[redacted]

[redacted]

PROJECT

Parking Lot Expansion
Central District Building
400 Brand Place

Saskatoon , Saskatchewan

[redacted]

PROJECT No.	SET No.
S-19-2015	
DATE	
2015-07-31	

[redacted]

LIST OF DRAWINGS

PART 1 General

1.1 GEOTECHNICAL REPORT

.1 A copy of a detailed geotechnical investigation report with respect to the building site is included for reference as follows:

.1 Title: "Geotechnical Investigation, Proposed RCMP Detachment, Saskatoon, Saskatchewan. PWGSC File No. 6300253, PMEL File No. S98-2930"

.2 Date: February 4, 1998

.3 Prepared by: P. Machibroda Engineering Ltd., 806 48th Street East, Saskatoon, SK S7K 3Y4. Phone: (306) 665-8444.

.2 This report records properties of the soils and recommendations for the design of foundations, prepared primarily for the use of the Consultant. The recommendations given shall not be construed as a requirement of this Contract unless also contained in the Contract Documents.

.3 The geotechnical report, by its nature, cannot reveal all conditions that exist or can occur on the site. Should subsurface conditions, in the opinion of the Consultant, be found to vary substantially from the report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to the Owner.

.4 Direct all questions pertaining to the geotechnical investigation report to the Departmental Representative.

PART 2 Products

2.1 NOT USED

.1 Not used.

PART 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

P. MACHIBRODA ENGINEERING LTD.

CONSULTING
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GEOTECHNICAL INVESTIGATION
PROPOSED RCMP DETACHMENT
SASKATOON, SASKATCHEWAN
PWGSC FILE NO. 6300253
PMEL FILE NO. S98-2930
FEBRUARY 4, 1998

PREPARED FOR:

PUBLIC WORKS AND GOVERNMENT SERVICES
CANADA
WESTERN REGION
1000 - 9700 JASPER AVENUE
EDMONTON, ALBERTA
T5J 4E2

ATTENTION: MR. GORD STEVENSON
SENIOR PROPERTY AGENT
REAL PROPERTY SERVICES
WESTERN REGION

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1.0 INTRODUCTION

The following report has been prepared on the results of a geotechnical investigation performed for the proposed RCMP Detachment to be constructed in Saskatoon, Saskatchewan.

Authorization to perform this investigation was provided verbally (by telephone) on January 14, 1998. The Terms of Reference for this investigation were presented in PWGSC Contract No. 6300253, dated January 14, 1998.

The field test drilling and soil sampling were performed on January 15 and 16, 1998. Water level monitoring was performed on January 16 and 25, 1998.

A preliminary report on the findings of our investigation was presented in a letter, dated January 19, 1998.

2.0 FIELD INVESTIGATION

Fourteen test holes, located as shown on the Site Plan, Drawing No. S98-2930-1, were dry drilled during this investigation using a Texoma, Model 600 power auger drill rig. The test holes were 300 mm in diameter and were extended to depths of 3.0 to 10.5 metres below existing ground surface. Standpipe piezometers were installed in four test holes on the completion of test drilling.

Test hole drill logs were compiled during test drilling to record the soil stratification, the groundwater conditions, the position of unstable sloughing soils and the depths at which cobblestones and/or boulders were encountered.

3.2 Groundwater Conditions and Sloughing

Groundwater seepage and sloughing conditions were encountered during test drilling as shown on the Field Drill Logs, Drawing Nos. S98-2930-2 to 15, inclusive. A summary of the static groundwater conditions recorded during this investigation has been presented in Table I.

TABLE I. RECORDED GROUNDWATER LEVELS.

Test Hole No.	Piezometer Rim Elevation (metres)	Ground Surface Elevation (metres)	Recorded Groundwater Levels	
			Jan. 16/98	Jan. 25/98
1	504.2	503.3	500.4	500.4
3	503.9	503.1	500.4	500.4
6	506.2	505.3	DRY	DRY
9	505.5	504.4	500.8	500.8
POND	NA	NA	500.7	NR

NA - Not Applicable
NR - Not Recorded

Higher static water levels should be expected during or following spring snowmelt, during or following extended periods of precipitation and/or due to fluctuations in the local storm water pond.

3.3 Cobblestones and Boulders

There were no cobblestones or boulders encountered during test drilling.

4.0 LABORATORY ANALYSIS

The results of soil classification and index tests conducted on samples of soil have been plotted alongside the corresponding drill logs, opposite the depth at which the samples were recovered as shown on Drawing Nos. S98-2930-2 to 15, inclusive.

The soil classification, index and strength testing consisted of visual classification of the soil, Atterberg limits, pocket penetrometer and grain size distribution analysis. The results of the grain size distribution analyses have been shown plotted on Drawing Nos. S98-2930-16 to 21, inclusive.

5.0 DISCUSSION OF RESULTS

Based on the foregoing outline of soil test results, the following foundation design considerations and recommendations have been presented.

5.1 Design Considerations

It is understood that the proposed RCMP Detachment will be one and two stories in height and will be constructed with a partial basement. It is also understood that a paved parking area will be constructed around the north, south and west sides of the proposed building. A storm water pond is located to the immediate east of the proposed building.

The founding subgrade soils encountered at the conventional design bearing elevation consisted of variable medium dense sands, soft to firm silts and highly plastic clays. The founding subgrade soils encountered at this site are highly frost susceptible when combined with freezing temperatures and a source of groundwater. The static groundwater

levels recorded at this site were in the range of approximately 2 to 3 metres below existing ground surface.

The clay strata was medium to highly plastic indicating that these soils have the potential for undergoing excessive volume change with variations in the natural moisture content. In other words, these soils would shrink (settle) on drying followed by swelling (heaving) on wetting.

The founding subgrade soils at a conventional footing elevation are soft, compressible and have varying load carrying-settlement characteristics. Driven, treated timber piles and/or driven, open-end steel pipe piles are recommended to transfer the primary foundation loads to the deep lacustrine-alluvial sands, silts and clays. Temporary (construction) dewatering and permanent (sub-floor) drainage will be required for below grade excavations and/or basement construction.

Grade-supported concrete floor slabs constructed on at least 900 mm of structural granular fill and a non-woven geotextile over naturally deposited, undisturbed soil could perform satisfactorily if some floor slab movements (i.e., in the order of 25 mm) can be tolerated. Alternately, a structural floor with a crawlspace below or a structural floor constructed on a compressible void filler is recommended for this site. Sub-floor drainage should be installed below the floor for the full depth basement portion of the proposed building.

Design considerations and recommendations have been presented below for site grading; driven, treated timber piles; driven, open-end pipe piles, floor slabs; sub-floor drainage; foundation walls and asphalt concrete pavement.

5.2 Site Grading

All organics, topsoil, fill and deleterious materials should be stripped from the site and stockpiled for final site grading. The surface of the subgrade should be levelled and compacted to the following minimum density requirements.

Building areas	-	95 percent of standard Proctor density at optimum moisture content;
Roadway areas	-	95 percent of standard Proctor density at optimum moisture content;
Landscape areas	-	85 percent of standard Proctor density at optimum moisture content.

Fill, required to bring the subgrade soil to the design subgrade elevation, should preferably be granular material. The granular fill should be placed in thin lifts (maximum 150 mm loose) and compacted to a minimum of 98 percent of standard Proctor density at optimum moisture content.

The site should be graded to ensure positive site drainage away from the structure.

5.3 Driven, Treated Timber Piles

Driven, treated timber piles may be designed on the basis of skin friction or refusal criteria.

On the basis of skin friction, the allowable compressive design capacity for piles may be calculated at 0 kPa for the uppermost 4 metres of the pile shaft, and 25 kPa below the 4 metre depth. The maximum allowable design capacities, consistent with the maximum allowable structural capacity of the timber pile, are as follows.

TABLE II. MAXIMUM ALLOWABLE CAPACITY (TIMBER PILES).

Pile Size (Head Diameter) mm/No.	Maximum Allowable Capacity (kN)
275/11	200
300/12	250
355/14	330

NOTES:

1) For drop hammers, a minimum drop hammer mass of twice the mass of the pile, but not exceeding five times the mass of the pile, is recommended.

2) Preboring through the depth of fill, frost penetration and/or a minimum depth of 4 metres should be performed using a prebore diameter of at least the pile head diameter plus 50 mm. The recommended minimum 4 metre depth of prebore would serve to reduce the loading on the upper zone of the placed fill.

3) Driven, treated timber piles should have a minimum embedment length of 10 metres to transfer the primary foundations loads into the deep soil bearing stratum.

4) A minimum centre-to-centre pile spacing of not less than three pile diameters is recommended.

5) Timber piles should not be subject to hard driving. The potential problems as a result of hard driving are splitting of the pile, brooming of the pile toe and bowing or breaking of the pile. To reduce the potential for damage, driving must be stopped upon satisfying the following refusal criteria.

TABLE III. REFUSAL CRITERIA (TIMBER PILES).

Nominal Pile Size mm/No.	Energy Per Hammer Blow (Joules)*	Refusal Criteria Hammer Blows for 25 mm Penetration
275/11	27,000 (20,000 ft - lbs)	3
300/12	30,000 (22,000 ft - lbs)	3
354/14	35,000 (26,000 ft - lbs)	4

* 1 foot - pound - force = 1.356 Joules

6) The allowable tensile capacity of a driven, treated timber pile should not exceed 10 percent of the vertical axial compressive capacity based on shaft friction design.

7) The geotechnical consultant should inspect and document the installation of each driven, treated timber pile.

5.4 Driven, Open-End Pipe Piles

Driven, open-end pipe piles should be designed on the basis of skin friction or refusal criteria.

On the basis of skin friction, the allowable bearing pressures are as follows:

TABLE IV. SKIN FRICTION BEARING PRESSURE (DRIVEN, PIPE PILES).

Zone (metres)	Allowable Skin Friction Capacity (kPa)	
	Compression	Tension
0 to 4	0	0
Below 4	20	15

The maximum allowable compressive design capacities have been presented as maximum capacities for piles designed on the basis of refusal criteria.

TABLE V. MAXIMUM ALLOWABLE AXIAL COMPRESSIVE CAPACITY (OPEN-END PIPE PILES).

Nominal Pile Diameter (mm)	Wall Thickness (mm)	Energy Per Drop Hammer Blow (joules)	Refusal Criteria (Hammer Blows For 25 mm Penetration)	Allowable Capacity (kN)
195	8	25,000	8	200
250	8	30,000	8	350
300	8	40,700	10	450
350	8	40,700	10	530
400	8	40,700	10	600

NOTES:

1) Driven, open-end pipe piles designed on the basis of skin friction only should have a minimum embedment length of 6 metres.

2) A prebore diameter equal to the pile diameter plus 50 mm should be used through the depth of fill and/or frost penetration.

3) Pipe piles should be fitted with drive shoes equal in thickness to the pipe wall thickness and equal in length to the pile diameter.

4) Piles should not be subjected to additional driving after the refusal criteria is satisfied.

5) A minimum pile spacing of three times the shaft diameter is recommended.

6) The installation of each pile and the elevation monitoring of any piles within nine pile diameters which could be affected by the installation of adjacent piles should be documented during construction by the geotechnical consultant. Each pile should be inspected for damage as a result of the driving operations for the accumulation of water.

5.5 Floor Slabs

If floor slab movements of about 25 mm can be tolerated, then the following minimum provisions should be incorporated into the design of a grade-supported, cast-in-place, reinforced concrete slab subjected to light to moderate floor loading.

1) Excavate and remove all organics, topsoil, fill and other deleterious materials from the building area to provide at least 900 mm of clean, free-draining granular fill below a grade-supported concrete floor slab. The floor slab for a full depth basement should be constructed with a sub-floor drainage system.

2) Level and compact the surface of the subgrade to at least 95 percent of standard Proctor density at optimum moisture content. Do not allow the subgrade soil to dry out. Cover with granular fill as soon as practical after preparation.

3) Excavate soft subgrade areas or disturbed soils, replace with clean, non-expansive soil and compact to at least 96 percent of standard Proctor density at optimum moisture content.

4) Fill, required to bring the subgrade to the design subgrade elevation, should be granular material.

5) The uppermost 150 mm of fill should be clean, crushed, granular base course material.

6) All granular fill should be placed in thin lifts (maximum of 150 mm loose) and each lift should be compacted to at least 98 percent of standard Proctor density at optimum moisture content.

7) Isolate the slab from grade beams, walls, columns, etc., by means of separation joints.

8) Reinforce the concrete slab and articulate the slab at regular intervals to provide for controlled cracking.

9) Provide a polyethylene vapour barrier between the granular base and the reinforced concrete floor slab.

10) Provide positive site drainage away from the building.

11) Floor slabs should not be constructed on desiccated, frozen or wet subgrade soil or base.

If floor slab movements cannot be tolerated during operation of the proposed RCMP Detachment, then it is recommended that a structural floor with a crawl space below or a structural floor on a compressible void filler should be constructed. Surficial organics, fill, topsoil and other deleterious materials should be removed from the floor slab area.

If a structural floor with a crawl space is constructed, then the crawl space should be covered with a continuous sheet of polyethylene plastic. The polyethylene plastic should be covered with 50 mm of sand to hold it tightly to the soil surface. The crawl space should be ventilated during warm weather and heated during cold temperatures.

