5-72

FOUNDATION AND SOILS REPORT

BELLEVUE INTERCHANGE RAMPS
R_1-R_2-R_3-R_4

MARCH 14, 1972

PROJECT NO. F-003-2(13)

E. A. NO. 70561

FOUNDATION AND SOILS REPORT

BELLEVUE INTERCHANGE RAMPS

R_1, R_2, R_3 and R_4

March 14, 1972

Project No. F-003-2(13)

E. A. No. 70561

GENERAL

A foundation study was conducted by the Foundation and Engineering Geology Section of tne Materials and Testing Division for the ramps at the site of the Bellevue Interchange, Structure No. I-1261. The field study was conducted during the period of February 29 through March 2, 1972, and consisted of three borings using wet rotary sample methods, a 1.4-inch (ID) split spoon sampler and three hand auger borings.

GEOLOGY AND SOILS

The site lies on the east edge of an alluvial fan extending eastward from Musgrove Canyon in the Carson Range.

Rock units in the Carson Range consist of principally Quartzmonzonite, Granodiorite with some Andesite, Dacite and Rhyolite. These rock units have decomposed in place, eroded and the material deposited by streams in their present location.

For the most part, the coarse grains are silicious and therefore, stable to a degree from further disintegration. No rocks or pebbles were found in the borings taken and undoubtedly some washing and sorting of the material has occurred from wave action of Washoe Lake. Some of the samples taken contained a high percentage of Mica (10% to 15%). Boring one contained 1.6 feet of soft sandy clay from elevation 5026.7 to 5025.1.

Ground water was encountered in all borings and will approximate the water level of Washoe Lake.

FOUNDATION RECOMMENDATIONS

Foundation conditions encountered at the site indicate that the sub-base for ramps R_1 and R_4 may be constructed of granular select material (Nevada Stnd. Spec. 203.03.09). Ramps R_2 and R_3 may be constructed by placing a blanket of select borrow material from "OG" to one foot above high water elevation. The select borrow material shall have the following specifications:

Native materials passing a 2-inch screen shall be wasted. Native material retained on a 2-inch screen up to that material that will pass a 20-inch grizzly shall be crushed to a size that will pass an 8-inch grizzly and said crushed material shall be incorporated into the finished product. Prior to crushing, not less than 50 percent of the remaining material that has passed over the 2-inch screen shall be material that is larger than will pass an 8-inch grizzly.

The material placed above the select borrow shall consist of embankment material (Nevada Stnd. Spec. 203.03.15) and ramp R_2 shall have a 2-foot surcharge. All ramps should have a 30-day time delay to allow for compaction of material below the fills.

It is recommended that slope protection be provided for ramp R_2.

Submitted by,

David G. Cochran

David G. Cochran
Engineering Geologist II

SUMMARY OF TEST RESULTS

EVADA HIGHWAY DEPARTMENT — FOUNDATIONS AND ENGINEERING GEOLOGY SECTION

BELLEVUE INTERCHANGE RAMPS

BORING NO.	TOTAL DEPTH (FT.)	STATION OR LOCATION	SAMPLE NO.	SAMPLE DEPTH (FT.)	SAMPLE SIZE (IN.)	N (BLOWS/FOOT)	SOIL GROUP	UNIT DRY WT. (lb/ft³)	UNIT WET WT. (lb/ft³)	WATER CONTENT %	% MINUS 200	ATTERBERG LIMITS PI	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	OTHER TESTS PERFORMED
1	20	"R_2" 1+32 (7' Rt. ℄)	A	0.5-1	1.4	6	SM		119	13	15.5	NP	18		
972)			B	2-3	1.4	6	SM		126	17	27.7	10	28		Qu=1.01 Tons/ft²
			C	5.5-6.5	1.4	11	SW			21	11.5	NP	28		
			D	10.5-11.5	1.4	25	SW		120	12	12.8	NP	30		
			E	15.5-16.5	1.4	32	SW			18.4	12.5	NP	29		
2	15	"R_3" 0+77 (4' Rt. ℄)	A	0.5-1.5	1.4	15	SM		130	12	20.1	5	26		Qu=1.07 Tons/ft²
972)			B	2-3	1.4	8	SM			10	17.7	4	25		
			C	3.5-4.5	1.4	14	SW								
			D	5.5-6.5	1.4	21	SW								
			E	10.5-11.5	1.4	29	SW								
6															
972)	16.5	"R_1" 16+22 (℄)	1	0.5-1.5	1.4	3	SM								
			2	2.0-3.0	1.4	8	SM								
			3A	3.5-4.5	1.4	11	SW			12.7	16.5	NP	19		
			4	10.5-11.5	1.4	27	SM								
			5	15.5-16.5	1.4	30	SM								
1	64	"P" 11+70 (℄)	A	1-2	1.4	14	CL	95		13					
967)			D	8.5-9.5	1.4	33	SM	105		14	5	NP	25		
			E	14-15	1.4	23	SW	97		17					
			F	18.5-19.5	1.4	40	SW	107		14					
			G	28.5-29.5	1.4	45	SW								
			H	39-40	1.4	40	SW								
			I	52.5-53.5	1.4	54	SW								
			J	61.5-62.5	1.4	>60	SW								

NOTATION

QU = UNCONFINED COMPRESSION, S = DIRECT SHEAR, C = CONSOLIDATION, T = TRIAXIAL COMPRESSION

ϕ = ANGLE OF SIDE FRICTION PI = PLASTICITY INDEX LL = LIQUID LIMIT PL = PLASTIC LIMIT

SUMMARY OF TEST RESULTS

EVADA HIGHWAY DEPARTMENT — FOUNDATIONS AND ENGINEERING GEOLOGY SECTION

BELLEVUE INTERCHANGE RAMPS

BORING NO.	TOTAL DEPTH (FT.)	STATION OR LOCATION	SAMPLE NO.	SAMPLE DEPTH (FT.)	SAMPLE SIZE (IN.)	N (BLOWS/FOOT)	SOIL GROUP	UNIT DRY WT. (lb/ft³)	UNIT WET WT. (lb/ft³)	WATER CONTENT %	% MINUS 200	ATTERBERG LIMITS PI	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	OTHER TESTS PERFORMED
2	36	"P" 10+54 (℄)	A	1-2	1.4	16	(Fill)	94		8	13	NP	17		
1967)			B	5-6	1.4	8	SM								
			C	10-11	1.4	31	SW	105		14					
			D	15-16	1.4	36	SW	106		14	10	NP	24		
			E	20-21	1.4	32	SW								
			F	25-26	1.4	26	SW								
			G	35.5-36.5	1.4	51	SW								
3															
1967)	31	"P" 9+40 (6' Rt. ℄)	A	3.5-4.5	1.4	11	SM								
			B	6-7	1.4	19	SM								
			C	9-10	1.4	26	SW								
			D	13-14	1.4	32	SW								
			E	19-20	1.4	27	SW								
			F	29-30	1.4	53	SW								

