown Spokane. From STA Plaza, the project extends east along Riverside Avenue and then north along Division Street (including the Ruby-Division couplet). The project continues along Division Street north of the couplet until it reaches Hastings Avenue where the route turns east along Hastings and ends at the future Mead Transit Center. The route is shown in the *Vicinity Map* and *Site Plan.*

Scope

This geotechnical study involved interpretation of subsurface soil conditions to provide conclusions addressing the suitability of the sites explored to support proposed structures and provide geotechnical parameters required for others to design and construct. We endeavored to conduct these services in accordance with generally accepted geotechnical engineering practices as outlined in Work Order #10610-0203 (Phase II Work Order #3), dated September 1, 2023. A separate report will be prepared for the Mead Transit Center following geotechnical exploration and analysis under Work Order #6.

ENCOUNTERED CONDITIONS

Geologic Setting

Geologic mapping of the area shows the downtown segment of the route, south of E Desmet Avenue, is underlain by middle Miocene age Grande Ronde Basalt of the Columbia River Basalt Group (*Mgr*). The *Mgr* unit is described as *"Dark gray to dark greenish gray, fine-grained basalt* (WSDNR, 2004)*."*

North of the Desmet Avenue to Francis Avenue the geology is mapped as Pleistocene glacial flood-channel deposits consisting of predominantly gravel (*Qfcg*). The *Qfcg* unit is described as *"Thick-bedded to massive mixture of boulders, cobbles, pebbles, granules, and sand; may contain beds and lenses of sand and silt."*

North of Francis, geologic conditions are mapped as Pleistocene glacial flood-channel deposits consisting of predominantly sand *(Qfs).* The *Qfs* unit is described as "*medium-fine to coarse grained sand and granules with sparse pebbles, cobbles, and boulders; may contain beds and lenses of gravel."*

Surface Conditions

Sites explored in downtown Spokane consisted of a dense urban environment with asphalt paved road surfaces and concrete hardscape. Sites north of the Spokane River to Holland Avenue consisted of an urban commerce corridor with paved streets and concrete hardscape. From Holland to Hastings, the alignment transitioned to a suburban environment with landscaped grass and trees lining the roadway, concrete hardscape was present as sidewalks.

Subsurface Conditions

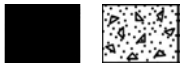
Conditions encountered in the explorations are described in the *Test Boring Logs* in accordance with methods described in *Field Exploration*. Subsurface exploration locations are shown in the *Site Plan*.

Subsurface materials were differentiated based on characteristics relevant to this project as summarized below:

Segment 1 – Sprague to Desmet

Existing Pavement

boring log symbols:



Existing pavement was encountered beginning at the ground surface. *Existing pavement* consisted of 4.5 to 8.5 inches of asphalt concrete pavement (ACP) or PCC over crushed gravel base. Crushed gravel base was encountered in Boring 1 (B-1), B-3, and B-23 and extended to depths ranging from 0.67 feet to 2.1 feet. Crushed gravel was not encountered in B-2. Crushed gravel consisted of crushed surfacing base course (CSBC) or crushed surfacing top course.

Existing fill

boring log symbol:



Existing fill was encountered beginning beneath *existing pavement* and extending to depths ranging from 1 to 11 feet. *Existing fill* generally consisted of gravel with clay and sand, clayey sand with gravel, silty gravel with sand, and silty sand with gravel. Brick debris was encountered in B-1. Loss of air return was observed while drilling *existing fill* in B-1 and B-3, indicating the presence of voids. Fines percentages (passing the #200 sieve) ranged from 10 to 17 percent in the two samples tested in the laboratory.

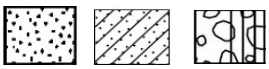
Table 2 summarizes the thickness of surfacing and crushed gravel and the depth of *existing fill.*

Table 2. Segment 1 Pavement Section and Existing Fill Thickness

Boring number	Surfacing thickness (inch)	Crushed gravel thickness (inch)	Existing fill depth (feet)
B-1	4.5	7	10
B-2	8.5	N/A	1.5
B-3	7.25	18	11
B-23	5.5	2	1

Sand and gravel

boring log symbols:



A layer of *sand and gravel* was encountered beneath *existing fill* and extended to depths ranging from 5.5 to 15.5 feet in B-1, B-2, and B-23. *Sand and gravel* consisted of medium dense to dense sand with gravel and gravel with sand and silt. Fines percentages ranged from 4.7 to 12 percent.

Completely weathered basalt

boring log symbol:



Completely weathered basalt consisting of silt with sand was encountered in B-3 beginning beneath *existing fill* and extended to 15 feet.

Basalt

boring log symbol:

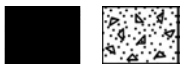


Basalt was encountered beginning beneath *sand and gravel* or *silt with sand*. *Basalt* was strong to very strong (R4 to R5) and moderately weathered.

Segment 2 – Desmet to Garland

Existing pavement

boring log symbols:



Existing pavement was encountered beginning at the ground surface in B-4 through B-9 and B-24. *Existing pavement* consisted of 8 to 9.75 inches of ACP or PCC over crushed gravel. Crushed gravel extended 1.3 to 2.1 feet below the ground surface. Crushed gravel was not encountered in B-6 and B-24.

Existing fill

boring log symbol:



Existing fill was encountered beginning beneath *existing pavement* in B-6, B-8, and B-24 and extended 2.5 to 4 feet below the ground surface. *Existing fill* consisted of silty gravel with sand and gravel with silt and sand. Fines percentages were 9.2, 7.2, and 14 percent in B-6, B-8, and B-24, respectively.

Table 3 summarizes the thickness of surfacing and crushed gravel and the depth of *existing fill.*

Table 3. Segment 2 Pavement Section and Existing Fill Thickness

Boring number	Surfacing thickness (inch)	Crushed gravel thickness (inch)	Existing fill depth (feet)
B-4	8	15	N/A
B-5	8	15	N/A
B-6	9.5	N/A	3
B-7	7.25	17	N/A
B-8	8.25	7	4
B-9	6.75	15	N/A
B-24	9.75	N/A	2.5

Silty gravel

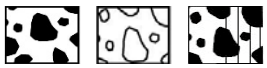
boring log symbol:



Silty gravel was encountered in B-4, B-7 and B-8, beginning beneath *existing pavement* and extending to depths ranging from 3.5 to 5 feet. *Silty gravel* was encountered in a medium dense to dense condition.

Gravel

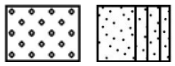
boring log symbols:



Gravel was encountered beginning beneath *existing pavement, existing fill,* or *silty gravel*. The *Gravel* unit consisted of gravel with various amounts of silt and sand. *Gravel* was generally encountered in a medium dense to dense condition. The maximum fines percentage tested was 8.1 percent. In B-7, *gravel* underlaid *sand* and extended to depths greater than 26.5 feet.

Sand

boring log symbols:



Sand was encountered beginning beneath *existing pavement* in B-9 and extended to depths greater than 26.5 feet. *Sand* was encountered in B-7 beginning beneath *gravel* and extending to 22.5 feet. *Sand* consisted of sand with various amounts of silt and gravel. *Sand* was generally encountered in a loose to medium dense condition. The maximum fines percentage tested was 5.6 percent.

Segment 3 – Garland to Lincoln

Existing pavement

boring log symbol:



Existing pavement was encountered beginning at the ground surface. *Existing pavement* consisted of 5.75 to 9 inches of ACP over crushed gravel. Crushed gravel was encountered in B-10 through B-15 and extended 1 to 2 feet below the ground surface. Crushed gravel was not encountered in B-16.

Existing fill

boring log symbol:



Existing fill was encountered in B-13 beginning beneath *existing pavement* and extended to 5 feet. *Existing fill* consisted of medium plasticity silty, clayey sand. The fines percentage was 16 percent.

Table 4 summarizes the thickness of surfacing and crushed gravel and the depth of *existing fill.*

Table 4. Segment 3 Pavement Section and Existing Fill Thickness

Boring number	Surfacing thickness (inch)	Crushed gravel thickness (inch)	Existing fill depth (feet)
B-10	7.5	14	N/A
B-12	7.25	17	N/A
B-13	8	12	5
B-14	9	12	N/A
B-15	5.75	6	N/A
B-16	5.75	N/A	N/A

Sand

boring log symbols:



Sand was encountered beginning beneath *existing pavement* and *existing fill* and extended to depths greater than 26.5 feet. *Sand* consisted of sand with various amounts of gravel and silt. *Sand* was generally encountered in a loose condition and trended to medium dense with depth. Fines percentages were generally low.

Segment 4 – Lincoln to Hawthorne

Existing Pavement

boring log symbol:



Existing pavement was encountered beginning at the ground surface. *Existing pavement* consisted of 6.75 to 11 inches of ACP over crushed gravel. Crushed gravel was encountered in B-17 through B-19 and extended 1 to 1.9 feet below the ground surface.

Existing fill

boring log symbol:



Existing fill was encountered in B-17 beginning beneath *existing pavement* and extending to 2 feet. *Existing fill* consisted of silty sand with gravel. The fines percentage was 18 percent.

Table 5 summarizes the thickness of surfacing and crushed gravel and the depth of *existing fill.*

Table 5. Segment 4 Pavement Section and Existing Fill Thickness

Boring number	Surfacing thickness (inch)	Crushed gravel thickness (inch)	Existing fill depth (feet)
B-17	6.75	5	2
B-18	6.75	14	N/A
B-19	11	17	N/A

Silty sand

boring log symbol:



Silty sand was encountered beginning beneath *existing pavement* and *existing fill* and extending to 6 and 6.5 feet in B-17 and B-18 and 22.5 feet in B-19. *Silty sand* was encountered in a loose to medium dense condition in B-17 and 18. In B-19 *silty sand* was encountered in a loose condition to 7.5 feet, a medium dense condition to 20 feet and a dense condition to 22.5 feet. Interbeds of silt and clay were observed at 9 feet in B-19. Fines percentages ranged from 13 to 32 percent.

Sand with silt

boring log symbol:



Sand with silt was encountered beginning beneath *silty sand* and extending to depths greater than 26.5 feet. *Sand with silt* was generally encountered in a medium dense condition. Fines percentages ranged from 6.6 to 7.8 percent. A fine sandy silt layer was encountered in B-17 at 15 feet.

Segment 5 – Hawthorne to Hastings

Existing pavement

boring log symbol:



Existing pavement was encountered, in B-20, beginning at the ground surface. *Existing pavement* consisted of 4.5 inches of ACP over crushed gravel. Crushed gravel extended 0.9 feet below the ground surface.

Existing fill

boring log symbol:



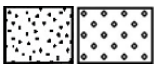
Existing fill was encountered beginning beneath *existing pavement* and extended to 4.5 feet. *Existing fill* consisted of silty sand with gravel. The fines percentage was 16 percent.

Table 6. Segment 5 Pavement Section and Existing Fill Thickness

Boring number	Surfacing thickness (inch)	Crushed gravel thickness (inch)	Existing fill depth (feet)
B-20	4.5	6	4.5

Sand

boring log symbols:



Sand was encountered beginning beneath *existing fill* and extended to greater than 26.5 feet. *Sand* consisted of sand with various amounts of gravel. *Sand* was encountered in a medium dense condition. Fines percentages were low.

Segment 6 – Hastings

Existing pavement

boring log symbol:



Existing pavement was encountered, in B-22, beginning at the ground surface. *Existing pavement* consisted of 9.5 inches of PCC.

Existing fill

boring log symbol:



Existing fill was encountered beginning beneath *existing pavement* and extending to 4.5 feet. *Existing fill* consisted of silty sand with gravel. The fines percentage was 19 percent.

Table 7. Segment 6 Pavement Section and Existing Fill Thickness

Boring number	Surfacing thickness (inch)	Crushed gravel thickness (inch)	Existing fill depth (feet)
B-22	9.5	N/A	4.5

Sand

boring log symbol:



Sand was encountered beginning beneath *existing fill* and extending to greater than 26.5 feet. *Sand* was encountered in A loose condition. Fines percentages were low.

NOTE: Soil encountered below *existing fill* including *sand*, *gravel*, *sand and gravel*, *silty gravel*, *silty sand*, and *sand with silt* are broadly categorized as *native soil* in this report.

Surface and Groundwater Hydrology

Surface water was observed in the Spokane River beneath Division Street Bridge.

Groundwater was encountered in B-3, B-4, and B-23 at depths of 14.5, 23, and 13.1 feet, respectively. Groundwater was not encountered in the other borings.

Local well reports obtained through the Washington State Department of Ecology website show static ground water levels for the section of the route north of Desmet Avenue beginning at depths greater than 50 feet below ground surface.

CONCLUSIONS

Earthwork. *Existing fill* at B-1, B-3, B-13, B-17, B-20, and B-22 presents challenges regarding compaction for subgrade preparation due to high fines percentages. Soils with high fines contents are moisture sensitive and may be difficult to compact in wet conditions. Select an earthwork contractor with successful experience working with fine-grained soils and discuss wet weather contingencies prior to beginning work. The earthwork portion of this project should be performed during the dry season to mitigate challenges related to compaction of moisture sensitive subgrade soils.

Foundations. Construction of new foundations over undocumented *existing fill* poses a risk of total and differential settlement to footings and slabs. This can be mitigated by over-excavating *existing fill* down to *native soil* and replacing it with compacted structural fill. B-1 and 3 encountered 10 and 11 feet of fill, respectively. Performance risks may be mitigated by over excavation, scarification, moisture conditioning and placing geogrid reinforcement as described in *Recommendations*.

Pavement. *Existing fill* presents performance risks to new pavements. Where removal and replacement of existing fill is not feasible, performance risks from *existing fill* below new pavements may be mitigated by moisture conditioning and compacting the subgrade and placing a stabilization geotextile as described in *Recommendations*.

A suitable subgrade resilient modulus (Mr) for design at B-2, 4 through B-9, B-12, and B-18 through B-24 is 10,000 pounds per square inch (psi) or greater. A suitable Mr for design at B-10 and 13 through 17 ranges from 8,000 to 9,300 psi.

Stormwater Infiltration. Use of rapid infiltration structures, such as drywells, requires the presence of a suitable target soil of high permeability, wide horizontal extent, and suitable thickness of above limiting layers such as fine-grained soils, groundwater, or rock.

Preliminary evaluation of stormwater infiltration based on the borings is provided below. Targeted explorations should be performed at proposed infiltration locations to confirm these recommendations.

Segment 1. Stormwater infiltration with drywells is not considered feasible in this segment due to the presence of limiting layers including *basalt* and shallow groundwater.

Segments 2 through 6. Preliminary stormwater evaluation indicates single and double depth drywell infiltration is likely feasible with the exception of B-19 where fines percentages exceed 12 percent. Gravel galleries are likely a feasible alternative to drywells at this location.

RECOMMENDATIONS

The recommendations presented throughout this chapter are intended to provide economically feasible criteria at normally accepted risk levels. More conservative design parameters can be used if lower risks are preferred. Specifically, the design should incorporate the following recommendations concerning earthwork, foundations, slabs, pavements, and stormwater drainage.

Seismic Considerations

Seismic Site Classification. The recommended seismic site class designation is Site Class D "stiff soil." Spectral response acceleration parameters, adjusted for Site Class D, were calculated using the online ASCE 7 Hazard Tool. The values of predicted earthquake ground motion for short period structural elements (0.2 second spectral response acceleration, S_S) and for long period structural elements (1.0 second spectral response acceleration, S_1) are provided in *Table 1*. The design parameters (S_{DS} and S_{D1}) are equal to ⅔ of the maximum earthquake spectral response accelerations (S_{MS} and S_{M1}).

Table 8. Seismic Design Parameters

Site Class	Latitude	Longitude	PGA	Ss	S_1	S_{DS}	S_{D1}
D	47.701 N	-117.411 W	0.12g	0.32g	0.094g	0.31g	0.17g

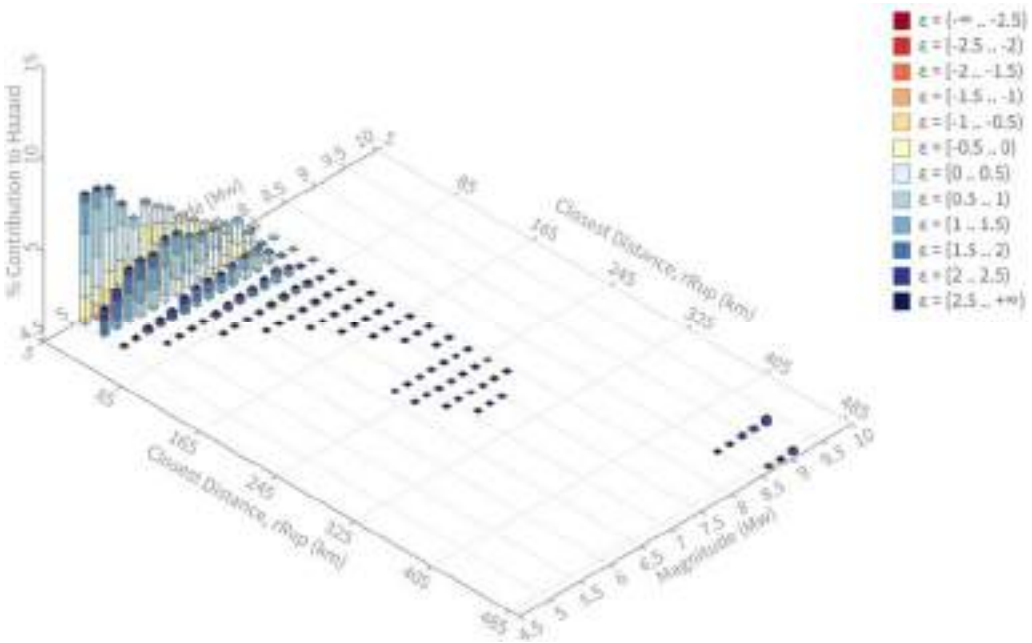
*Code Reference: ASCE/SEI 7-22

Seismic Earth Pressures. Cantilevered concrete retaining walls with granular backfill designed to resist static loads with a factor of safety of 1.5 can be reasonably expected to resist PGA values of up to 0.4g. Therefore, designing the retaining walls to resist seismic earth pressures is not required for walls designed with appropriate safety factors under static loading conditions.[1]

Liquefaction. Liquefaction is a temporary reduction in strength and stiffness of saturated cohesionless soil resulting from the buildup of pore pressures during earthquake shaking. The likelihood and consequences of liquefaction triggering are a function of groundwater conditions, soil composition and relative density, and the amplitude, frequency content and duration of potential earthquake ground motions.

Deaggreation of the seismic hazard using the USGS unified hazard tool indicates the largest contributor to the peak ground acceleration (PGA) hazard at the site is shallow crustal earthquakes. The corresponding earthquake moment magnitude is M5.1 and the site-modified peak ground acceleration (PGA_M) is 0.19g. Due to dense condition of soils encountered below groundwater and the low design PGA, the liquefaction potential is very low. Detailed liquefaction evaluation is not warranted based on preliminary screening criteria described in *Section 6-4.2.1 of the WSDOT GDM*.

[1] This recommendation is based on performance history of retaining walls under seismic loading and centrifuge testing as described in Gerali & Sitar (2013). Additional background information supporting this recommendation can be found in the AASHTO LRFD Bridge Design Specifications 11.5.4.2 (AASHTO, 2020).



Plot 1. USGS Seismic Hazard Deaggregation

Earthwork

Site Preparation. Strip organics, topsoil and deleterious materials down to mineral soil lacking concentrated organics within the construction area. Remove *existing fill* below footings and slabs and replace with compacted structural fill.

Temporary slopes. Due to varying construction methods and conditions, temporary cuts should be the responsibility of the contractor. The overburden soils are consistent with Type C materials per OSHA excavation criteria. OSHA specifies a maximum inclination of 1.5H:1V in the temporary condition for Type C.

Permanent slopes. Maximum permanent soil cut and fill slope angles of 2H:1V are recommended. Protect completed surfaces as soon as possible with mechanical or bio-technical erosion control.

Preparation of surfaces to receive fill. Compact surfaces to receive fill to at least 92 percent of maximum dry unit weight. Determine maximum unit weight and optimum moisture contents in accordance with the modified Proctor (MP) – AASHTO T-180. If necessary, moisture condition the soil by either wetting or drying to a suitable moisture content, typically within 2 percent of optimum.

Protection of subgrade. Following compaction of subgrade, protect surfaces from degradation during inclement weather. Protection measures include erosion control maintenance, preventing tracking soil and rock offsite, and preventing driving on or disturbing wet subgrade soil. Prevent frost penetration in freezing weather by covering soils, such as placing a temporary loose, insulating layer of soil on top.

Fill material. The encountered soils are generally suitable for re-use as structural fill provided that the fines content is less than 15 percent and deleterious items (anthropogenic debris, organics, over-sized materials, etc.) are removed prior to re-use. Soils exhibiting high fines percentages (including *existing fill*) should not be used for structural fill as they are considered moisture sensitive and may be difficult to compact in wet conditions.

General recommendations for import fill materials and uses are provided in *Table 2*. Contact us to review alternative material selections.

Table 9. Fill Materials

Soil Fill Product	Allowable Use
Class B Gravel Backfill for Foundations: WSDOT SS 9-03.12(1)B	• Structural fill below foundations and slabs, where required
Gravel Backfill for Walls: WSDOT SS 9-03.12(2)	• Foundation and retaining wall backfill
Select Borrow: WSDOT SS 9-03.14(2)	• Fill within building footprint and paved areas to establish subgrade • Over-excavations • Utility trench backfill above bedding course (pipe-zone backfill)
Bedding Course: WSDOT SS 9-03.12(3)	• Utility trench backfill for pipe-zone bedding

Fill Placement. Place fill in lifts of thickness suited to the compaction equipment, but not to exceed than 12-inch loose lifts. Compact structural fill to at least 92 percent of maximum dry unit weight below footings and below slabs and pavements, except within the top 12 inches of final grade where compaction should be increased to 95 percent. Do not place fill in a frozen condition or on un-compacted frozen subgrade.

Verification and application. These earthwork recommendations apply to structural fill, backfill against footings and walls, and backfill of utility trenches.

The earthwork recommendations are confirmation-dependent; retain our geotechnical engineer to confirm that conditions anticipated are actually encountered during excavation to establish subgrade.

Retain a qualified earthwork technician present during fill and backfill operations to observe and test each lift of fill. Frequency of testing should be 2 tests per 2,000 square feet or fraction thereof per lift. At least one density test should be performed for every 100 lineal feet of trench backfill at vertical intervals not exceeding 2 feet. A representative of the Geotechnical Engineer is best suited to provide such testing.

Foundations

We recommend founding proposed shelter structures on spread footings bearing directly on undisturbed *native soil* or properly placed and compacted structural fill over undisturbed *native soil*. Do not bear foundations on *existing fill*.

Size footings using a net allowable bearing pressure of 3,000 psf. The minimum recommended foundation size is 18 inches for continuous footings and 24 inches isolated column footings. The minimum recommended foundation frost-embedment depth is 24 inches for unheated and heated structures. WSDOT Pavement Policy Appendix 2 depicts Spokane as having an expected freeze depth of 35 and 65 inches for fine and coarse-grained soils, respectively. The generally accepted level of risk in Spokane is an embedment depth of 24 inches. The calculated maximum total and differential settlements for footings constructed as recommended are less than 1 inch and ½ inches, respectively.

For mat foundations and slabs bearing on a minimum of 6 inches of compacted structural fill over properly prepared subgrade, we recommend using a vertical modulus of subgrade reaction (K_{s1}) of 150 pounds per cubic inch (pci).

Geogrid Reinforced Soil. Removal and replacement of *existing fill* at B-1 and B-3 may be reduced by supporting footings and slabs on geogrid reinforced fill (GRF). Construct GRF by removing *existing fill* to a depth of 18 inches below footing subgrade and placing GRF as described below.

Geogrid reinforcement should consist of a multidirectional geogrid such as NX650 or suitable alternate approved by the Geotechnical Engineer. Prior to placing grid, prepare the exposed subgrade in accordance with the recommendations provided in *Earthwork*. Place the first layer of grid directly on the prepared subgrade followed by 12 inches of compacted structural fill. Place the second layer of grid 12 inches above the first and 6 inches below bottom of slab. Excavated *existing fill* materials may be reused for constructing the GRS foundation provided the fines content is less than 15 percent and oversized particles and anthropogenic debris are removed prior to reuse.

Earth Pressures and Lateral Resistance

Retaining walls will be subjected to lateral earth pressure. Depending upon the level of wall restraint, they should be designed for either at-rest (for zero deflection at the top of the wall) or active (top of wall free to move at least 0.5 percent of the wall height). Recommended equivalent fluid pressures for these two cases and for passive pressures are provided below:

- At-Rest Earth Pressure: 55 pounds per square foot per foot of depth (psf/ft)
- Active Earth Pressure: 36 psf/ft of depth
- Passive Earth Pressure: 380 psf/ft of depth

These values assume properly compacted backfill, drained conditions (no hydrostatic pressures build up behind the wall), level surfaces in front of and behind the wall, and no surface surcharge loads. The wall designer must request modified criteria if sloping ground conditions or surcharge loading are anticipated.

Lateral resistance would be mobilized by friction along the base of footings. The recommended ultimate earth to cast-in-place concrete friction factor is 0.5 for footings constructed as recommended in *Foundations*.

Pavements

Subgrade Preparation. We recommend careful excavation to establish pavement subgrade. Pavement subgrades should be moisture conditioned by either wetting or drying to within 2 percent of optimum and compacted to 95 percent of maximum dry unit weight.

Removal and replacement of *existing fill* at B-1 and B-3 beneath pavements may be reduced by placing a stabilization geotextile over prepared subgrade to improve performance of the pavement section. We recommend using a stabilization geotextile meeting the requirements of *WSDOT Standard Specification 9-33.2(1) – Table 3*, such as Mirafi 180N. Place subbase by pushing material out over the subgrade, working from the fill, to minimize construction traffic on the prepared subgrade and protect the geotextile fabric from damage. Keep the geotextile taut and free of wrinkles during fill placement.

ESAL Calculations. Pavement loading information provided by Fehr & Peers was used to calculate Equivalent Single Axle Loads for flexible and rigid pavement design. ESAL factors used for calculating design ESALs for flexible and rigid pavements are:

Table 10. ESAL Factors

Vehicle Type	Flexible ESAL Factor	Rigid ESAL Factor
Passenger cars and pickups	0.0004	0.0004
4-axle trucks	0.51	0.76
Xcelsior XE60 bus[2]	3.86	4.35

A pavement design life of 50 years was used in ESAL calculations. Total design ESALs estimated from the provided information are summarized below.

Table 11. Design ESALs

Location	Boring ID	Flexible ESALs		Rigid ESALs	
		GP Lane	BAT Lane	GP Lane	BAT Lane
2nd Ave	-	10,944,000	-	13,616,000	-
Howard Street	-	8,909,000	-	10,628,000	-
Sprague Ave between Browne St. & Howard St.	1	11,483,000	-	14,451,000	-
Browne St. between Spokane Falls Blvd. & Sprague Ave.	23	13,603,000	-	17,755,000	-
Division St. South of North River Dr.	2, 3	18,821,000	-	25,239,000	-
Division St. between North River Dr. and North Foothills St.	4, 6, 24	4,780,000	7,266,000	7,048,000	8,188,000
Ruby St. between North River Dr and North Foothills St.	5, 7	7,374,000	7,266,000	10,891,000	8,188,000
Division St. between North Foothills[3] St. and Magnesium St.	8, 9, 10, 12, 13, 14, 15, 16 17	10,372,000	7,266,000	15,325,000	8,188,000
Division St. between Holland and Fred Myer driveway	18, 19, 20	13,460,000	-	17,296,000	-
Hastings Rd between Division St. and Mead Transit Center	22	13,722,000	-	17,715,000	-

Flexible Pavements. The required flexible pavement thickness was determined in accordance with *1993 AASHTO Guide for Design of Pavement Structures* and *WSDOT Pavement Policy.* The required minimum thickness was determined in accordance with *WSDOT Pavement Policy Table 5.1* where a M_r of 10,000 psi or greater is feasible and *AASHTO Guide for Design of Pavement Structures* and *WSDOT Pavement Policy* where a M_r of 10,000 or greater is not considered feasible.

The following design parameters were used in pavement section thickness calculations:

- Design Life: 50 years
- Reliability: 95% and 85% for ESALs greater than 10 million and less than 10 million, respectively
- Initial Serviceability: 4.2
- Terminal Serviceability: 2.7
- Overall Standard Deviation: 0.45

[2] ESAL factor based on half-full axle weight

[3] Provided road segment begins at Garland, assumed loading extends to North Foothills

Table 12 below describes the required thickness for each boring location, provided the recommendations in *subgrade preparation* are followed.