If a structural floor on a compressible void filler is constructed, then a continuous sheet of polyethylene plastic should be placed between the compressible void filler and the concrete floor. The compressible void filler should be installed in accordance with the manufacturer's specifications. The compressible void filler should be a minimum of 100 mm in thickness.

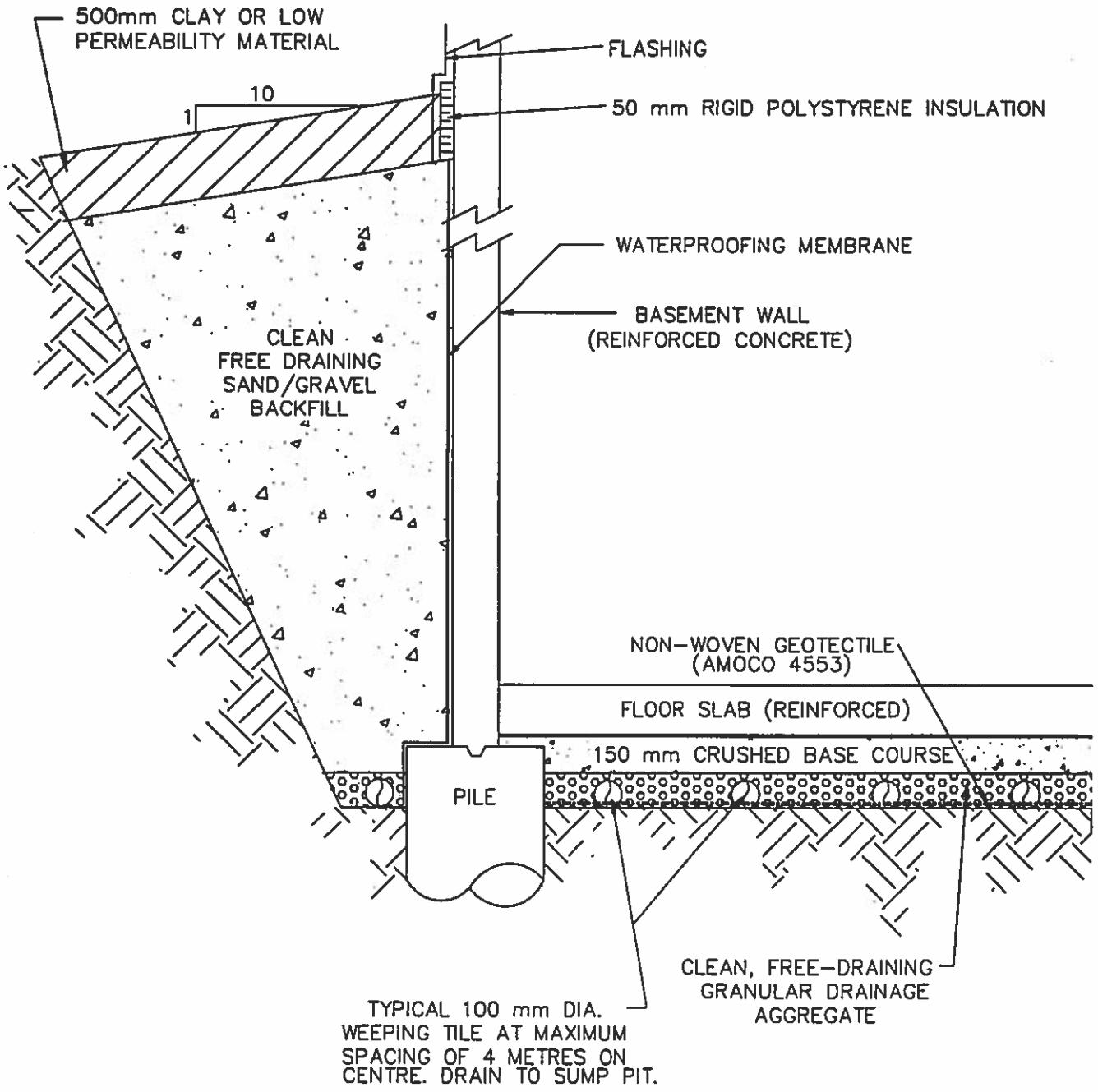
5.6 Sub-Floor Drainage System

It is recommended that a sub-floor drainage system be installed below a grade-supported or structural floor slab for collection and controlled discharge of free water which may enter or accumulate within or below the full depth basement. The suggested configuration of the sub-floor drainage system has been shown plotted on Figure No. 1. The sub-floor drainage system should consist of perforated drainage pipe with the invert placed at least 900 mm below the underside of the concrete slab-on-grade floor. For a structural floor slab, the perforated drainage pipe should be placed at least 600 mm below the surface of the subgrade. The weeping tile drains should be placed in the longitudinal direction at a maximum spacing of 3 metres on centre and drained to header pipes along the end walls. The drainage pipe should be at least 100 mm in diameter, wrapped in filter cloth and placed on undisturbed, naturally-deposited soil or free-draining sand as may be required to level the surface. The drainage pipe should be covered with a minimum of 500 mm of clean, free-draining granular fill meeting the following gradation requirements.

Sieve Designation (mm)	**Percent Passing**
25.0	100
9.5	75 - 100
4.75	48 - 100
2.00	20 - 80
0.850	0 - 53
0.425	0 - 32
0.150	0 - 10
0.075	0 - 3

The sub-floor drainage system should be positively drained to a sump equipped with an automatic sump pump.

Positive site drainage should be provided around the periphery of the proposed RCMP Detachment to minimize the potential for surface water infiltration.



CONSULTING GEOENVIRONMENTAL GEOTECHNICAL ENGINEERS

P. MACHIBRODA ENGINEERING LTD.

2623 B FAITHFULL AVENUE SASKATOON, SASK.

DRAWING TITLE: SUB-SLAB DRAINAGE DETAILS

PROJECT: PROPOSED RCMP DETACHMENT SASKATOON, SK

SCALE: NOT TO SCALE

DRAWING NUMBER: FIGURE No. 1

DATE: JANUARY, 1998

5.7 Foundation Walls

Subsurface foundation walls should be designed to resist lateral earth pressure exerted by the backfill, as well as the horizontal pressure induced by any surcharge loading. The lateral earth pressure may be calculated on the basis of an equivalent fluid pressure distribution of 8.0 kN/m^3. The surcharge loading should be calculated on the basis of actual loads. The lateral earth pressure loading assumes that the backfill, extending out a distance of at least 1.5 metres away from the foundation wall, will be placed in thin lifts, will be lightly compacted and a peripheral weeping tile drainage system will be installed alongside the base of the foundation walls with the invert elevation at or below the base of the wall. The perforated drainage pipe should be at least 100 mm in diameter, wrapped in filter cloth and placed on the undisturbed foundation soil. The backfill above the drainage pipe should be clean, free-draining granular material meeting the following gradation requirements.

Sieve Designation (mm)	Percent Passing
25.0	100
9.5	75 - 100
4.75	48 - 100
2.00	20 - 80
0.850	0 - 53
0.425	0 - 32
0.150	0 - 10
0.075	0 - 3

The uppermost 500 mm of backfill should be clay or other low permeability material.

5.8 Foundation Concrete

Water soluble sulphate salts (gypsum crystals) were encountered during test drilling. Sulphate resistant (CSA Symbol 50) Portland cement should be used for all foundation concrete in contact with the soil. A minimum 28-day concrete compressive strength of 25 MPa is recommended. An entrained air content of 5 to 7 percent is recommended. All concrete should be manufactured in accordance with current CSA standards.

5.9 Asphalt Concrete Pavement

The following minimum recommendations should be incorporated into the design of the asphalt surfacing structure.

1) Remove organics, loose fill and any other deleterious materials from the roadway/parking areas and compact the upper 150 mm of subgrade to at least 95 percent of standard Proctor density at optimum moisture content.

2) Soft subgrade areas should be excavated and replaced with suitable soil compacted to a minimum of 95 percent of standard Proctor density at optimum moisture content.

3) As a subgrade support, the CBR (California Bearing Ratio) rating of the compacted subgrade soil would be in the order of 1 to 2. Based on the CBR rating and Drawing No. S98-2930-22 (Design of Pavement & Base by California Method), the following pavement structures have been presented.

TABLE VI. SUGGESTED THICKNESS FOR PAVEMENT STRUCTURE.

Pavement Structure	Heavy Truck Traffic Wheel Loading 4,540 kg (10,000 lbs) (mm)	Light Truck Passenger Vehicle Traffic Wheel Loading 1,830 kg (4,000 lbs) (mm)
Asphaltic Concrete	120	60
Granular Base (CBR 65, min.)	200	150
Granular Sub-Base (CBR 35, min.)	530	290
Non-Woven Geotextile	AMOCO 4557	AMOCO 4557
TOTAL THICKNESS	**850**	**500**

4) Fill, required to raise the level of the subgrade to the underside of the granular base, should preferably consist of granular soil.

5) All granular fill placed above the subgrade elevation should be placed in thin lifts (maximum 150 mm loose) and compacted to a minimum of 98 percent of standard Proctor density. The granular base and sub-base course material should meet the following aggregate gradation requirements.

TABLE VII. AGGREGATE GRADATION REQUIREMENTS.

Grain Size (mm)	Percent Passing	
	Base Course	Sub-Base Course
50.0	-	100
25.0	100	85 - 100
18.0	87 - 100	80 - 100
12.5	72 - 93	70 - 100
5.0	45 - 77	50 - 85
2.0	26 - 56	35 - 75
0.900	18 - 39	25 - 50
0.400	13 - 26	15 - 35
0.160	7 - 16	8 - 22
0.071	6 - 11	0 - 13
Plasticity Index (%)	0 - 6	0 - 6
CBR (min.)	65	35
% Fracture (min.)	50	-

6) Positive surface drainage is recommended to reduce the potential for moisture infiltration through the pavement structure.

7) Surface water should be prevented from seeping back under the outer edges of the pavement structures.

8) Periodic maintenance such as crack sealing will be required.

6.0 CLOSURE

The presentation of the field test drilling summary and foundation design recommendations has been completed as authorized. Fourteen, 300 mm diameter test holes were dry drilled using a Texoma, Model 600 power auger drill rig. A field drill log was compiled for each Test Hole during test drilling which, we believe, was representative of the subsurface conditions at the Test Hole locations at the time of test drilling. Variations in the subsurface conditions from that shown on the field drill logs at locations other than the exact Test Hole locations should be anticipated. If conditions should differ from those reported here, then we should be notified immediately in order that we may examine the conditions in the field and reassess our recommendations in the light of any new findings.

The Terms of Reference for this geotechnical investigation did not include any environmental assessment of the site. No detectable evidence of environmentally sensitive materials such as hydrocarbon odour was detected during the actual time of the field test drilling program. If on the basis of any knowledge, other than that formally communicated to us, there is reason to suspect that environmentally sensitive materials may exist, then additional test holes should be drilled and samples recovered for chemical analysis.

This report has been prepared for the exclusive use of Public Works and Government Services Canada and their agents for specific application to the proposed RCMP Detachment to be constructed in Saskatoon, Saskatchewan. It has been prepared in accordance with generally accepted geotechnical engineering practices and no other warranty, express or implied is made. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. P. Machibroda Engineering Ltd. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

The subsurface investigation necessitated the drilling of deep test holes. Each test hole was backfilled with auger cuttings upon the completion of drilling. Please be advised that some settlement of the backfill material will occur which may leave a depression or an open hole. It is the responsibility of the client to inspect the site and backfill, as required, to ensure that the ground surface at each Test Hole location is maintained level with the existing grade.

We trust that this meets your requirements at this time. Should you require additional information, please contact us.

Yours very truly,

P. MACHIBRODA ENGINEERING LTD.

B.F. Eckel, P.Eng., M.Sc.