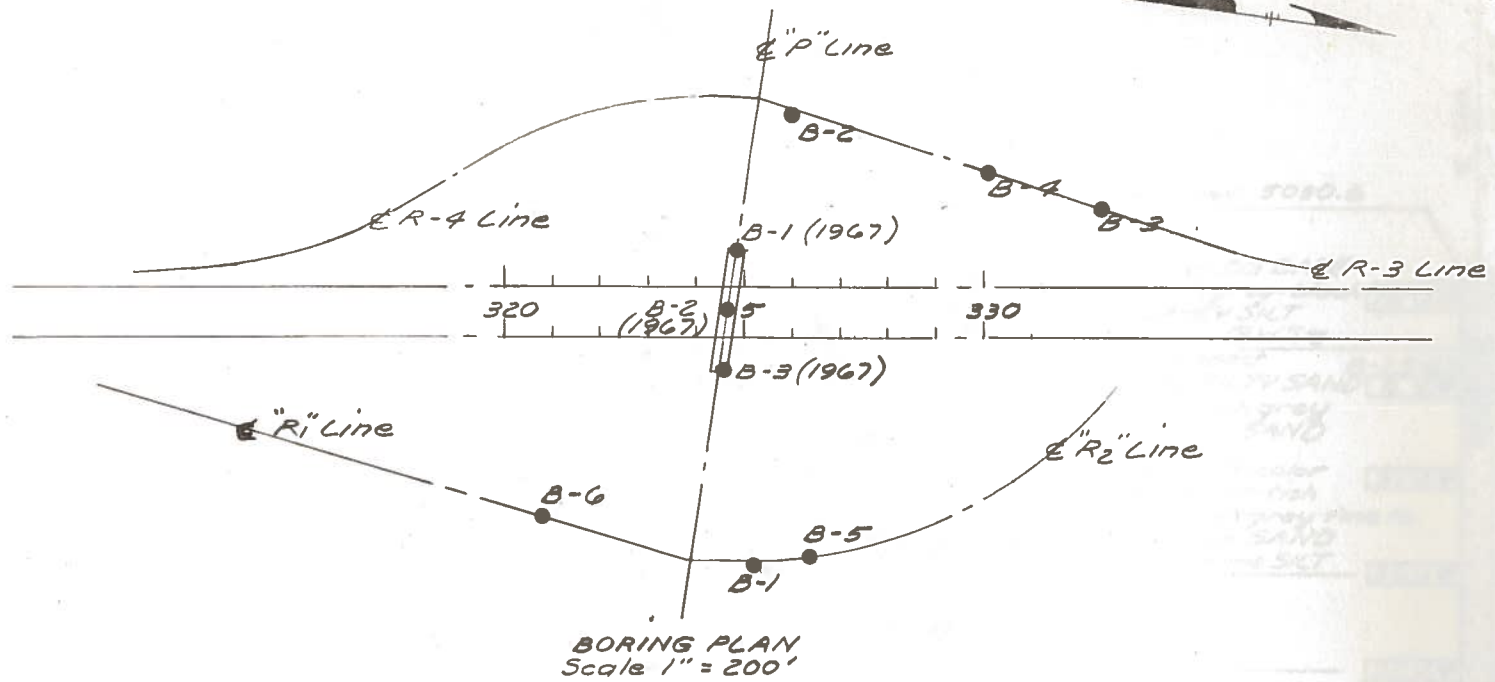
NOTATION

QU = UNCONFINED COMPRESSION, S = DIRECT SHEAR, C = CONSOLIDATION, T = TRIAXIAL COMPRESSION

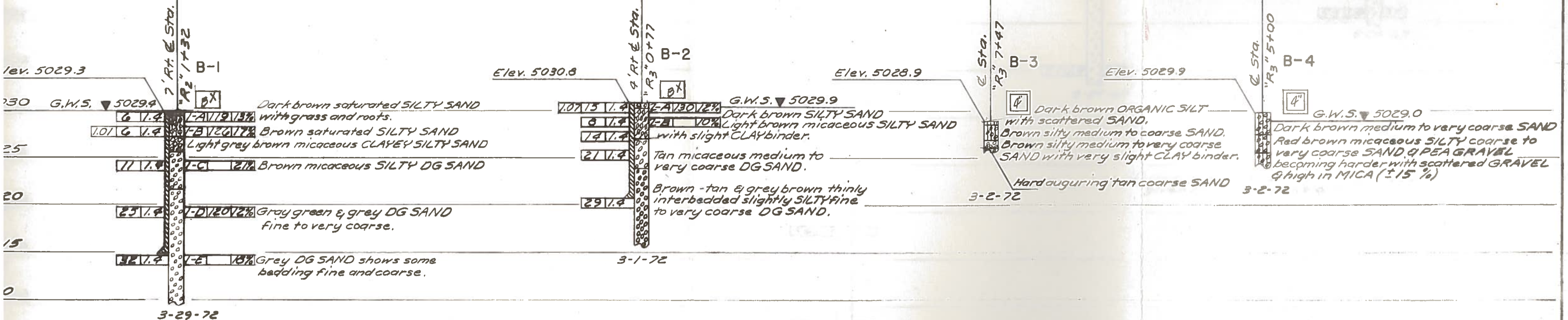
ϕ = ANGLE OF SIDE FRICTION PI = PLASTICITY INDEX LL = LIQUID LIMIT PL = PLASTIC LIMIT

FED. AID RDS. NO.	STATE	PROJECT NO.	MILE POST	SHEET NO.
9	NEVADA			

NOTE:
Foundation Report Available For Contractors Study In District Office & Materials & Testing Div.

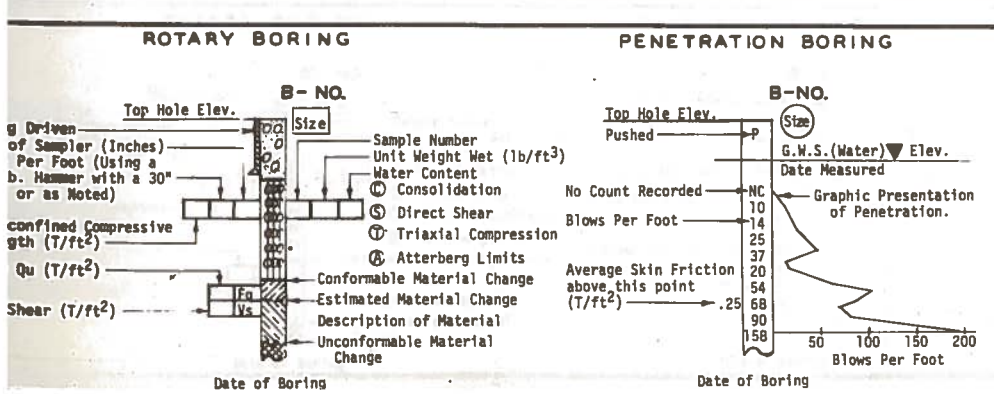


BORING PLAN
Scale 1" = 200'



BORING PROFILE

ROTARY BORING



PENETRATION BORING

- PLAN OF ANY BORING
- PENETROMETER (FLUSH-COUPLED)
- 2 " CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- DIAMOND CORE BORING.
- TEST PIT.

BIT SIZES: (O.D.): "AX"=1-13/16", "BX"=2-9/32", "NX"=2-29/32".

CASING SIZES: (O.D.): "BX"=2-7/8", "NX"=3-1/2".

THE UNIFIED SOIL CLASSIFICATION SYSTEM

MAJ. DIV.		LETTER	SYMBOL	NAME
Coarse Grained Material	Gravel and Gravelly Soil	GW		Well-graded gravel or gravel-sand Mixtures, Little or no Fines.
		GP		Poorly-graded Gravel or Gravel-Sand Mixtures, Little or no Fines.
		GM		Silty Gravel, Gravel-Sand-Silt Mixtures.
		GC		Clayey Gravel, Gravel-Sand-Clay Mixtures.
	Sand and Sandy Soil	SW		Well-Graded Sand or Gravelly Sand, Little or no Fines.
		SP		Poorly-Graded Sand or Gravelly Sand, Little or no Fines.
		SM		Silty Sand, Sand-Silt Mixtures.
		SC		Clayey Sand, Sand-Silt Mixtures
Fine Grained Soil	Silts and Clays LL<50	ML		Inorganic Silt and Very Fine Sand, Rock Flour, Silty or Clayey Fine Sand or Clayey Silt with Slight Plasticity.
		CL		Inorganic Clay or Low to Medium Plasticity, Gravelly Clay, Sandy Clay, Silty Clay, Lean Clay.
		OL		Organic Silt and Organic Silt-Clay of Low Plasticity
	Silts and Clays LL>50	MH		Inorganic Silt, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silt.
		CH		Inorganic Clay or High Plasticity, Fat Clay.
		OH		Organic Clay of Medium to High Plasticity, Organic Silt.
Highly Organic Soils		PT		Peat and other Highly Organic Soils

ROCK CLASSIFICATION

SYMBOL	NAME
	IGNEOUS ROCK
	SEDIMENTARY ROCK
	METAMORPHIC ROCK

NOTE:
Classification of earth material shown on this sheet is based upon field inspection unless noted otherwise.

SOIL CONSISTENCY CLASSIFICATION

CONSISTENCY		BLOWS PER FT.*
GRANULAR	COHESIVE	
Very Loose	Very Soft	0 to 5
Loose	Soft	5 to 10
Slightly Compact	Stiff	10 to 20
Compact	Very Stiff	20 to 35
Dense	Hard	35 to 70
Very Dense	Very Hard	70

*(Standard Penetration Test) Blows Per Ft. (140 LB. Hammer, 30" Free-Fall Blow using a 2" O.D. x 1-3/8" I.D. Sampler).