Table 12. Minimum Required Flexible Pavement Thickness

Boring number	GP Lane		BAT Lane	
	HMA thickness (inches)	CSBC thickness (inches)	HMA thickness (inches)	CSBC thickness (inches)
1	**10**	**6**	**-**	**-**
2	**10**	**6**	**-**	**-**
3	**10**	**6**	**-**	**-**
4	**6**	**6**	**8**	**6**
5	**8**	**6**	**8**	**6**
6	**6**	**6**	**8**	**6**
7	**8**	**6**	**8**	**6**
8	**10**	**6**	**8**	**6**
9	**10**	**6**	**8**	**6**
10	**10**	**6**	**8**	**6**
12	**10**	**6**	**8**	**6**
13	**10**	**6**	**8**	**6**
14	**10**	**6**	**8**	**6**
15	**10**	**6**	**8**	**6**
16	**10**	**6**	**8**	**6**
17	**10**	**6**	**8**	**6**
18	**10**	**6**	**-**	**-**
19	**10**	**6**	**-**	**-**
20	**10**	**6**	**-**	**-**
22	**10**	**6**	**-**	**-**
23	**10**	**6**	**-**	**-**
24	**6**	**6**	**-**	**-**

We recommend a minimum scarification depth of 12 inches, which is typically achieved using ripper teeth behind a dozer or other suitable means.

Table 13. Recommended Flexible Pavement Materials

Material	Specification	Compaction
HMA	*WSDOT Standard Specification 9-03.8(6).*	92% TM[1]
CSBC	*WSDOT Standard Specification 9-03.9(3)*	95% MP[2]
Subgrade	Subgrade compacted to 95 percent or greater of maximum dry density and to a firm and unyielding condition	95% MP

[1]TM = Theoretical Maximum Unit Weight
[2]MP = Modified Proctor *(*ASTM D-1557*)*

Construct flexible pavements in accordance with *WSDOT SS Section 5-04.*

We recommend performing periodic maintenance of cracks on paved surfaces to reduce the potential for surface water infiltration into the underlying pavement subgrade. Surface and subgrade drainage are critical to the performance of the pavement section.

Rigid Pavements. The required rigid pavement thickness was determined in accordance with *AASHTO Guide for Design of Pavement Structures* and *WSDOT Pavement Policy. AASHTO Guide for Design of Pavement Structures* was used to determine the minimum required rigid pavement thickness in locations with greater than 5 million ESA design ESALs greater than 5 million, due to construction restraints precluding the use of HMA base.

Rigid pavement thickness was determined in accordance with *1993 AASHTO Guide for Design of Pavement Structures* and *WSDOT Pavement Policy.* The following design parameters were used in pavement section thickness calculations:

- Design Life: 50 years
- Reliability: 95% and 85% for ESALs greater than 10 million and less than 10 million, respectively
- Initial Serviceability: 4.5
- Terminal Serviceability: 3.0
- Overall Standard Deviation: 0.4
- Subgrade Resilient Modulus: 200 pci

Table 14 below describes the required PCC thickness for each boring location provided the recommendations in *subgrade preparation* are followed. We recommend a minimum thickness of 4 inches CSBC for PCCP slabs.

Table 14. Minimum Required Rigid Pavement Thickness

Boring number	GP Lane PCCP thickness (inches)	BAT PCCP thickness (inches)	Boring number	GP Lane PCCP thickness (inches)	BAT PCCP thickness (inches)
1	**13**	**-**	**13**	**13.5**	**11**
2	**14.5**	**-**	**14**	**13.5**	**11**
3	**14.5**	**-**	**15**	**13.5**	**11**
4	**11**	**11**	**16**	**13.5**	**11**
5	**12.5**	**11**	**17**	**13.5**	**11**
6	**11**	**11**	**18**	**13.5**	**-**
7	**12.5**	**11**	**19**	**13.5**	**-**
8	**13**	**11**	**20**	**13.5**	**-**
9	**13.5**	**11**	**22**	**13.5**	**-**
10	**13.5**	**11**	**23**	**13.5**	**-**
12	**13**	**11**	**24**	**11**	**-**

Note: Borings 11 and 21 are n/a as they were removed from the exploration plan.

Construct PCCP in accordance with *WSDOT SS Section 5-05.*

Table 15. Recommended Flexible Pavement Materials

Material	Specification	Compaction
PCC	*WSDOT Standard Specification 9-01.1 and 9-01.2(1) Portland Cement Type I/II*	92% TM
CSBC	*WSDOT Standard Specification 9-03.9(3)*	95% MP
Subgrade	Subgrade compacted to 95 percent or greater of maximum dry density and to a firm and unyielding condition	95% MP

We recommend using jointed reinforced concrete pavement with doweled transverse joints and tied longitudinal joints. The recommended maximum joint spacing is 15 feet. The recommended dowel size is 1.5-inch by 18 inch long bar spaced 12 inches apart placed at mid-slab depth. The recommended tie is #5 bar 30 inches long, spaced 36 inches apart, and placed at mid-slab depth.

Construct PCCP to HMA joints in accordance with *WSDOT Standard Plan A-40.10-04.*

Preliminary Stormwater Drainage Recommendations

Preliminary stormwater drainage recommendations are provided below to facilitate planning and conceptual design. Targeted subsurface explorations will be completed as part of Work Order 6 once proposed stormwater infiltration facilities types and locations have been determined.

Gradation analysis was used to estimate permeability in accordance with the *Spokane Regional Stormwater Manual* (SRSM), *Appendix 4A – Spokane 200 Method*. The results are summarized in *Figure 8* (in Attachments).

Segment 1: Stormwater infiltration in route Segment 1 from downtown to Desmet Avenue is not considered feasible due to the presence of limiting layers including *basalt* and shallow groundwater and the presence of *existing fill*. Potentially feasible options include treatment on-site by a lined bio-infiltration swale with an underdrain system that directs treated stormwater to the city system.

Segment 2: North of Desmet Avenue, infiltrative drywells in conjunction with grass-lined bio-infiltration swales targeting *native soil* are likely feasible for stormwater disposal. Preliminary estimates of outflow rates for single depth drywells range from 0.09 to 0.3 cubic feet per second (cfs). Anticipated rates for double depth drywells range from 0.14 to 1 cfs. Higher infiltration rates may be justified by performing full-scale drywell infiltration testing on installed drywells.

Fines percentages at B-19 are greater than 12 percent, size swale bottoms using *Spokane Regional Stormwater Manual Section 6.7.1* equations *6-1b and 6-1d.*

Grade surfaces to allow positive drainage away from structures and pavements. Runoff should be collected and disposed of such that water is not allowed to accumulate near paved surfaces or structures. Place drywells no closer than 25 feet from structure foundations. Drywells can "silt-up" over time and operation and maintenance guidelines in the stormwater manual should be followed.

Additional Services

Effective geotechnical services involve cooperation with the owner, designer, and constructor as follows:

1. Preliminary study to assist in planning and to economically adapt the project to its geologic

environment;
2. Soil exploration and analysis to characterize subsurface conditions and recommend design criteria;
3. Consultation with the designer to adapt the specific design to the site in accordance with the recommendations;
4. Construction observation to verify the conditions encountered and to make recommendations for modifications, as necessary; and,
5. Construction material testing, quality control, and special inspection.

This report satisfies Item 1 and 2 of the 5-phase endeavor. We are eager to provide assistance with design and construction as appropriate to assist in completing a safe and economical project.

FIELD EXPLORATION

The fieldwork was conducted by staff engineer Greyson Charon, EIT, and supervised by John Finnegan, PE, from January 14 through January 30, 2025. The field activities generally consisted of the following:

- Reconnaissance of the site and surrounding area;
- Logging subsurface conditions in 22 test borings; and,
- Obtaining split-spoon samples of the encountered soils.

Results are presented in *Figures*.

Test Borings

Air Rotary Drilling, ASTM D5782. Borings were drilled with a truck-mounted Geoprobe 3100GT by the air rotary method utilizing 4.5-inch outside diameter casing. The air rotary method involves circulating air through a specially designed pilot bit that engages with a casing bit during drilling but disengages upon reversal of rotation to allow retrieval of the drill stem at desired sampling depths.

Soil Samples

Samples were obtained by capturing representative material from the bucket of the excavator within test pits. Samples collected during boring operations were obtained by driving split-spoon samplers through the drill casing.

Standard penetration tests - ASTM D 1586. To obtain samples of soil, Standard Penetration Tests (SPT) were conducted by driving a 2-inch outside diameter split-spoon sampler with a 140-pound automatic hammer to provide a test of penetration resistance. The resulting blow count for each foot of sampler advancement is presented in the *Test Boring Logs*. The tested average hammer efficiency for the 3100GT over the depth of the drilled boreholes is 90 percent. SPT N-values reported in the logs do not include hammer efficiency corrections.

3-inch split-spoon samples (3”SS) - ASTM D 3550. Several of the split-spoon samples were obtained with a 3.0-inch outside by 2.4-inch inside diameter split-spoon barrel sample similar to the 2-inch SPT described above. Blow counts with the 3”SS do not represent N-values since the end area of the 3-inch sampler is approximately twice that of the standard sampler. Uncorrected N-values can be approximated by multiplying the observed blow counts (in blows per foot) by 0.5 for the 3-inch split-spoon.

DCP Testing– ASTM D6951. Soil strength was estimated with a series of DCP tests using a Kessler®

DCP which consists of a 17.6-pound slide hammer and rods with 2-inch graduations. The hammer is manually lifted and allowed to fall from a fixed height. DCP test results can be correlated to CBR values for estimating relative soil strength for pavement design. The results of DCP penetration per 1-inch intervals are presented in *Figures*.

Soil and Rock Classification

Field descriptions of soils and rock were completed in accordance with the current version of the Washington State Department of Transportation, *Geotechnical Design Manual* (GDM), M 46-03.12, except that fines (silt and clay) were described in accordance with ASTM D 2487. *Whereas, the GDM uses the terms 'silty' and 'clayey' to describe a very broad range of fines from 10 to 49 percent; ASTM D 2487 uses those terms for percentages greater than 12 and the term 'with' for fines ranging from 5 to 12 percent, which is typically necessary to describe variations relevant to soil permeability per the SRSM.* A key to the descriptions is provided in *Guide to Soil and Rock Descriptions.*

Location

Horizontal & vertical control. The *Site Plan* was reproduced from the Division BRT route plan provided by Parametrix. Horizontal locations were recorded in the field using a handheld GPS unit. Elevations presented in the *Test Boring Logs* were provided based on interpolation of the project surface and are considered accurate to within ±0.5 feet. Horizontal and vertical locations can be considered accurate to within 10-foot and 1-foot, respectively.

LABORATORY ANALYSIS

Laboratory testing was performed on representative samples of the soils encountered to provide data used in our assessment of soil characteristics.

Tests were conducted, where practical, in accordance with nationally recognized standards (ASTM, AASHTO, etc.), which are intended to model in-situ soil conditions and behavior. The results are presented in *Figures*.

Index Parameters

Moisture Content - ASTM D 2216. Moisture contents were determined by direct weight proportion (weight of water/weight of dry soil), obtained by drying soil samples in an oven until reaching constant weight.

Gradation – ASTM D6913. Gradation analysis was performed by the mechanical sieve method. The mechanical sieve method is utilized to determine particle size distribution based upon the dry weight of sample passing through sieves of varying mesh sizes. The results of gradation are provided in *Grain Size Distribution Results*.

Atterberg Limits – ASTM D4318. Atterberg limits describe the properties of the fine-grained constituents of a soil by relating the water content to the plastic and liquid limits of engineering behavior. As the water content increases, the state of the soil changes from a brittle solid to a plastic solid and then to a viscous liquid.

The liquid limit (LL) is the water content above which the soil tends to behave as a viscous liquid. Similarly, the plastic limit (PL) is defined as the water content below which the soil tends to behave as a brittle solid. The plasticity index describes the range of water content over which a soil is plastic and is derived by subtracting the PL from the LL. The soil is classified as "non-plastic" if rolling a 1/8-inch

bead is not possible at any water content.

Hydrometer - ASTM D 422. The hydrometer method implements Stoke's Law to determine particle size distribution based on the rate of spherical particles settling into a liquid of known temperature, viscosity, and specific gravity.

US#200 Wash – ASTM D 1140. Representative samples were washed over a 75-µm (No. 200) sieve. Clay and other particles that are dispersed by the wash water, as well as water-soluble materials, are removed from the soil during the test. The loss in mass resulting from the wash treatment is calculated as mass percent of the original sample and is reported as the percentage of material finer than a No. 200 sieve by washing. Material finer than the No. 200 sieve can be separated from larger particles much more efficiently and completely by wet sieving than with dry sieving.

LIMITATIONS

The conclusions and recommendations presented herein are based upon the results of field explorations and laboratory testing results. They are predicated upon our understanding of the project, its design, and its location as defined by the client. We endeavored to conduct this study in accordance with generally accepted geotechnical engineering practices in this area. This report presents our professional interpretation of exploration data developed, which we believe meets the standards of the geotechnical profession in this area; we make no other warranties, express or implied. Attached is a document titled "*Important Information About This Geotechnical Engineering Report*," which we recommend you review carefully to better understand the context within which these services were completed.

Unless test locations are specified by others or limited by accessibility, the scope of analysis is intended to develop data from a representative portion of the site. However, the areas tested are discreet. Interpolation between these discreet locations is made for illustrative purposes only but should be expected to vary. If a greater level of detail is desired, the client should request an increased scope of exploration.

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SCALE: 1"=5280' 0 2640 5280 BASE MAP PROVIDED BY PARAMETRIX	Budinger & Associates	VICINITY MAP STA DIVISION STREET BRT SPOKANE COUNTY, WASHINGTON	FIGURE 1 PROJECT NUMBER S23090 DATE: 2/2025



TEST BORING LOCATION (1)

Budinger & Associates

SITE PLAN	FIGURE 2-1
STA DIVISION STREET BRT SEGMENT 1 - SPRAGUE TO DESMET SEGMENT 2 - DESMET TO GARLAND	PROJECT NUMBER S23090
	DATE: 2/2025



TEST BORING LOCATION (1)

Budinger & Associates

SITE PLAN	FIGURE 2-2
STA DIVISION STREET BRT SEGMENT 2 - DESMET TO GARLAND SEGMENT 3 - GARLAND TO LINCOLN	PROJECT NUMBER S23090
	DATE: 2/2025



TEST BORING LOCATION (1)

Budinger & Associates

SITE PLAN	FIGURE 2-3
STA DIVISION STREET BRT SEGMENT 3 - GARLAND TO LINCOLN SEGMENT 4 - LINCOLN TO HAWTHORNE	PROJECT NUMBER S23090
	DATE: 2/2025



TEST BORING LOCATION (1)

Budinger & Associates

SITE PLAN	FIGURE 2-4
STA DIVISION STREET BRT SEGMENT 4 - LINCOLN TO HAWTHORNE SEGMENT 5 - HAWTHORNE TO HASTINGS	PROJECT NUMBER S23090 DATE: 2/2025



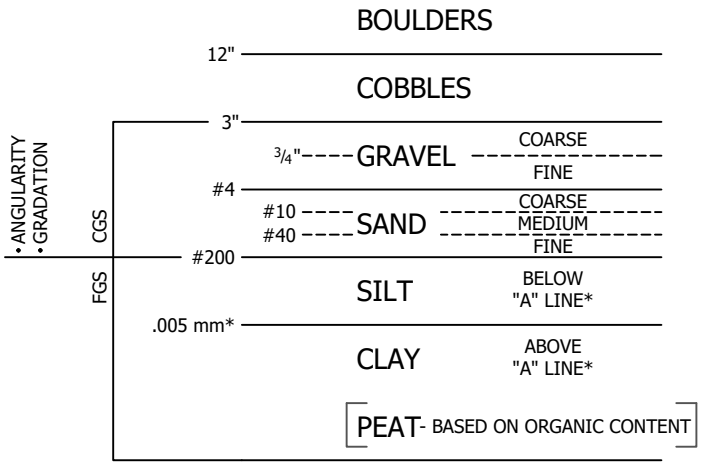
TEST BORING LOCATION (1)

Budinger & Associates

SITE PLAN	FIGURE 2-5
STA DIVISION STREET BRT SEGMENT 5 - HAWTHORNE TO HASTINGS SEGMENT 6 - HASTINGS	PROJECT NUMBER S23090
	DATE: 2/2025

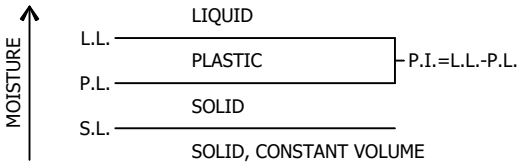
GUIDE TO SOIL & ROCK DESCRIPTIONS

SOIL CLASSIFICATION

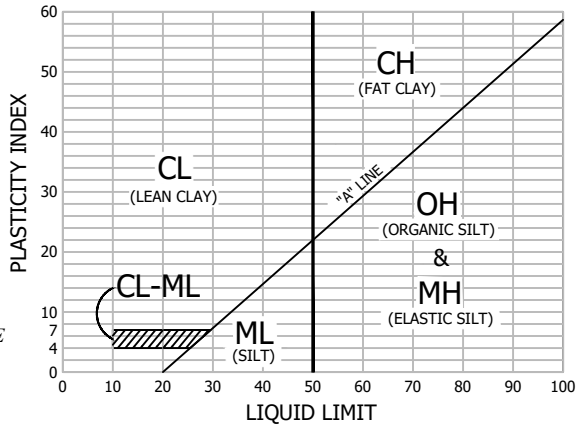


** SEE PLASTICITY CHART*
CGS - COARSE GRAINED SOIL - MORE THAN 50% RETAINED ON A #200 SIEVE
FGS - FINE GRAINED SOIL - 50% MORE PASSES, #200 SIEVE
FINES - PORTION FINER THAN #200 SIEVE

ATTERBERG LIMITS



PLASTICITY CHART



NOTE - CHART APPLIES TO FGS AND MINUS #40 SIEVE FRACTION OF CGS

GUIDE TO SOIL DESCRIPTION MODIFIERS, MOISTURE, AND CONDITION PRESENTED ON LOGS

MODIFIER	ESTIMATED PERCENTAGE OF MATERIAL
SUFFIX "LY" OR "Y"	30% OR MORE FOR COARSE PARTS IN FGS GREATER THAN 12% FOR FINES IN CGS
WITH	15% - 29% FOR COARSE PARTS IN FGS 6% - 14% FOR FINES IN CGS

NOTE - VISUAL ESTIMATES OF MATERIAL PERCENTAGES TYPICALLY VARY 0 TO 10% FROM THOSE DETERMINED BY LABORATORY TESTING.

MOISTURE

DRY
MOIST
SATURATED OR WET

SOIL CONDITION

CGS:
- VERY LOOSE
- LOOSE
- MEDIUM DENSE
- DENSE
- VERY DENSE

FGS:
- VERY SOFT
- SOFT
- MEDIUM STIFF
- STIFF
- VERY STIFF
- HARD

SAMPLES

- STANDARD 2" PENETRATION TEST SAMPLER WITH BLOWS PER FOOT
- 3" SPLIT SPOON SAMPLER WITH BLOWS PER FOOT
- DRILL CUTTING SAMPLE
- BULK SAMPLE
- THIN-WALLED TUBE SAMPLE
- DIAMOND CORE RUN WITH % RECOVERY & ROCK QUALITY DESIGNATION
- 4" SPLIT SPOON SAMPLER WITH BLOWS PER FOOT
- R REFUSAL OF SAMPLE (50+ BLOWS PER 6")

ROCK WEATHERING	ROCK CONDITION
FRESH	EXTREMELY WEAK
SLIGHTLY WEATHERED	VERY WEAK
MODERATELY WEATHERED	MODERATELY WEAK
HIGHLY WEATHERED	MODERATELY STRONG
COMPLETELY WEATHERED	STRONG
RESIDUAL SOIL	VERY STRONG

Budinger & Associates

FIGURE 3

TEST BORING 1

Date of Boring: 1-28-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Sprague Avenue, east of Stevens
Surface: concrete pavement

Elevation: 1889 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0			moist, dark gray, dense	Portland cement concrete - 4.5 inches (existing sidewalk)	
				Crushed gravel top course	
	36 (42%) *(19-26-10-14)*		moist, moderate brown to reddish orange, dense	GRAVEL with Clay and Sand, coarse to fine, subangular to subrounded, debris as brick (existing fill)	
5	18 (50%) *(3-4-28-29)*		medium dense	5 feet to 13.5 feet: poor air return	
	R (33%) *(26-R/4")*				
10	15 (67%) *(10-12-15-17)*		moist, olive brown, medium dense	SAND with Gravel, coarse to fine, subangular to subrounded, calcium carbonate on bottom of coarse particles	
15				BASALT, moderately weathered, fine grained, strong to very strong (R4 to R5)	
				17 to 17.5 feet: fracture infilled with sand	
20					
25			no free groundwater observed	End of Boring @ 24 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

+100

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

Budinger & Associates
1101 North Fancher Road
Spokane Valley WA 99212

BORING LOGS **FIGURE 4-1**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 2

Date of Boring: 1-28-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of Main
Surface: asphalt concrete pavement

Elevation: 1904 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt pavement concrete - 8.5 inches	
		27 (50%)	moist, gray, dense	Silty SAND with Gravel, coarse to fine, subangular to subrounded (existing fill)	
		(14-6-24-41) (33%)	moist, moderate brown, dense	CLAYEY SAND with Gravel, coarse to fine, subagular to subrounded	
		(100%)	moist, gray, dense	GRAVEL with Silt, coarse to fine, subangular to subrounded	
5		R (142%)			
		(50-R/1")	dark gray	BASALT, moderately weathered, fine grained, strong to very strong (R4 to R5)	
10			no free groundwater observed	End of Boring @ 10 ft	
15					
20					
25					
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

+100

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BORING LOGS **FIGURE 4-2**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

TEST BORING 3

Date of Boring: 1-21-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of North River Drive
Surface: asphalt concrete pavement

Elevation: 1885 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0			wet, gray, dense	Aspahlt pavement concrete - 7.25 inches Crushed gravel base course	
		(67%)	moist, dark brow to black, medium dense	SILTY GRAVEL with Sand, coarse to fine, angular to subrounded (existing fill)	
	(disturbed by dcp)	(100%)			
5	5 *(4-2-3-11)*	(21%)	loose	(no air return from 5 to 10 feet)	
	R *(15-52-R/2")*	(29%)			
10	10 *(19-10-7-3)*	(50%)			
		(58%)	wet, brown, soft	SILT with Sand, rapid dilatancy, moderate plasticity (completely weathered basalt)	
	R *(12-21-R/2")*	(36%)		12.5 feet: refused shelby tube	
15				14.5 feet: Groundwater encountered	
	R *(R/0")*	(0%)	dark gray	BASALT, moderately weathered, fine grained, strong to very strong (R4 to R5)	
20				End of Boring @ 20 ft	
25					
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED)
APPROX. SPT N-VALUE USING 3" SAMPLER

10 20 30 40 50 60 70 80 90

+100

+100

+100

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-3**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 4

Date of Boring: 1-16-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of Boone
Surface: asphalt concrete pavement

Elevation: 1890 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION
0				Aspahlt pavement concrete - 8 inches
			wet, gray, dense	Crushed gravel base course
		(63%)	wet, brown, dense	SILTY GRAVEL with Sand, coarse to fine, calcium carbonate on bottom of coarse particles
		(disturbed by dcp)		
5			dry, grayish brown, dense	GRAVEL with Silt and Sand, coarse to fine, subangular to subrounded, calcium carbonate on underside of coarse particles
		33 (50%) *(20-15-18-17)*		
		36 (67%) *(29-33-31-41)*		
10		54 (13%) *(21-28-26-24)*	very dense	
15		52 (42%) *(16-38-55-57)*		
20		30 (62%) *(19-24-29-R/3")*	dense	
			23 feet: groundwater	
25		15 (58%) *(20-16-10-8)*	wet, dark brown, medium dense	
				End of Boring @ 27 ft
30				

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-4**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 5

Date of Boring: 1-16-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Ruby Street, south of Mission
Surface: asphalt concrete pavement

Elevation: 1912 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Aspahlt pavement concrete - 8 inches	
			wet, gray, dense	Crushed gravel base course	
		(63%)	moist, reddish brown, medium dense	GRAVEL with Silt and Sand, coarse to fine, subangular to subrounded, calcium carbonate on bottom of coarse particles	
		(disturbed by dcp)			
5		18 (58%) *(8-9-9-10)*			
		27 (63%) *(20-24-24-24)*	grayish brown, dense		
10		49 (59%) *(16-19-20-R/4")*			
15		39 (63%) *(22-37-32-31)*			
20		R (88%) *(28-41-R/4")*		22 feet: cobble	
25		45 (58%) *(20-33-48-27)*			
			no free groundwater observed	End of Boring @ 27 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

+100

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-5**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 6

Date of Boring: 1-24-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of Indiana
Surface: bare

Elevation: 1917 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION
0				Asphalt pavement concrete - 2.5 inches
				Portland cement concrete - 7 inches
	(disturbed by dcp)	(21%)	moist, brown, dense	SILTY GRAVEL with Sand, coarse to fine, subangular to subrounded (existing fill)
			moist, olive brown, dense	GRAVEL with Silt and Sand, coarse to fine, subangular to subrounded, calcium carbonate on bottom of coarse particles
5	R *(12-R/5")*	(55%)		
	47 *(44-41-43-32)*	(58%)	olive gray	
10	20 *(19-16-19-19)*	(88%)	medium dense	
15	19 *(12-16-18-18)*	(63%)	olive brown	
20	48 *(30-39-47-43)*	(71%)	dense	
25	23 *(12-21-10-18)*	(71%)	medium dense	
			no free groundwater observed	End of Boring @ 27 ft
30				

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90 100+

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-6**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 7

Date of Boring: 1-17-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of Foothills
Surface: asphalt concrete pavement

Elevation: 1926 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt pavement concrete - 7.25 inches	
		(disturbed by dcp) (100%)	moist, gray, dense	Crushed gravel base coarse	
		(100%)	moist, moderate brown, medium dense	SILTY GRAVEL with Sand, coarse to fine, subangular to subrounded	
			moist, olive brown, medium dense	GRAVEL with Sand, coarse to fine, subangular to subrounded, calcium carbonate on bottom of coarse particles	
5		17 *(10-9-8-10)* (89%)			
		22 *(20-19-20-27)* (67%)			
10		20 *(13-11-9-6)* (46%)			
			moist, olive brown, medium dense	SAND with Gravel, coarse to fine, subangular to subrounded, calcium carbonate on bottom of coarse particles	
15		24 *(16-23-19-13)* (75%)			
			moist, olive brown, loose	SAND with Silt, medium to fine, subangular to subrounded	
20		8 *(5-6-8-8)* (92%)			
			moist, olive brown, medium dense	GRAVEL with Sand, coarse to fine, subangular to subrounded	
25		R *(36-R/5")* (91%)			
			no free groundwater observed	End of Boring @ 26 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

+100

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-7**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 8

Date of Boring: 1-29-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division, north of Bridgeport
Surface: asphalt concrete pavement

Elevation: 2002 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt pavement concrete - 8.25 inches	
			moist, gray, dense	Crushed gravel base course	
		35 (33%) *(2-9-26-18)*	moist, olive brown, dense	GRAVEL with Silt and Sand, coarse to fine, subangular to subrounded (existing fill)	
5		18 (42%) *(14-18-14-12)*	moist, olive brown, medium dense	SILTY GRAVEL with Sand, coarse to fine, subangular to subrounded	
		(83%)	moist, olive brown, medium dense	GRAVEL with Sand, coarse to fine, subangular to subrounded	
		18 (54%) *(7-9-9-13)*			
10		26 (50%) *(17-22-24-55)*	dense		
15		R (73%) *(37-R/5")*			
20		29 (71%) *(16-26-26-23)*			
25		32 (67%) *(12-31-27-25)*			
30			no free groundwater observed	End of Boring @ 26 ft	

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

+100

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-8**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 9

Date of Boring: 1-14-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, north of Garland, SB lane
Surface: asphalt concrete pavement

Elevation: 2034 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0			moist, gray, dense	Asphalt concrete pavement - 6.75 inches (existing pavement)	
				Crushed gravel top course	
			moist, olive brown, medium dense	SAND with Gravel, coarse to medium, subangular to subrounded	
5		18 *(9-10-8-8)* (4%)		5 feet: gravel particle lodged in sampler shoe	
		21 *(17-20-18)* (89%)			
10		24 *(8-12-12)* (67%)			
15		35 *(22-33-29)* (78%)	dense		
20		27 *(14-23-25)* (67%)			
25		30 *(15-25-28)* (72%)			
30			no free groundwater observed	End of Boring @ 26.5 ft	

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-9**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 10