P. Machibroda, P.Eng., FCSCE

BFE/PM/blm

PROFESSIONAL ENGINEER
B. F. ECKEL
MEMBER 5288
2000-08-25
YR. MN. DAY
SASKATCHEWAN

ASSOCIATION OF PROFESSIONAL
ENGINEERS OF SASKATCHEWAN
CERTIFICATE OF AUTHORIZATION
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NUMBER 172
PERMISSION TO CONSULT HELD BY:

DISCIPLINE	SASK. REG NO.	SIGNATURE
Geotechnical	5288	B. Eckel

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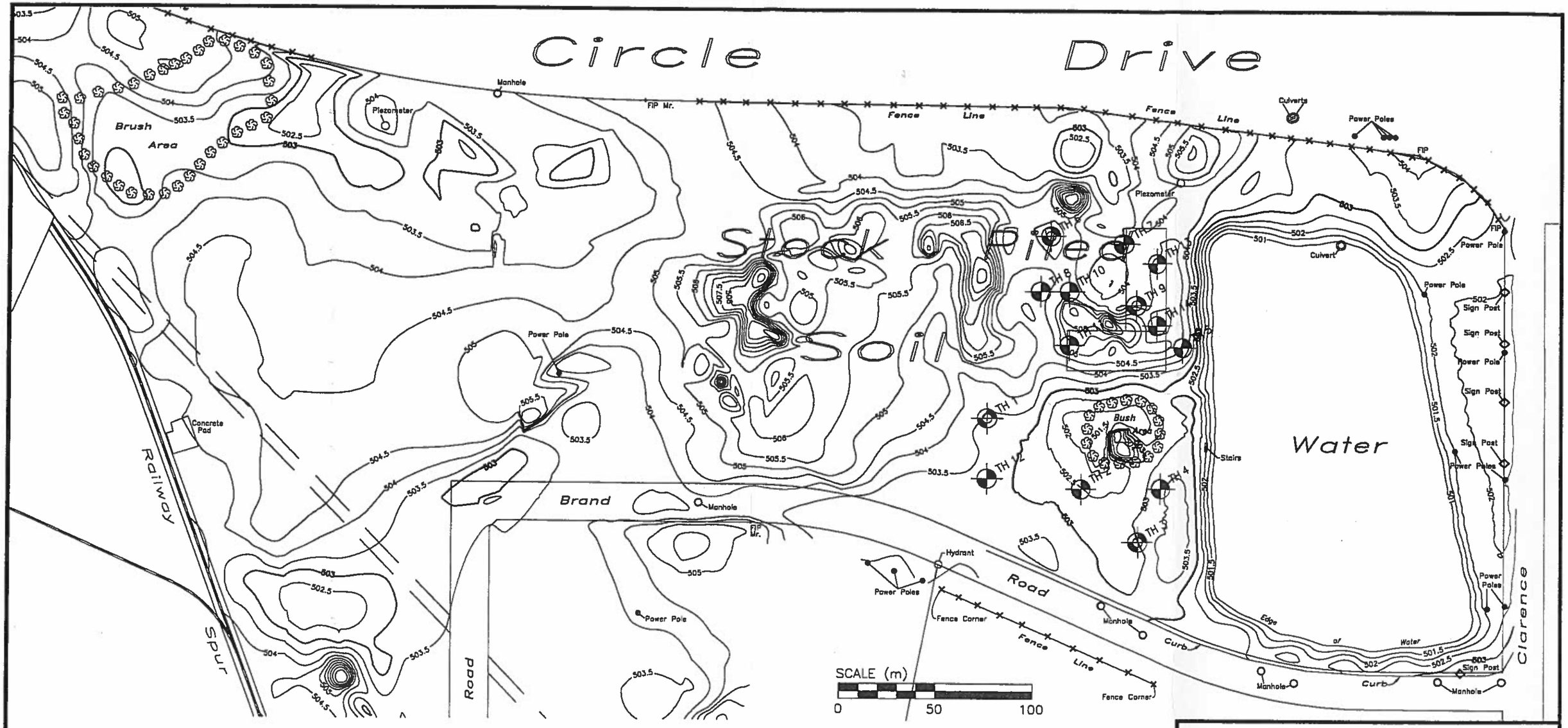
ENGINEERS

DRAWINGS



NOTE:
THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

ORIGINAL DRAWING SUPPLIED BY PETERS SURVEYS, SASKATOON, SK.

BENCHMARK NO. D-249:
ELEVATION 1639.64 FEET (504.591 M). TYPE 7. AT THE NE 9-36-5-W3M. 225' W OF CENTRELINE OF CLARENCE AVENUE. 7.0' E OF POWER POLE. 2.0' S OF FENCE. 1 M ABOVE GROUND.

LEGEND

- –PMEL TEST HOLE
- –PMEL TEST HOLE (PIEZOMETER INSTALLED)
- –BENCHMARK

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CONSULTING
GEOTECHNICAL
GEOENVIRONMENTAL
ENGINEERS

2623 B FAITHFULL AVENUE
SASKATOON, SASK.

DRAWING TITLE:

SITE PLAN – TEST HOLE LOCATIONS

PROJECT:

GEOTECHNICAL PROPOSED RCMP DETACHMENT BUILDING, SASKATOON, SK

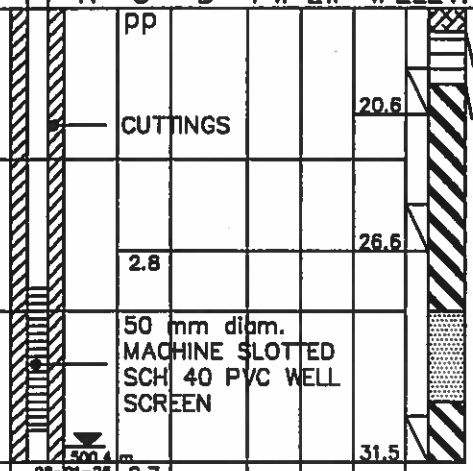
SCALE: AS SHOWN	DRAWING NUMBER:
DATE: JANUARY, 1998	S98-2930-1

PIEZO. ELEV. = 504.2 m

TEST HOLE 98-1

DEPTH (m)

N U D Pw Lw w ELEV: 503.3 m



TOPSOIL, organics, black, rootlets.

FILL- Clay, silty, some sand, trace organics, frozen.

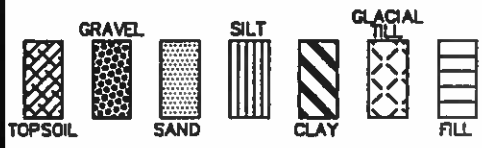
CLAY, silty, trace sand, firm, medium plastic, moist, brown, oxide stained.

SAND, silty, dense, poorly graded, fine grained, moist to wet, brown to olive, sloughing.

CLAY, silty, stiff, highly plastic, moist, olive.

NOTE:
Frozen to 800 mm.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

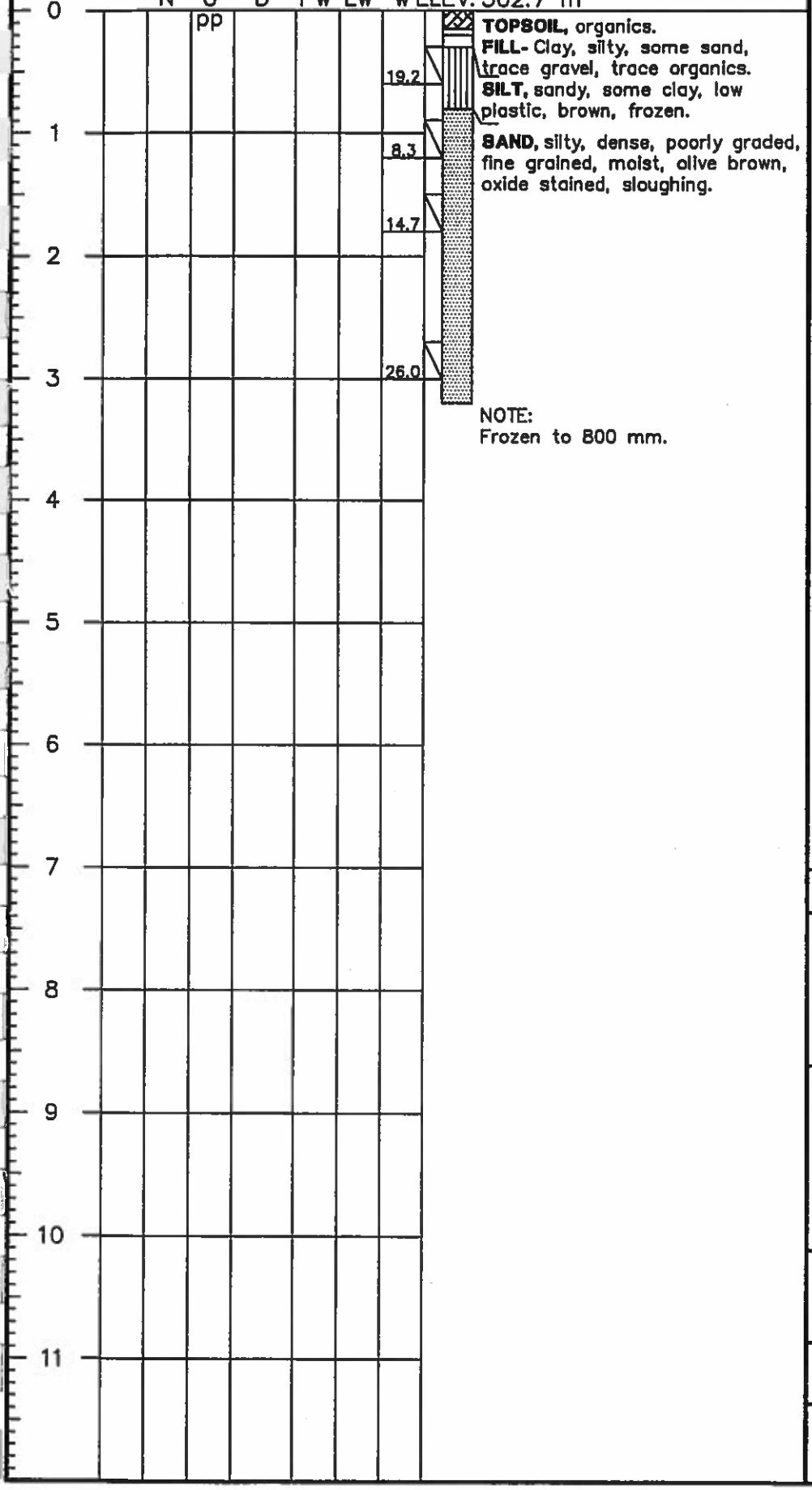
FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

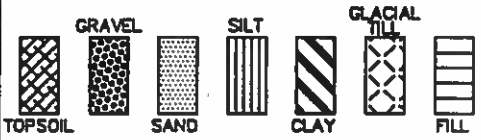
LOCATION:
SASKATOON, SK

DATE DRILLED:	DRAWING NUMBER:
JAN 15, 1998	S98-2930-2

TEST HOLE 98-2



LEGEND:



pp....POCKET PENETROMETER (kg/cm^2)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

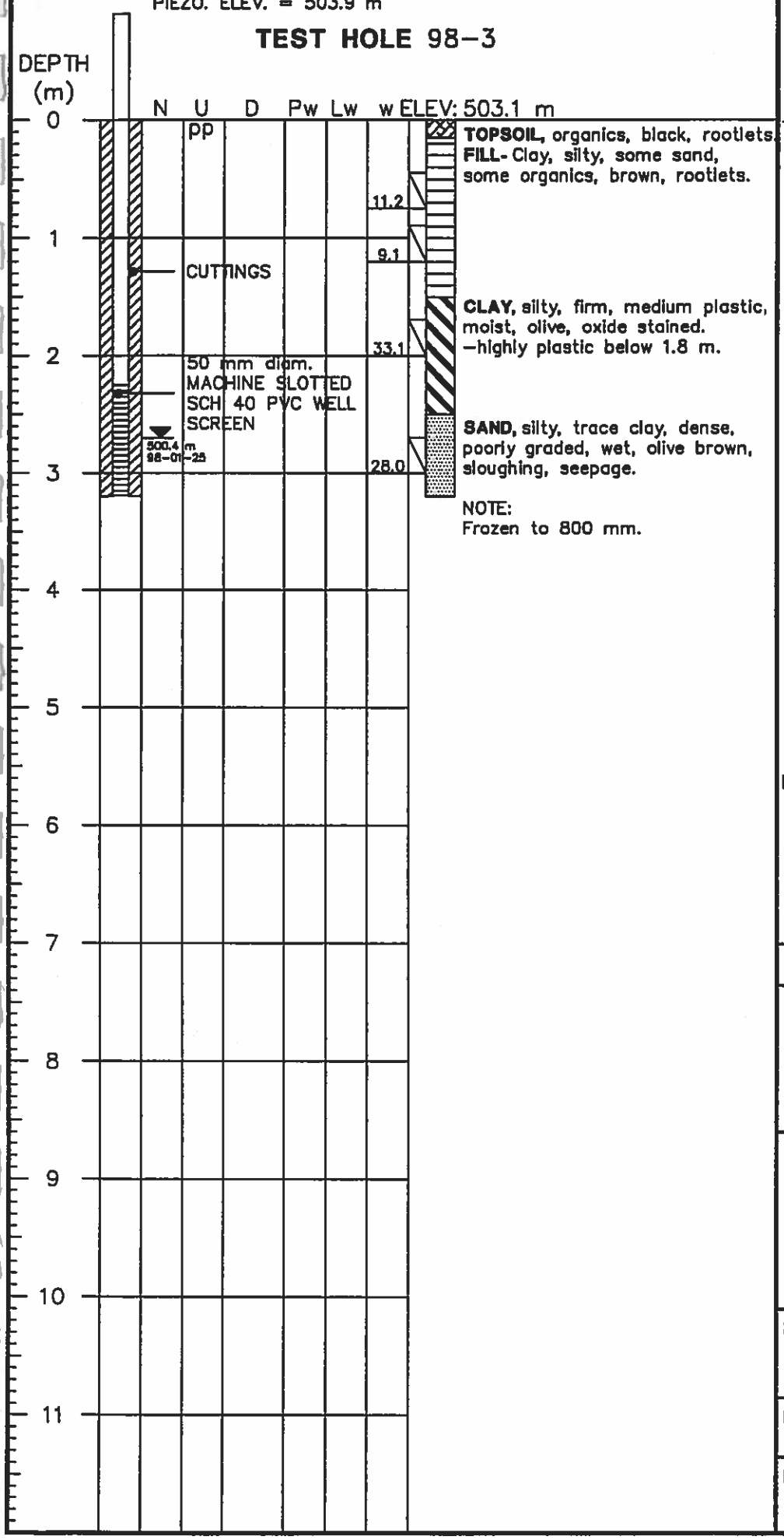
PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