DWN. WJW
CHK. D.G.C.
DATE 3-17-72

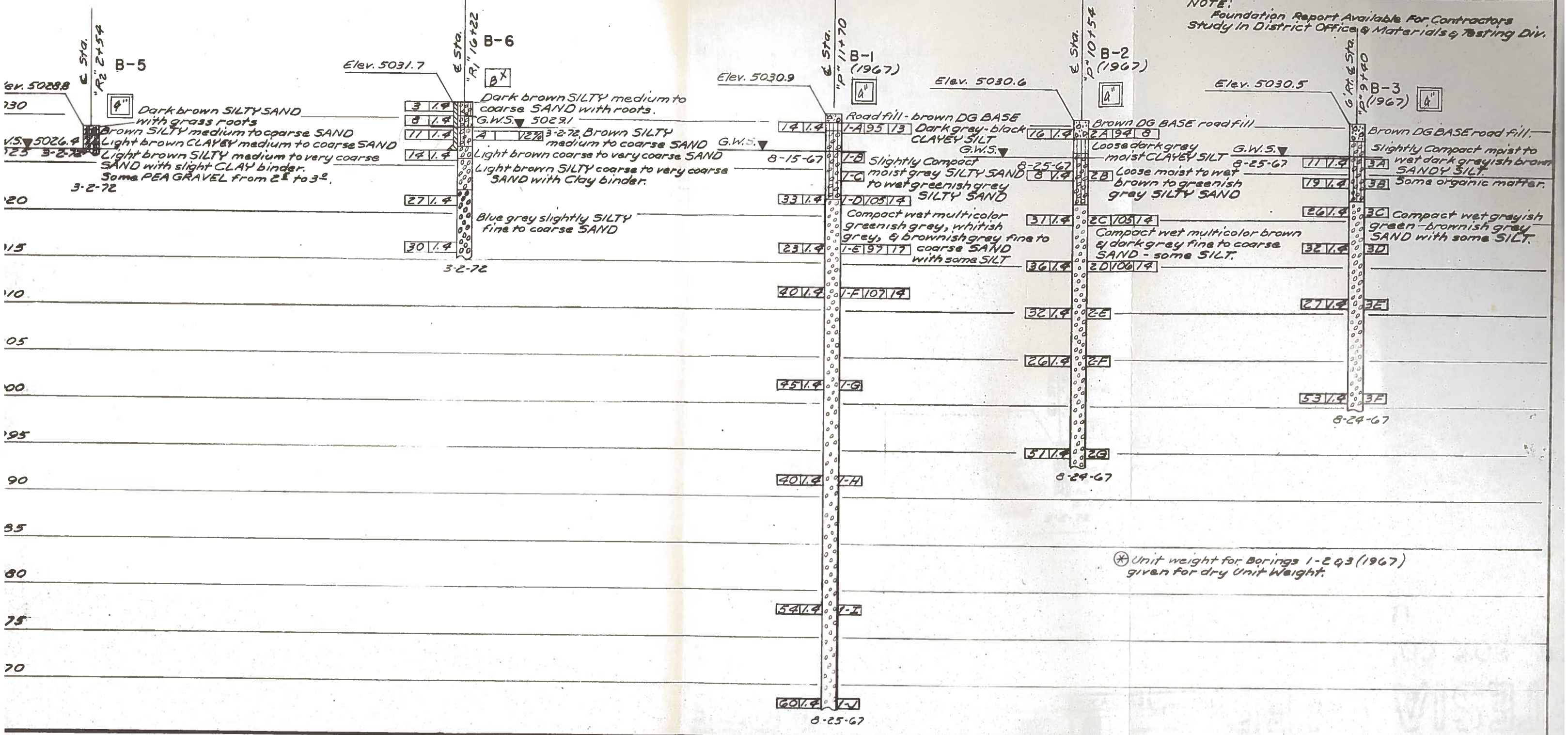
NEVADA HIGHWAY DEPARTMENT — MATERIALS AND TESTING DIVISION
FOUNDATIONS AND ENGINEERING GEOLOGY SECTION

LOG OF TEST BORINGS
H-1261
BELLEVUE INTERCHANGE RAMPS
WASHOE COUNTY R1, R2, R3, R4.
NEVADA

DWG. NO. SHEET 1 of 2 SHEETS

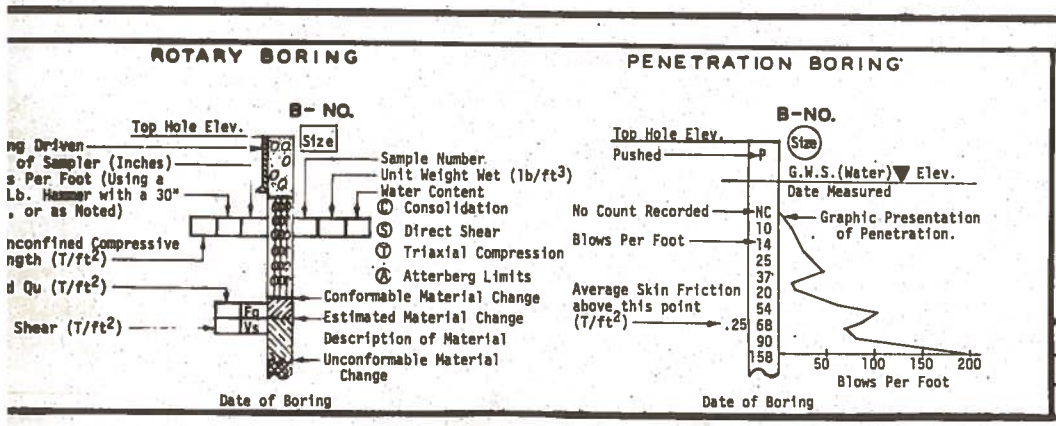
DIST.	STATE	PROJECT NO.	MILE POST	SURVEY NO.
9	NEVADA			

NOTE:
Foundation Report Available For Contractors Study In District Office & Materials & Testing Div.



⊛ Unit weight for Borings 1-2 & 3 (1967) given for dry Unit Weight.

ROTARY BORING



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- 2 " CONE PENETROMETER
- SAMPLER BORING (DRY)
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- AUGER BORING (DRY)
- JET BORING
- DIAMOND CORE BORING.
- TEST PIT.

BIT SIZES: (O.D.): "AX"=1-13/16", "BX"=2-9/32", "NX"=2-29/32".
CASING SIZES: (O.D.): "BX"=2-7/8", "NX"=3-1/2".

THE UNIFIED SOIL CLASSIFICATION SYSTEM

MAJ. DIV.		LETTER	SYMBOL	NAME
Coarse Grained Material	Gravel and Gravelly Soil	GW		Well-graded gravel or gravel-sand Mixtures, Little or no Fines.
		GP		Poorly-graded Gravel or Gravel-Sand Mixtures, Little or no Fines.
		GM		Silty Gravel, Gravel-Sand-Silt Mixtures.
		GC		Clayey Gravel, Gravel-Sand-Clay Mixtures.
	Sand and Sandy Soil	SW		Well-Graded Sand or Gravelly Sand, Little or no Fines.
		SP		Poorly-Graded Sand or Gravelly Sand, Little or no Fines.
		SM		Silty Sand, Sand-Silt Mixtures.
		SC		Clayey Sand, Sand-Silt Mixtures

MAJ. DIV.		LETTER	SYMBOL	NAME
Fine Grained Soil	Silts and Clays LL≤50	ML		Inorganic Silt and Very Fine Sand, Rock Flour, Silty or Clayey Fine Sand or Clayey Silt with Slight Plasticity.
		CL		Inorganic Clay or Low to Medium Plasticity, Gravelly Clay, Sandy Clay, Silty Clay, Lean Clay.
		OL		Organic Silt and Organic Silt-Clay of Low Plasticity
	Silts and Clays LL>50	MH		Inorganic Silt, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silt.
		CH		Inorganic Clay or High Plasticity, Fat Clay.
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Highly Organic Soils		PT		Peat and other Highly Organic Soils

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	SEDIMENTARY ROCK
	METAMORPHIC ROCK

NOTE:
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SOIL CONSISTENCY CLASSIFICATION

CONSISTENCY		* BLOWS PER FT.
GRANULAR	COHESIVE	
Very Loose	Very Soft	0 to 5
Loose	Soft	5 to 10
Slightly Compact	Stiff	10 to 20
Compact	Very Stiff	20 to 35
Dense	Hard	35 to 70
Very Dense	Very Hard	70

*(Standard Penetration Test) Blows Per Ft. (140 LB. Hammer, 30" Free-Fall Blow using a 2" O.D. x 1-3/8" I.D. Sampler).

DSN. WJW
CHK. D.G.C.
DATE. 5-17-72

NEVADA HIGHWAY DEPARTMENT MATERIALS AND TESTING DIVISION
FOUNDATIONS AND ENGINEERING GEOLOGY SECTION

LOG OF TEST BORINGS
H-1261
BELLEVUE INTERCHANGE RAMPS
WASHOE COUNTY R1, R2, R3, R4 NEVADA

DWG. NO. Sheet 2 of 2

STATE OF NEVADA
Department of Highways
Materials and Testing Division

E.A. or Cont. No. 70561
Con.Sec. or M.P. WA

Lab No. FO-25-72
Date 4-13-72

REPORT OF CONSOLIDATION AND SHEAR TESTS ON COHESIVE SOILS

Samplers No. [redacted]-1A
Location Bellvue Interchange
Depth 0-1'

Condition of Sample

Sieve Analysis	100
Sieve Size	% Pass.
No. 4	98.1
No. 10	93.1
No. 40	53.4
No. 200	15.5

Hydrometer Analysis	
smaller than	%
.02mm	7.3
.002mm	2.5
.001mm	2.3

Liquid Limit 18
Plasticity Index NP
Specific Gravity 2.64 @ 20°C
Description of Soil COARSE SAND

Consolidation

Load tons/sq.ft.	Void Ratio e	Permeability, K ft/day	Amount of Settlement, feet/foot at 50% consol.	C_v, sq ft/day at 50% consol.	Primary Compression ratio, r
Initial					
1/4					
1/2					
1					
2					
4					
8					
Unload 2					
1/2					
1/16					

	Initial	Final
Moisture Content		
Degree of Saturation		

Remarks

Direct Shear* or Triaxial Compression**

	①	②	③	④
Normal Stress, or Chamber pressure				
Shear Maximum, S_m, psf				
Displacement at s_m				
Shear Ultimate, S_u, psf				
Displacement at s_u				
Moisture Content: Initial/Final	13.2 %	13.1 %	18.0 %	22.8
Degree of Saturation: Initial/Final				
~~Void Ratio: Initial~~ unit weight	117 pcf	120 pcf	104 pcf	—
Final				
Angle of Internal Friction, ϕ_a				
Cohesion, C				