Date of Boring: 1-15-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of Wellesley
Surface: asphalt concrete pavement

Elevation: 2054 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt pavement concrete - 7.5 inches	
			wet, dark gray, dense	Crushed gravel base coarse	
		13 (75%)	moist, reddish brown, medium dense	SAND with Silt, coarse to fine, subangular to subrounded	
		(15-14-10-9)			
5		12 (67%)	moist, olive brown, medium dense	SAND, coarse to medium, subangular to subrounded, calcium carbonate on bottom of coarse particles	
		(6-6-6)			
		13 (50%)			
		(4-12-11)			
10		9 (46%)	loose		
		(4-4-5-7)			
15		22 (67%)	medium dense		
		(17-19-20)			
20		21 (94%)			
		(14-18-20)			
25		21 (83%)			
		(11-18-19)			
			no free groundwater observed	End of Boring @ 26.5 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-10**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 12

Date of Boring: 1-15-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of Rowan
Surface: asphalt concrete pavement

Elevation: 2064 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt concrete pavement - 7.25 inches (existing pavement)	
			wet, dark gray, dense	Crushed gravel base coarse	
			moist, olive brown, loose	SAND, coarse to medium, subangular to subrounded	
5		8 (6-7-8) (89%)			
		5 (2-2-3) (72%)			
10		10 (7-10-7) (94%)			
			moist, olive brown, medium dense	SAND, coarse to medium, subangular to subrounded, calcium carbonate on bottom of coarse particles	
15		23 (14-22-19) (89%)			
20		11 (8-9-10) (94%)			
25		12 (8-9-13) (83%)			
			no free groundwater observed	End of Boring @ 26.5 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-11**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 13

Date of Boring: 1-27-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, north of Central
Surface: asphalt concrete pavement

Elevation: 2065 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt pavement concrete - 8 inches	
			moist, gray, dense	Crushed gravel top course	
	(disturbed by dcp)	(100%) (90%)	moist, brown, medium dense	SILTY, CLAYEY SAND, coarse to fine, subangular to subrounded (existing fill)	
5	4 *(3-2-2-1)*	(71%)	moist, olive gray, loose	SAND, medium, subangular to subrounded	
	5 *(3-4-5-5)*	(83%)			
10	7 *(3-3-4-4)*	(67%)			
15	19 *(13-18-16-18)*	(100%)	medium dense		
20	18 *(12-15-17-22)*	(88%)			
25	17 *(11-15-16-18)*	(92%)			
			no free groundwater observed	End of Boring @ 27 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-12**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 14

Date of Boring: 1-15-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of Francis
Surface: asphalt concrete pavement

Elevation: 2067 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt pavement concrete - 9 inches	
		17 (58%)	wet, gray, dense	Crushed gravel top course	
		(14-18-12-11)			
		(100%)	moist, moderate brown, loose	SAND with Silt, medium to fine, subangular to subrounded	
5		7 (71%)			
		(5-4-3-4)			
		7 (83%)			
		(5-6-6-6)			
10		4 (79%)			
		(1-2-2-3)			
15		17 (92%)	medium dense		
		(11-17-14-14)			
20		16 (88%)			
		(11-12-16-17)			
25		22 (100%)	moist, olive gray, medium dense	SAND, medium to fine, subangular to subrounded	
		(13-18-21-19)			
			no free groundwater observed	End of Boring @ 27 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-13**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 15

Date of Boring: 1-23-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, north of Rhoades
Surface: asphalt concrete pavement

Elevation: 2064 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt pavement concrete - 5.75 inches	
				Crushed gravel base course	
	(disturbed by dcp)	(83%)	moist, moderate brown, medium dense	SILTY SAND with Gravel, medium to fine, subangular to subrounded	
5	13 *(6-6-7-9)*	(88%)	moist, olive brown, medium dense	SAND with Silt and Gravel, coarse to medium, subangular to subrounded, calcium carbonate present on bottom of coarse particles	
	10 *(7-8-10-8)*	(92%)			
10	7 *(3-3-4-4)*	(83%)	moist, olive gray, loose	SAND, medium, subangular to subrounded	
15	8 *(6-8-7-9)*	(83%)			
20	10 *(11-9-9-9)*	(100%)			
25	12 *(8-10-12-13)*	(96%)	medium dense		
			no free groundwater observed	End of Boring @ 27 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-14**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 16

Date of Boring: 1-23-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of Lincoln Road
Surface: asphalt concrete pavement

Elevation: 2055 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt pavement concrete - 5.75 inches	
	(disturbed by dcp)	(79%)	moist, moderate brown, loose	SAND with Silt, medium to fine, subangular to subrounded	
5	6 *(3-3-3-4)*	(83%)			
	4 *(4-5-5)*	(92%)			
		(75%)	moist, grayish brown, loose	SAND, medium to fine, subangular to subrounded	
10	8 *(3-4-4-4)*	(79%)			
15	9 *(6-8-8-8)*	(92%)			
20	10 *(7-9-9-10)*	(100%)	moist, olive gray		
25	15 *(9-12-14-15)*	(100%)	medium dense		
			no free groundwater observed	End of Boring @ 27 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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BORING LOGS **FIGURE 4-15**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 17

Date of Boring: 1-22-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of North Price
Surface: asphalt concrete pavement

Elevation: 1965 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt concrete pavement - 6.75 inches (existing pavement)	
		(75%)	moist, dark brown, dense	Crushed gravel top course	
	(disturbed by dcp)	(75%)	moist, dark brown, dense	SILTY SAND with Gravel, coarse to fine, subangular to subrounded (existing fill)	
			moist, moderate brown, loose	SILTY SAND, fine, subangular to subrounded	
5	7 *(2-3-4-5)*	(72%)			
		(100%)	moist, olive brown, medium dense	SAND with Silt, fine, subangular to subrounded	
	16 *(10-12-16-17)*	(96%)			
10	20 *(9-10-10-12)*	(92%)			
15	19 *(7-16-18-19)*	(100%)		15.3 to 15.6 feet: fine sandy silt layer encountered	
		(100%)			
		(88%)			
20	24 *(17-22-20-20)*	(96%)			
25	23 *(15-20-21-24)*	(96%)			
			no free groundwater observed	End of Boring @ 27 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

Budinger & Associates
1101 North Fancher Road
Spokane Valley WA 99212

BORING LOGS **FIGURE 4-16**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 18

Date of Boring: 1-20-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, north of Holland
Surface: asphalt concrete pavement

Elevation: 1941 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt concrete pavement - 6.75 inches (existing pavement)	
			moist, dark brown, dense	Crushed gravel top course	
	(distrubed by dcp)	(83%)	moist, moderate brown, medium dense	SILTY SAND, fine, subangular to subrounded	
5	11 *(2-4-7-9)*	(100%)			
		(83%)	moist, olive gray, medium dense	SAND with Silt, fine, subangular to subrounded	
	20 *(12-17-18-20)*	(100%)			
10	20 *(8-9-11-12)*	(92%)			
15	30 *(19-25-27-29)*	(100%)	dense		
20	29 *(19-23-28-31)*	(100%)			
25	32 *(21-27-30-28)*	(100%)			
			no free groundwater observed	End of Boring @ 27 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

Budinger & Associates
1101 North Fancher Road
Spokane Valley WA 99212

BORING LOGS **FIGURE 4-17**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 19

Date of Boring: 1-31-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, North of Hawthorne
Surface: asphalt concrete pavement

Elevation: 1939 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Aspahlt pavement concrete - 11 inches	
			moist, gray, dense	Crushed gravel top coarse	
	(disturbed by dcp)	(88%) (100%)	moist, moderate brown, loose	SILTY SAND, medium to fine, subangular to subrounded	
5	8 *(4-4-4-5)*	(83%)			
	15 *(12-13-14-13)*	(88%)	medium dense	medium to fine	
10	11 *(5-5-6-5)*	(96%)		9.5 feet: interbeds of silt and clay	
15	19 *(12-17-17-16)*	(96%)			
20	31 *(15-24-31-25)*	(92%)	dense		
25	25 *(14-23-22-26)*	(96%)			
			no free groundwater observed	End of Boring @ 26.5 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

Budinger & Associates
1101 North Fancher Road
Spokane Valley WA 99212

BORING LOGS **FIGURE 4-18**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 20

Date of Boring: 1-30-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, south of Hastings
Surface: bare

Elevation: 1778 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0			moist, gray, dense	Aspahlt pavement concrete - 4.5 inches	
			moist, tannish brown, medium dense	Crushed gravel top course, recycled asphalt pavement present	
	30 (9-20-10-9)	(100%) (100%) (38%)		SILTY SAND with Gravel, coarse to fine, subangular to subruonded (existing fill)	
5	19 (23-18-16-16)	(0%)	moist, olive gray, medium dense	SAND with Gravel, coarse to medium, subangular to subrounded	
	11 (2-4-7-13)	(25%)			
10	22 (9-15-4-R/6")	(54%)			
15	17 (11-16-15-15)	(67%)			
20	14 (5-11-14-19)	(79%)	moist, olive brown, medium dense	SAND, coarse to medium, subangular to subrounded	
25	18 (13-15-17-19)	(88%)	no free groundwater observed		
				End of Boring @ 26.5 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

Budinger & Associates
1101 North Fancher Road
Spokane Valley WA 99212

BORING LOGS **FIGURE 4-19**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 22

Date of Boring: 1-22-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: East Hastings Road
Surface: concrete pavement

Elevation: 1823 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Portland cement concrete - 9.5 inches	
	(disturbed by dcp)	(88%)	moist, moderate brown, loose	SILTY SAND with Gravel, coarse to fine, subangular to subrounded, organics as roots (existing fill)	
5			moist, olive brown, loose	SAND, coarse to medium, subangular to subrounded	
	5 *(2-2-3-3)*	(75%)			
	7 *(4-5-7-8)*	(83%)			
10					
	6 *(4-3-3-3)*	(75%)			
15					
	7 *(5-7-6-8)*	(92%)			
20					
	8 *(6-7-8-7)*	(83%)			
25					
	7 *(5-6-7-8)*	(92%)			
			no free groundwater observed	End of Boring @ 27 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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Spokane Valley WA 99212

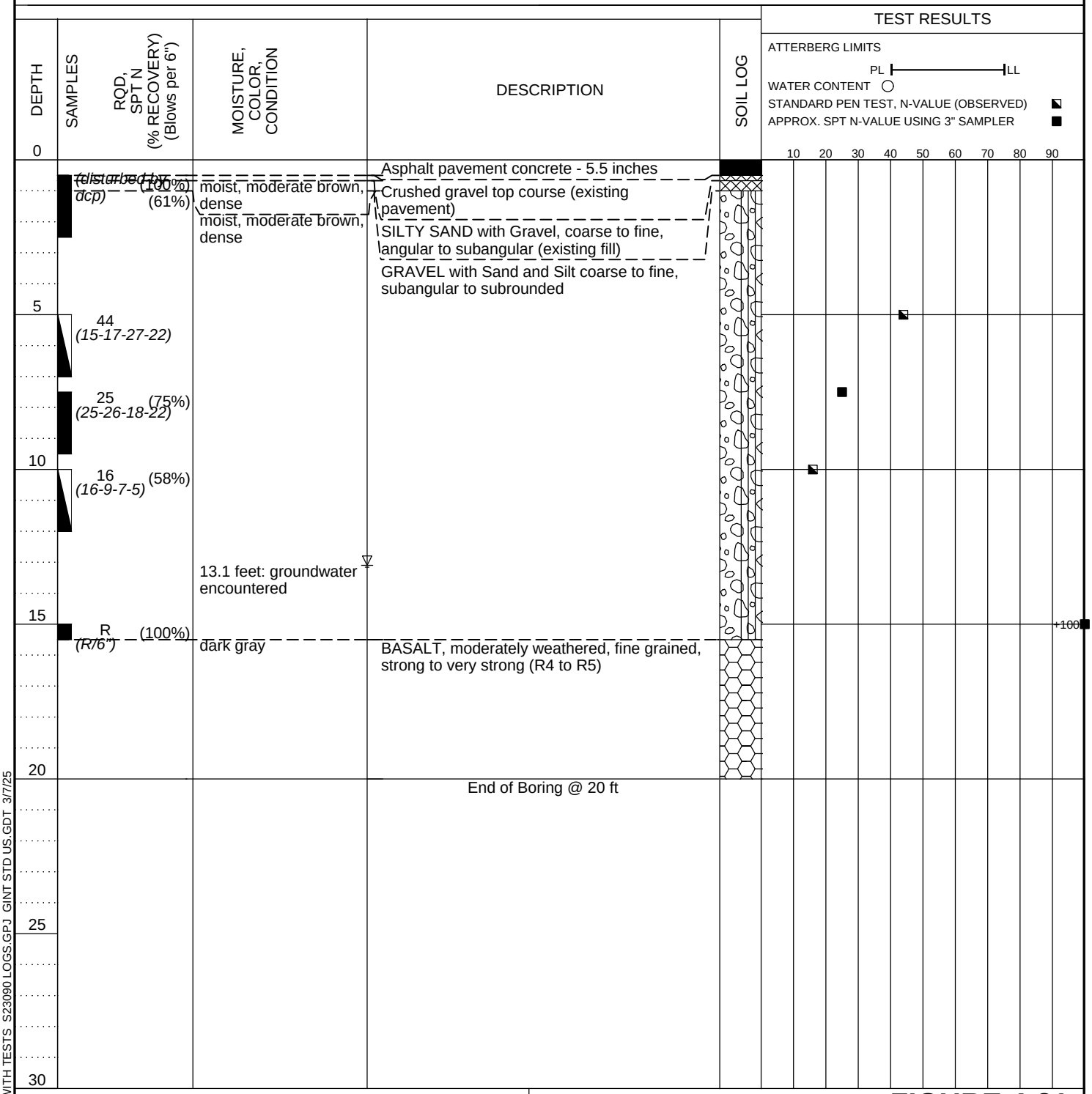
BORING LOGS **FIGURE 4-20**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 23

Date of Boring: 1-27-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Browne Street, north of Main
Surface: asphalt concrete pavement

Elevation: 1886 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing



LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

Budinger & Associates
1101 North Fancher Road
Spokane Valley WA 99212

BORING LOGS **FIGURE 4-21**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

TEST BORING 24

Date of Boring: 1-24-25
Driller: Budinger & Assoc., Inc.
Type of Drill: Geoprobe 3100GT drill, automatic SPT hammer
Location: Division Street, north of Mission
Surface: asphalt concrete pavement

Elevation: 1911 ft
Logged by: G. Charon
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES	RQD, SPT N (% RECOVERY) (Blows per 6")	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG
0				Asphalt pavement concrete - 2.5 inches (existing pavement)	
	(disturbed by dcp)	(67%)	moist, dark brown, medium dense	Portland cement concrete - 7.25 inches (existing pavement)	
		(67%)	moist, moderate brown, medium dense	SILTY GRAVEL with Sand, coarse to fine, subangular to subrounded (existing fill)	
5				GRAVEL, coarse to fine, subangular to subrounded, calcium carbonate present on bottom of coarse particles	
	15 *(14-12-15-15)*	(63%)			
	14 *(7-5-9-15)*	(50%)	olive brown		
10	R *(72-44-R/1")*	(69%)			
15	16 *(14-13-15-15)*	(83%)			
20	35 *(46-34-28-27)*	(75%)	dense		
25	10 *(9-9-9-10)*	(71%)	loose		
			no free groundwater observed	End of Boring @ 27 ft	
30					

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
APPROX. SPT N-VALUE USING 3" SAMPLER ■

10 20 30 40 50 60 70 80 90

+100

LOGS WITHOUT WELL WITH TESTS S23090 LOGS.GPJ GINT STD US.GDT 3/7/25

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1101 North Fancher Road
Spokane Valley WA 99212

BORING LOGS **FIGURE 4-22**

Project: STA Division Street BRT
Location: Spokane, Washington
Number: S23090

DCP TEST DATA

DCP-3

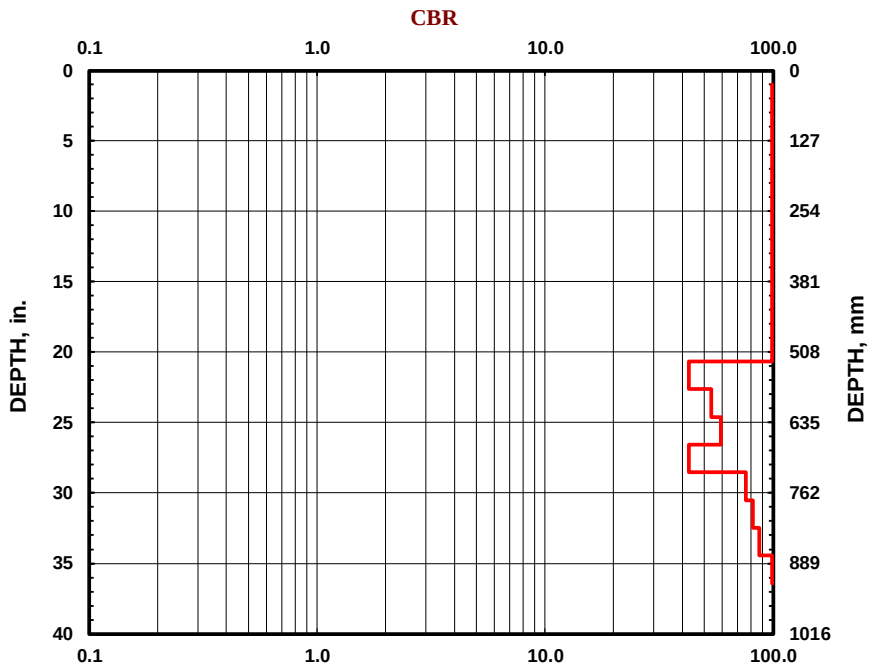
Project: *STA Division ST BRT* **Date:** 21-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty gravel with sand

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0	450	1
0	475	1
0	500	1
0	525	1
4.5	550	1
4.5	575	1
5.5	600	1
5.5	625	1
6	650	1
6	675	1
4.5	700	1
4.5	725	1
7.5	750	1
7.5	775	1
8	800	1
8	825	1
8.5	850	1
8.5	875	1
15	900	1
15	925	1



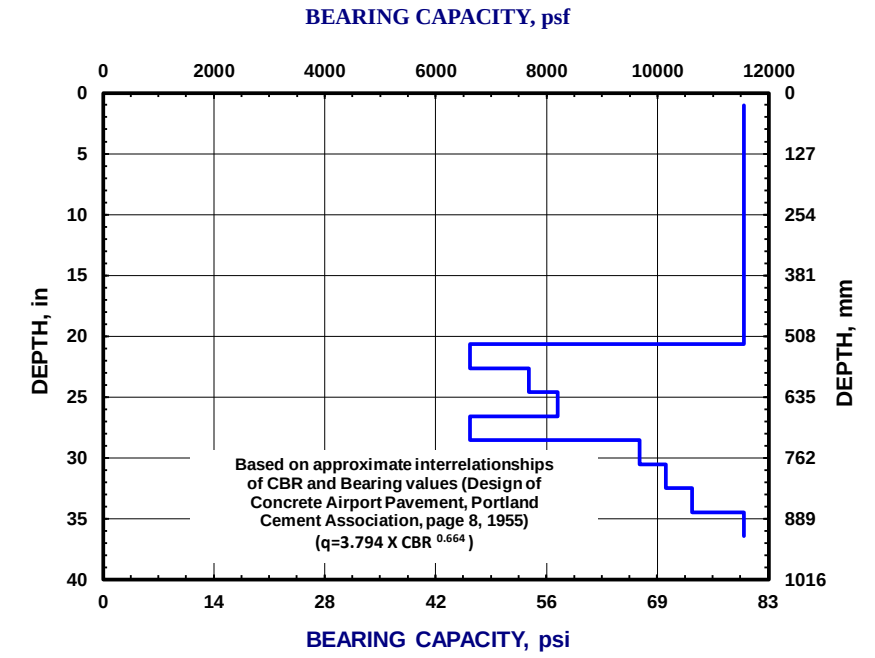


FIGURE 5-1

DCP TEST DATA

DCP-4

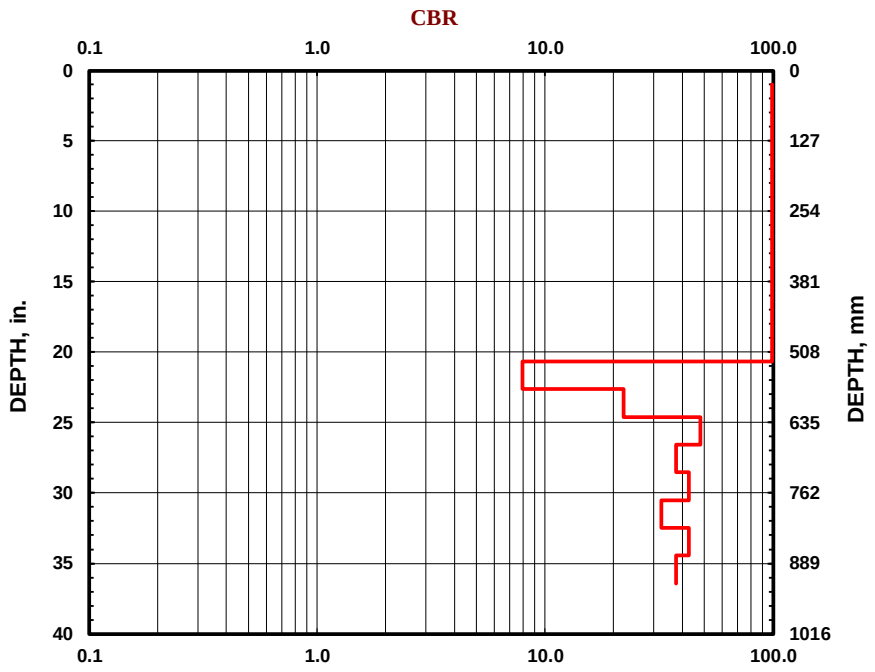
Project: *STA Division ST BRT* **Date:** 16-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty gravel with sand

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0	450	1
0	475	1
0	500	1
0	525	1
1	550	1
1	575	1
2.5	600	1
2.5	625	1
5	650	1
5	675	1
4	700	1
4	725	1
4.5	750	1
4.5	775	1
3.5	800	1
3.5	825	1
4.5	850	1
4.5	875	1
4	900	1
4	925	1



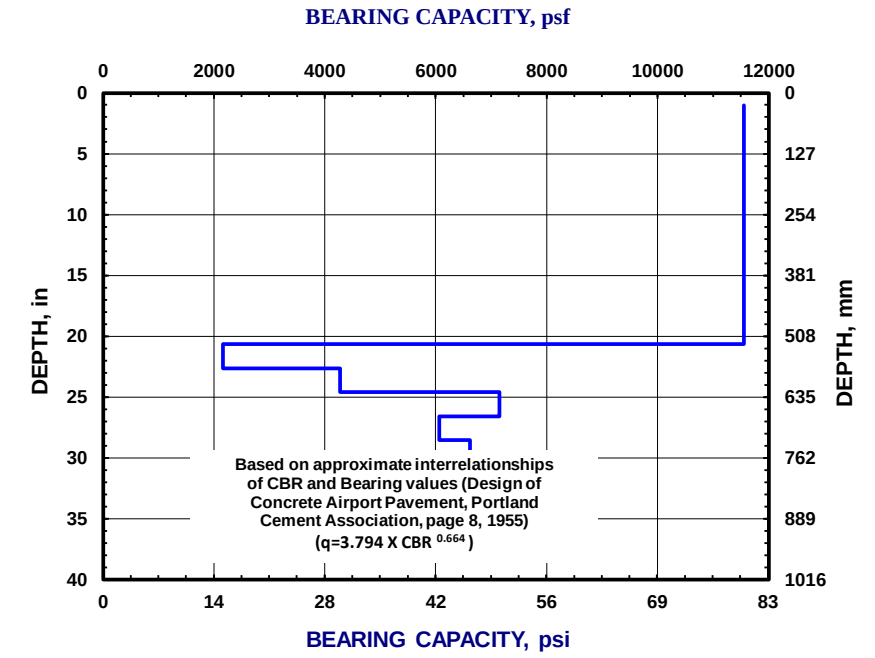


FIGURE 5-2

DCP TEST DATA

DCP-5

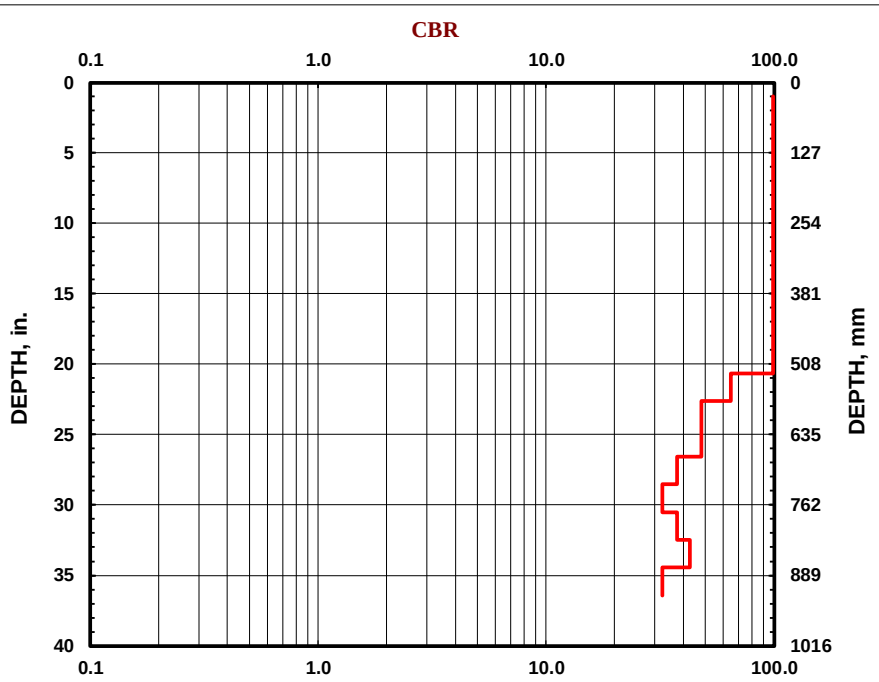
Project: *STA Division ST BRT* **Date:** 16-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty gravel with sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0	450	1
0	475	1
0	500	1
0	525	1
6.5	550	1
6.5	575	1
5	600	1
5	625	1
5	650	1
5	675	1
4	700	1
4	725	1
3.5	750	1
3.5	775	1
4	800	1
4	825	1
4.5	850	1
4.5	875	1
3.5	900	1
3.5	925	1



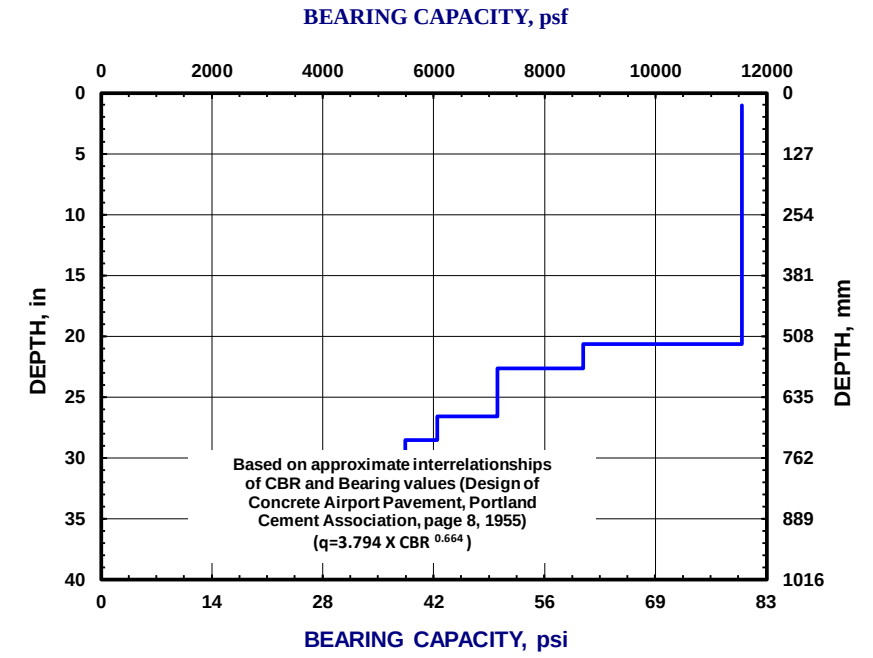


FIGURE 5-3

DCP TEST DATA

DCP-6

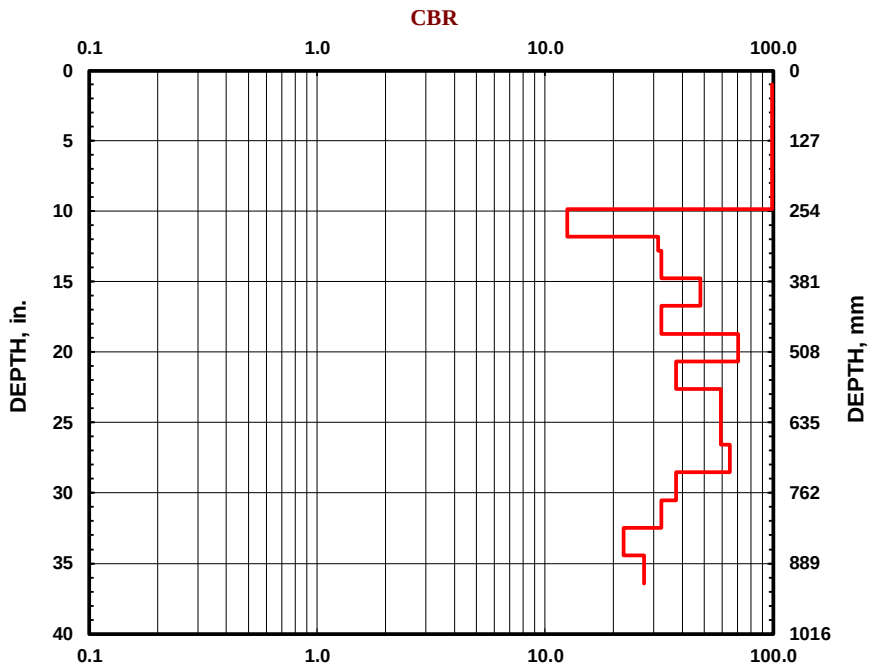
Project: *STA Division ST BRT* **Date:** 24-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty gravel with sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
1.5	275	1
1.5	300	1
3.4	325	1
3.5	350	1
3.5	375	1
5	400	1
5	425	1
3.5	450	1
3.5	475	1
7	500	1
7	525	1
4	550	1
4	575	1
6	600	1
6	625	1
6	650	1
6	675	1
6.5	700	1
6.5	725	1
4	750	1
4	775	1
3.5	800	1
3.5	825	1
2.5	850	1
2.5	875	1
3	900	1
3	925	1