LOCATION:
SASKATOON, SK

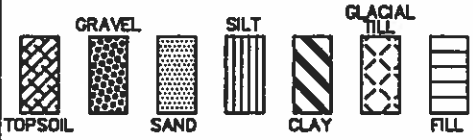
DATE DRILLED:	DRAWING NUMBER:
JAN 15, 1998	S98-2930-3

PIEZO. ELEV. = 503.9 m

TEST HOLE 98-3



LEGEND:



pp....POCKET PENETROMETER (kg/cm^2)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

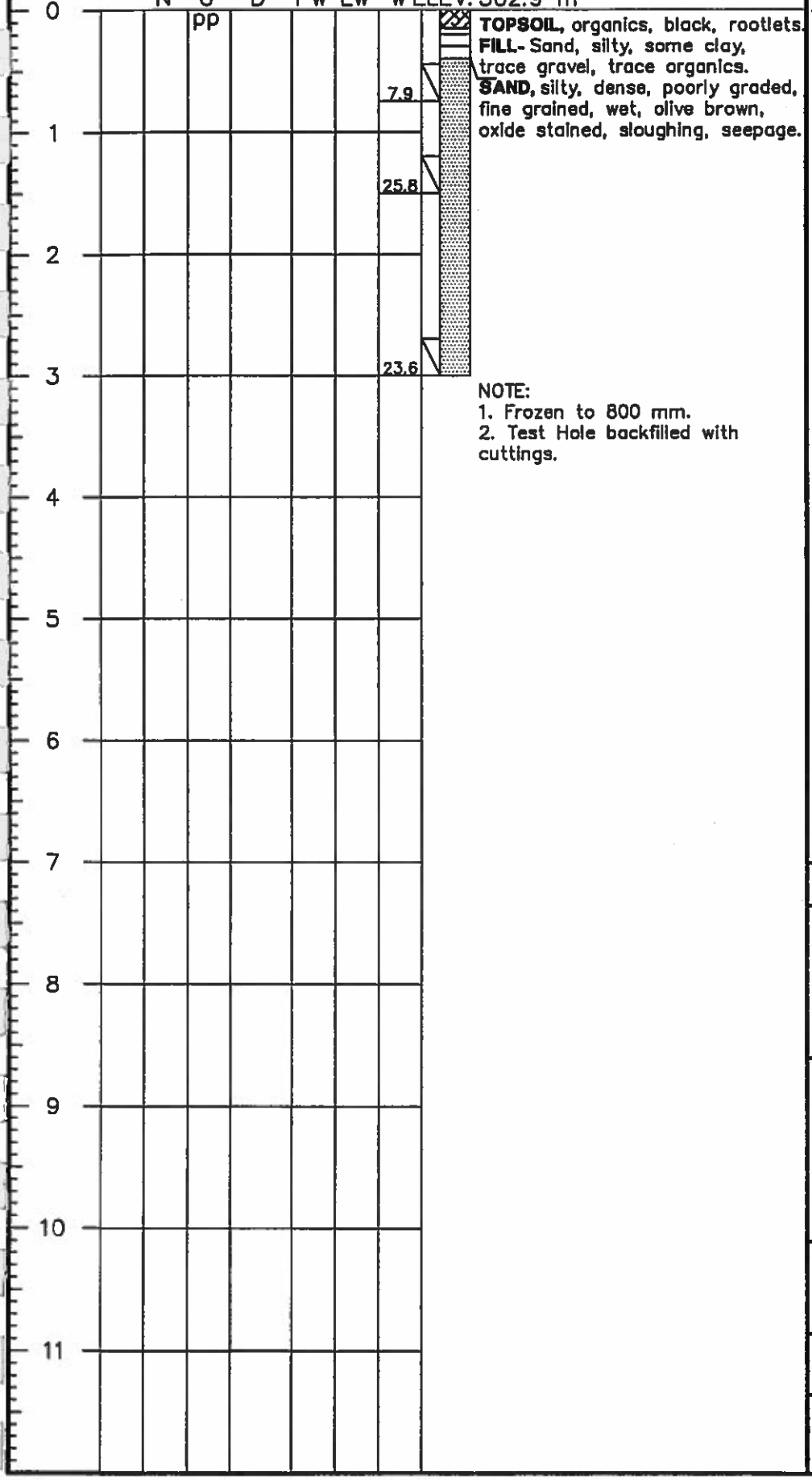
FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

LOCATION:
SASKATOON, SK

DATE DRILLED:	DRAWING NUMBER:
JAN 15, 1998	S98-2930-4

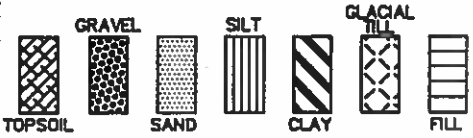
TEST HOLE 98-4



TOPSOIL, organics, black, rootlets.
FILL- Sand, silty, some clay, trace gravel, trace organics.
SAND, silty, dense, poorly graded, fine grained, wet, olive brown, oxide stained, sloughing, seepage.

NOTE:
1. Frozen to 800 mm.
2. Test Hole backfilled with cuttings.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

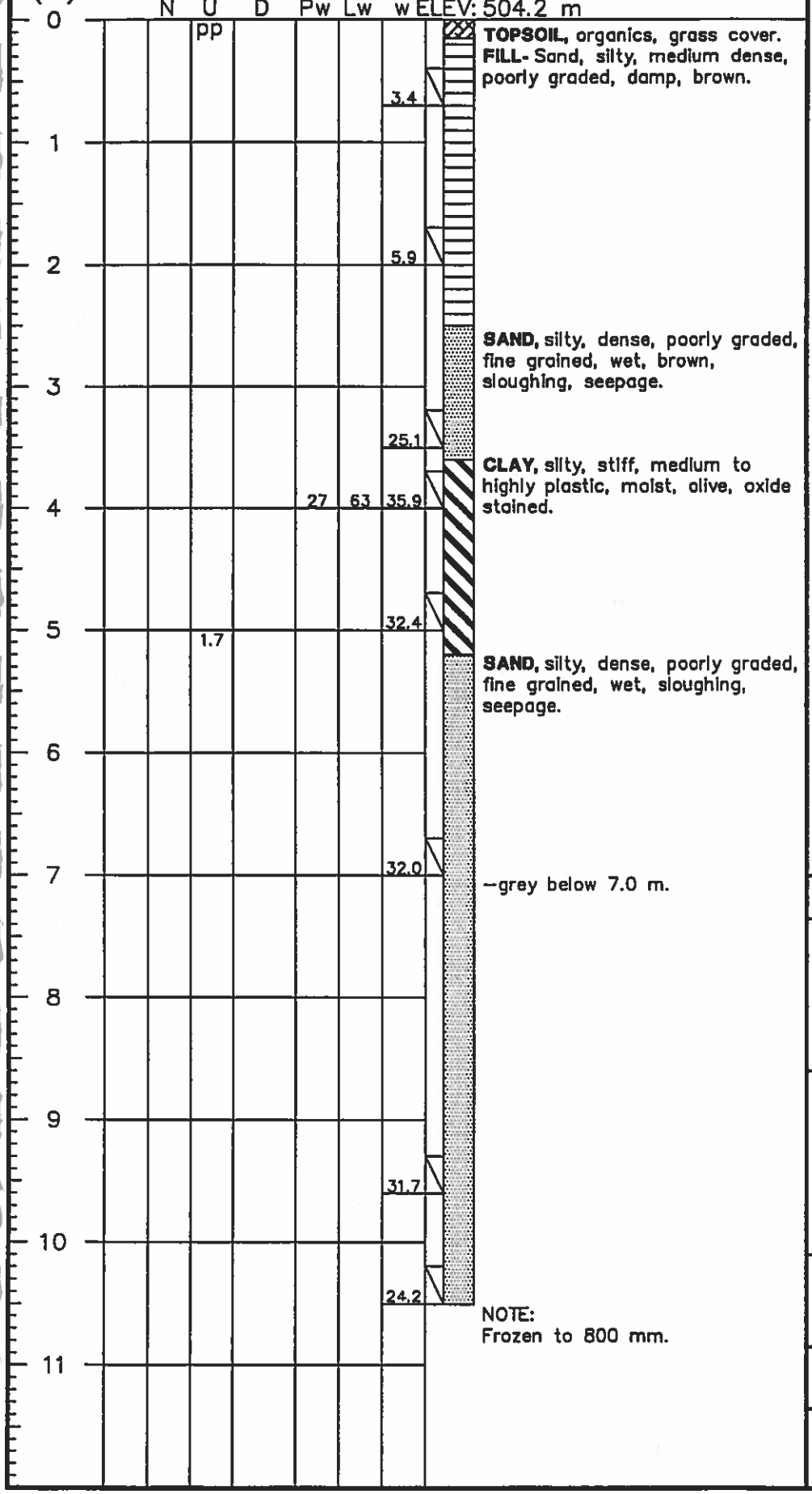
FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

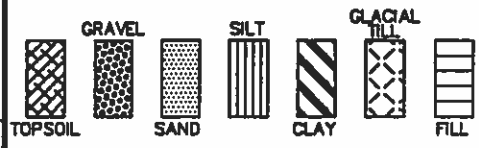
LOCATION:
SASKATOON, SK

DATE DRILLED:	DRAWING NUMBER:
JAN 15, 1998	S98-2930-5

TEST HOLE 98-5



LEGEND:



pp....POCKET PENETROMETER (kg/cm^2)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

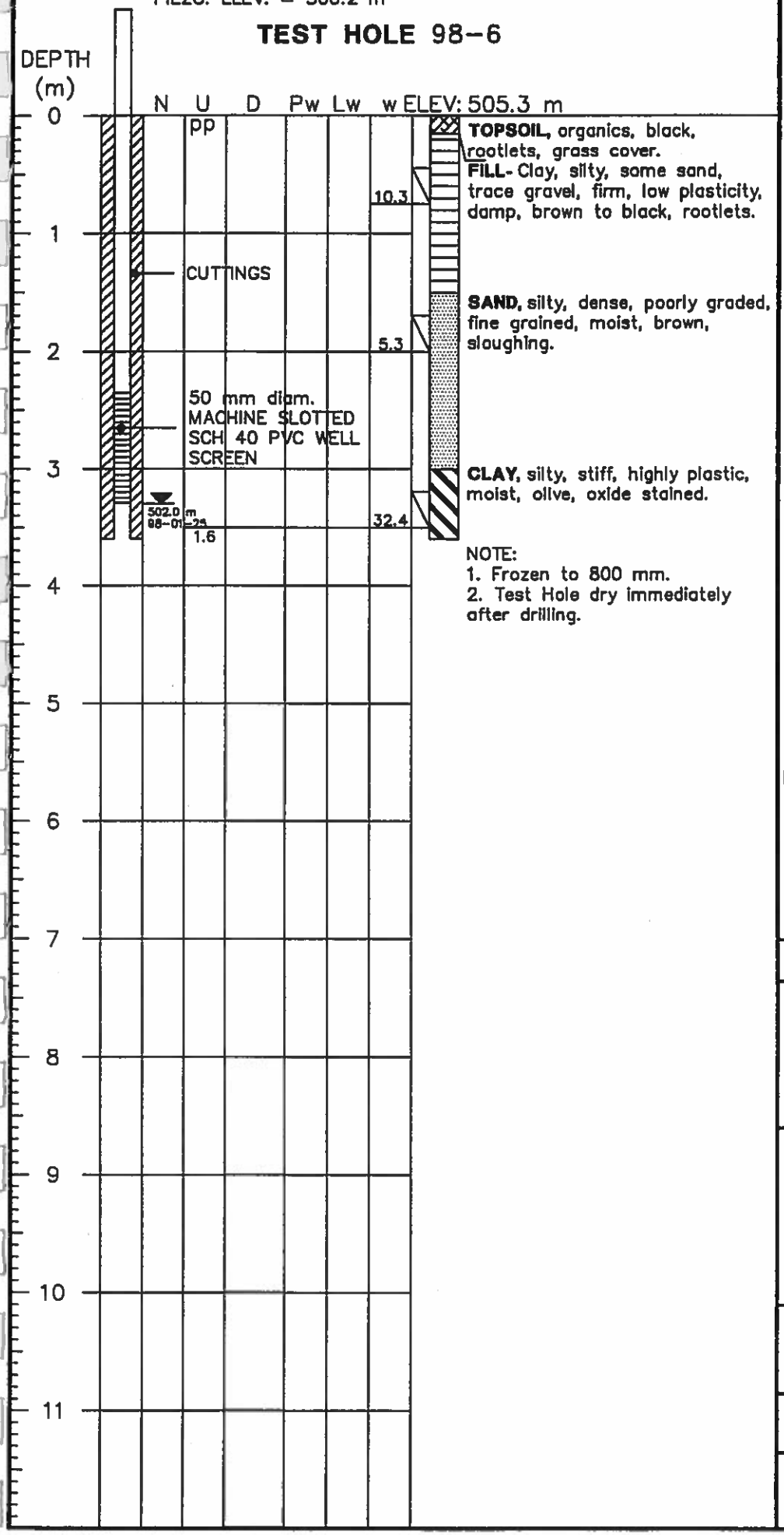
LOCATION:
SASKATOON, SK

DATE DRILLED:
JAN 15, 1998

DRAWING NUMBER:
S98-2930-6

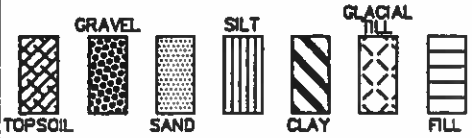
PIEZO. ELEV. = 506.2 m

TEST HOLE 98-6



NOTE:
1. Frozen to 800 mm.
2. Test Hole dry immediately after drilling.