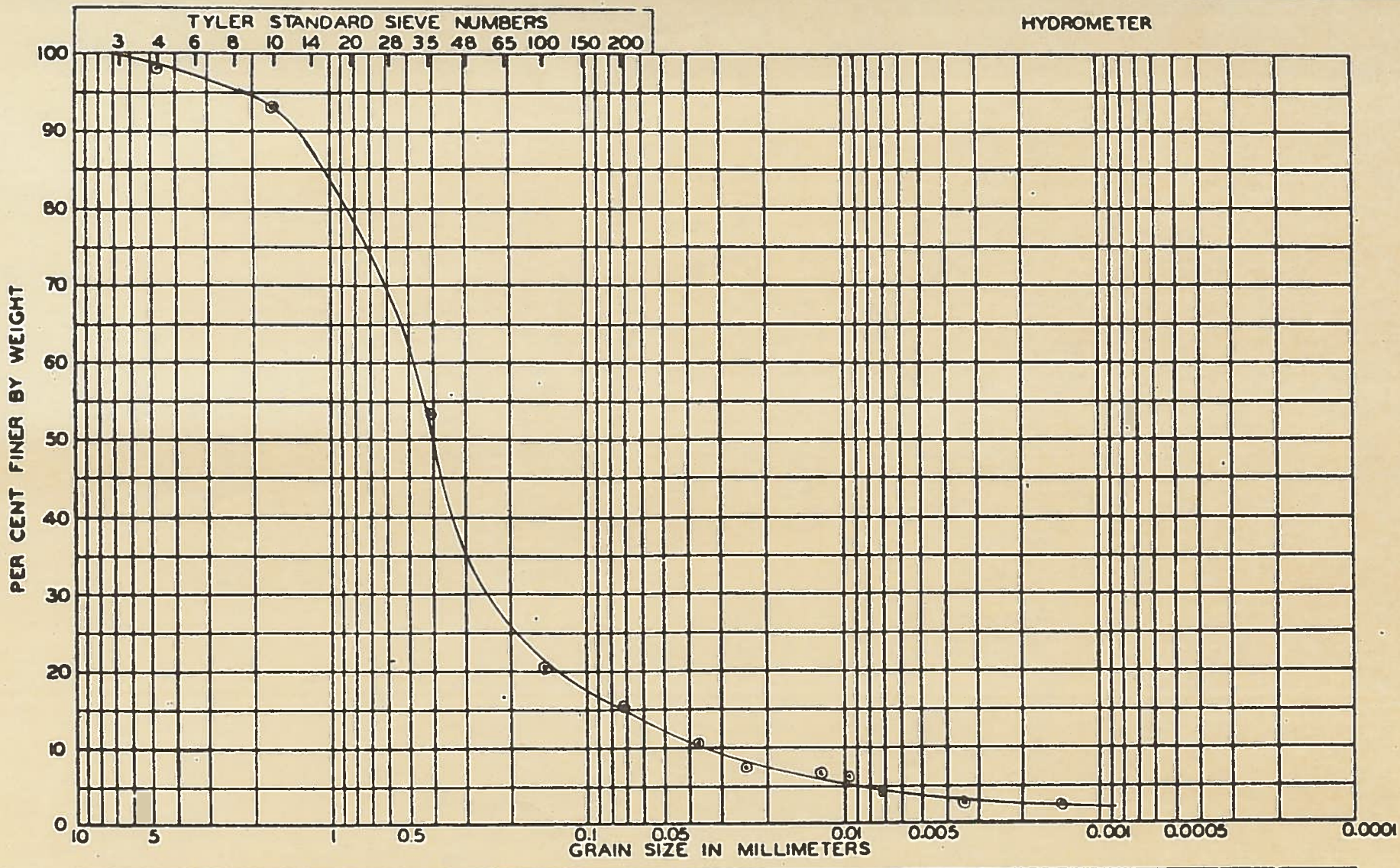
Remarks:

J. M. DESMOND, Chief Materials & Testing Engr.

By [signature]

DISTRIBUTION:
1 Stan Mosher
1 J. A. Montrose
1 Laboratory M. S. File

STATE OF NEVADA, DEPARTMENT OF HIGHWAYS, MATERIALS AND TESTING DIVISION



PROJECT Bellvue Interchange BORING NO [redacted] 1 SAMPLE NO 1A

DEPTH ____ ELEVATION ____ REMARKS ____

GRAIN SIZE DISTRIBUTION DIAGRAM

STATE OF NEVADA
Department of Highways
Materials and Testing Division

E.A. or Cont. No. 70561
Con.Sec. or M.P. N/A

Lab No. FO-24-72
Date 4-13-72

REPORT OF CONSOLIDATION AND SHEAR TESTS ON COHESIVE SOILS

Samplers No. 2-A
Location Bellvue Interchange
Depth

Condition of Sample undisturbed

Sieve Analysis	100
Sieve Size	% Pass.
No. 4	97.8
No. 10	87.6
No. 40	45.9
No. 200	20.1

Hydrometer Analysis	
smaller than	%
.02mm	13.8
.002mm	6.2
.001mm	5.9

Liquid Limit 26
Plasticity Index 5
Specific Gravity 2.64 @ 20°C
Description of Soil medium sand

Consolidation

Load tons/sq.ft.	Void Ratio e	Permeability, K ft/day	Amount of Settlement, feet/foot at 50% consol.	C_v, sq ft/day at 50% consol.	Primary Compression ratio, r
Initial					
1/4					
1/2					
1					
2					
4					
8					
Unload 2					
1/2					
1/16					

	Initial	Final
Moisture Content		
Degree of Saturation		

Remarks

Direct Shear* or Triaxial Compression**

UNCONFINED COMPRESSION

	(1)	(2)	(3)	(4)
Normal Stress, or Chamber pressure	2923 psf	1570 psf	1930 psf	1148 psf
~~Shear Maximum, S_m, psf~~ TOTAL LOAD				
Displacement at s_m				
Shear Ultimate, S_u, psf				
Displacement at s_u				
Moisture Content: Initial/Final	13.2	9.5 %	13.5	10.1 %
Degree of Saturation: Initial/Final				
~~Void Ratio: Initial~~ UNIT WT.	126.0 pcf	129.0 pcf	136.0 pcf	134.9 pcf
Final				
Angle of Internal Friction, ϕ_a				
Cohesion, C				