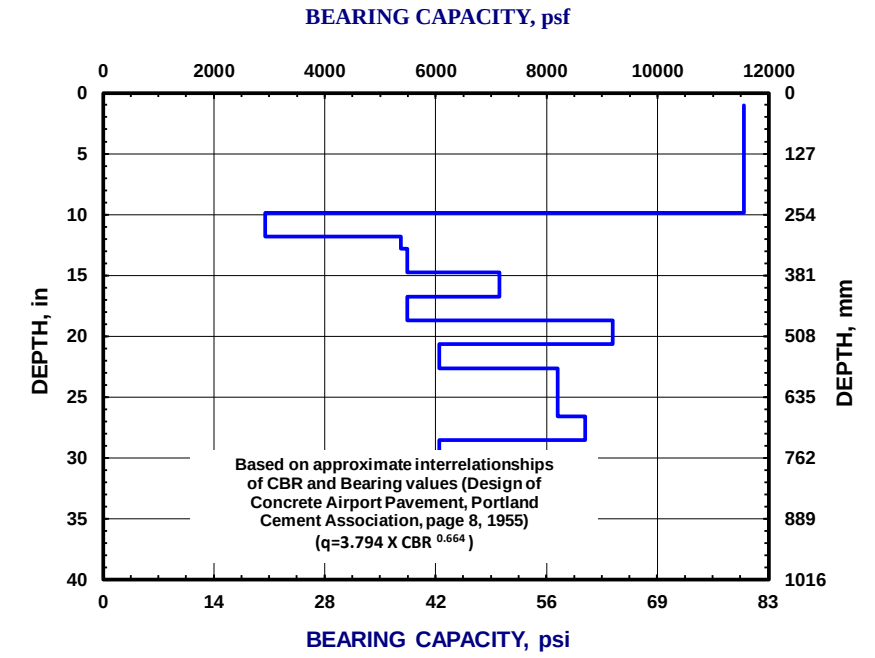


FIGURE 5-4

DCP TEST DATA

DCP-7

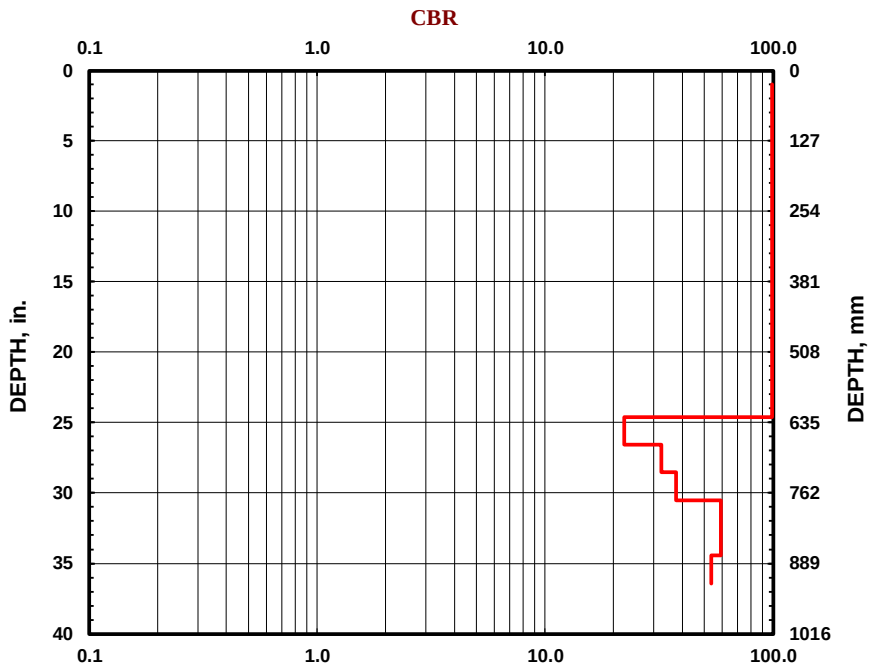
Project: *STA Division ST BRT* **Date:** 17-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty gravel with sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0	450	1
0	475	1
0	500	1
0	525	1
0	550	1
0	575	1
0	600	1
0	625	1
2.5	650	1
2.5	675	1
3.5	700	1
3.5	725	1
4	750	1
4	775	1
6	800	1
6	825	1
6	850	1
6	875	1
5.5	900	1
5.5	925	1



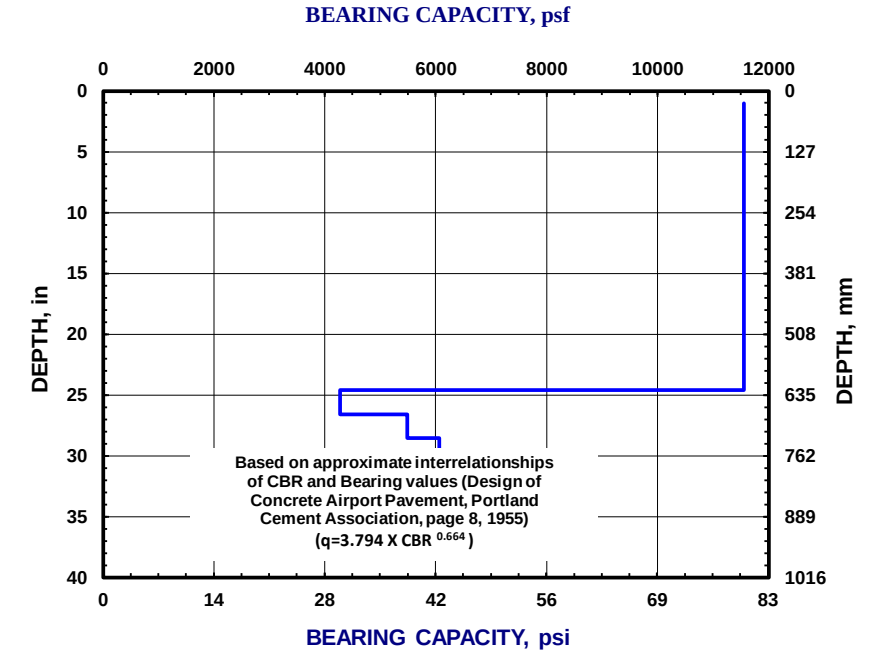


FIGURE 5-5

DCP TEST DATA

DCP-9

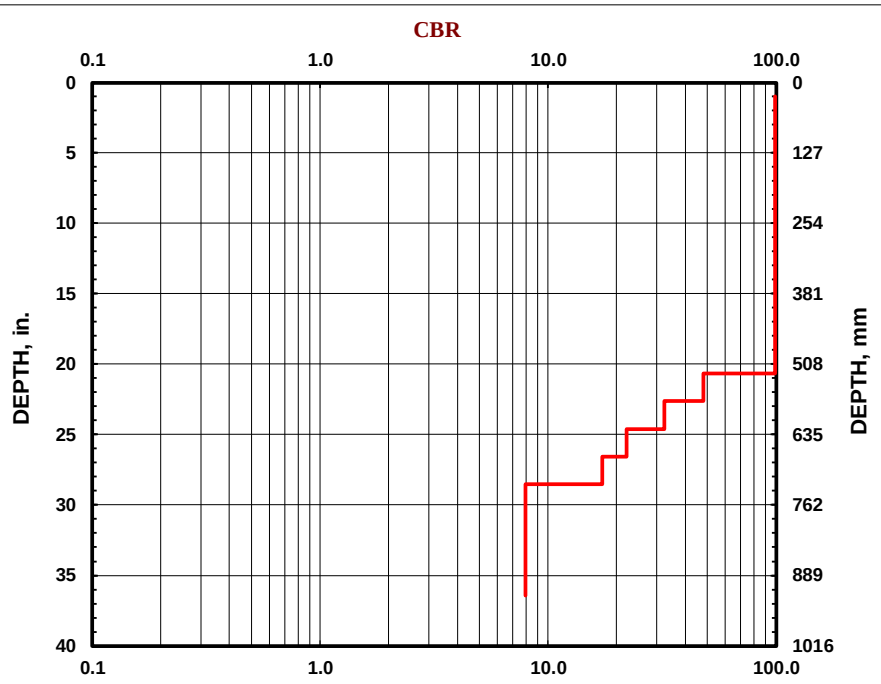
Project: *STA Division ST BRT* **Date:** 14-Jan-25

Location: Spokane County, WA **Soil Type(s):** gravel with sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0	450	1
0	475	1
0	500	1
0	525	1
5	550	1
5	575	1
3.5	600	1
3.5	625	1
2.5	650	1
2.5	675	1
2	700	1
2	725	1
1	750	1
1	775	1
1	800	1
1	825	1
1	850	1
1	875	1
1	900	1
1	925	1



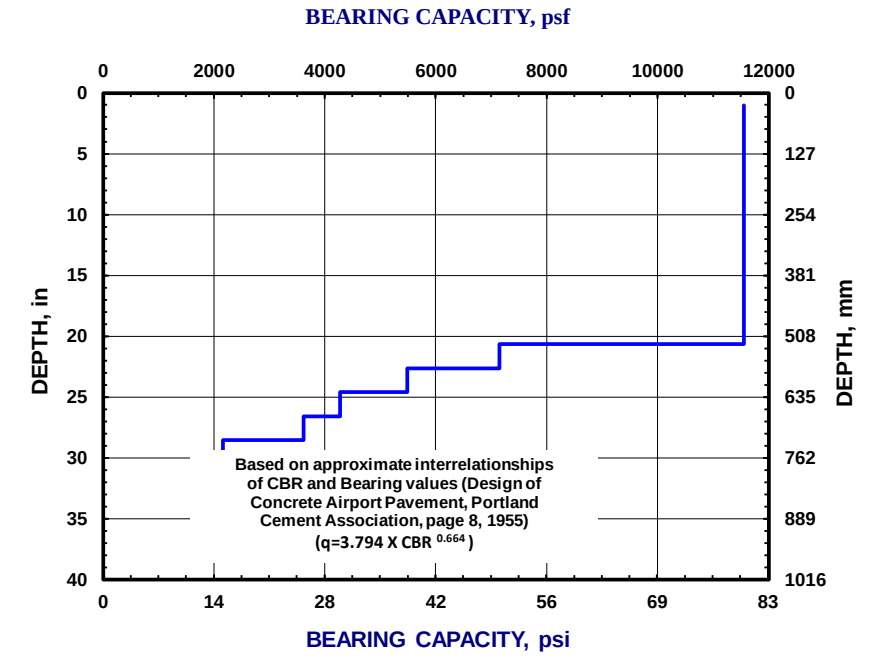


FIGURE 5-6

DCP TEST DATA

DCP-10

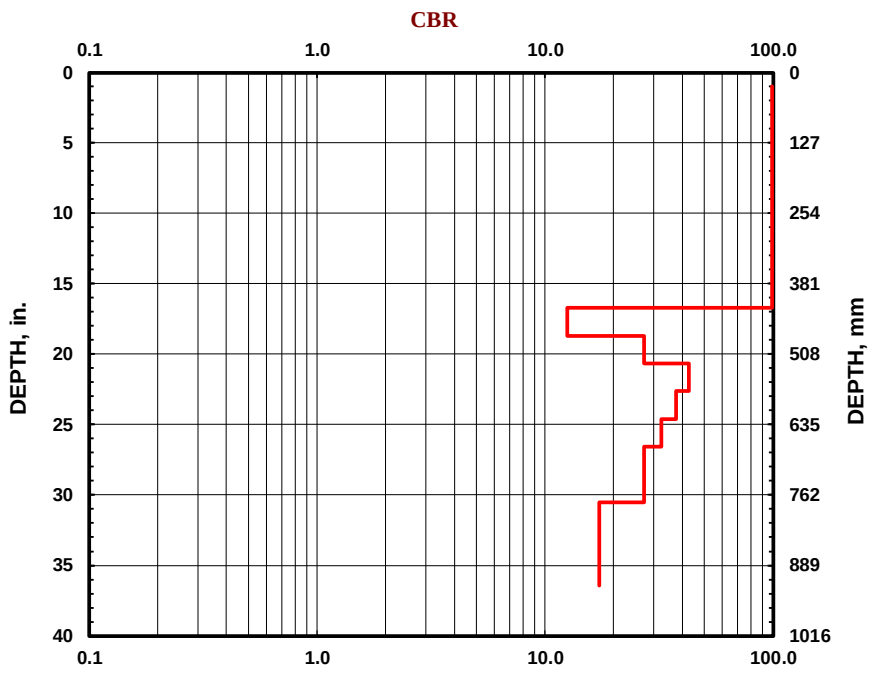
Project: *STA Division ST BRT* **Date:** 15-Jan-25

Location: Spokane County, WA **Soil Type(s):** sand with silt

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
1.5	450	1
1.5	475	1
3	500	1
3	525	1
4.5	550	1
4.5	575	1
4	600	1
4	625	1
3.5	650	1
3.5	675	1
3	700	1
3	725	1
3	750	1
3	775	1
2	800	1
2	825	1
2	850	1
2	875	1
2	900	1
2	925	1



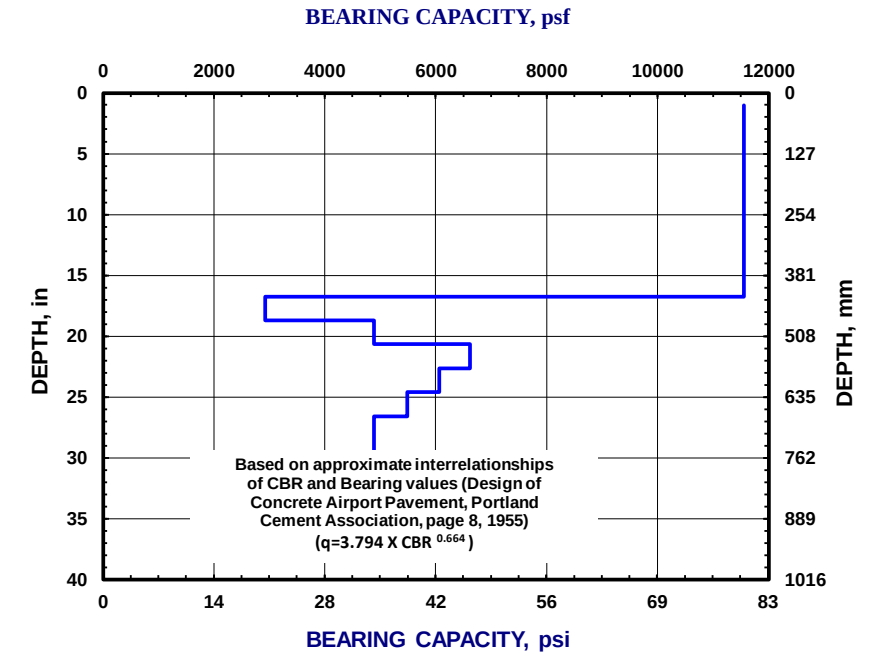


FIGURE 5-7

DCP TEST DATA

DCP-12

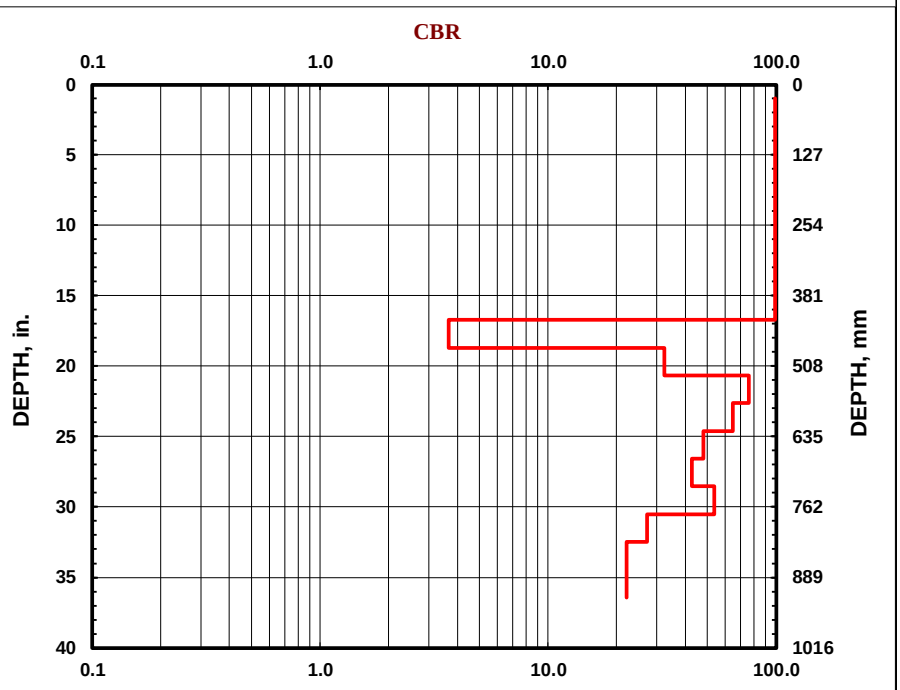
Project: *STA Division ST BRT* **Date:** 15-Jan-25

Location: Spokane County, WA **Soil Type(s):** sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0.5	450	1
0.5	475	1
3.5	500	1
3.5	525	1
7.5	550	1
7.5	575	1
6.5	600	1
6.5	625	1
5	650	1
5	675	1
4.5	700	1
4.5	725	1
5.5	750	1
5.5	775	1
3	800	1
3	825	1
2.5	850	1
2.5	875	1
2.5	900	1
2.5	925	1



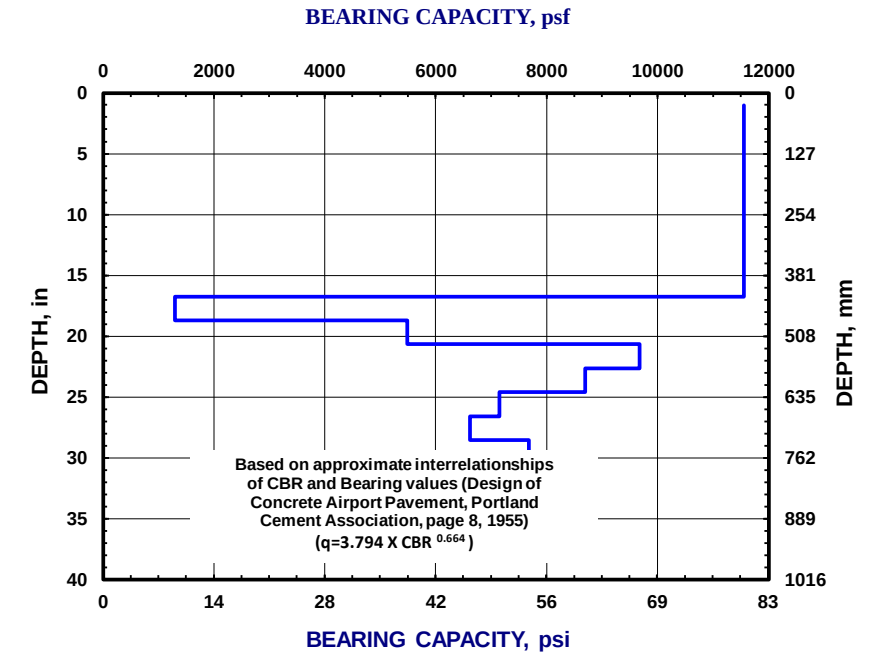


FIGURE 5-8

DCP TEST DATA

DCP-13

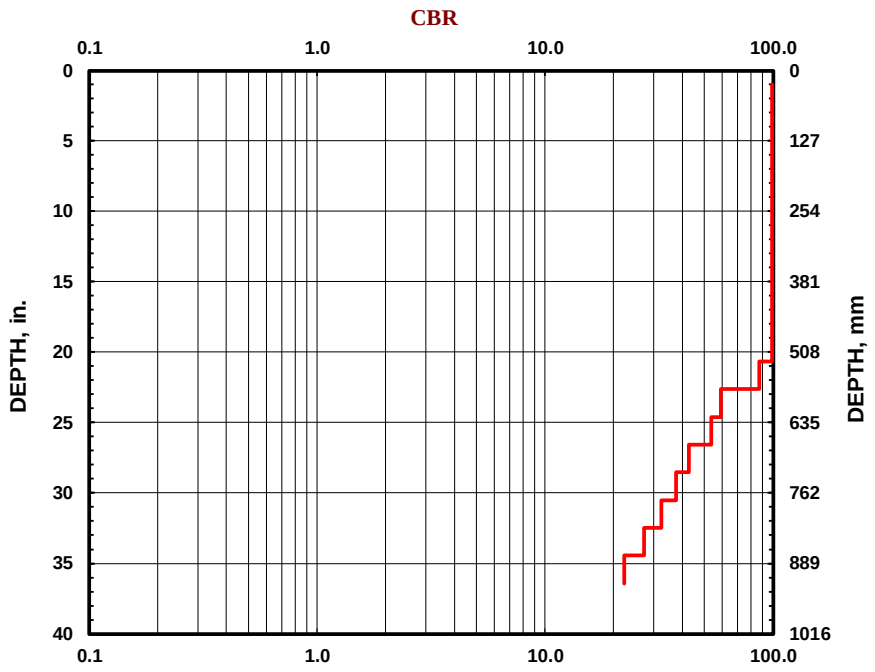
Project: *STA Division ST BRT* **Date:** 27-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0	450	1
0	475	1
0	500	1
0	525	1
8.5	550	1
8.5	575	1
6	600	1
6	625	1
5.5	650	1
5.5	675	1
4.5	700	1
4.5	725	1
4	750	1
4	775	1
3.5	800	1
3.5	825	1
3	850	1
3	875	1
2.5	900	1
2.5	925	1



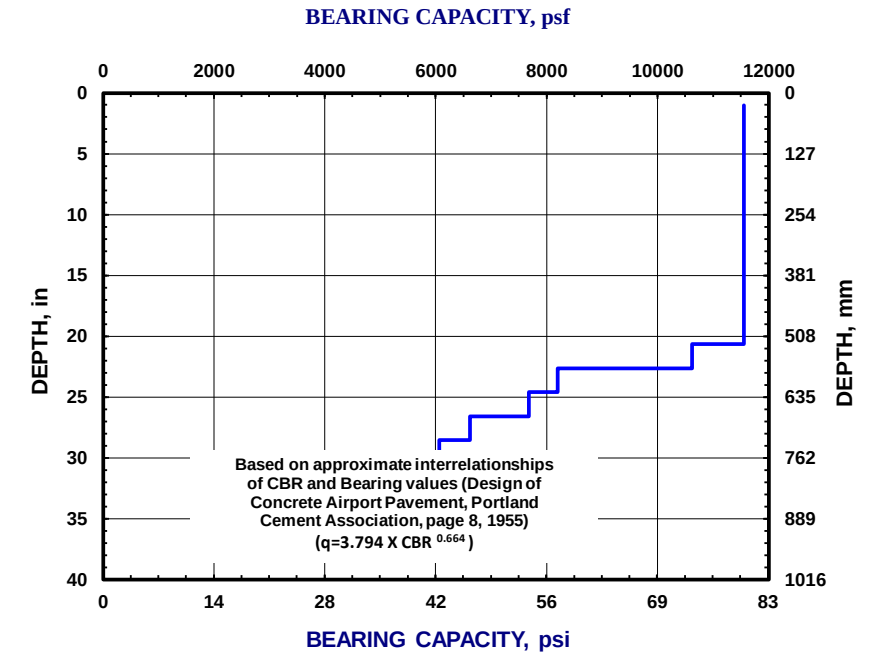


FIGURE 5-9

DCP TEST DATA

DCP-14

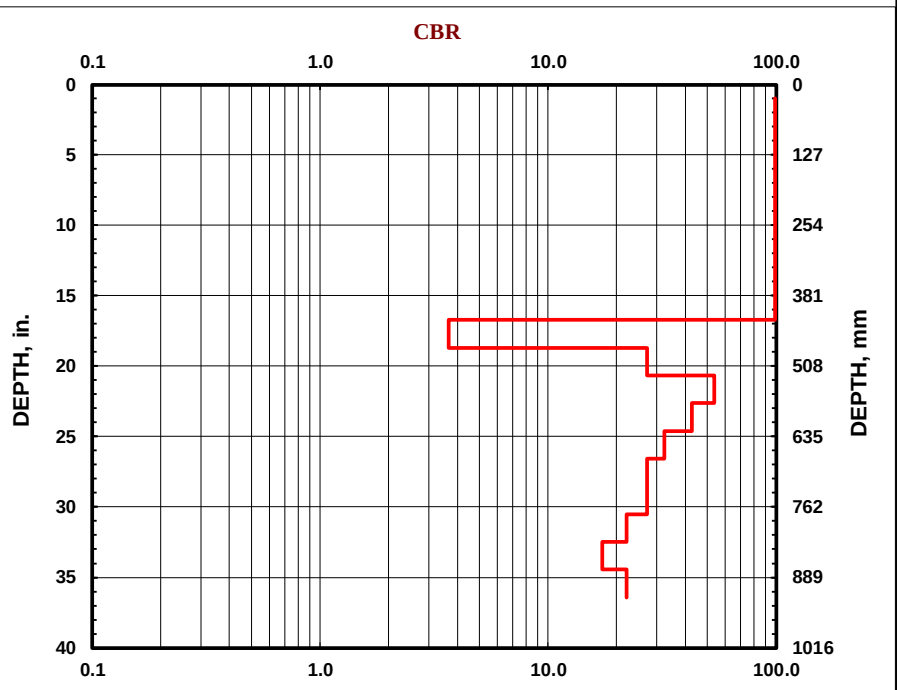
Project: *STA Division ST BRT* **Date:** 21-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0.5	450	1
0.5	475	1
3	500	1
3	525	1
5.5	550	1
5.5	575	1
4.5	600	1
4.5	625	1
3.5	650	1
3.5	675	1
3	700	1
3	725	1
3	750	1
3	775	1
2.5	800	1
2.5	825	1
2	850	1
2	875	1
2.5	900	1
2.5	925	1