LEGEND:



pp....POCKET PENETROMETER (kg/cm^2)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

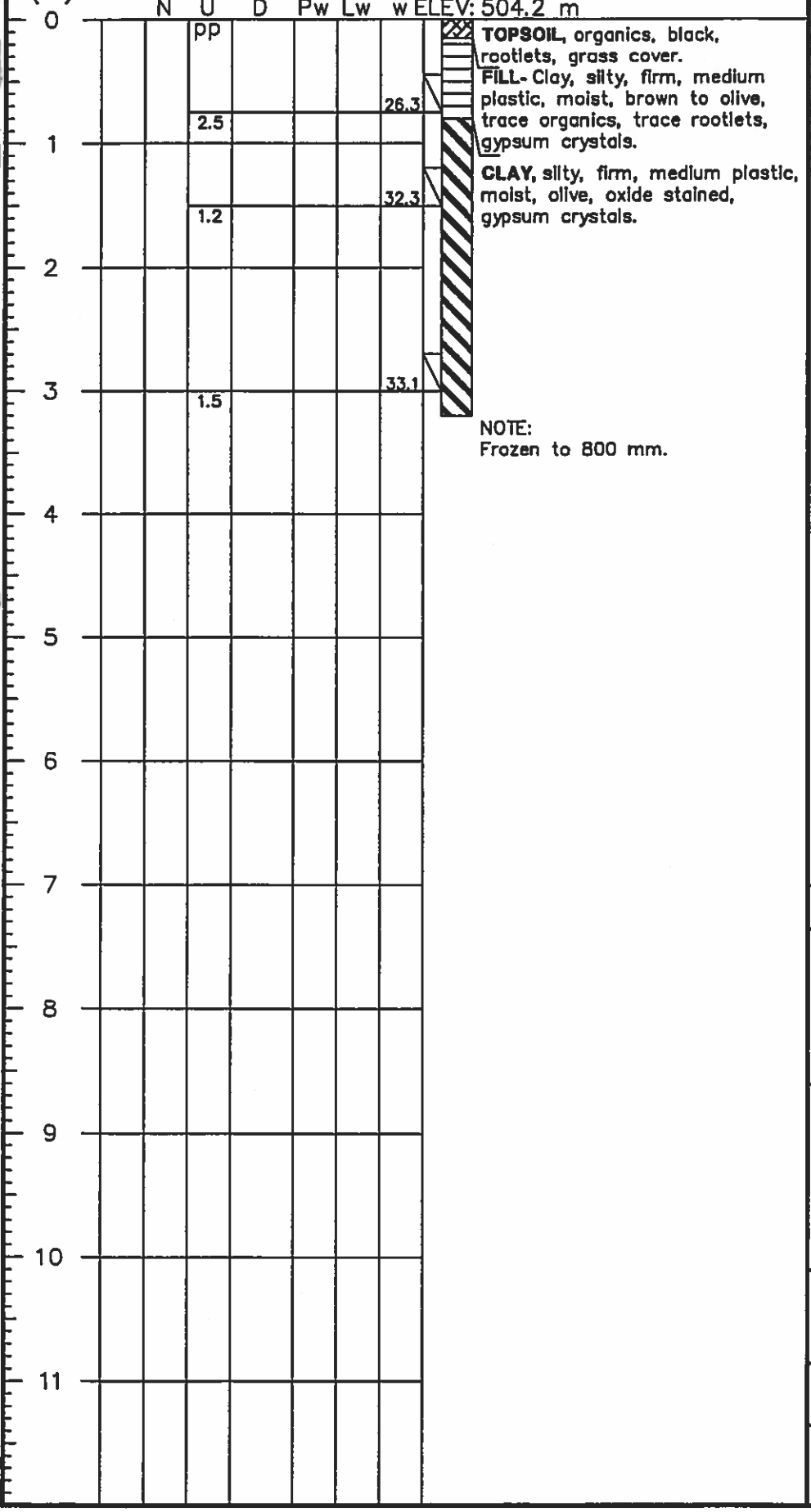
FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

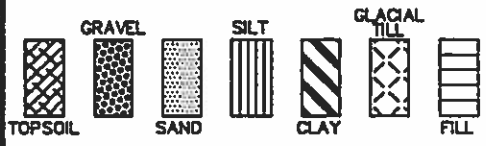
LOCATION:
SASKATOON, SK

DATE DRILLED:	DRAWING NUMBER:
JAN 15, 1998	S98-2930-7

TEST HOLE 98-7



LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

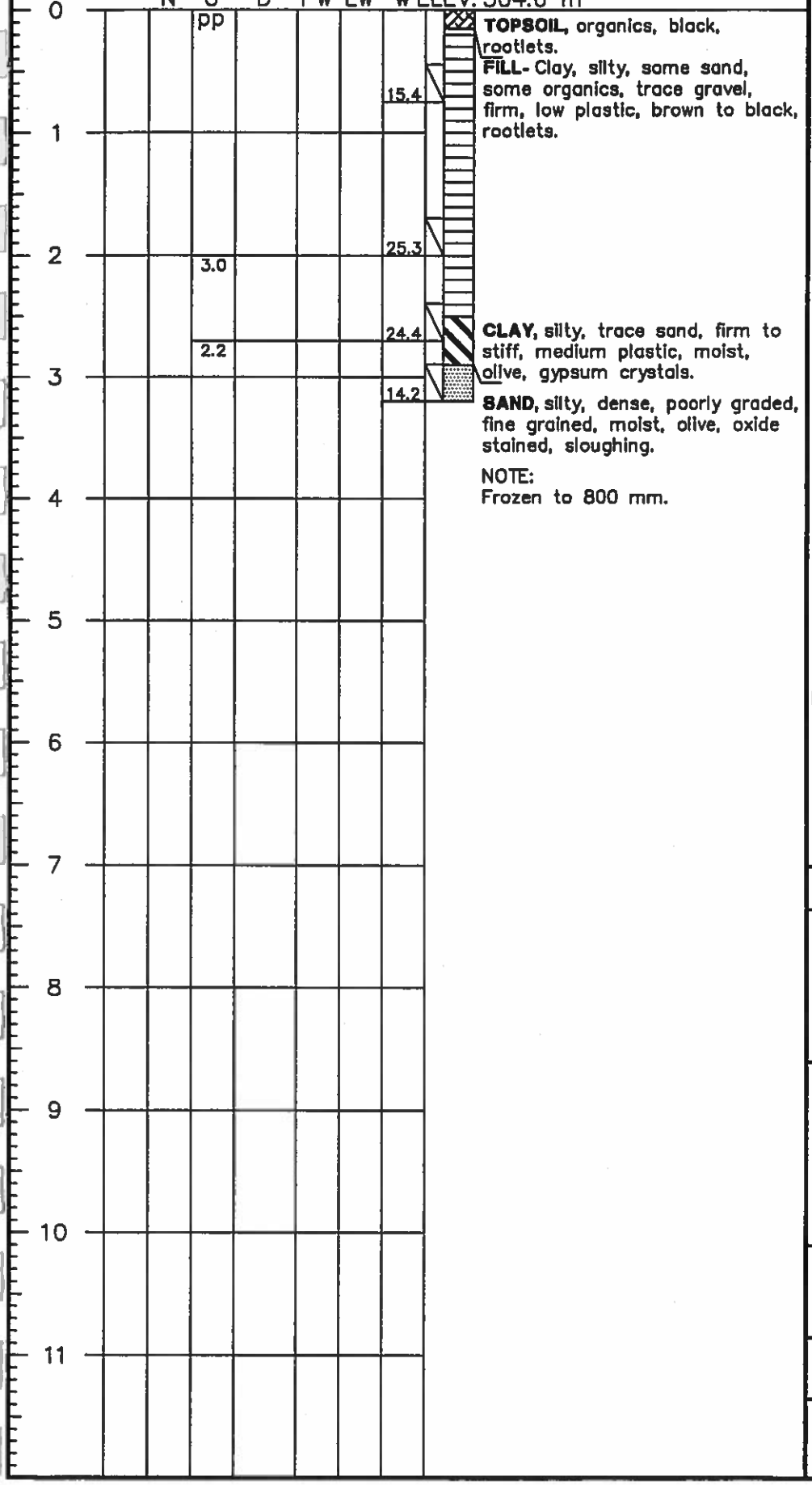
FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

LOCATION:
SASKATOON, SK

DATE DRILLED:	DRAWING NUMBER:
JAN 15, 1998	S98-2930-8

TEST HOLE 98-8



TOPSOIL, organics, black, rootlets.

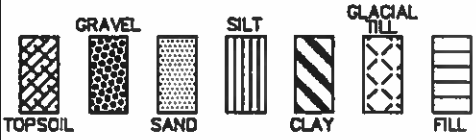
FILL- Clay, silty, some sand, some organics, trace gravel, firm, low plastic, brown to black, rootlets.

CLAY, silty, trace sand, firm to stiff, medium plastic, moist, olive, gypsum crystals.

SAND, silty, dense, poorly graded, fine grained, moist, olive, oxide stained, sloughing.

NOTE:
Frozen to 800 mm.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

LOCATION:
SASKATOON, SK

DATE DRILLED:
JAN 15, 1998

DRAWING NUMBER:
S98-2930-9

PIEZO. ELEV. = 505.5 m

TEST HOLE 98-9

DEPTH (m)

N U D Pw Lw w ELEV: 504.4 m

pp

8.4

CUTTINGS

25.8

14.9

500.8 m 98-01-25

50 mm diam. MACHINE SLOTTED SCH 40 PVC WELL SCREEN

25.6

26.8

27.7

27.3

27.6

23.9

33.1

1.0

29.4

TOPSOIL, organics, black, rootlets.
SAND, silty, dense, poorly graded, fine grained, moist, brown, oxide stained.

-wet, seepage below 3.0 m.

-grey sand, seepage, sloughing at 3.6 m.

CLAY, some silt, stiff, highly plastic, moist, grey.

SAND, silty, dense, poorly graded, fine grained, wet, grey, sloughing, seepage.

NOTE:
1. Frozen to 800 mm.
2. Water level 4.8 m immediately after drilling.

LEGEND:

GRAVEL, SILT, GLACIAL TILL, TOPSOIL, SAND, CLAY, FILL

pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

SHELBY TUBE, SPLIT SPOON, CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

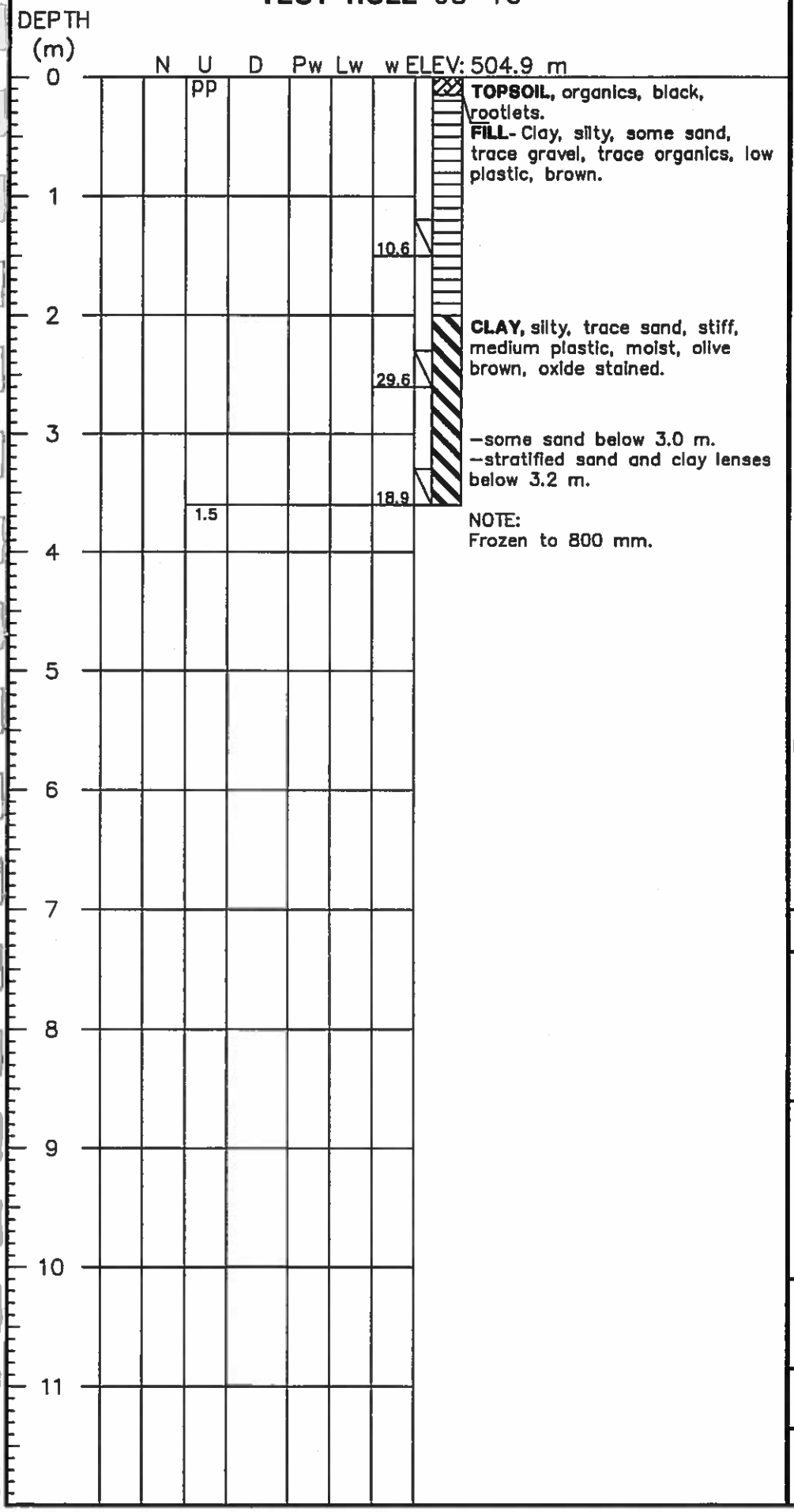
PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