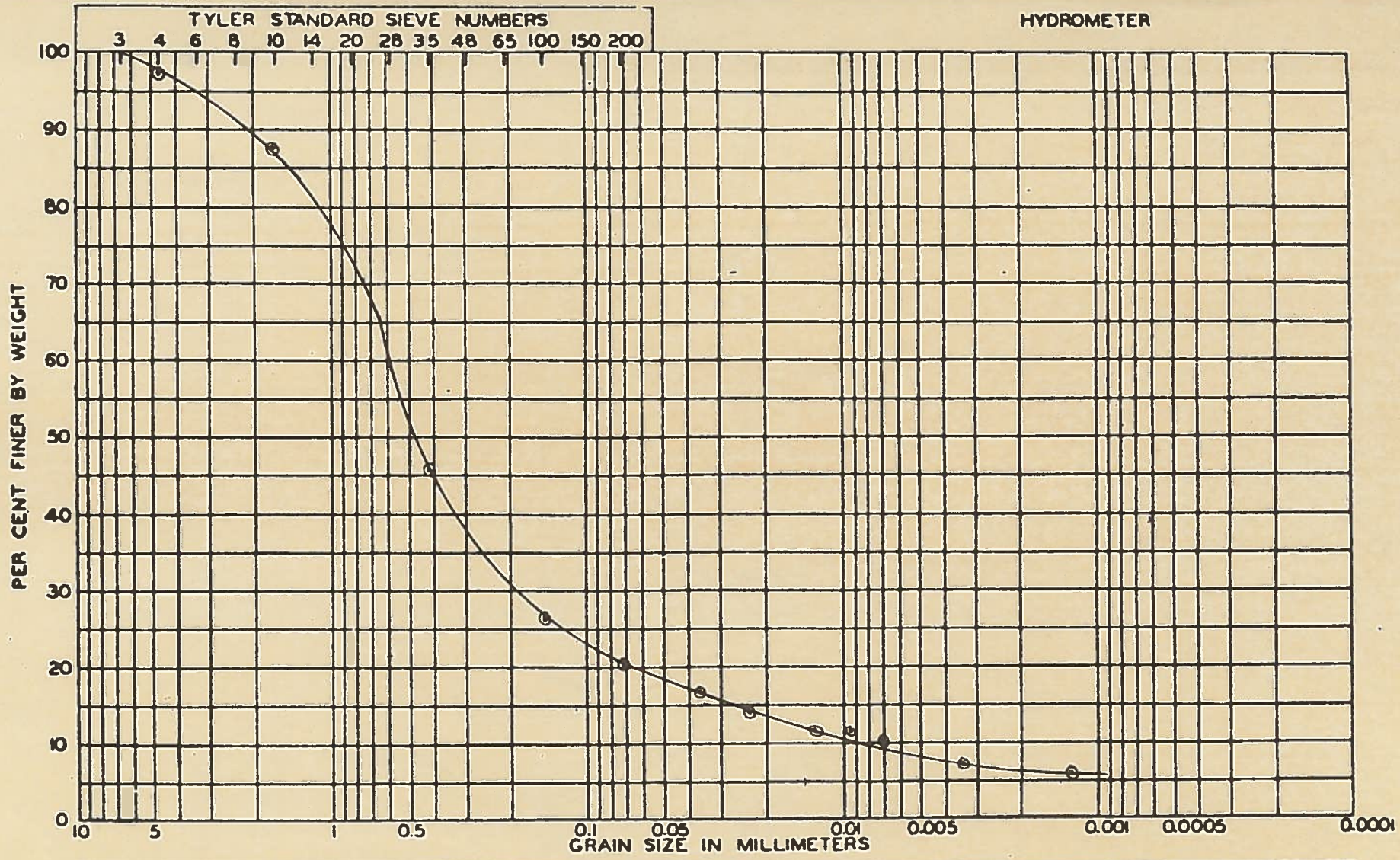
Remarks: By JM

J. M. DESMOND, Chief Materials & Testing Engr.

By

DISTRIBUTION:
1 Stan Mosher
1 J. A. Montrose
1 Laboratory M. S. File

STATE OF NEVADA, DEPARTMENT OF HIGHWAYS, MATERIALS AND TESTING DIVISION



MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY

U.S. BUREAU OF SOILS CLASSIFICATION

PROJECT Bellvue Interchange BORING NO 2 SAMPLE NO 2A

DEPTH ____ ELEVATION ____ REMARKS ____

GRAIN SIZE DISTRIBUTION DIAGRAM

STATE OF NEVADA
Department of Highways
Materials and Testing Division

E.A. or Cont. No. 70561
Con.Sec. or M.P. WA

Lab No. FO-31-72
Date 4-13-72

REPORT OF CONSOLIDATION AND SHEAR TESTS ON COHESIVE SOILS

Samplers No. 6-A 7-38
Location Bellvue Interchange
Depth

Condition of Sample

% moist. 12.7

Sieve Analysis	100
Sieve Size	% Pass.
No. 4	98.5
No. 10	89.6
No. 40	53.5
No. 200	16.5

Hydrometer Analysis	
smaller than	%
.02mm	7.8
.002mm	2.1
.001mm	0.9

Liquid Limit 19
Plasticity Index N.P.
Specific Gravity 2.64 @ 20°C
Description of Soil
COARSE SAND

Consolidation

Load tons/sq.ft.	Void Ratio e	Permeability, K ft/day	Amount of Settlement, feet/foot at 50% consol.	C_v, sq ft/day at 50% consol.	Primary Compression ratio, r
Initial					
1/4					
1/2					
1					
2					
4					
8					
Unload 2					
1/2					
1/16					

	Initial	Final
Moisture Content		
Degree of Saturation		

Remarks

Direct Shear* or Triaxial Compression**

Normal Stress, or Chamber pressure			
Shear Maximum, S_m, psf			
Displacement at s_m			
Shear Ultimate, S_u, psf			
Displacement at s_u			
Moisture Content: Initial/Final			
Degree of Saturation: Initial/Final			
Void Ratio: Initial			
Final			
Angle of Internal Friction, ϕ_a			
Cohesion, C			

Remarks: By JM

J. M. DESMOND, Chief Materials & Testing Engr.

By

DISTRIBUTION:
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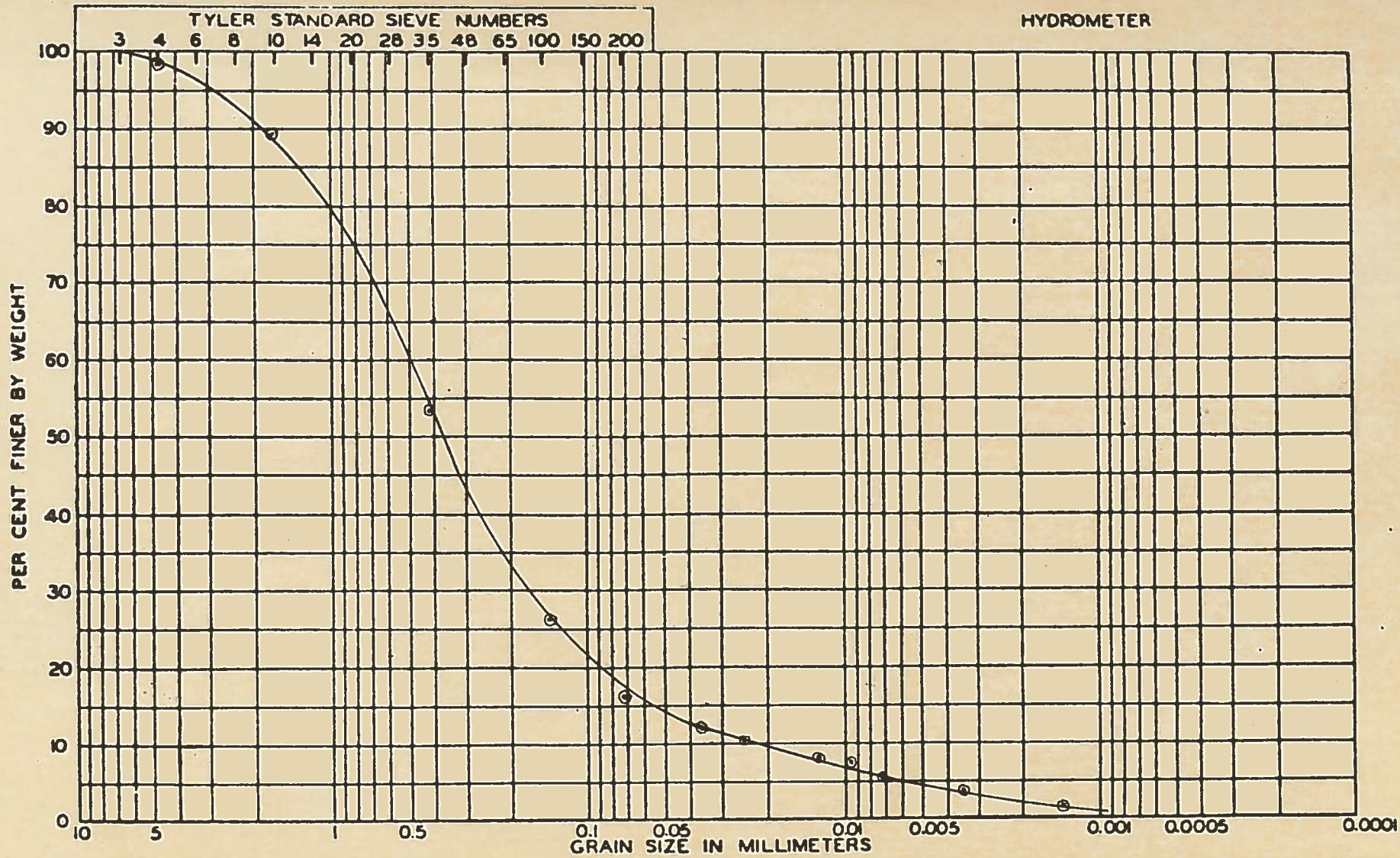
1 Laboratory M. S. File

STATE OF NEVADA, DEPARTMENT OF HIGHWAYS, MATERIALS AND TESTING DIVISION



MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY

U.S. BUREAU OF SOILS CLASSIFICATION

PROJECT Bellvue Interchange BORING NO 6 SAMPLE NO. 6-A

DEPTH ____ ELEVATION ____ REMARKS ____

GRAIN SIZE DISTRIBUTION DIAGRAM

STATE OF NEVADA
Department of Highways
Materials and Testing Division

E.A. or Cont. No. 70561
Con.Sec. or M.P. WA
Lab No. FO-23-72
Date 4-13-72

REPORT OF CONSOLIDATION AND SHEAR TESTS ON COHESIVE SOILS

Samplers No. 1B
Location Bellvue Interchange
Depth

Condition of Sample undisturbed

Sieve Analysis

Sieve Size	% Pass.
No. 4	99.2
No. 10	92.9
No. 40	61.7
No. 200	27.7

Hydrometer Analysis

smaller than	%
.02mm	18.0
.002mm	8.8
.001mm	6.5

Liquid Limit 28
Plasticity Index 10
Specific Gravity 2.64 @ 20°C
Description of Soil silty sand

Consolidation

Load tons/sq.ft.	Void Ratio e	Permeability, K ft/day	Amount of Settlement, feet/foot at 50% consol.	C_v, sq ft/day at 50% consol.	Primary Compression ratio, r
Initial					
1/4					
1/2					
1					
2					
4					
8					
Unload 2					
1/2					
1/16					

	Initial	Final
Moisture Content		
Degree of Saturation		

Remarks

Direct Shear* or Triaxial Compression**

UNCONFINED COMPRESSION

	①	②	③	④
Normal Stress, or Chamber pressure				
~~Shear Maximum, S_m~~ psf	1411 psf	2621 psf	2045 psf	746
Displacement at s_m				
Shear Ultimate, S_u, psf				
Displacement at s_u				
Moisture Content: Initial/Final	13.5%	21.4%	17.4%	13.5%
Degree of Saturation: Initial/Final				
~~Void Ratio: Initial~~ UNIT WEIGHT	124.5 pcf	124.3 pcf	128.5 pcf	128.4 pcf
Final				
Angle of Internal Friction, ϕ_a				
Cohesion, C				