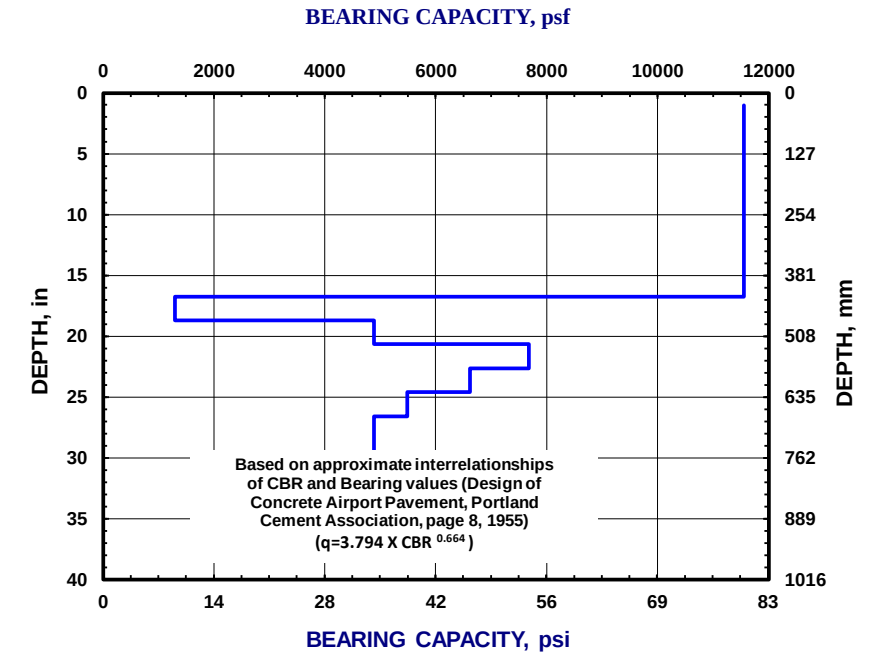


FIGURE 5-10

DCP TEST DATA

DCP-15

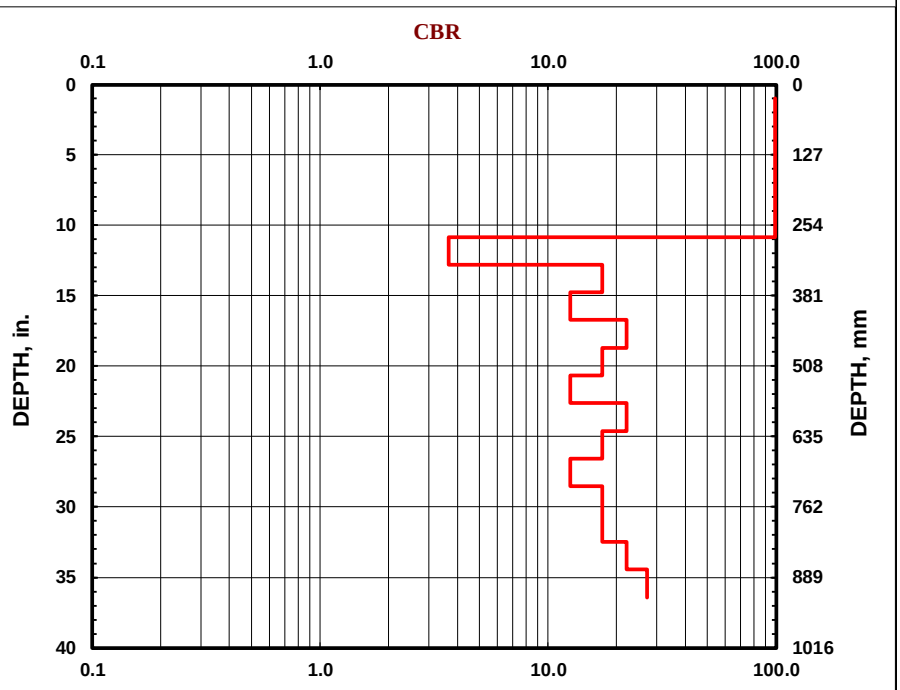
Project: *STA Division ST BRT* **Date:** 23-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty sand with gravel

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0.5	300	1
0.5	325	1
2	350	1
2	375	1
1.5	400	1
1.5	425	1
2.5	450	1
2.5	475	1
2	500	1
2	525	1
1.5	550	1
1.5	575	1
2.5	600	1
2.5	625	1
2	650	1
2	675	1
1.5	700	1
1.5	725	1
2	750	1
2	775	1
2	800	1
2	825	1
2.5	850	1
2.5	875	1
3	900	1
3	925	1



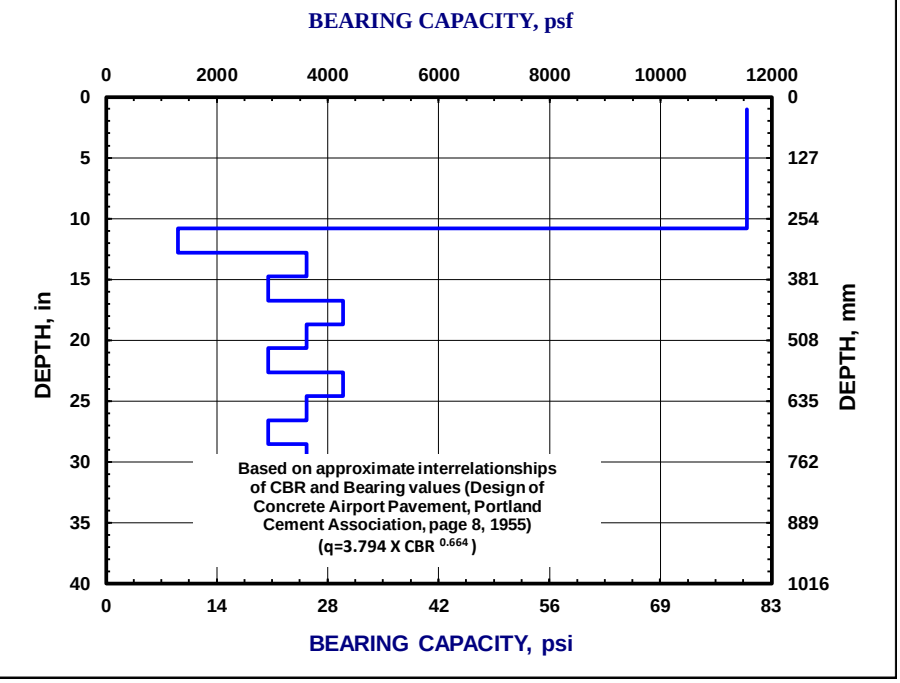


FIGURE 5-11

DCP TEST DATA

DCP-16

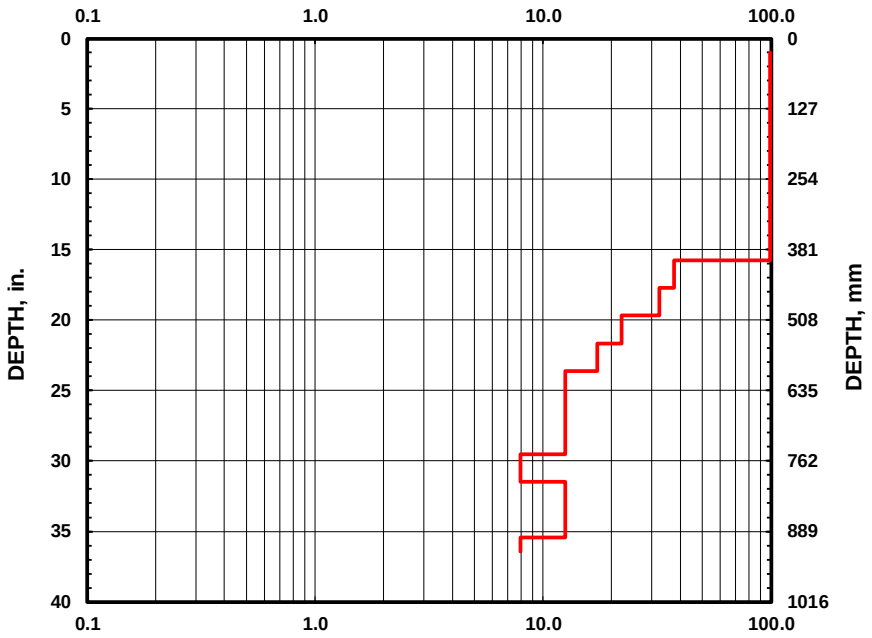
Project: *STA Division ST BRT* **Date:** 22-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
4	425	1
4	450	1
3.5	475	1
3.5	500	1
2.5	525	1
2.5	550	1
2	575	1
2	600	1
1.5	625	1
1.5	650	1
1.5	675	1
1.5	700	1
1.5	725	1
1.5	750	1
1	775	1
1	800	1
1.5	825	1
1.5	850	1
1.5	875	1
1.5	900	1
1	925	1
1		



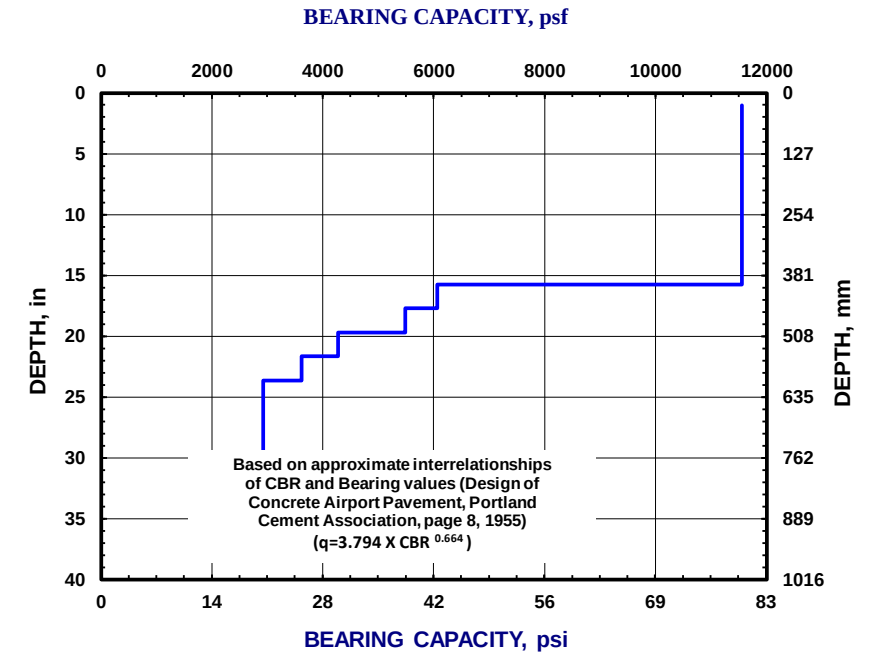


FIGURE 5-12

DCP TEST DATA

DCP-17

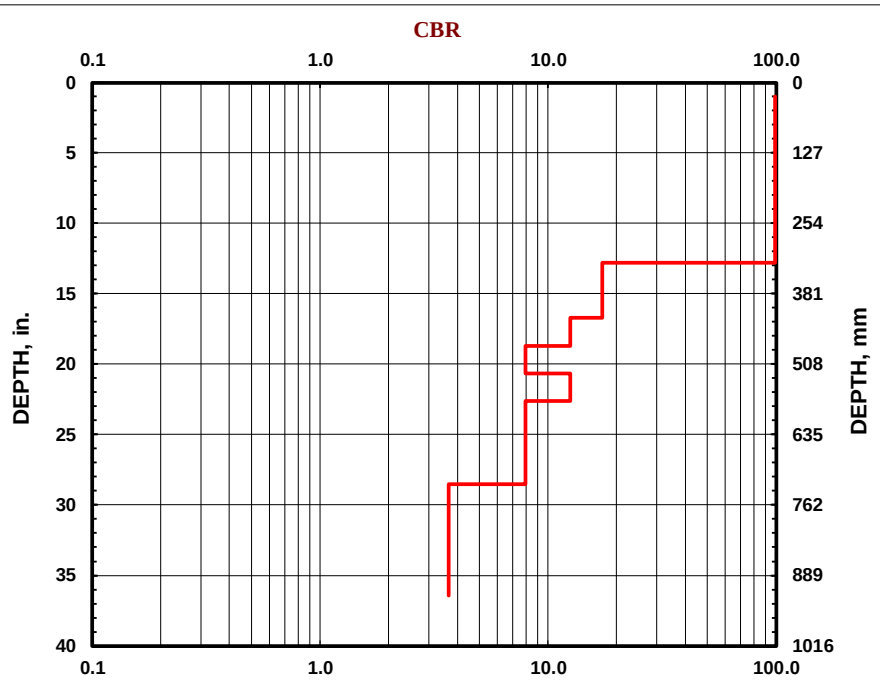
Project: *STA Division ST BRT* **Date:** 22-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
2	350	1
2	375	1
2	400	1
2	425	1
1.5	450	1
1.5	475	1
1	500	1
1	525	1
1.5	550	1
1.5	575	1
1	600	1
1	625	1
1	650	1
1	675	1
1	700	1
1	725	1
0.5	750	1
0.5	775	1
0.5	800	1
0.5	825	1
0.5	850	1
0.5	875	1
0.5	900	1
0.5	925	1



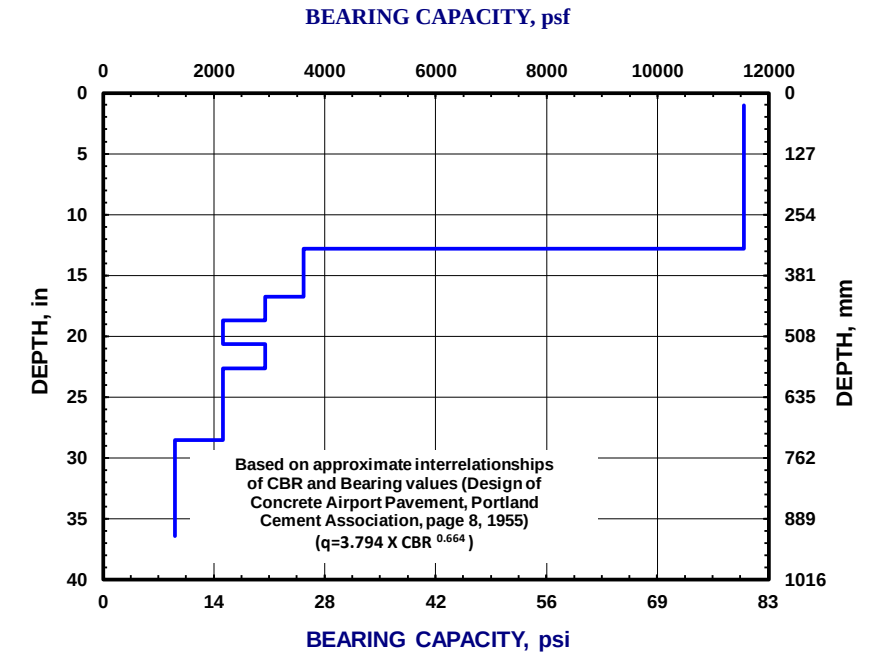


FIGURE 5-13

DCP TEST DATA

DCP-18

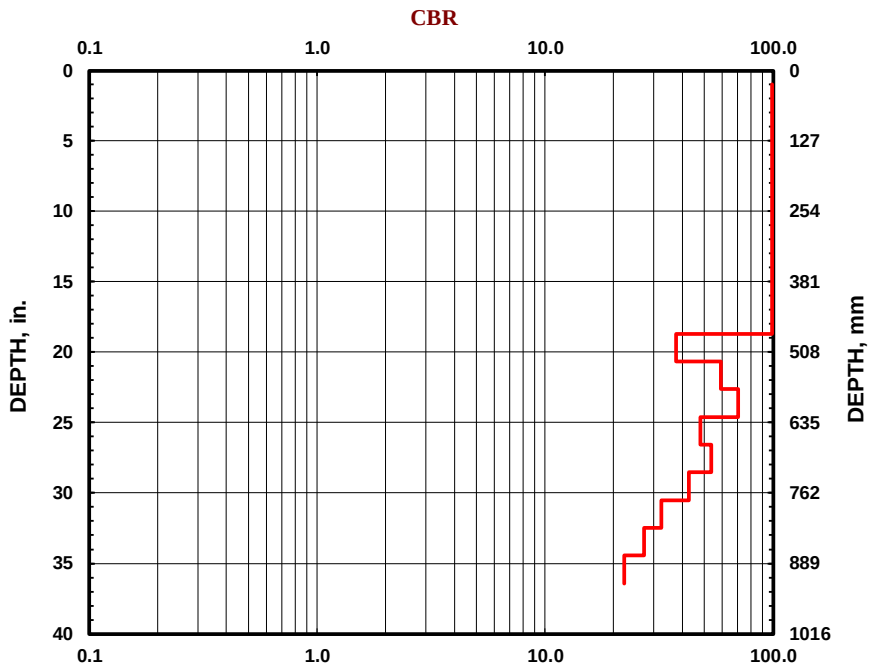
Project: *STA Division ST BRT* **Date:** 20-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0	450	1
0	475	1
4	500	1
4	525	1
6	550	1
6	575	1
7	600	1
7	625	1
5	650	1
5	675	1
5.5	700	1
5.5	725	1
4.5	750	1
4.5	775	1
3.5	800	1
3.5	825	1
3	850	1
3	875	1
2.5	900	1
2.5	925	1



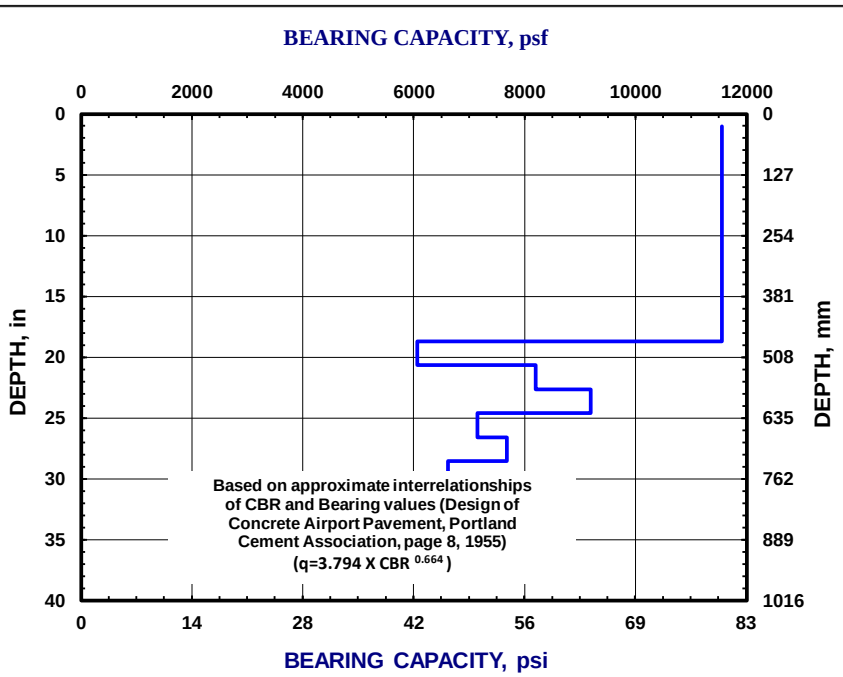


FIGURE 5-14

DCP TEST DATA

DCP-22

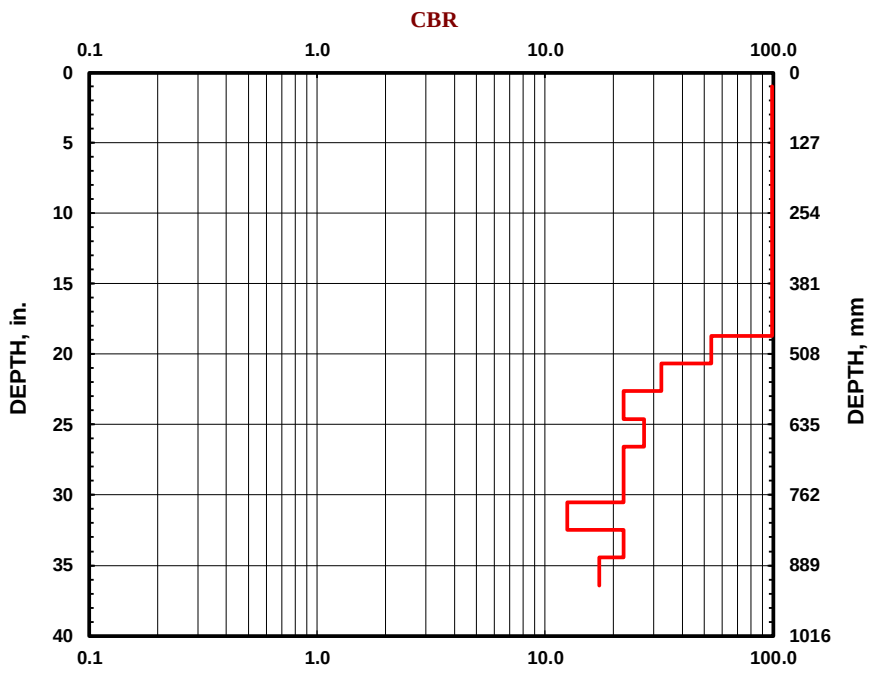
Project: *STA Division ST BRT* **Date:** 22-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty sand with gravel

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
0	300	1
0	325	1
0	350	1
0	375	1
0	400	1
0	425	1
0	450	1
0	475	1
5.5	500	1
5.5	525	1
3.5	550	1
3.5	575	1
2.5	600	1
2.5	625	1
3	650	1
3	675	1
2.5	700	1
2.5	725	1
2.5	750	1
2.5	775	1
1.5	800	1
1.5	825	1
2.5	850	1
2.5	875	1
2	900	1
2	925	1



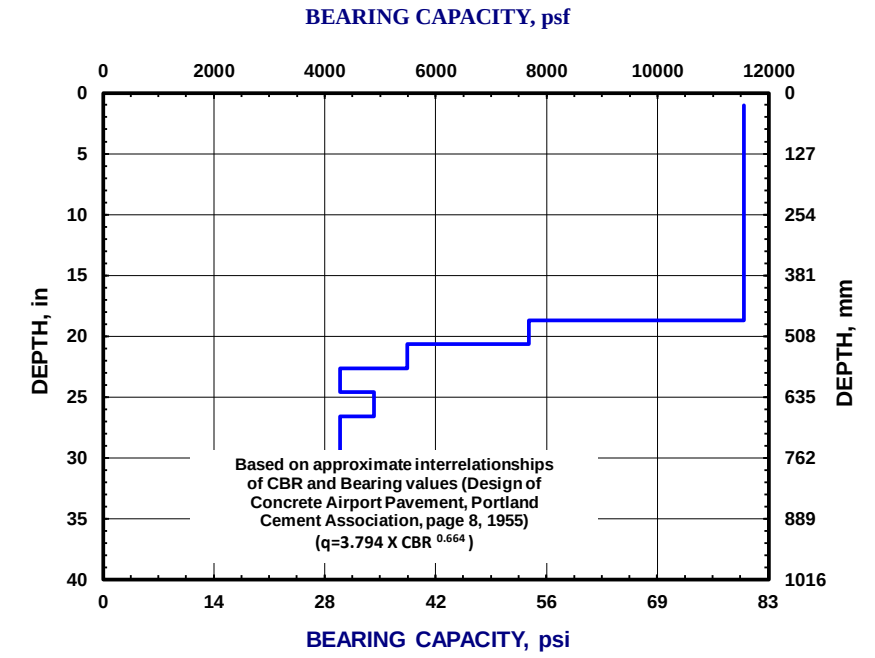


FIGURE 5-15

DCP TEST DATA

DCP-23

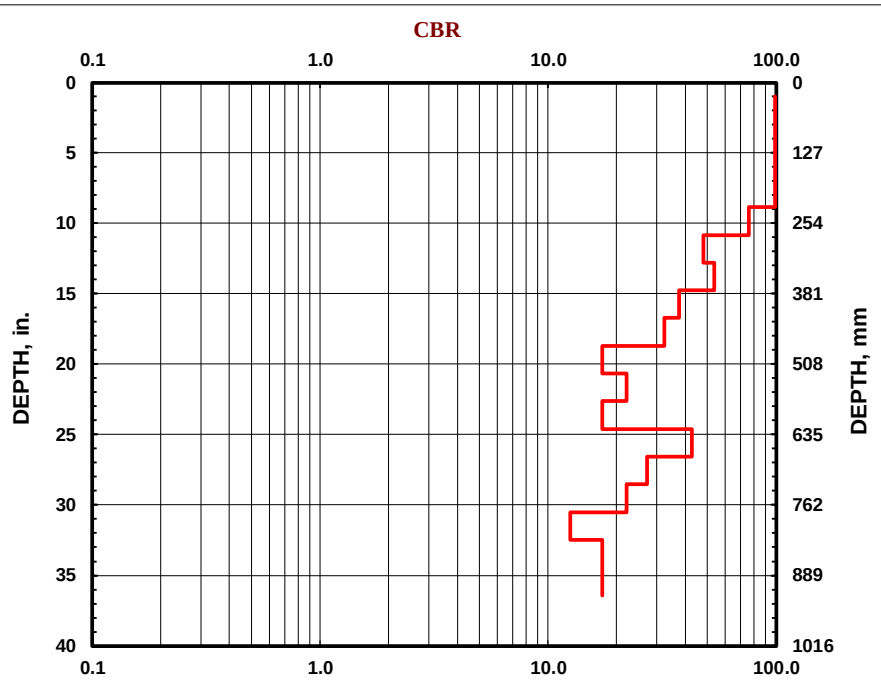
Project: *STA Division ST BRT* **Date:** 27-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty sand with gravel

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
12.5	200	1
12.5	225	1
7.5	250	1
7.5	275	1
5	300	1
5	325	1
5.5	350	1
5.5	375	1
4	400	1
4	425	1
3.5	450	1
3.5	475	1
2	500	1
2	525	1
2.5	550	1
2.5	575	1
2	600	1
2	625	1
4.5	650	1
4.5	675	1
3	700	1
3	725	1
2.5	750	1
2.5	775	1
1.5	800	1
1.5	825	1
2	850	1
2	875	1
2	900	1
2	925	1



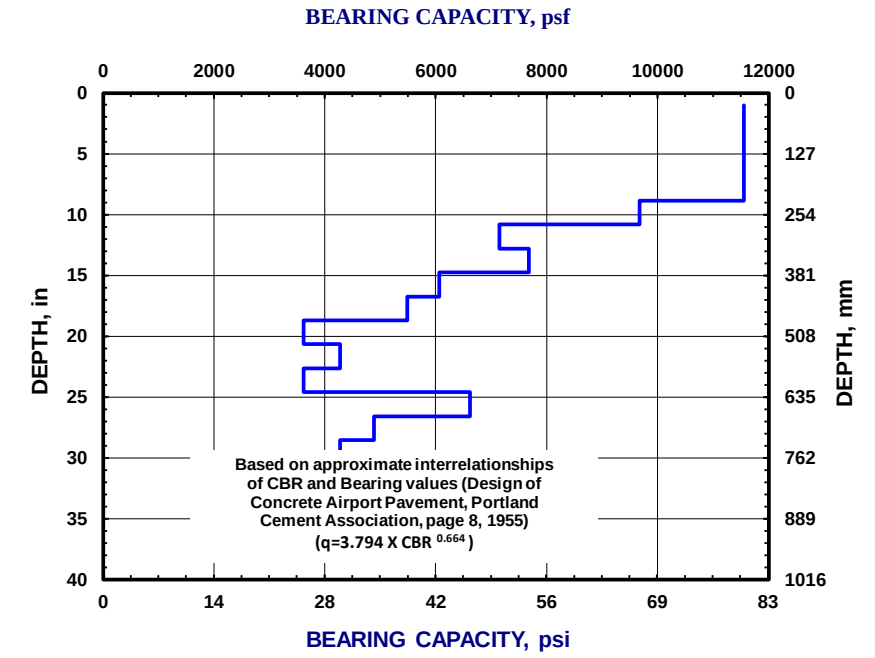


FIGURE 5-16

DCP TEST DATA

DCP-24

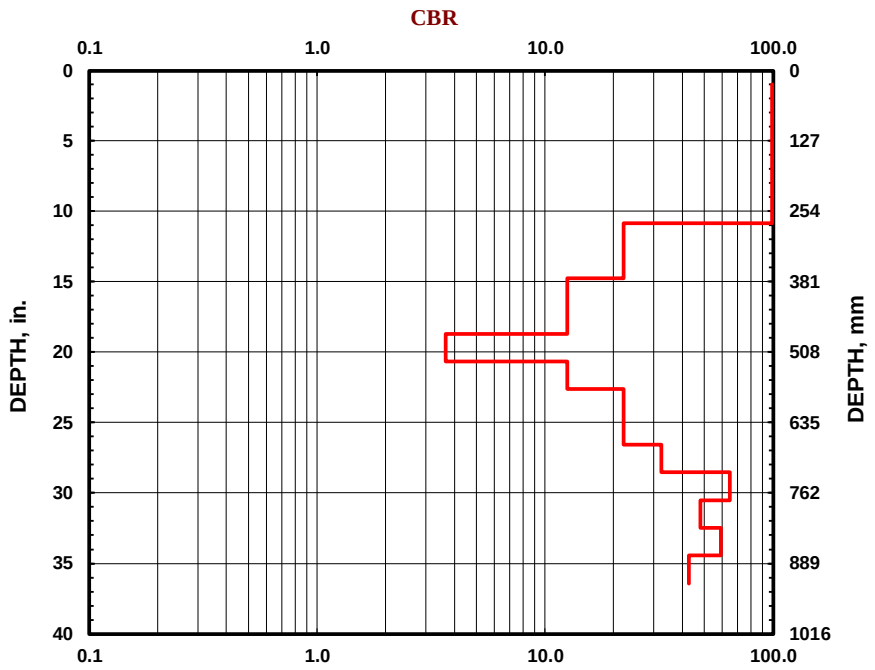
Project: *STA Division ST BRT* **Date:** 24-Jan-25