LOCATION:
SASKATOON, SK

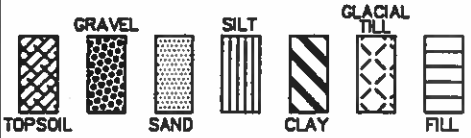
DATE DRILLED:
JAN 15, 1998

DRAWING NUMBER:
S98-2930-10

TEST HOLE 98-10



LEGEND:



pp....POCKET PENETROMETER (kg/cm^2)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

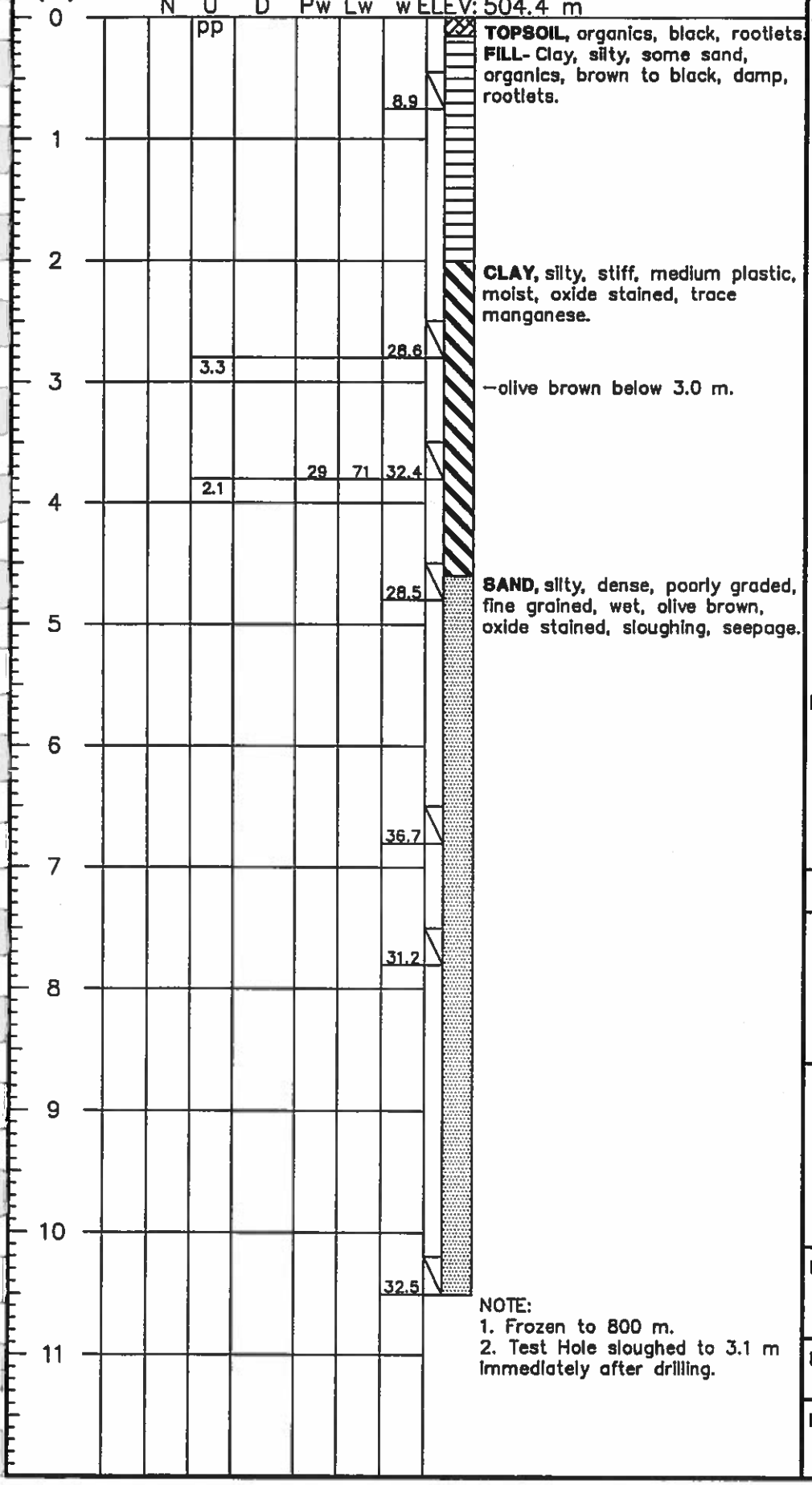
FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

LOCATION:
SASKATOON, SK

DATE DRILLED:	DRAWING NUMBER:
JAN 15, 1998	S98-2930-11

TEST HOLE 98-11



TOPSOIL, organics, black, rootlets.
FILL- Clay, silty, some sand, organics, brown to black, damp, rootlets.

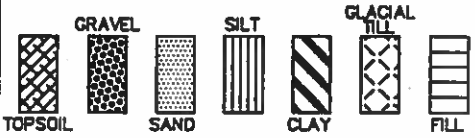
CLAY, silty, stiff, medium plastic, moist, oxide stained, trace manganese.

—olive brown below 3.0 m.

SAND, silty, dense, poorly graded, fine grained, wet, olive brown, oxide stained, sloughing, seepage.

NOTE:
1. Frozen to 800 m.
2. Test Hole sloughed to 3.1 m immediately after drilling.

LEGEND:



pp....POCKET PENETROMETER (kg/cm^2)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

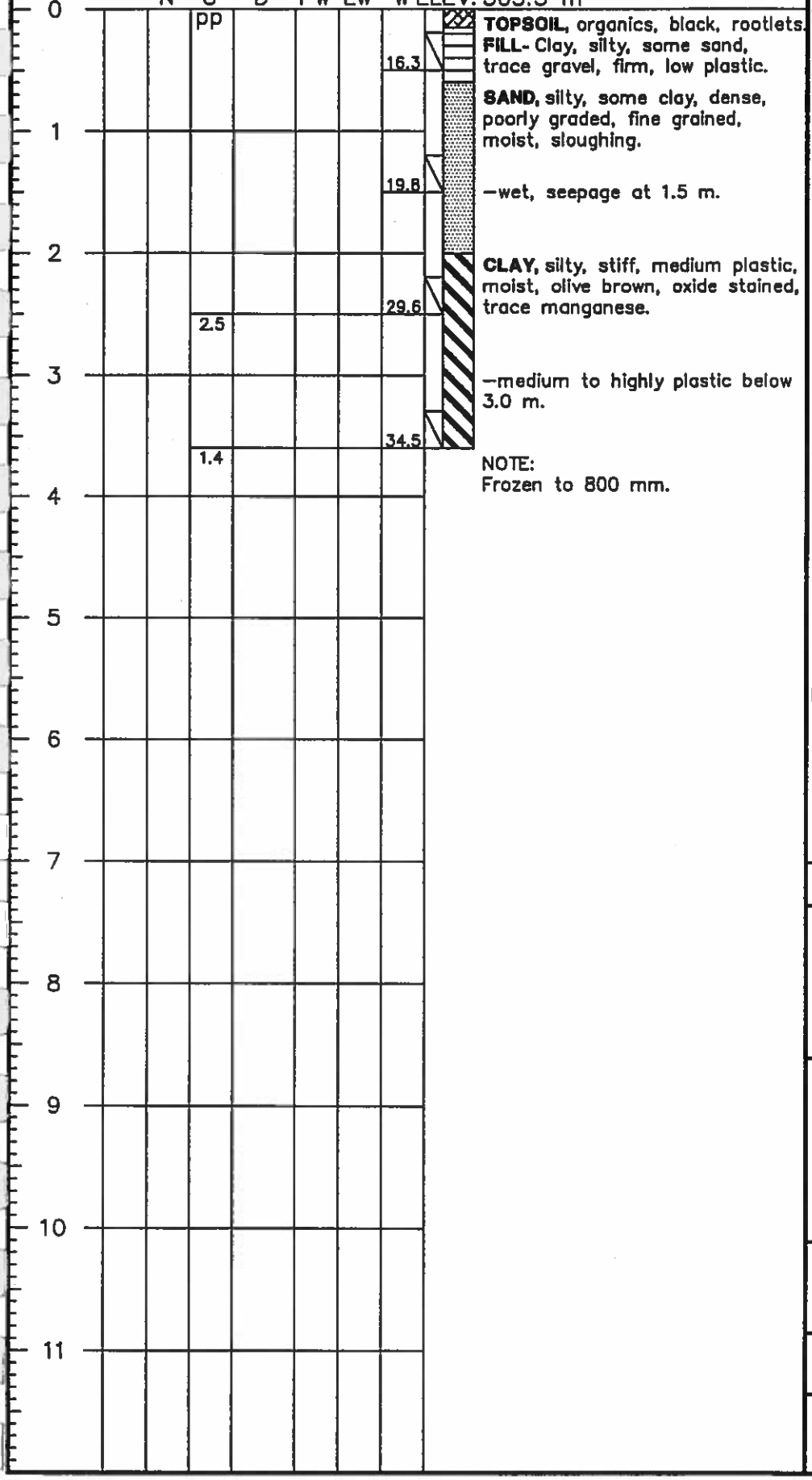
FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

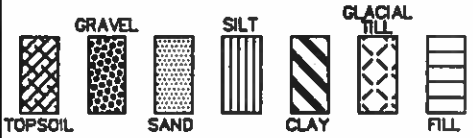
LOCATION:
SASKATOON, SK

DATE DRILLED:	DRAWING NUMBER:
JAN 15, 1998	S98-2930-12

TEST HOLE 98-12



LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

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P. MACHIBRODA ENGINEERING LTD.