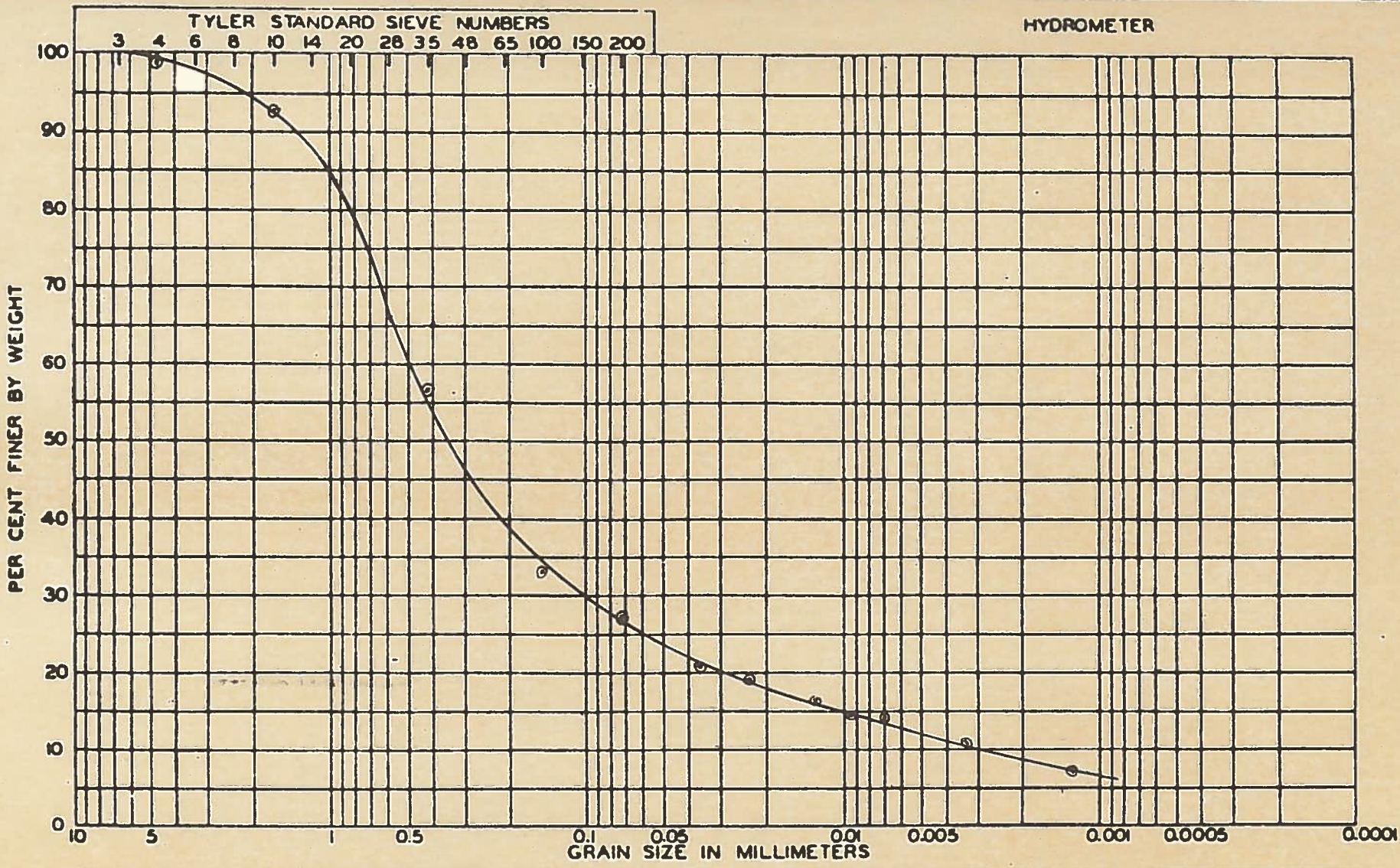
Remarks: By JM

J. M. DESMOND, Chief Materials & Testing Engr.

By

DISTRIBUTION:
1 Stan Mosher
1 J. A. Montrose
1 Laboratory M. S. File

STATE OF NEVADA, DEPARTMENT OF HIGHWAYS, MATERIALS AND TESTING DIVISION



MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY

U.S. BUREAU OF SOILS CLASSIFICATION

PROJECT Bellvue Interchange BORING NO 1 [redacted] SAMPLE NO 1-B

DEPTH ____ ELEVATION ____ REMARKS ____

GRAIN SIZE DISTRIBUTION DIAGRAM

STATE OF NEVADA
Department of Highways
Materials and Testing Division

E.A. or Cont. No. 70561
Con.Sec. or M.P. WA
Lab No. FO-30-72
Date 4-13-72

REPORT OF CONSOLIDATION AND SHEAR TESTS ON COHESIVE SOILS

Samplers No. 2-B
Location Bellvue Interchange
Depth

Condition of Sample

Sieve Analysis		Hydrometer Analysis	
Sieve Size	% Pass.	smaller than	%
1/2	100		
3/8	98.9		
No. 4	93.0	.02mm	12.9
No. 10	76.4	.002mm	7.5
No. 40	39.6	.001mm	6.8
No. 200	17.7		

% moist. 10.5
Liquid Limit 25
Plasticity Index 4
Specific Gravity 2.66 @ 20°C
Description of Soil COARSE SAND

Consolidation

Load tons/sq.ft.	Void Ratio e	Permeability, K ft/day	Amount of Settlement, feet/foot at 50% consol.	C_v, sq ft/day at 50% consol.	Primary Compression ratio, r
Initial					
1/4					
1/2					
1					
2					
4					
8					
Unload 2					
1/2					
1/16					

	Initial	Final
Moisture Content		
Degree of Saturation		

Remarks

Direct Shear* or Triaxial Compression**

Normal Stress, or Chamber pressure			
Shear Maximum, S_m, psf			
Displacement at s_m			
Shear Ultimate, S_u, psf			
Displacement at s_u			
Moisture Content: Initial/Final			
Degree of Saturation: Initial/Final			
Void Ratio: Initial			
Final			
Angle of Internal Friction, ϕ_a			
Cohesion, C			

Remarks: By JM

J. M. DESMOND, Chief Materials & Testing Engr.

By

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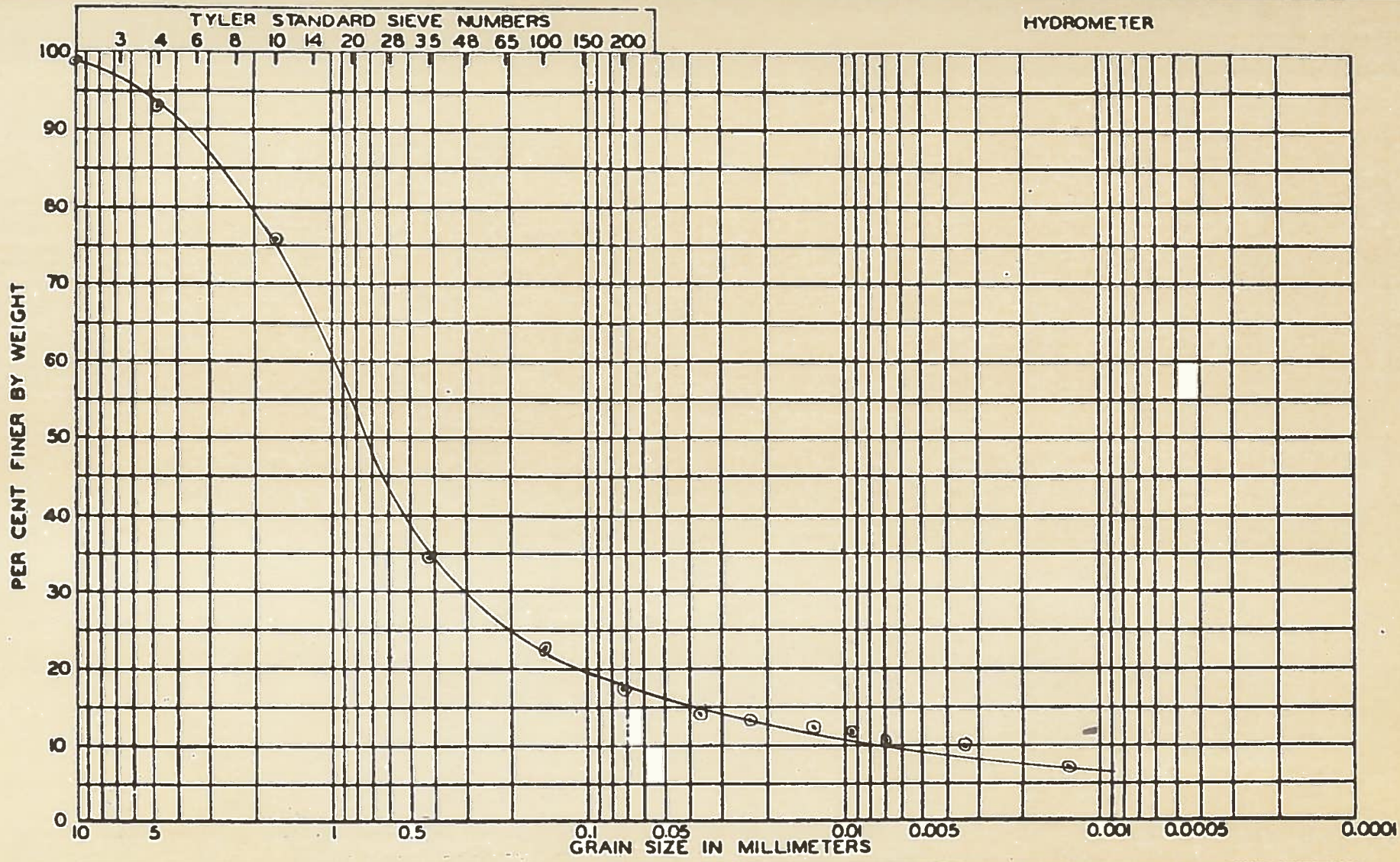
1 Laboratory M. S. File