Location: Spokane County, WA **Soil Type(s):** silty gravel with sand

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	25	
0	50	1
0	75	1
0	100	1
0	125	1
0	150	1
0	175	1
0	200	1
0	225	1
0	250	1
0	275	1
2.5	300	1
2.5	325	1
2.5	350	1
2.5	375	1
1.5	400	1
1.5	425	1
1.5	450	1
1.5	475	1
0.5	500	1
0.5	525	1
1.5	550	1
1.5	575	1
2.5	600	1
2.5	625	1
2.5	650	1
2.5	675	1
3.5	700	1
3.5	725	1
6.5	750	1
6.5	775	1
5	800	1
5	825	1
6	850	1
6	875	1
4.5	900	1
4.5	925	1



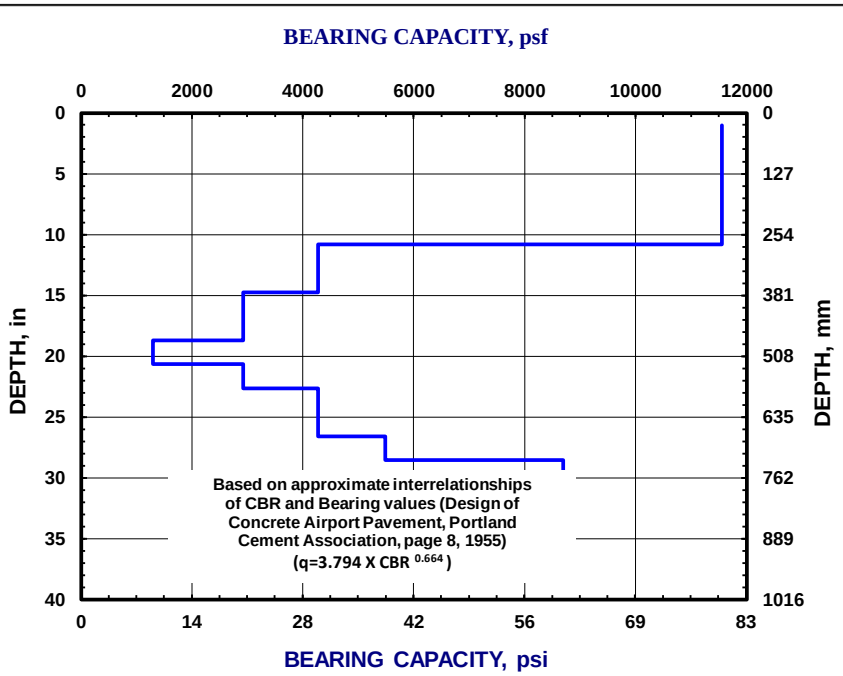


FIGURE 5-17

SOIL MECHANICS
LABORATORY SUMMARY

LABORATORY NUMBER		Units	Test Methods	25-5095	25-5096	25-5097	25-5098	25-5099	25-5100	25-5101	25-5102	25-5103	25-5104	25-5105	25-5106	25-5324	25-5107	25-5108	25-5109	25-5110	25-5111	25-5112	25-5113	25-5114	25-5115
BORING NUMBER				1	1	2	2	3	3	4	4	4	5	5	5	6	6	6	6	7	7	7	7	8	8
DEPTH	TOP	feet		5	10	1.5	2.3	2.5	11	7.5	15	20	7.5	15	25	0.75	10	15	25	7.5	15	20	25	1.5	9
	BOTTOM	feet		7	12	2.3	2.7	3.5	12	9.5	17	22	9.5	17	27	2.75	12	17	27	9.5	17	22	26	3.5	11
STRATUM				*fill*	*sand*	*clayey sand*	*gravel*	*fill*	*sandy silt*	*gravel*	*gravel*	*gravel*	*gravel*	*gravel*	*gravel*	*fill*	*gravel*	*gravel*	*gravel*	*gravel*	*sand*	*sand*	*gravel*	*fill*	*gravel*
SAMPLE TYPE				3" S.S.	3" S.S.	SPT	SPT	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	SPT	3" S.S.
MOISTURE CONTENT		%	ASTM D2216	7.0		9		11.5	44.8															6.4	
LIQUID LIMIT		%	ASTM D4318	28				27																	
PLASTIC LIMIT		%		19				23																	
PLASTICITY INDEX		%		9				4	NP*																
UNIFIED CLASSIFICATION			ASTM D2487																						
SIEVE ANALYSIS			ASTM D6913																						
	6"																								
	3"			100				100		100							100			100					100
	1 1/2"			85	100			82	100	86				100		100	94			95					92
S	1"	%		74	99	100	100	72	92	81				89		64	94			81				100	88
I	3/4"			70	96	93	91	66	92	73				82		52	94			72				94	75
E	1/2"	P		65	89	83	79	59	92	52				69		38	88			52		100		75	62
V	3/8"	A		59	85	81	68	54	92	41				59		33	80			42		99		68	54
E	#4	S		48	72	67	40	44	91	24				38		25	47			28		97		49	38
	#10	S		31	49	42	22	35	89	13				18		17	20			17		97		29	25
S	#16	I		22	27	35	16	30	88	10				14		14	14			11		96		22	17
I	#30	N		15	11	31	11	26	88	8				10		12	10			6		86		16	9
Z	#40	G		14	8	29	10	24	87	7				9		12	9			5		58		13	7
E	#100			12	6	24	7	20	85	6				7		10	7			3		8		9	4
	#200			10	4.7	18	5	17	78	5.4	3.3	3	5	6.4	8.1	9.2	6.3	4.4	4.4	2.8	4.2	5.6	3.6	7.2	3.2
	.05mm																								
	.01mm																								
	.005mm																								
	.001mm																								

NP = Non Plastic
Gradation analysis of split spoon samples excludes particles larger than the sampler opening

SOIL MECHANICS
LABORATORY SUMMARY

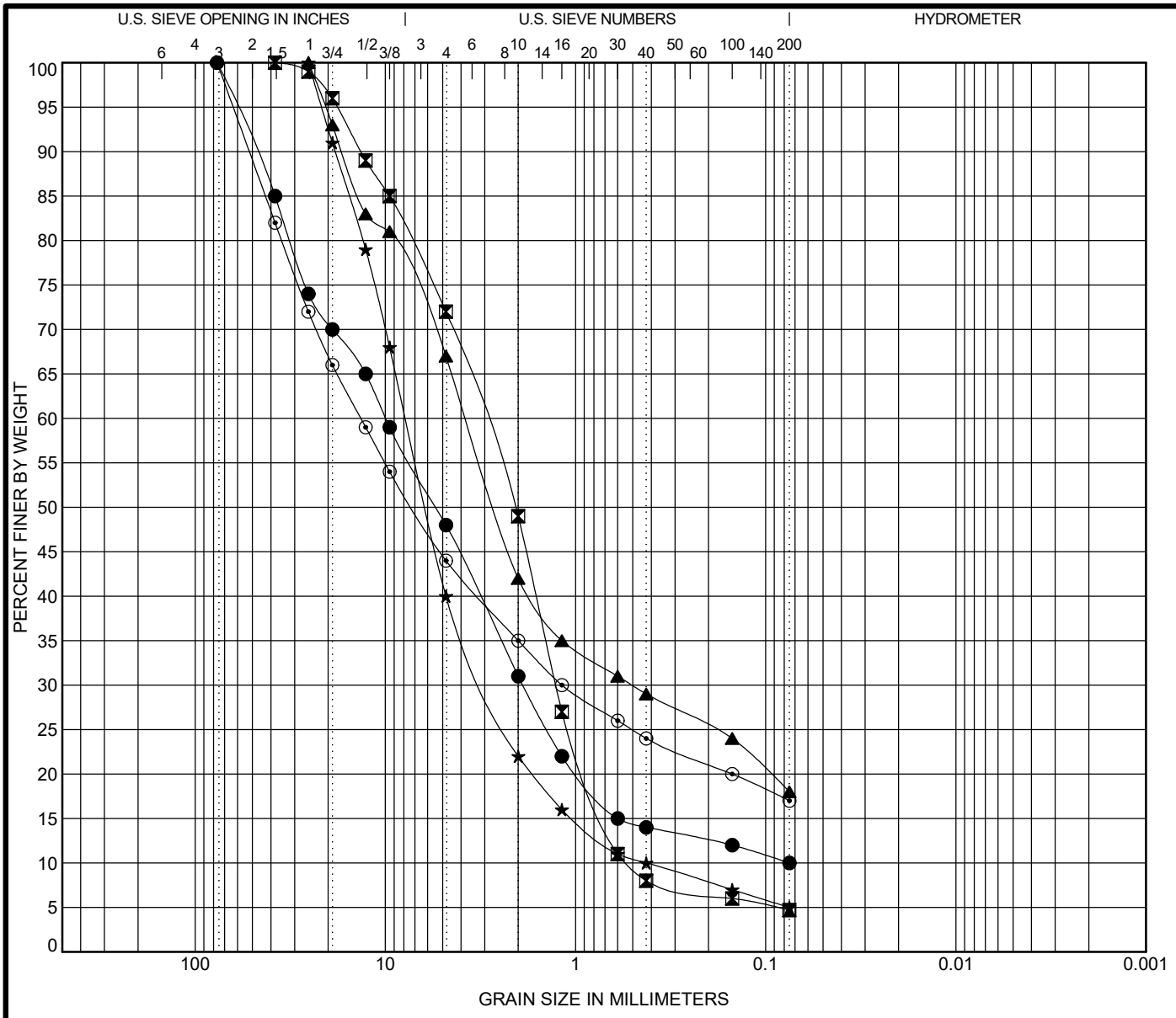
LABORATORY NUMBER		Units	Test Methods	25-5116	25-5117	25-5118	25-5119	25-5120	25-5121	25-5122	25-5123	25-5124	25-5125	25-5126	25-5127	25-5128	25-5129	25-5130	25-5131	25-5132	25-5133	25-5134	25-5135	25-5136	25-5137
BORING NUMBER				8	9	9	9	10	10	10	12	12	13	13	13	14	14	14	15	15	15	16	16	16	17
DEPTH	TOP	feet		19	7.5	15	25	7.5	15	25	10	20	2	10	25	10	15	25	5	7.5	25	1	15	25	1
	BOTTOM	feet		21	9	16.5	26.5	9	16.5	26.5	11.5	21.5	3.5	12	27	12	17	27	7	9.5	27	3	17	27	3
STRATUM				*gravel*	*sand*	*sand*	*sand*	*sand*	*sand*	*sand*	*sand*	*sand*	*fill*	*sand*	*sand*	*sand*	*sand*	*sand*	*sand*	*sand*	*sand*	*sand*	*sand*	*sand*	*fill*
SAMPLE TYPE				3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	SPT	3" S.S.	SPT	3" S.S.	3" S.S.	SPT	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.
MOISTURE CONTENT		%	ASTM D2216										6.6									8.3			9.8
LIQUID LIMIT		%	ASTM D4318										24												
PLASTIC LIMIT		%											17												
PLASTICITY INDEX		%											7									NP*			NP*
UNIFIED CLASSIFICATION			ASTM D2487																						
SIEVE ANALYSIS			ASTM D6913																						
	6"																								
	3"																								
	1 1/2"									100												100			
S	1"	%			100					99		100										99			100
I	3/4"				98					99		97			100							98			99
E	1/2"	P			88					97		95			99		100					96			97
V	3/8"	A			80					95	100	95	100		99		99					94			97
E	#4	S			55					90	99	95	99		98	100	99					93			91
	#10	S			24					77	95	93	97		92	98	93			100		91	100	100	82
S	#16	I			14					54	80	76	86		76	88	70			96		87	99	99	70
I	#30	N			8					20	32	27	49		26	38	29			47		51	68	67	51
Z	#40	G			6					11	14	13	34		14	19	17			22		33	27	30	42
E	#100				4					5	6	5	20		6	9	8			8		14	6	7	24
	#200			3.4	3.2	4.5	3.7	3.1	4.2	4	4.3	3.7	16	4.6	4.3	7.4	5.8	4.3	8.5	5.7	3.7	11	4.3	4.5	18
	.05mm																								
	.01mm																								
	.005mm																								
	.001mm																								

NP = Non Plastic
Gradation analysis of split spoon samples excludes particles larger than the sampler opening

SOIL MECHANICS
LABORATORY SUMMARY

LABORATORY NUMBER		Units	Test Methods	25-5157	25-5138	25-5139	25-5140	25-5141	25-5142	25-5143	25-5144	25-5145	25-5146	25-5147	25-5148	25-5149	25-5150	25-5151	25-5152	25-5153	255324	25-5154	25-5155	25-5156
BORING NUMBER				17	17	17	18	18	18	19	19	19	20	20	20	22	22	22	23	23	25	24	24	24
DEPTH	TOP	feet		2	10	15.3	1.5	7.5	25	9.5	14.5	25	1.5	14.5	19.5	1.5	8.5	25	5	10	0.8	10	15	25
	BOTTOM	feet		3	12	15.6	3.5	9.5	27	11.5	16.5	27	3	16.5	21.5	3.5	10.5	27	7	12	1.8	11	17	27
STRATUM				*fill*	*sand*	*sandy silt*	*silty sand*	*sand*	*sand*	*silty sand*	*silty sand*	*sand*	*fill*	*sand*	*sand*	*fill*	*sand*	*sand*	*gravel*	*gravel*	*fill*	*gravel*	*gravel*	*gravel*
SAMPLE TYPE				3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	SPT	3" S.S.	3" S.S.	SPT	3" S.S.	3" S.S.	3" S.S.	3" S.S.	3" S.S.	SPT	SPT	3" S.S.	3" S.S.	3" S.S.	3" S.S.
MOISTURE CONTENT		%	ASTM D2216			27	8.4			16.3			6.8			14.9								
LIQUID LIMIT		%	ASTM D4318													28								
PLASTIC LIMIT		%														23								
PLASTICITY INDEX		%				NP*	NP*			NP*						5								
UNIFIED CLASSIFICATION			ASTM D2487																					
SIEVE ANALYSIS			ASTM D6913																					
	6"																							
	3"																				100		100	
	1 1/2"												100	100	100	100					94		96	
S	1"	%											87	95	98	98				100	90		87	
I	3/4"						100			100			87	93	97	98	100			96	83		78	
E	1/2"	P					99			99			81	88	95	97	99			84	71		57	
V	3/8"	A		100			99			99			76	85	93	96	98			74	64		42	
E	#4	S		99			98			98			64	73	88	91	95			47	47		19	
	#10	S		98		100	97	100		96			47	46	65	76	83			27	30		10	
S	#16	I		97		99	96	99		95	100		38	26	37	54	57			22	25		8	
I	#30	N		93		99	85	85		93	97		30	11	12	32	16			18	21		6	
Z	#40	G		85		99	67	59		92	90		27	9	9	27	9			16	20		6	
E	#100			28		96	23	11		61	26		20	5	5	22	5			14	17		5	
	#200			18	6.6	74	16	7.2	6.4	32	13	7.8	16	3.8	3.6	19	3.9	3.2	7.4	12	17	3.1	4.4	5.8
	.05mm								21	13			3.5											
	.01mm								13	7.2			3.1											
	.005mm								9.1	4.1			2.1											
	.001mm								4.8	1.8			0.8											

NP = Non Plastic
Gradation analysis of split spoon samples excludes particles larger than the sampler opening



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	1	5.0	**POORLY GRADED GRAVEL with CLAY and SAND(GP-GC)**	**28**	**19**	**9**	**4.76**	**132.95**
⊠	1	10.0	**POORLY GRADED SAND with GRAVEL(SP)**				**0.99**	**5.68**
▲	2	1.5						
★	2	2.3					**2.62**	**18.39**
⊙	3	2.5						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	1	5.0	**76.8**	**9.971**	**1.886**	**0.075**	**51.7**	**37.8**	**10.0**	
⊠	1	10.0	**38**	**3.04**	**1.268**	**0.535**	**28.3**	**67.0**	**4.7**	
▲	2	1.5	**25.4**	**3.756**	**0.505**		**33.3**	**48.7**	**18.0**	
★	2	2.3	**25.4**	**7.817**	**2.951**	**0.425**	**60.2**	**34.8**	**5.0**	
⊙	3	2.5	**76.8**	**13.452**	**1.18**		**55.5**	**26.9**	**17.0**	

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GRAIN SIZE DISTRIBUTION

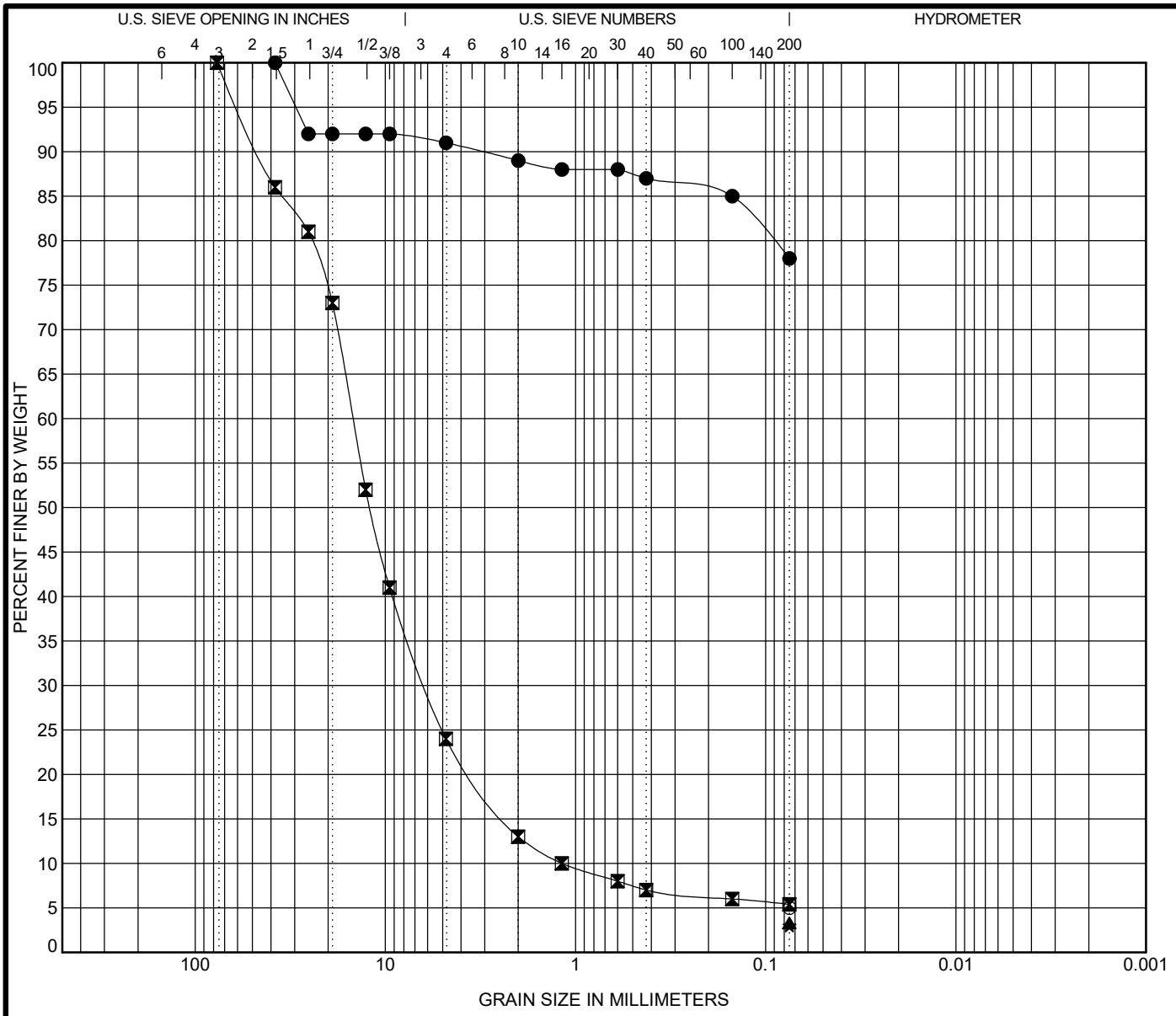
Project: STA Division Street BRT

Location: Spokane, Washington

Number: S23090

FIGURE 7-1

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	3	11.0						
⊠	4	7.5					2.14	12.55
▲	4	15.0						
★	4	20.0						
⊙	5	7.5						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	3	11.0	38				9.0	13.0	78.0	
⊠	4	7.5	76.8	14.806	6.108	1.18	75.7	18.5	5.4	
▲	4	15.0	0.075				0.0	0.0	3.3	
★	4	20.0	0.075				0.0	0.0	3.0	
⊙	5	7.5	0.075				0.0	0.0	5.0	

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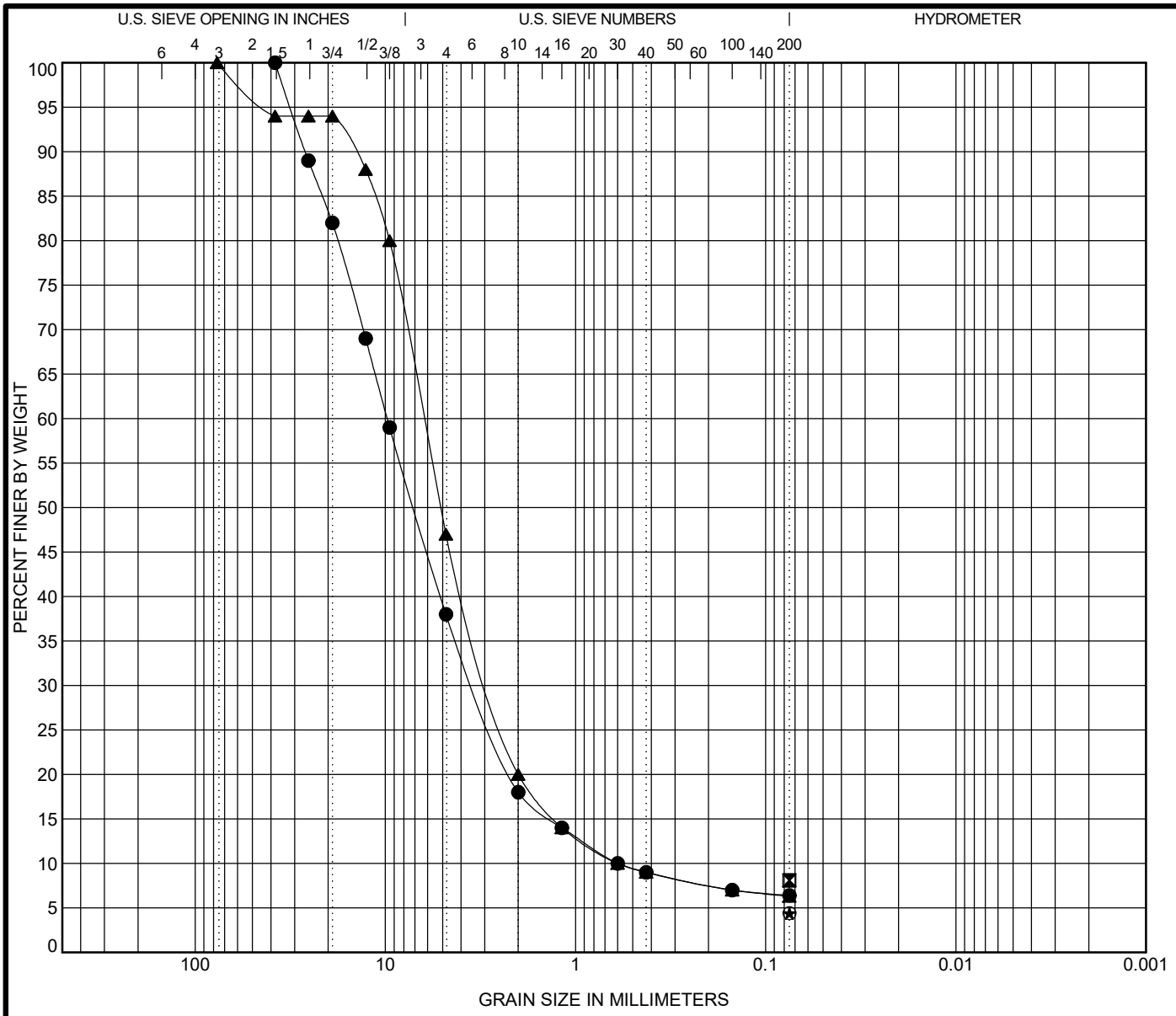
Project: STA Division Street BRT

Location: Spokane, Washington

Number: S23090

FIGURE 7-2

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	5	15.0					1.95	16.30
⊠	5	25.0						
▲	6	10.0					2.03	10.47
★	6	15.0						
⊙	6	25.0						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	5	15.0	38	9.78	3.382	0.6	62.2	31.4	6.4	
⊠	5	25.0	0.075				0.0	0.0	8.1	
▲	6	10.0	76.8	6.281	2.766	0.6	53.1	40.4	6.3	
★	6	15.0	0.075				0.0	0.0	4.4	
⊙	6	25.0	0.075				0.0	0.0	4.4	

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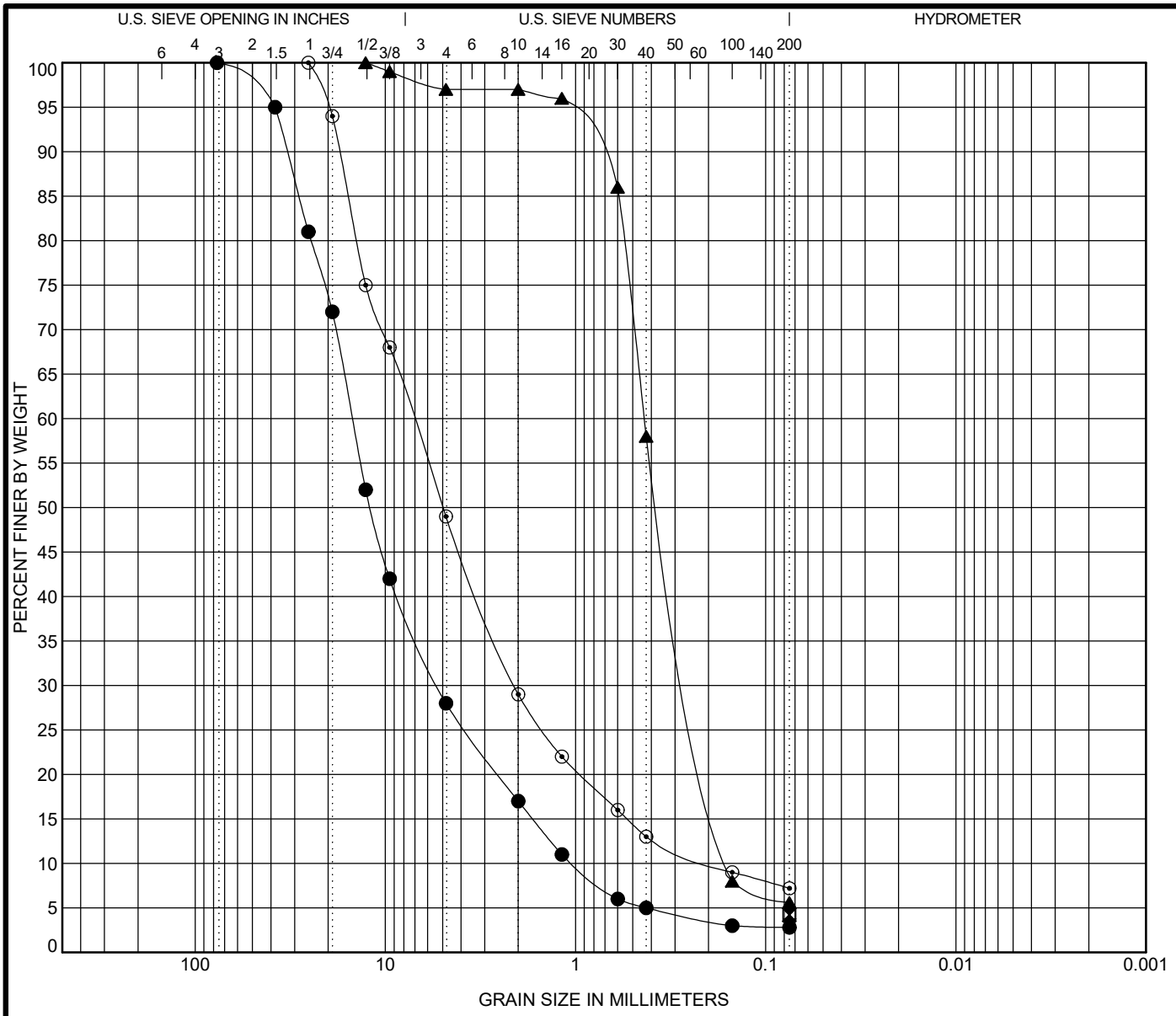
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Location: Spokane, Washington