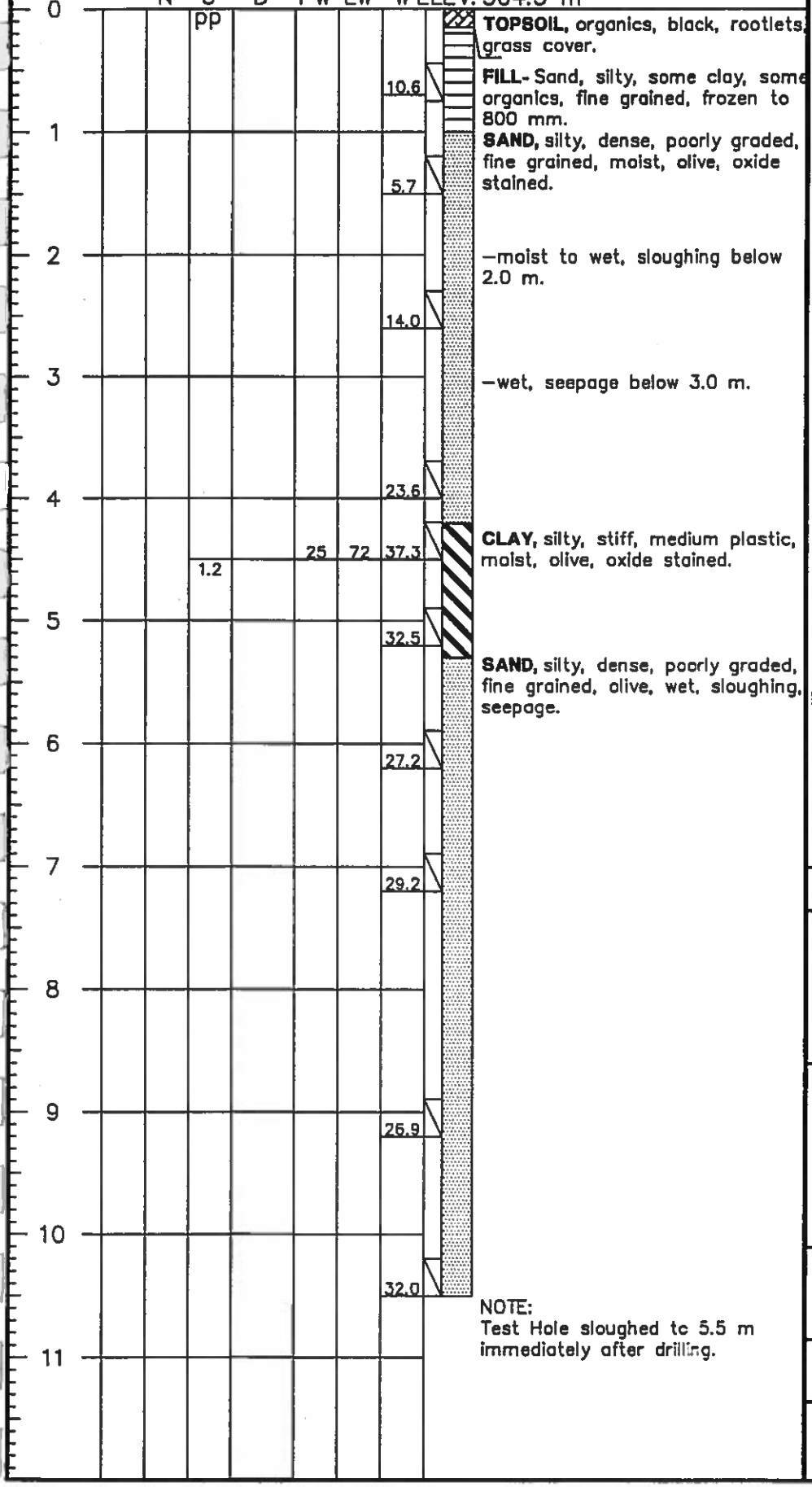
FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

LOCATION:
SASKATOON, SK

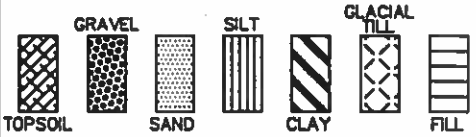
DATE DRILLED:	**DRAWING NUMBER:**
JAN 15, 1998	S98-2930-13

TEST HOLE 98-13



NOTE:
Test Hole sloughed to 5.5 m immediately after drilling.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

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N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

SHELBY TUBE | SPLIT SPOON | CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

LOCATION:
SASKATOON, SK

DATE DRILLED:	DRAWING NUMBER:
JAN 16, 1998	S98-2930-14

TEST HOLE 98-14

ELEV: 504.3 m

DEPTH (m)	N	U	D	Pw	Lw	w	
0		pp					**TOPSOIL**, organics, black, rootlets, grass cover.
				NP	NP	6.7	**FILL**- Clay, silty, some sand, trace gravel, low plastic, trace organics, frozen.
1							
		2.5				29.6	**CLAY**, silty, stiff, medium plastic, moist, olive brown, oxide stained.
2				19	67	29.3	
3							
						29.4	**SAND**, silty, dense, poorly graded, fine grained, olive, wet, sloughing, seepage.
4							
						39.7	**CLAY**, silty, medium to highly plastic, stiff, olive to grey, moist.
5							
						36.0	**SAND**, silty, trace clay, dense, poorly graded, fine grained, olive grey, wet, sloughing, seepage.
6							
							CLAY, silty, stiff, highly plastic, moist, grey, unoxidized.
7						31.3	
8							
9							
						34.7	
10							
11							

NOTE:
Test Hole sloughed to 5.0 m immediately after drilling.

LEGEND:

GRAVEL, SILT, GLACIAL TILL, TOPSOIL, SAND, CLAY, FILL

pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO_4...SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼....RECORDED WATER LEVEL

SHELBY TUBE, SPLIT SPOON, CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RCMP DETACHMENT BUILDING

LOCATION:
SASKATOON, SK

DATE DRILLED:
JAN 16, 1998

DRAWING NUMBER:
S98-2930-15

GRAIN SIZE DISTRIBUTION TEST REPORT

Project: PROPOSED RCMP
DETACHMENT BUILDING

Project No.: S98-2930

Date Tested: JAN 23, 1998

Test Hole No.: 5

Sample No.: 17

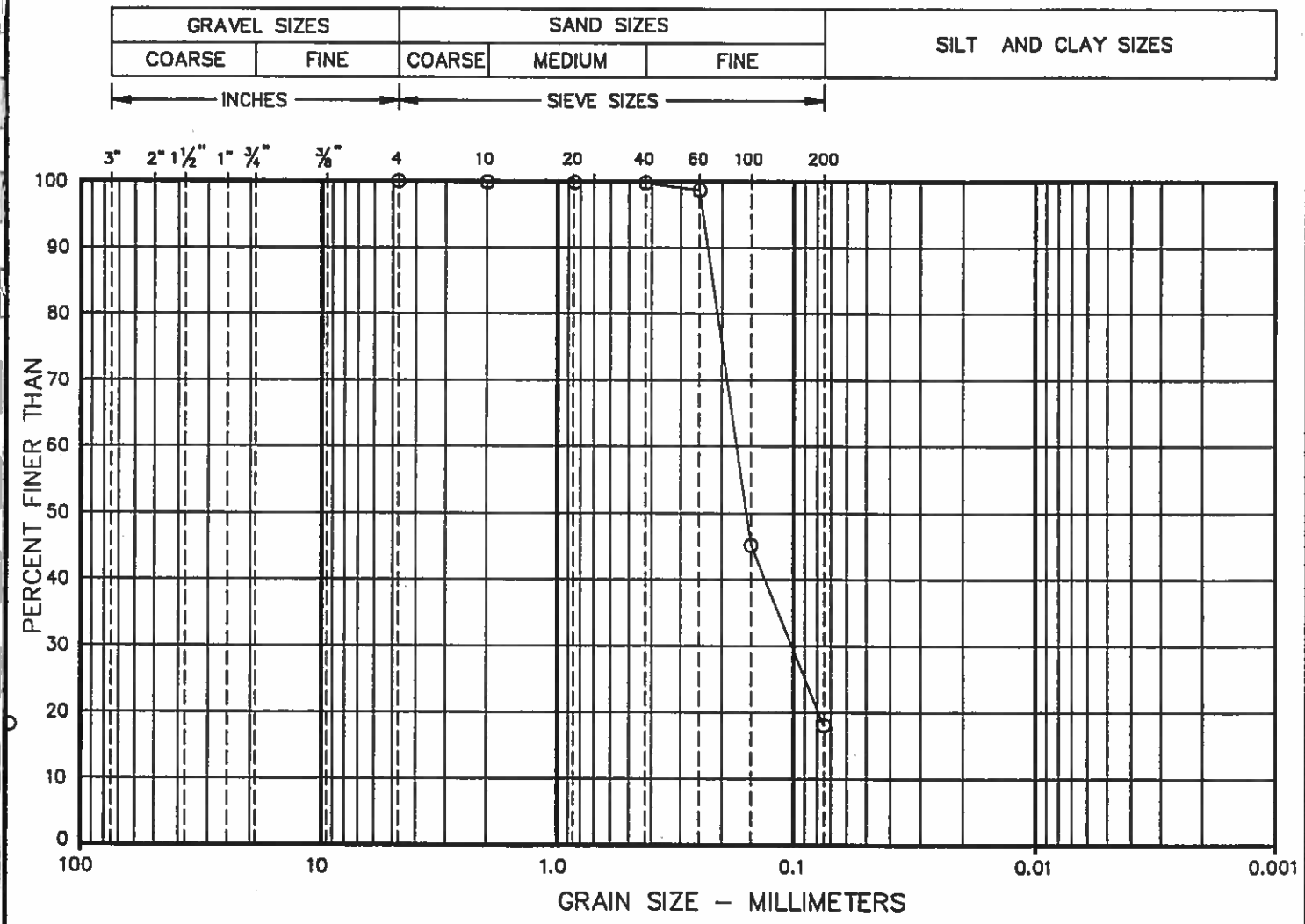
Depth (m): 3.5

Remarks:

SIEVE SIZE	PERCENT PASSING
No. 4	100.0
No. 10	99.9
No. 20	99.9
No. 40	99.8
No. 60	98.7
No. 100	45.1
No. 200	18.1

Material Description

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
0	82	18



P. MACHIBRODA ENGINEERING LTD.

DRAWING NO.

S98-2930-16

GRAIN SIZE DISTRIBUTION TEST REPORT

Project: PROPOSED RCMP
DETACHMENT BUILDING

Project No.: S98-2930

Date Tested: JAN 23, 1998

Test Hole No.: 9

Sample No.: 38

Depth (m): 3.0

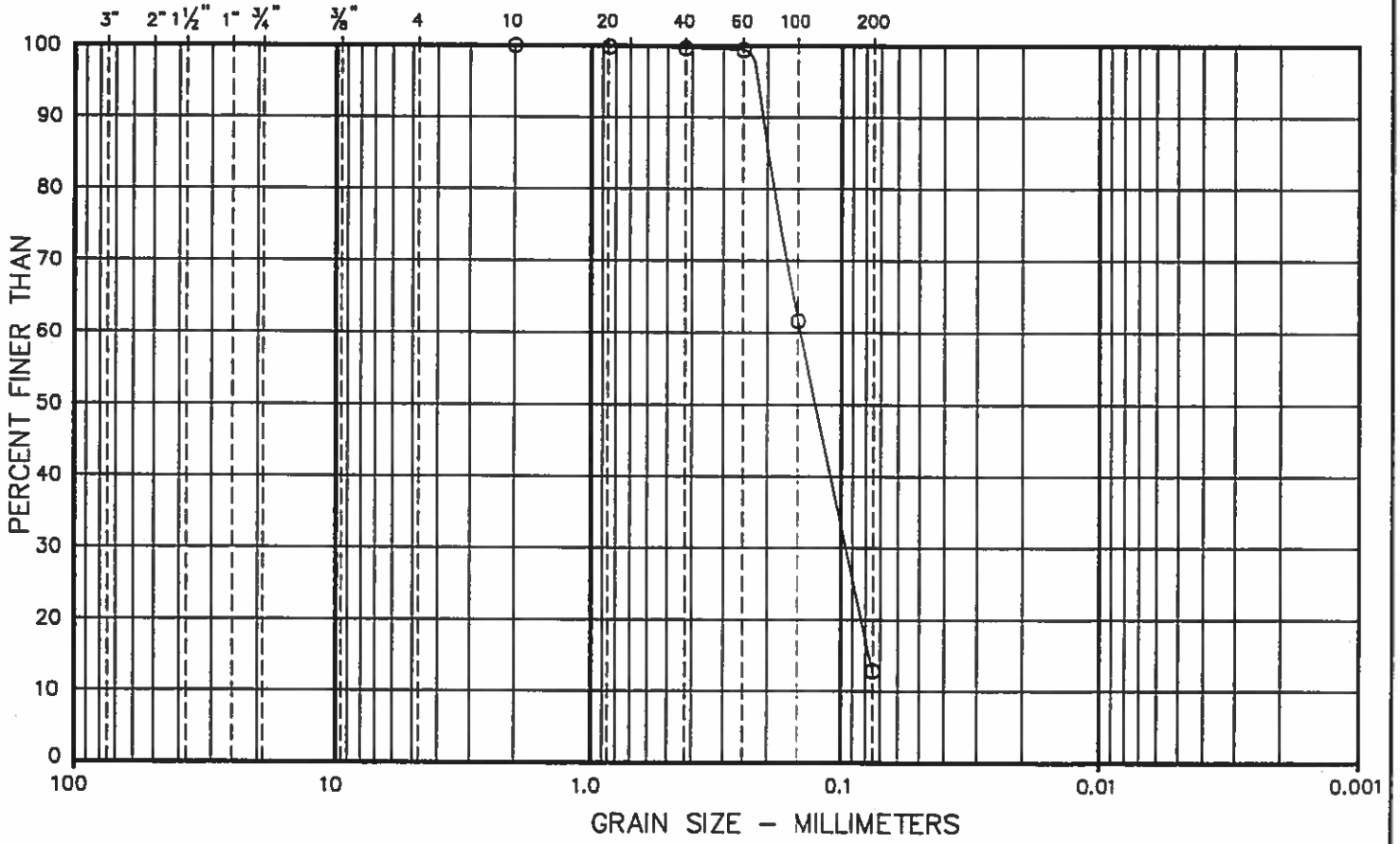
Remarks:

SIEVE SIZE	PERCENT PASSING
No. 10	100.0
No. 20	99.8
No. 40	99.7
No. 60	99.5
No. 100	61.6
No. 200	12.8

Material Description

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
0	87	13

GRAVEL SIZES		SAND SIZES			SILT AND CLAY SIZES
COARSE	FINE	COARSE	MEDIUM	FINE	
← INCHES →		← SIEVE SIZES →			



P. MACHIBRODA ENGINEERING LTD.

DRAWING NO.