STATE OF NEVADA, DEPARTMENT OF HIGHWAYS, MATERIALS AND TESTING DIVISION



MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY

U.S. BUREAU OF SOILS CLASSIFICATION

PROJECT Bellvue Interchange BORING NO 2 SAMPLE NO 2B

DEPTH ____ ELEVATION ____ REMARKS ____

GRAIN SIZE DISTRIBUTION DIAGRAM

STATE OF NEVADA
Department of Highways
Materials and Testing Division

E.A. or Cont. No. 70561
Con.Sec. or M.P. WA

Lab No. Fo-27-72
Date 4-13-72

REPORT OF CONSOLIDATION AND SHEAR TESTS ON COHESIVE SOILS

Samplers No. 1-C
Location Bellvue Interchange
Depth

Condition of Sample

Sieve Analysis	100
Sieve Size	% Pass.
No. 4	99.2
No. 10	90.8
No. 40	49.0
No. 200	11.5

Hydrometer Analysis	
smaller than	%
.02mm	7.2
.002mm	4.3
.001mm	4.0

% moist. 20.7
Liquid Limit 28
Plasticity Index NP
Specific Gravity 2.66 @ 20°C
Description of Soil
COARSE - medium sand

Consolidation

Load tons/sq.ft.	Void Ratio e	Permeability, K ft/day	Amount of Settlement, feet/foot at 50% consol.	C_v, sq ft/day at 50% consol.	Primary Compression ratio, r
Initial					
1/4					
1/2					
1					
2					
4					
8					
Unload 2					
1/2					
1/16					

	Initial	Final
Moisture Content		
Degree of Saturation		

Remarks

Direct Shear* or Triaxial Compression**

Normal Stress, or Chamber pressure			
Shear Maximum, S_m, psf			
Displacement at s_m			
Shear Ultimate, S_u, psf			
Displacement at s_u			
Moisture Content: Initial/Final			
Degree of Saturation: Initial/Final			
Void Ratio: Initial			
Final			
Angle of Internal Friction, ϕ_a			
Cohesion, C			

Remarks: By JM

J. M. DIAMOND, Chief Materials & Testing Engr.

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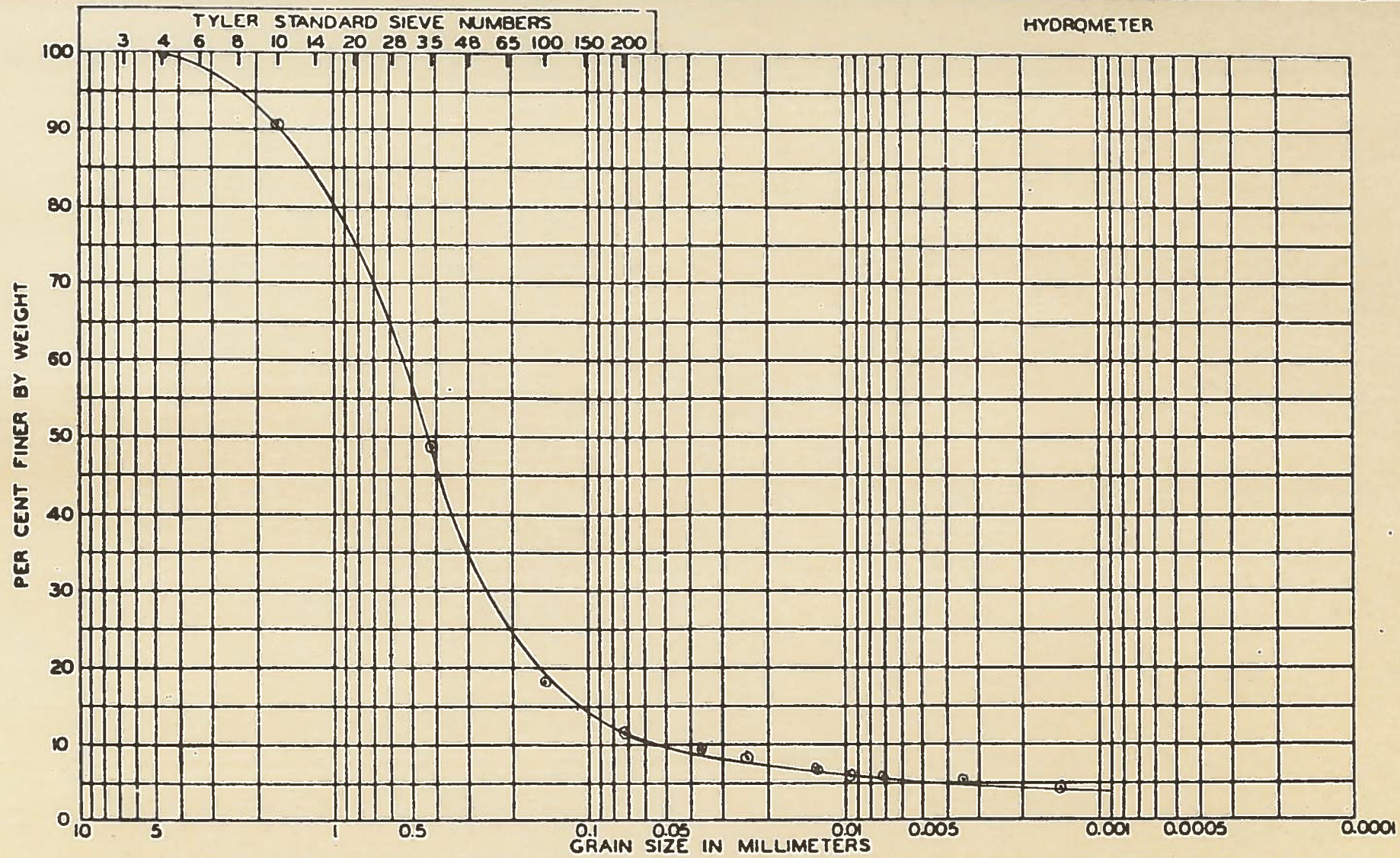
STATE OF NEVADA, DEPARTMENT OF HIGHWAYS, MATERIALS AND TESTING DIVISION



MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY

U.S. BUREAU OF SOILS CLASSIFICATION

PROJECT Bellvue Interchange BORING NO 1 [redacted] SAMPLE NO 1-C [redacted]

DEPTH ____ ELEVATION ____ REMARKS ____

GRAIN SIZE DISTRIBUTION DIAGRAM

STATE OF NEVADA
Department of Highways
Materials and Testing Division

E.A. or Cont. No. 70561
Con.Sec. or M.P. WA
Lab No. F0-28-72
Date 4-13-72

REPORT OF CONSOLIDATION AND SHEAR TESTS ON COHESIVE SOILS

Samplers No. 1-D
Location Bellvue Interchange
Depth 11"

Condition of Sample

% moist. 12.4

Sieve Analysis	100
Sieve Size	% Pass.
No. 4	91.5
No. 10	70.6
No. 40	39.8
No. 200	12.8

Hydrometer Analysis	
smaller than	%
.02mm	7.1
.002mm	2.3
.001mm	1.4

Liquid Limit 30
Plasticity Index NP
Specific Gravity 2.67 @ 20°C
Description of Soil

Consolidation

Load tons/sq.ft.	Void Ratio e	Permeability, K ft/day	Amount of Settlement, feet/foot at 50% consol.	C_v, sq ft/day at 50% consol.	Primary Compression ratio, r
Initial					
1/4					
1/2					
1					
2					
4					
8					
Unload 2					
1/2					
1/16					

	Initial	Final
Moisture Content		
Degree of Saturation		

Remarks

Direct Shear* or Triaxial Compression**

Normal Stress, or Chamber pressure			
Shear Maximum, S_m, psf			
Displacement at s_m			
Shear Ultimate, S_u, psf			
Displacement at s_u			
Moisture Content: Initial/Final			
Degree of Saturation: Initial/Final			
~~Void Ratio: Initial~~ UNIT WT.	120 pcf	121 pcf	120 pcf
Final			
Angle of Internal Friction, ϕ_a			
Cohesion, C			