Number: S23090

FIGURE 7-3

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	7	7.5	**WELL-GRADED GRAVEL with SAND(GW)**				**1.82**	**14.48**
⊠	7	15.0						
▲	7	20.0					**0.83**	**2.79**
★	7	25.0						
⊙	8	1.5					**3.15**	**36.62**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	7	7.5	**76.8**	**14.921**	**5.292**	**1.031**	**72.0**	**25.1**	**2.8**	
⊠	7	15.0	**0.075**				**0.0**	**0.0**	**4.2**	
▲	7	20.0	**12.7**	**0.436**	**0.237**	**0.156**	**3.0**	**91.4**	**5.6**	
★	7	25.0	**0.075**				**0.0**	**0.0**	**3.6**	
⊙	8	1.5	**25.4**	**7.127**	**2.089**	**0.195**	**51.2**	**41.6**	**7.2**	

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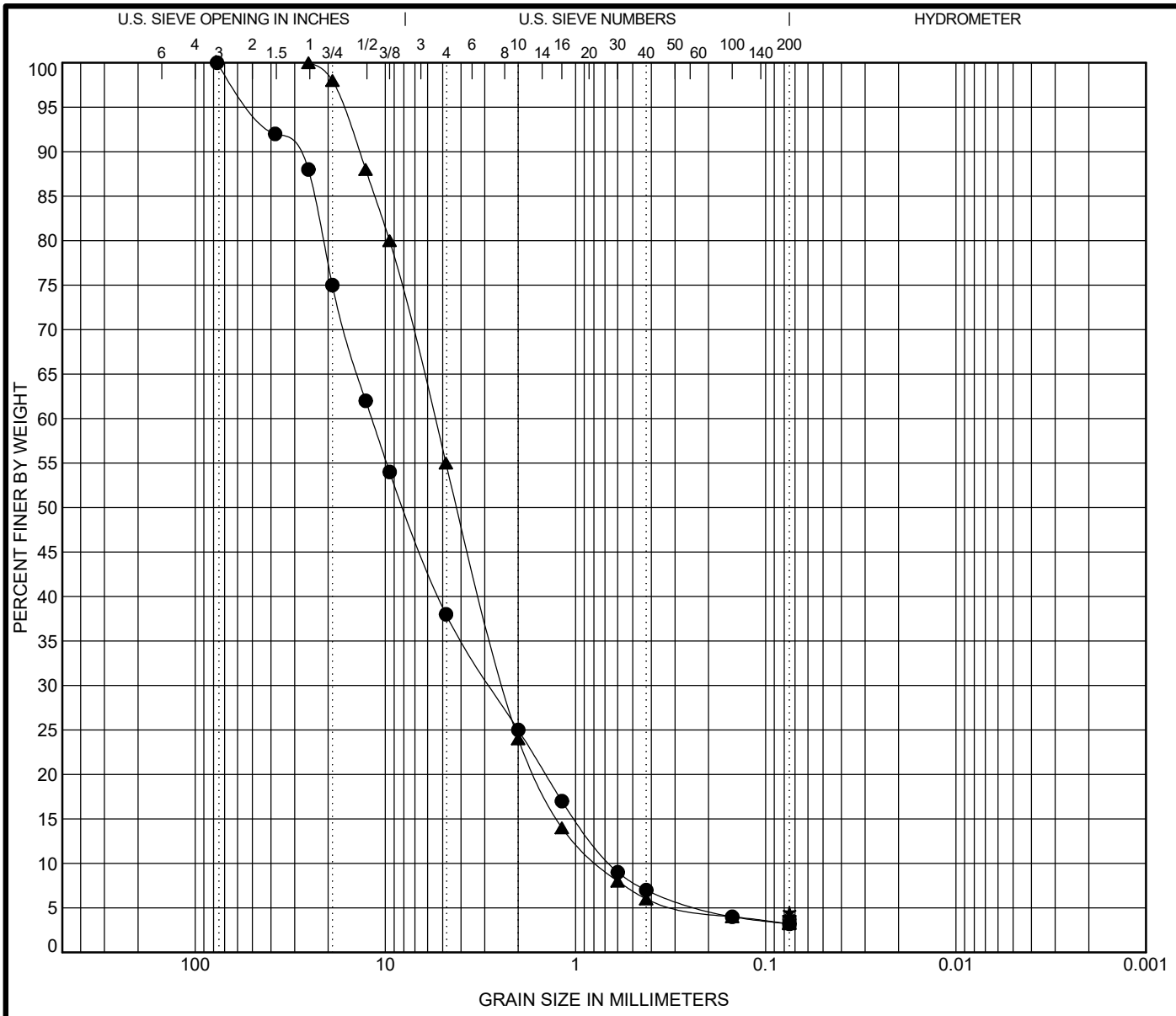
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Location: Spokane, Washington

Number: S23090

FIGURE 7-4

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	8	9.0	**WELL-GRADED GRAVEL with SAND(GW)**				**1.02**	**18.09**
⊠	8	19.0						
▲	9	7.5	**WELL-GRADED SAND with GRAVEL(SW)**				**1.36**	**7.32**
★	9	15.0						
⊙	9	25.0						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	8	9.0	**76.8**	**11.811**	**2.801**	**0.653**	**61.9**	**34.6**	**3.2**	
⊠	8	19.0	**0.075**				**0.0**	**0.0**	**3.4**	
▲	9	7.5	**25.4**	**5.502**	**2.369**	**0.752**	**45.4**	**51.4**	**3.2**	
★	9	15.0	**0.075**				**0.0**	**0.0**	**4.5**	
⊙	9	25.0	**0.075**				**0.0**	**0.0**	**3.7**	

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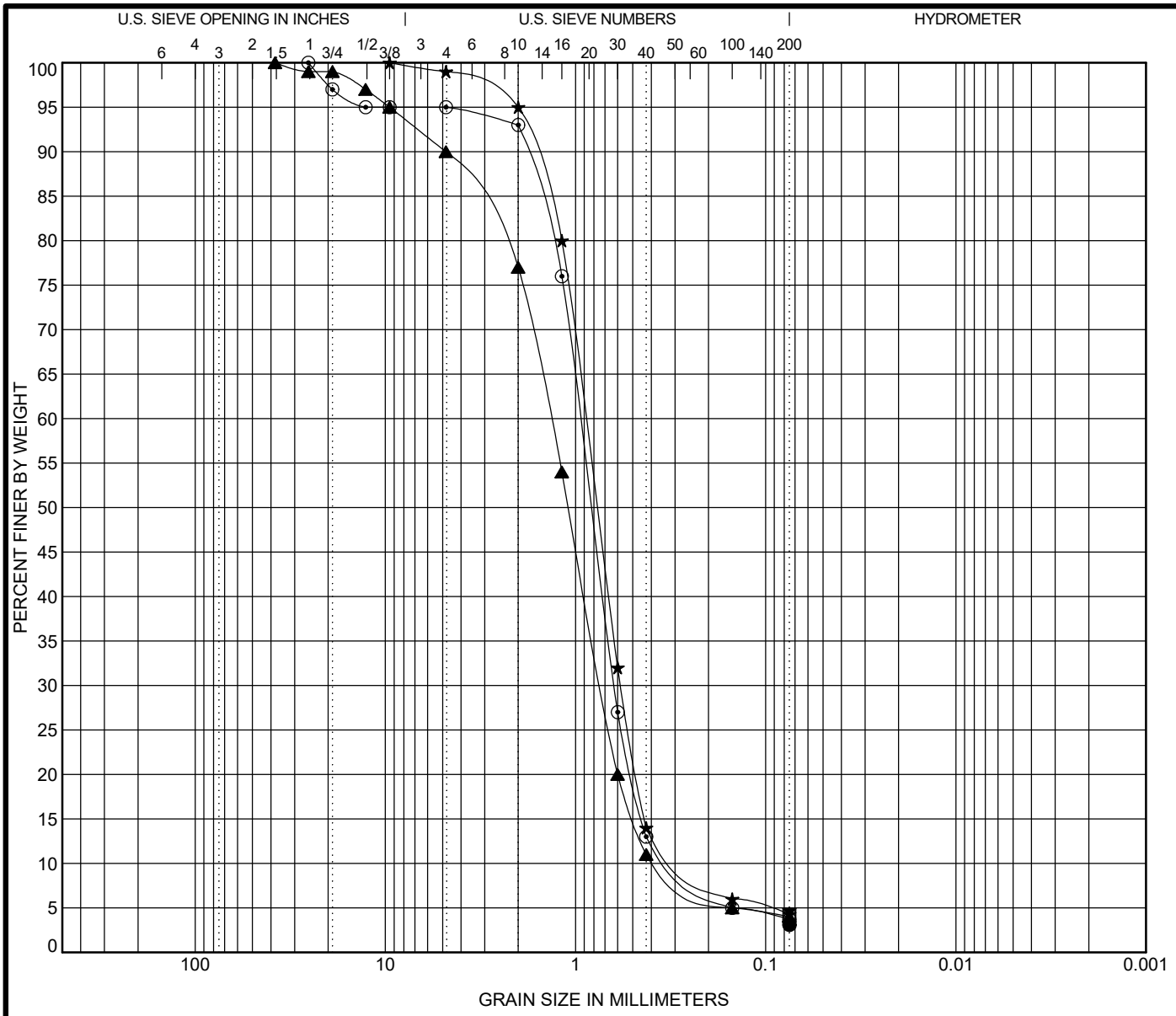
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Location: Spokane, Washington

Number: S23090

FIGURE 7-5

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	10	7.5						
⊠	10	15.0						
▲	10	25.0	**POORLY GRADED SAND(SP)**				1.11	3.79
★	12	10.0	**POORLY GRADED SAND(SP)**				1.48	3.53
⊙	12	20.0	**POORLY GRADED SAND(SP)**				1.44	3.29

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	10	7.5	0.075				0.0	0.0	3.1	
⊠	10	15.0	0.075				0.0	0.0	4.2	
▲	10	25.0	38	1.354	0.732	0.357	10.2	85.8	4.0	
★	12	10.0	9.5	0.89	0.577	0.252	1.0	94.7	4.3	
⊙	12	20.0	25.4	0.946	0.625	0.288	5.0	91.3	3.7	

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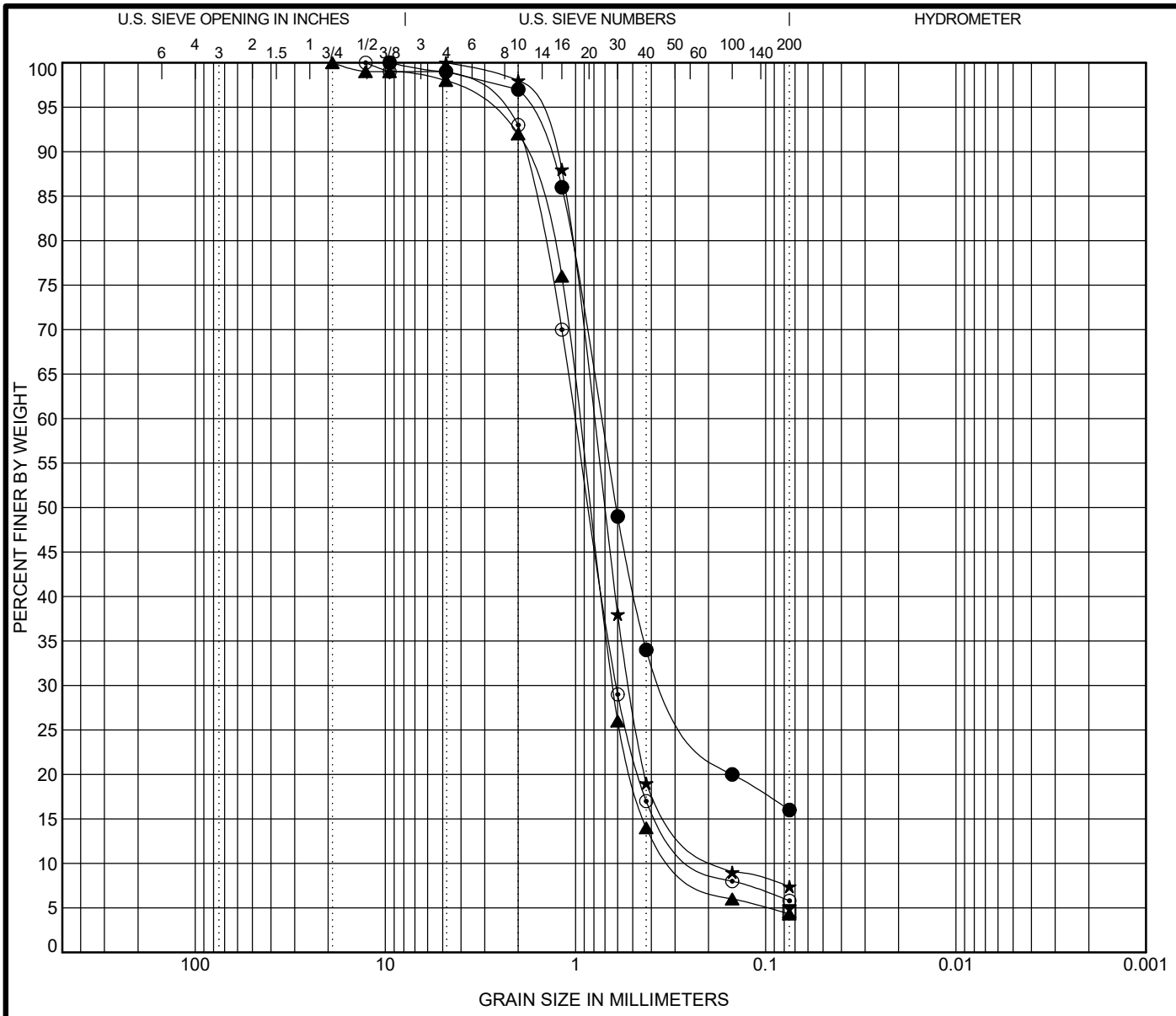
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Location: Spokane, Washington

Number: S23090

FIGURE 7-6

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	13	2.0	SILTY, CLAYEY SAND(SC-SM)	24	17	7		
⊠	13	10.0						
▲	13	25.0	POORLY GRADED SAND(SP)				1.67	3.76
★	14	10.0					2.00	4.85
⊙	14	15.0					1.97	5.29

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	13	2.0	9.5	0.734	0.316		1.0	83.0	16.0	
⊠	13	10.0	0.075				0.0	0.0	4.6	
▲	13	25.0	19	0.95	0.633	0.252	2.1	93.6	4.3	
★	14	10.0	4.8	0.808	0.519	0.166	0.0	92.6	7.4	
⊙	14	15.0	12.7	1.001	0.61	0.189	1.1	93.1	5.8	

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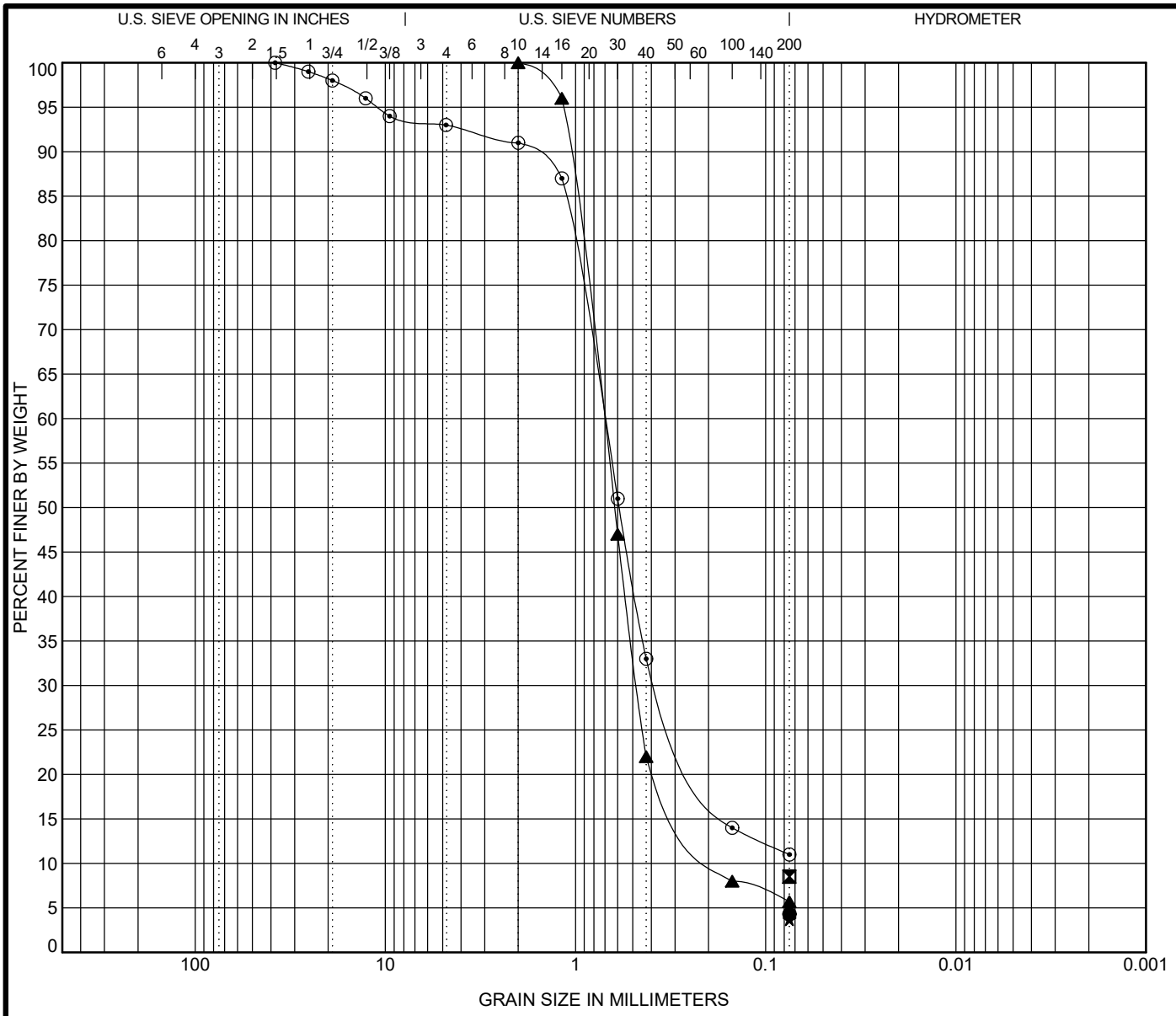
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Location: Spokane, Washington

Number: S23090

FIGURE 7-7

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	14	25.0						
⊠	15	5.0						
▲	15	7.5					1.80	4.12
★	15	25.0						
⊙	16	1.0	POORLY GRADED SAND with SILT(SP-SM)	NP	NP	NP	3.07	11.94

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	14	25.0	0.075				0.0	0.0	4.3	
⊠	15	5.0	0.075				0.0	0.0	8.5	
▲	15	7.5	2	0.718	0.475	0.174	0.0	94.3	5.7	
★	15	25.0	0.075				0.0	0.0	3.7	
⊙	16	1.0	38	0.711	0.361		7.0	82.0	11.0	

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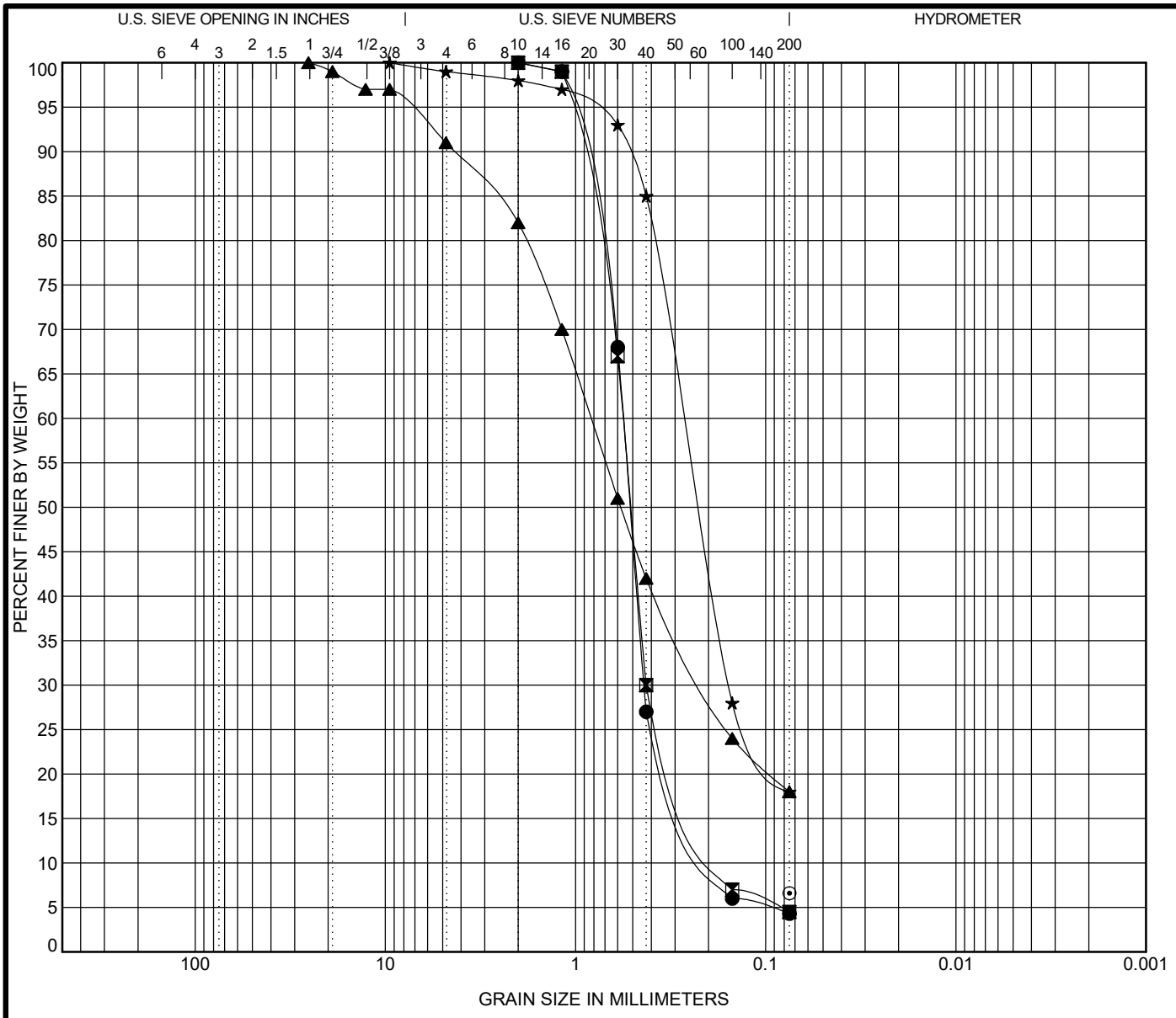
Project: STA Division Street BRT

Location: Spokane, Washington

Number: S23090

FIGURE 7-8

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	16	15.0	**POORLY GRADED SAND(SP)**				**1.85**	**3.07**
⊠	16	25.0	**POORLY GRADED SAND(SP)**				**1.87**	**3.27**
▲	17	1.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**		
★	17	2.0						
⊙	17	10.0						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	16	15.0	**2**	**0.561**	**0.436**	**0.183**	**0.0**	**95.7**	**4.3**	
⊠	16	25.0	**2**	**0.562**	**0.425**	**0.172**	**0.0**	**95.5**	**4.5**	
▲	17	1.0	**25.4**	**0.827**	**0.212**		**9.1**	**72.9**	**18.0**	
★	17	2.0	**9.5**	**0.269**	**0.156**		**1.0**	**81.0**	**18.0**	
⊙	17	10.0	**0.075**				**0.0**	**0.0**	**6.6**	

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GRAIN SIZE DISTRIBUTION

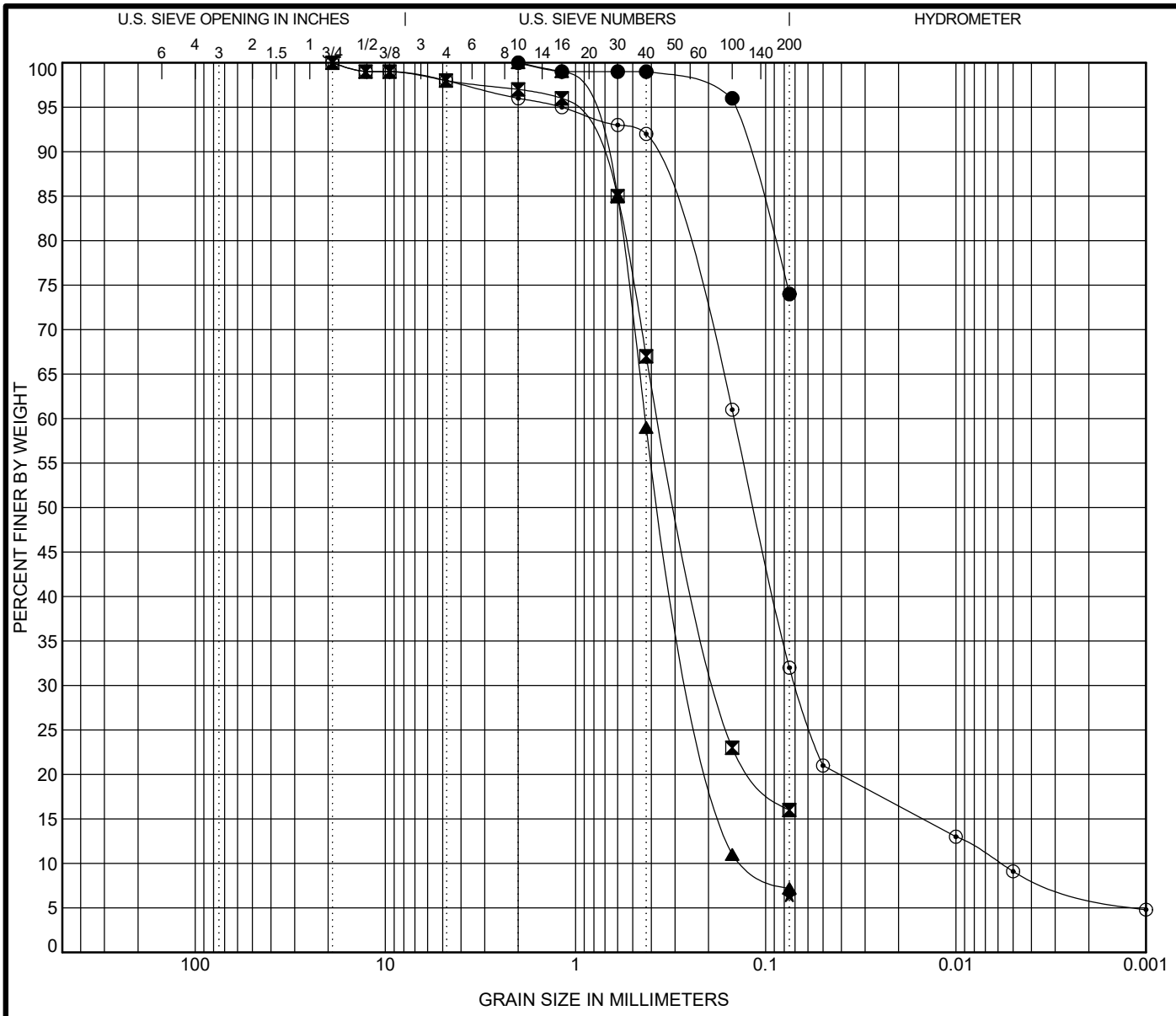
Project: STA Division Street BRT

Location: Spokane, Washington

Number: S23090

FIGURE 7-9

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	17	15.3	SILT with SAND(ML)	NP	NP	NP		
⊠	18	1.5	SILTY SAND(SM)	NP	NP	NP		
▲	18	7.5					0.95	3.45
★	18	25.0						
⊙	19	9.5	SILTY SAND(SM)	NP	NP	NP	5.65	24.96

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	17	15.3	2				0.0	26.0	74.0	
⊠	18	1.5	19	0.36	0.177		2.0	82.0	16.0	
▲	18	7.5	2	0.431	0.227	0.125	0.0	92.8	7.2	
★	18	25.0	0.075				0.0	0.0	6.4	
⊙	19	9.5	19	0.146	0.07	0.006	2.0	66.0	32.0	

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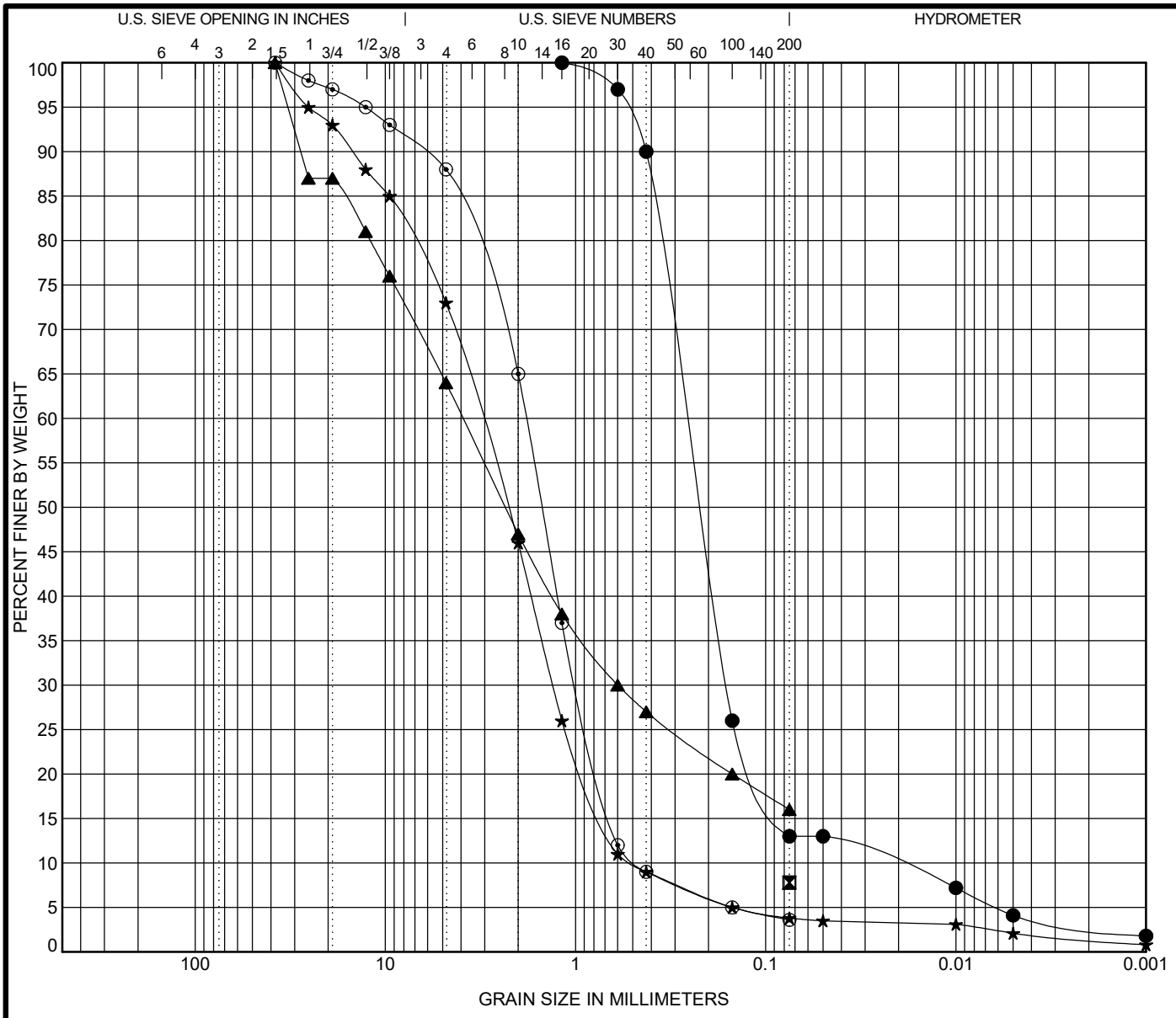
Project: STA Division Street BRT

Location: Spokane, Washington

Number: S23090

FIGURE 7-10

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	19	14.5					4.52	11.99
⊠	19	25.0						
▲	20	1.5	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
★	20	14.5	WELL-GRADED SAND with GRAVEL(SW)				1.08	6.24
⊙	20	19.5	POORLY GRADED SAND(SP)				1.10	3.82

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	19	14.5	1.18	0.261	0.16	0.022	0.0	87.0	13.0	
⊠	19	25.0	0.075				0.0	0.0	7.8	
▲	20	1.5	38	3.906	0.6		36.2	47.8	16.0	
★	20	14.5	38	3.149	1.311	0.505	27.3	68.9	3.8	
⊙	20	19.5	38	1.82	0.976	0.477	12.3	84.1	3.6	

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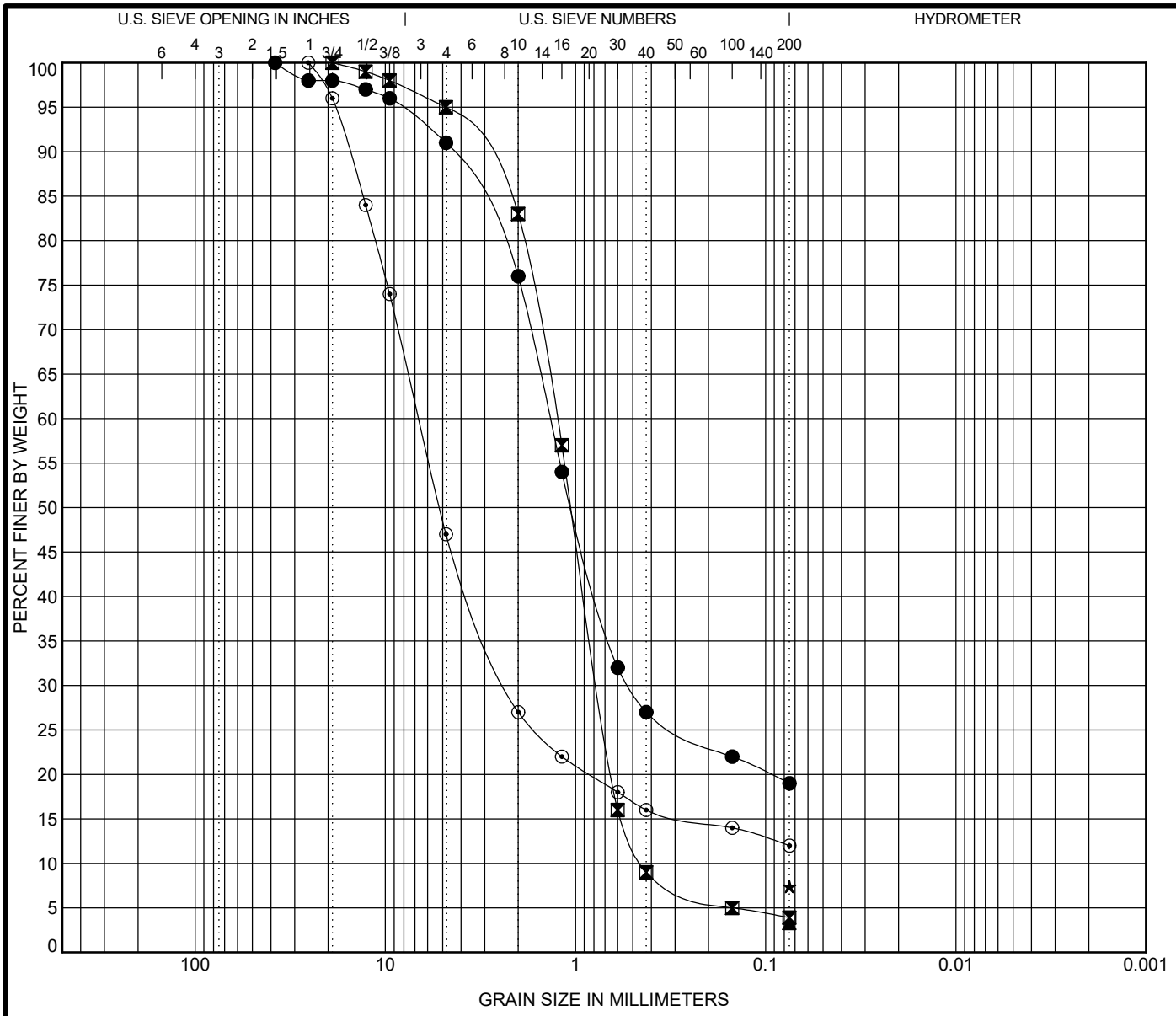
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Location: Spokane, Washington

Number: S23090

FIGURE 7-11

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	22	1.5	SILTY SAND(SM)	28	23	5		
⊠	22	8.5	POORLY GRADED SAND(SP)				1.02	2.81
▲	22	25.0						
★	23	5.0						
⊙	23	10.0					20.80	177.81

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	22	1.5	38	1.363	0.523		9.2	71.8	19.0	
⊠	22	8.5	19	1.254	0.756	0.446	5.1	91.0	3.9	
▲	22	25.0	0.075				0.0	0.0	3.2	
★	23	5.0	0.075				0.0	0.0	7.4	
⊙	23	10.0	25.4	6.668	2.281		53.2	34.8	12.0	

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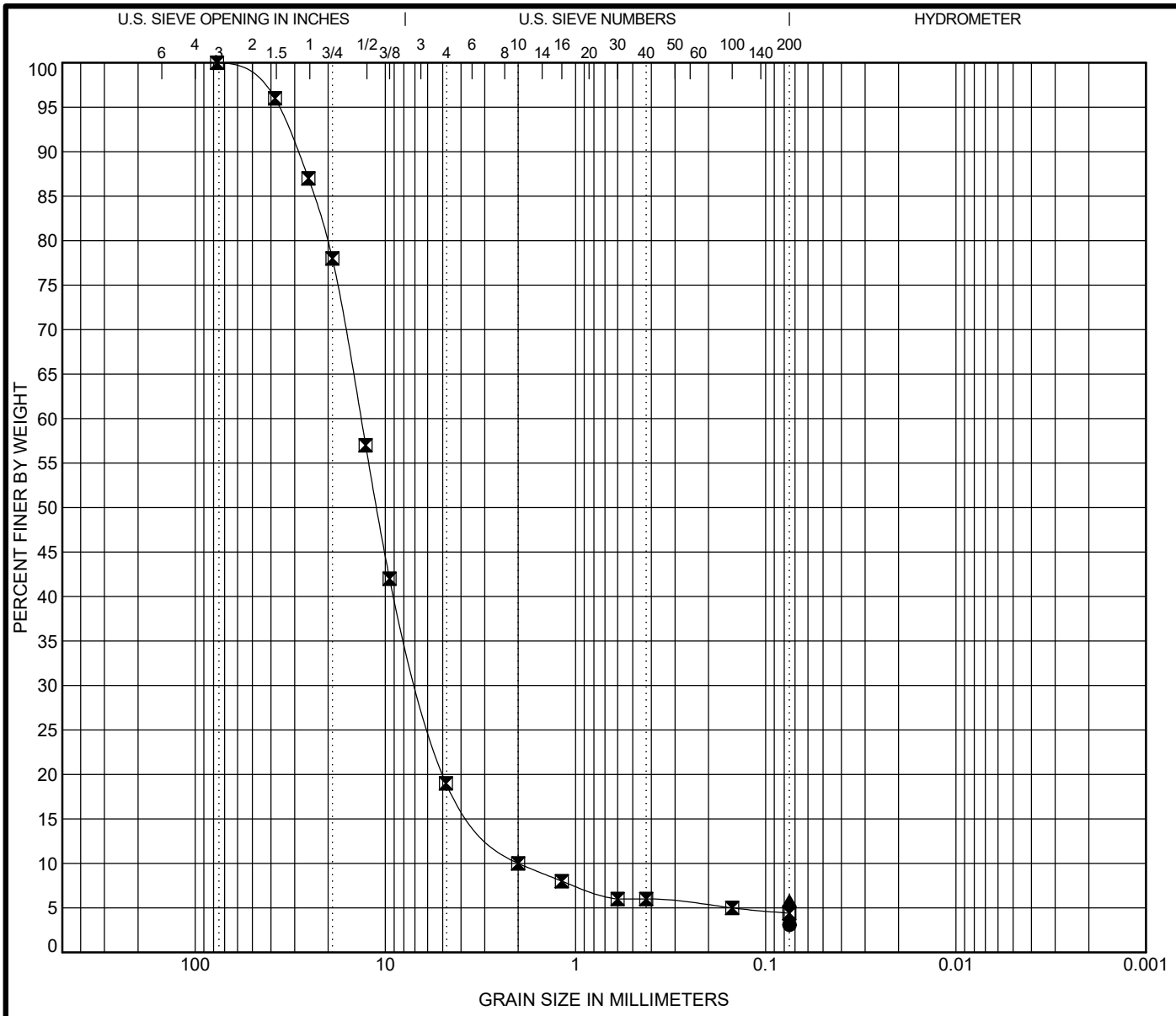
Project: STA Division Street BRT

Location: Spokane, Washington

Number: S23090

FIGURE 7-12

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	24	10.0						
⊠	24	15.0	**WELL-GRADED GRAVEL(GW)**				**1.65**	**6.73**
▲	24	25.0						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	24	10.0	**0.075**				**0.0**	**0.0**	**3.1**	
⊠	24	15.0	**76.8**	**13.452**	**6.653**	**2**	**81.0**	**14.5**	**4.4**	
▲	24	25.0	**0.075**				**0.0**	**0.0**	**5.8**	

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GRAIN SIZE DISTRIBUTION

Project: STA Division Street BRT

Location: Spokane, Washington

Number: S23090

FIGURE 7-13

GRAINSIZE WO FIGURE # S23090 LOGS.GPJ GINT STD US.GDT 2/17/25

Spokane 200 Method

Boring ID	Sample Depth (ft)	Fines (%)	Hydraulic Conductivity (in/hr)[1]	Normalized outflow rate (cfs/ft)[2]	Safety factor[3]	Factored Outflow Rate	
						Single Depth H=6	Double Depth H=10
4	7.5	5.4	38	0.07	1.5	0.28	0.46
4	15	3.3	96	0.15	1.3	0.71	1.18
4	20	3	115	0.18	1.3	0.83	1.38
5	7.5	5	44	0.08	1.3	0.36	0.60
5	15	6.4	28	0.05	2	0.16	0.26
5	25	8.1	18	0.04	2.3	0.09	0.16
6	10	6.3	28	0.05	2	0.16	0.27
6	15	4.4	56	0.10	1.3	0.45	0.74
6	25	4.4	56	0.10	1.3	0.45	0.74
7	7.5	2.8	131	0.20	1.3	0.93	1.54
7	15	4.2	61	0.10	1.3	0.48	0.80
7	20	5.6	36	0.07	1.5	0.26	0.44
7	25	3.6	82	0.13	1.3	0.62	1.03
8	9	3.2	102	0.16	1.3	0.75	1.24
8	19	3.4	91	0.15	1.3	0.68	1.13
9	7.5	3.2	102	0.16	1.3	0.75	1.24
9	15	4.5	54	0.09	1.3	0.43	0.72
9	25	3.7	77	0.13	1.3	0.59	0.98
10	7.5	3.1	108	0.17	1.3	0.79	1.31
10	15	4.2	61	0.10	1.3	0.48	0.80
10	25	4	67	0.11	1.3	0.52	0.87
12	10	4.3	58	0.10	1.3	0.46	0.77
12	20	3.7	77	0.13	1.3	0.59	0.98
13	10	4.6	51	0.09	1.3	0.42	0.69
13	25	4.3	58	0.10	1.3	0.46	0.77
14	10	7.4	21	0.04	2	0.13	0.21
14	15	5.8	33	0.06	1.5	0.25	0.41
14	25	4.3	58	0.10	1.3	0.46	0.77
15	5	8.5	16	0.03	2.3	0.09	0.14
15	7.5	5.7	34	0.06	1.5	0.25	0.42
15	25	3.7	77	0.13	1.3	0.59	0.98
16	15	4.3	58	0.10	1.3	0.46	0.77
16	25	4.5	54	0.09	1.3	0.43	0.72
17	10	6.6	26	0.05	2	0.15	0.25
18	7.5	7.2	22	0.04	2	0.13	0.22
18	25	6.4	28	0.05	2	0.16	0.26
20	14.5	3.8	74	0.12	1.3	0.57	0.94
20	19.5	3.6	82	0.14	1.3	0.62	1.03
22	8.5	3.9	70	0.12	1.3	0.54	0.90
22	25	3.2	102	0.16	1.3	0.75	1.24
23	5	7.4	21	0.04	2	0.13	0.21
23	10	12	8	0.02	2.9	NA	NA
24	10	3.1	108	0.17	1.3	0.79	1.31
24	15	4.4	56	0.10	1.3	0.45	0.74
24	25	5.8	33	0.06	1.5	0.25	0.41

1. Calculated saturated hydraulic conductivity (ksat) inches per hour (in3/in2/hr)
2. cfs/ft - cubic feet per second per foot
3. Safety factors from SRSM Table 4A-1

FIGURE 8

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Spokane, WA

Appendix A

Photo Exhibit

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A. B-1 boring location



B. B-1 PCC core, 4.5 inches



A. B-1, 0.75 to 2.75 FT



B. B-1, 5 to 7 FT



A. B-1 7.5 to 8.3 FT



B. B-1, 10 to 12 FT



A. B-1 post backfilling



A. B-2 boring location


B. B-2 ACP core 8.25 inches



A. B-2, 0.7 to 2.7 FT



B. B-2, 5 to 5.7 FT



A. B-2 post backfilling



A. B-3 boring location



B. B-3 ACP core 7.25 inches



A. B-3 1.5 to 3.5 FT



B. B-3, 5 to 7 FT



A. B-3, 7.5 to 8.5 FT



B. B-3, 10 to 12 FT



A. B-3, 12.5 to 13.7 FT



B. B-3 post backfilling



A. B-4 boring location


B. B-4 ACP core 8 inches



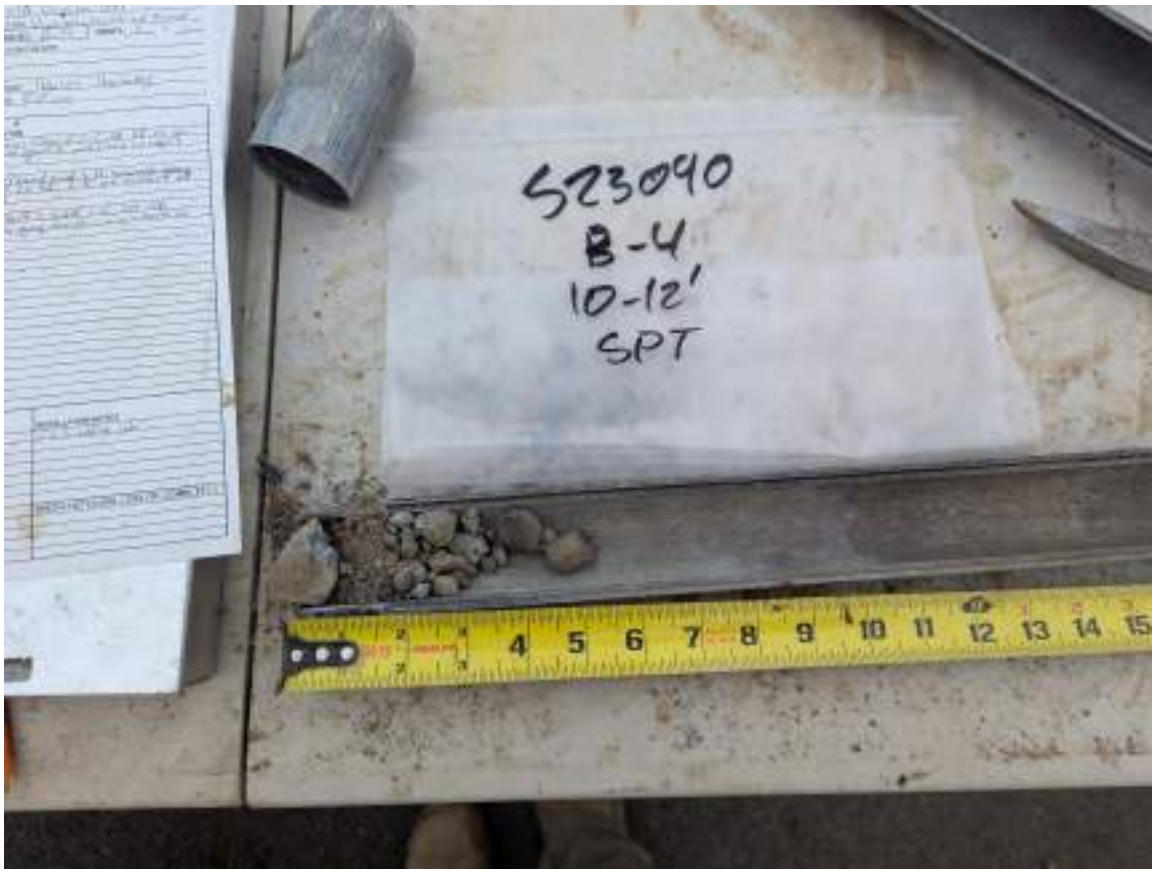
A. B-4, 1.9 to 3.9 FT



B. B-4, 5-7 FT



A. B-4, 7.5 to 9.5 FT



B. B-4, 10 to 12 FT



A. B-4, 15 to 17 FT



B. B-4, 20 to 22 FT



A. B-4, 25 to 27 FT



B. B-4 post backfilling



A. B-5 boring location



B. B-5 ACP core, 8 inches



A. B-5, 1.9 to 3.9 FT



B. B-5, 5 to 7 FT



A. B-5 7.5 to 9.5 FT



B. B-5, 10 to 11.7 FT



A. B-5, 15 to 17 FT



B. B-5, 20 to 21.3 FT



A. B-5, 25 to 27 FT


B. B-5 post backfilling



A. B-6 boring location



B. B-6 ACP over PCC core, 9.5 inches



A. B-6, 0.75 to 2.75 FT



B. B-6, 5 to 6 FT



A. B-6, 7.5 to 9.5 FT



B. B-6, 10 to 12 FT



A. B-6, 15 to 17 FT



B. B-6, 20 to 22 FT



A. B-6, 25 to 27 FT


B. B-6 post backfilling



A. B-7 boring location



B. B-7, 06 to 2.1 FT



A. B-7, 5 to 7 FT



B. B-7, 7.5 to 9.5 FT



A. B-7, 10 to 12 FT



B. B-7, 15 to 17 FT



A. B-7, 20 to 22 FT



B. B-7, 25 to 27 FT



A. B-7 post backfilling



A. B-8 boring location


B. B-8 ACP core, 8.25 inches



A. B-8, 1.3 to 3.3 FT



B. B-8, 4 to 6 FT



A. B-8, 6 to 8 FT



B. B-8, 9 to 11 FT



A. B-8, 14 to 14.9 FT



B. B-8, 19 to 21 FT



A. B-8, 24 to 26 FT



B. B-8 post backfilling



A. B-9 boring location


B. B-9 ACP core, 6.75 inches



A. B-9, 5 to 6.5 FT



B. B-9, 7.5 to 9 FT



A. B-9, 10 to 11.5 FT



B. B-9, 15 to 16.5 FT



A. B-9, 20 to 21.5 FT



B. B-9, 25 to 26.5 FT



A. B-9 post backfilling



A. B-10 boring location



B. B-10 ACP core, 7.5 inches



A. B-10, 1.5 to 3.5 FT



B. B-10, 5 to 6.5 FT



A. B-10, 7.5 to 9 FT



B. B-10, 10 to 11.5 FT



A. B-10, 15 to 16.5 FT



B. B-10, 20 to 21.5 FT



A. B-10, 25 to 27 FT



B. B-10 post backfilling



A. B-12 boring location



B. B-12 ACP core, 7.25 inches



A. B-12, 5 to 6.5 FT



B. B-12, 7.5 to 9 FT



A. B-12, 10 to 11.5 FT



B. B-12, 15 to 16.5 FT



A. B-12, 20 to 21.5 FT



B. B-12, 25 to 26.5 FT



A. B-12 post backfilling



A. B-13 boring location



B. B-13 ACP core, 8 inches



A. B-13, 1.5 to 3.5 FT



B. B-13, 5 to 7 FT



A. B-13, 7.5 to 9.5 FT



B. B-13, 10 to 12 FT



A. B-13, 15 to 17 FT



B. B-13, 20 to 22 FT



A. B-13, 25 to 27 FT



B. B-13 post backfilling



A. B-14 boring location



B. B-14 ACP core, 9 inches



A. B-14, 1 to 3 FT



B. B-14, 5 to 7 FT



A. B-14, 7.5 to 9.5 FT



B. B-14, 10 to 12 FT



A. B-14, 15 to 17 FT



B. B-14, 20 to 22 FT



A. B-14, 25 to 27 FT


B. B-14 post backfilling



A. B-15 boring location



B. B-15 ACP core, 6.5 inches



A. B-15, 0.75 to 2.75 FT



B. B-15, 5 to 7 FT



A. B-15, 7.5 to 9.5 FT



B. B-15, 10 to 12 FT



A. B-15, 15 to 17 FT



B. B-15, 20 to 22 FT



A. B-15, 25 to 27 FT


B. B-15 post backfilling



A. B-16 boring location



B. B-16 ACP core, 5.75 inches



A. B-16, 1 to 3 FT



B. B-16, 5 to 7 FT



A. B-16, 7.5 to 9.5 FT



B. B-16, 10 to 12 FT



A. B-16, 15 to 17 FT



B. B-16, 20 to 22 FT



A. B-16, 25 to 27 FT


B. B-16 post backfilling



A. B-17 boring location



B. B-17 ACP core, 6.75 inches



A. B-17, 1 to 3 FT



B. B-17, 5 to 7 FT



A. B-17, 7.5 to 9.5 FT



B. B-17, 10 to 12 FT



A. B-17, 15 to 17 FT



B. B-17, 20 to 22 FT



A. B-17, 25 to 27 FT



B. B-17 post backfilling



A. B-18 boring location



B. B-18, ACP core, 6.75 inches



A. B-18, 1.5 to 3.5 FT



B. B-18, 5 to 7 FT



A. B-18, 7.5 to 9.5 FT



B. B-18, 10 to 12 FT



A. B-18, 15 to 17 FT



B. B-18, 20 to 22 FT



A. B-18, 25 to 27 FT


B. B-18, backfilling with auto hammer



A. B-19 ACP core, 11 inches



B. B-19, 1.5 to 3.5 FT



A. B-19, 4.5 to 6.5 FT



B. B-19, 7.5 to 9.5 FT



A. B-19, 14.5 to 16.5 FT



B. B-19, 19.5 to 21.5 FT



A. B-19, 24.5 to 26.5 FT


B. B-19 post backfilling



A. B-20 boring location



B. B-20, ACP core, 4.5 inches



A. B-20, 1 to 3 FT



B. B-20, 6.5 to 8.5 FT



A. B-20, 9.5 to 11.5 FT



B. B-20, 14.5 to 16.5 FT



A. B-20, 19.5 to 21.5 FT



B. B-20, 24.5 to 26.5 FT



A. B-20 post backfilling



A. B-22 boring location



B. B-22 PCC core, 9.5 inches



A. B-22, 1.5 to 3.5 FT



B. B-22, 5 to 7 FT



A. B-22, 8.5 to 10.5 FT



B. B-22, 10.5 to 12.5 FT



A. B-22, 15 to 17 FT



B. B-22, 20 to 22 FT



A. B-22, 25 to 27 FT



B. B-22 post backfilling



A. B-23 boring location



B. B-23 ACP core, 5.5 inches



A. B-23, 0.5 to 2.5 FT



B. B-23, 5 to 7 FT



A. B-23, 7.5 to 9.5 FT



B. B-23, 10 to 12 FT



A. B-23, 15 to 15.5 FT


B. B-23 post backfilling



A. B-24 boring location



B. B-24 ACP over PCC core, 9.25 inches



A. B-24, 0.8 to 2.8 FT



B. B-24, 5 to 7 FT



A. B-24, 7.5 to 9.5 FT



B. B-24, 10 to 11.1 FT



A. B-24, 15 to 17 FT



B. B-24, 20 to 22 FT



A. B-24, 25 to 27 FT


B. B-24 post backfilling

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Appendix B

Important Information about your Geotechnical

Engineering Report

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Spokane Valley, WA 99212
Tel: 509.535.8841
Fax: 509.535.9589

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Hayden, ID
Tel: 208.719.9038
Fax: 509.535.9589

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Tel: 509.535.8841
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Appendix B

Important Information about this Geotechnical Engineering Report

1101 North Fancher Rd.
Spokane Valley, WA 99212
Tel: 509.535.8841
Fax: 509.535.9589

www.budingerinc.com

9997 Lyle Loop, Suite A
Hayden, ID
Tel: 208.719.9038
Fax: 509.535.9589

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

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