Remarks: By JMD

J. M. DESMOND, Chief Materials & Testing Engr.

By

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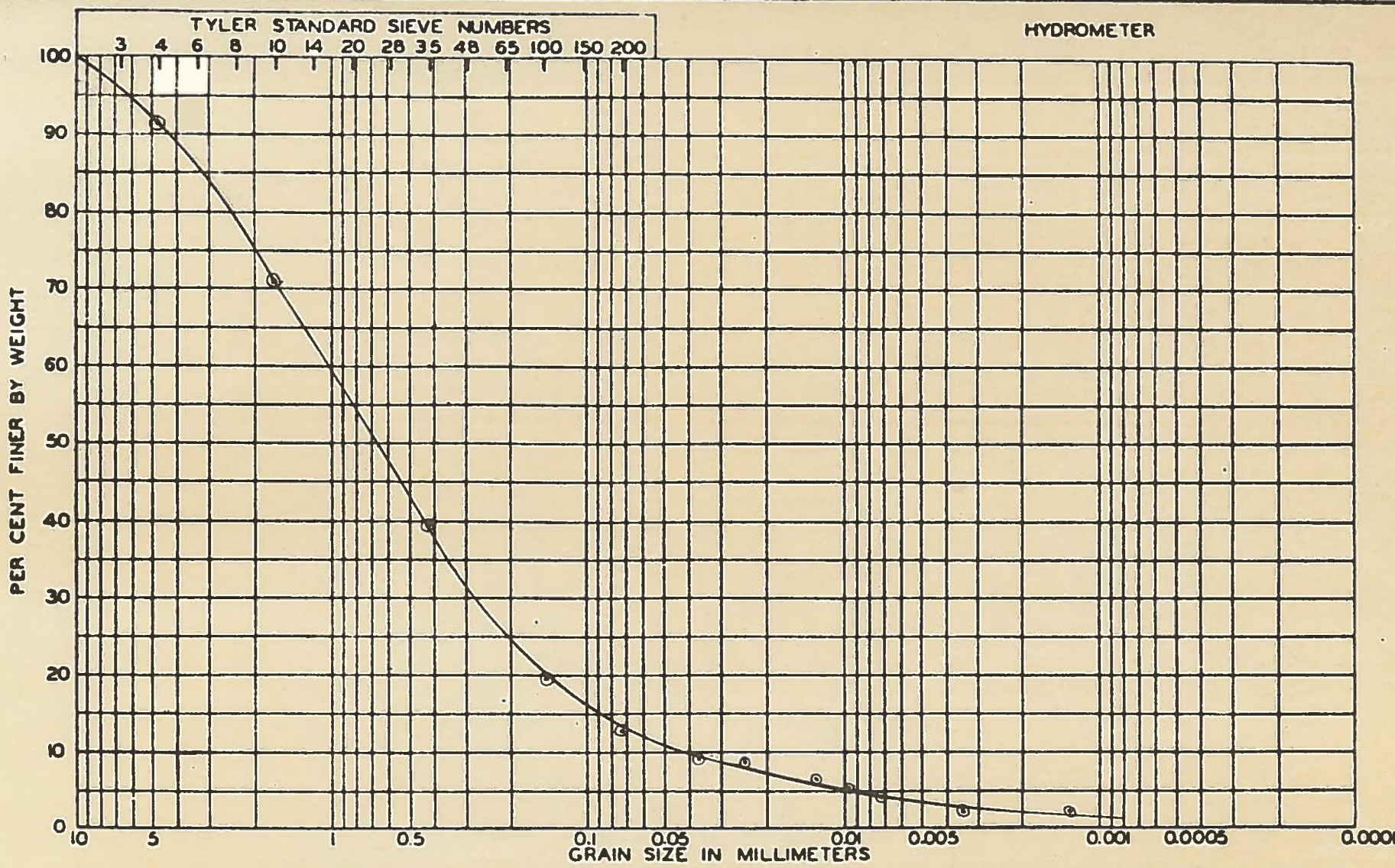
1 Laboratory M. S. File

STATE OF NEVADA, DEPARTMENT OF HIGHWAYS, MATERIALS AND TESTING DIVISION



MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY

U.S. BUREAU OF SOILS CLASSIFICATION

PROJECT Bellvue Interchange BORING NO 1 SAMPLE NO 1-B

DEPTH ____ ELEVATION ____ REMARKS ____

GRAIN SIZE DISTRIBUTION DIAGRAM

STATE OF NEVADA
Department of Highways
Materials and Testing Division

E.A. or Cont. No. 70561
Con.Sec. or M.P. WA
Lab No. FO-29-72
Date 4-13-72

REPORT OF CONSOLIDATION AND SHEAR TESTS ON COHESIVE SOILS

Samplers No. 1-E
Location Bellvue Interchange
Depth

Condition of Sample

Sieve Analysis		Hydrometer Analysis	
Sieve Size	% Pass.	smaller than	%
½	100		
⅜	98.5		
No. 4	96.4	.02mm	7.0
No. 10	87.7	.002mm	3.8
No. 40	49.8	.001mm	3.8
No. 200	12.5		

% moist. 18.4
Liquid Limit 29
Plasticity Index NP
Specific Gravity 2.67 @ 20°C
Description of Soil COARSE SAND

Consolidation

Load tons/sq.ft.	Void Ratio e	Permeability, K ft/day	Amount of Settlement, feet/foot at 50% consol.	C_v, sq ft/day at 50% consol.	Primary Compression ratio, r
Initial					
1/4					
1/2					
1					
2					
4					
8					
Unload 2					
1/2					
1/16					

	Initial	Final	Remarks
Moisture Content			
Degree of Saturation			

Direct Shear* or Triaxial Compression**

Normal Stress, or Chamber pressure			
Shear Maximum, S_m, psf			
Displacement at s_m			
Shear Ultimate, S_u, psf			
Displacement at s_u			
Moisture Content: Initial/Final			
Degree of Saturation: Initial/Final			
Void Ratio: Initial			
Final			
Angle of Internal Friction, ϕ_a			
Cohesion, C			

Remarks:

J. M. DESMOND, Chief Materials & Testing Engr.

By

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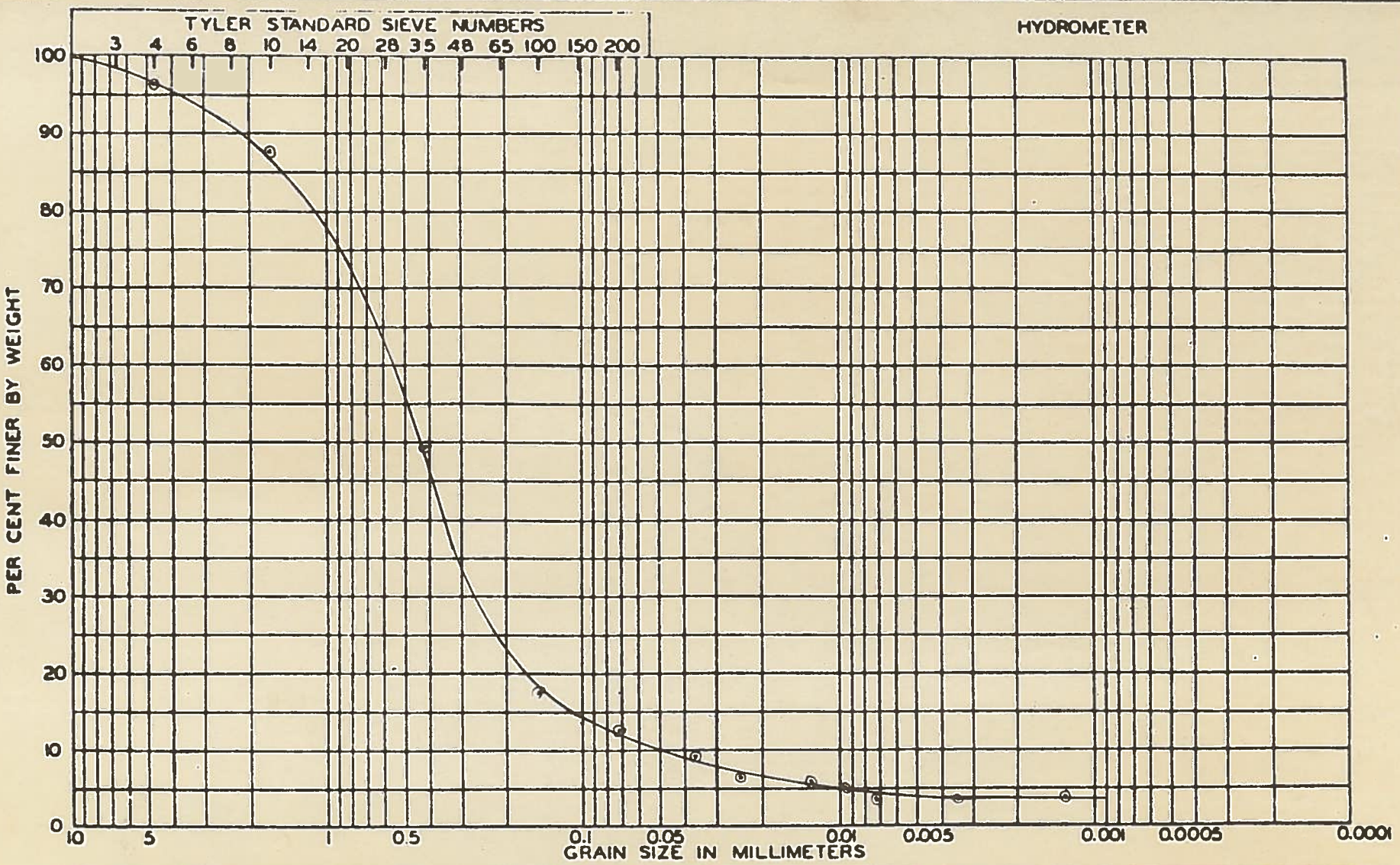

MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY

U.S. BUREAU OF SOILS CLASSIFICATION

PROJECT Bellvue Interchange BORING NO 1 SAMPLE NO. 1-E

DEPTH ____ ELEVATION ____ REMARKS ____

GRAIN SIZE DISTRIBUTION DIAGRAM