S98-2930-17

GRAIN SIZE DISTRIBUTION TEST REPORT

Project: PROPOSED RCMP
DETACHMENT BUILDING

Project No.: S89-2930

Date Tested: JAN 27, 1998

Test Hole No.: 2

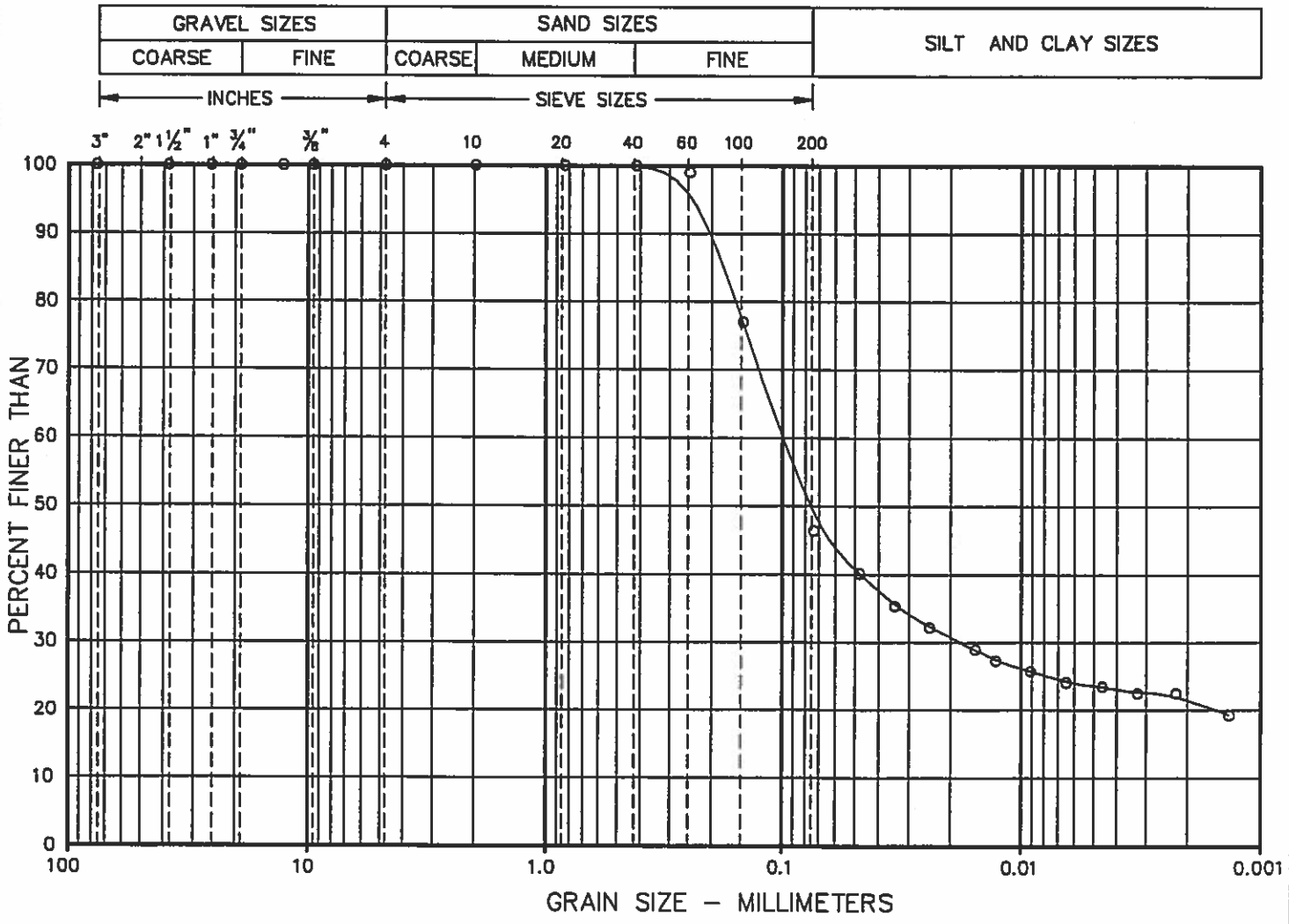
Sample No.: 4

Depth (m): 0.6

Remarks:

Material Description

% Gravel Sizes	% Sand Sizes	% Silt Sizes	% Clay Sizes
0	53	25	22



P. MACHIBRODA ENGINEERING LTD.

DRAWING NO.

S98-2930-18

GRAIN SIZE DISTRIBUTION TEST REPORT

Project: PROPOSED RCMP
DETACHMENT BUILDING

Project No.: S98-2930

Date Tested: JAN 27, 1998

Test Hole No.: 11

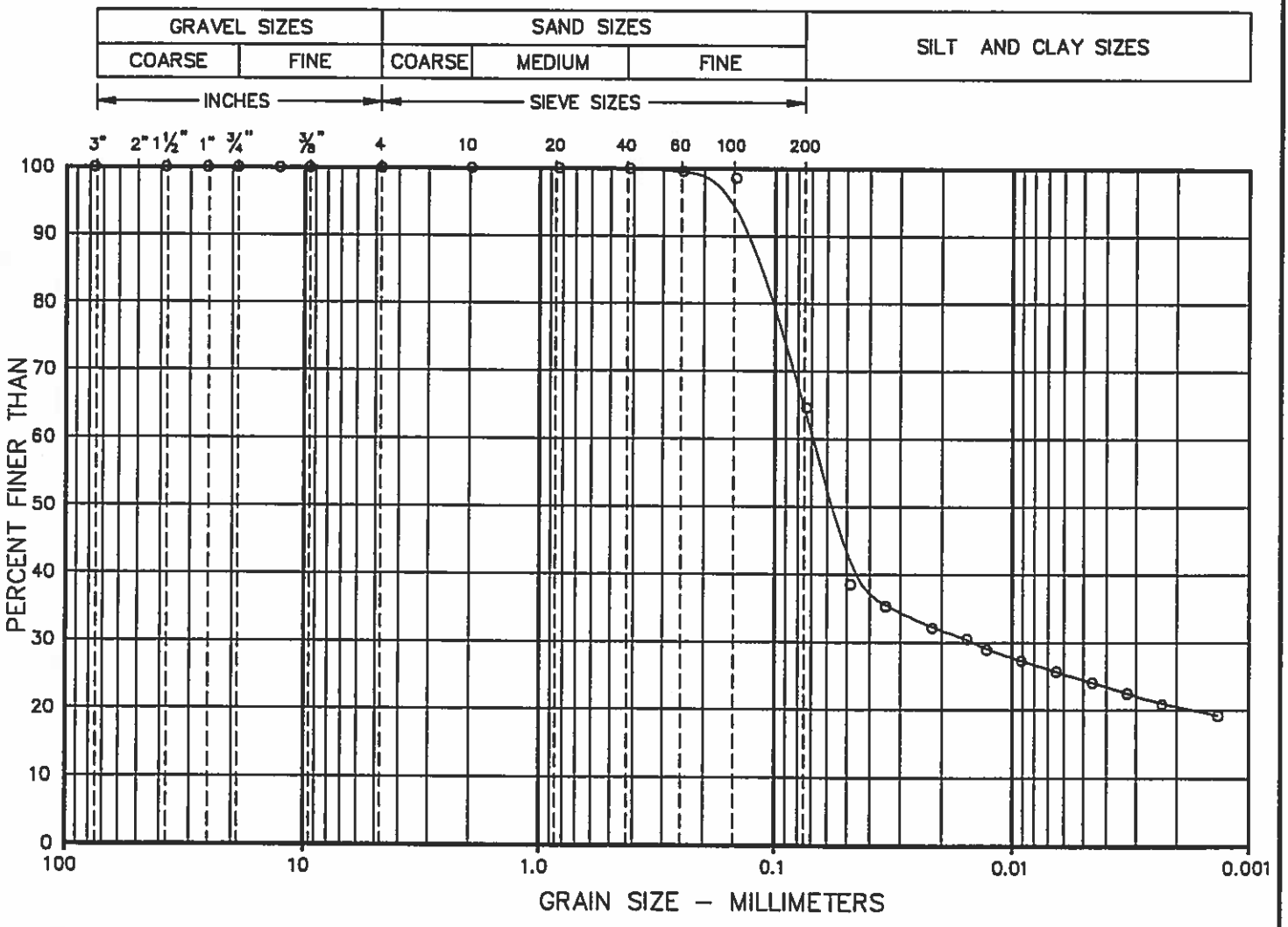
Sample No.: 56

Depth (m): 10.5

Remarks:

Material Description

% Gravel Sizes	% Sand Sizes	% Silt Sizes	% Clay Sizes
0	35	45	20



P. MACHIBRODA ENGINEERING LTD.

DRAWING NO.

S98-2930-19

GRAIN SIZE DISTRIBUTION TEST REPORT

Project: PROPOSED RCMP DETACHMENT BUILDING

Project No.: S98-2930

Date Tested: JAN 27, 1998

Test Hole No.: 13

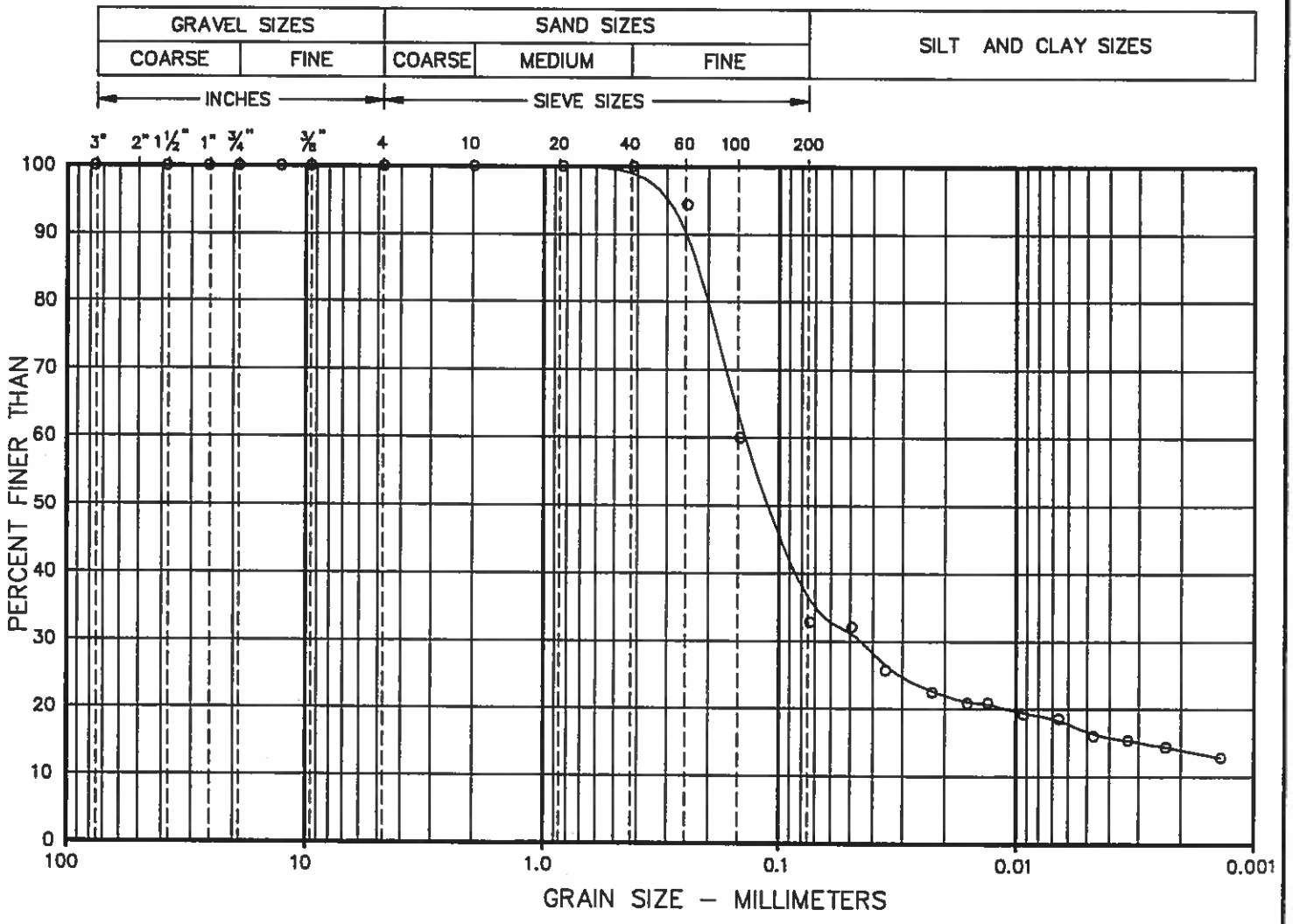
Sample No.: 61

Depth (m): 0.7

Remarks:

Material Description

% Gravel Sizes	% Sand Sizes	% Silt Sizes	% Clay Sizes
0	67	19	14



P. MACHIBRODA ENGINEERING LTD.

DRAWING NO.

S98-2930-20

GRAIN SIZE DISTRIBUTION TEST REPORT

Project: PROPOSED RCMP
DETACHMENT BUILDING

Project No.: S98-2930

Date Tested: JAN 27, 1998

Test Hole No.: 14

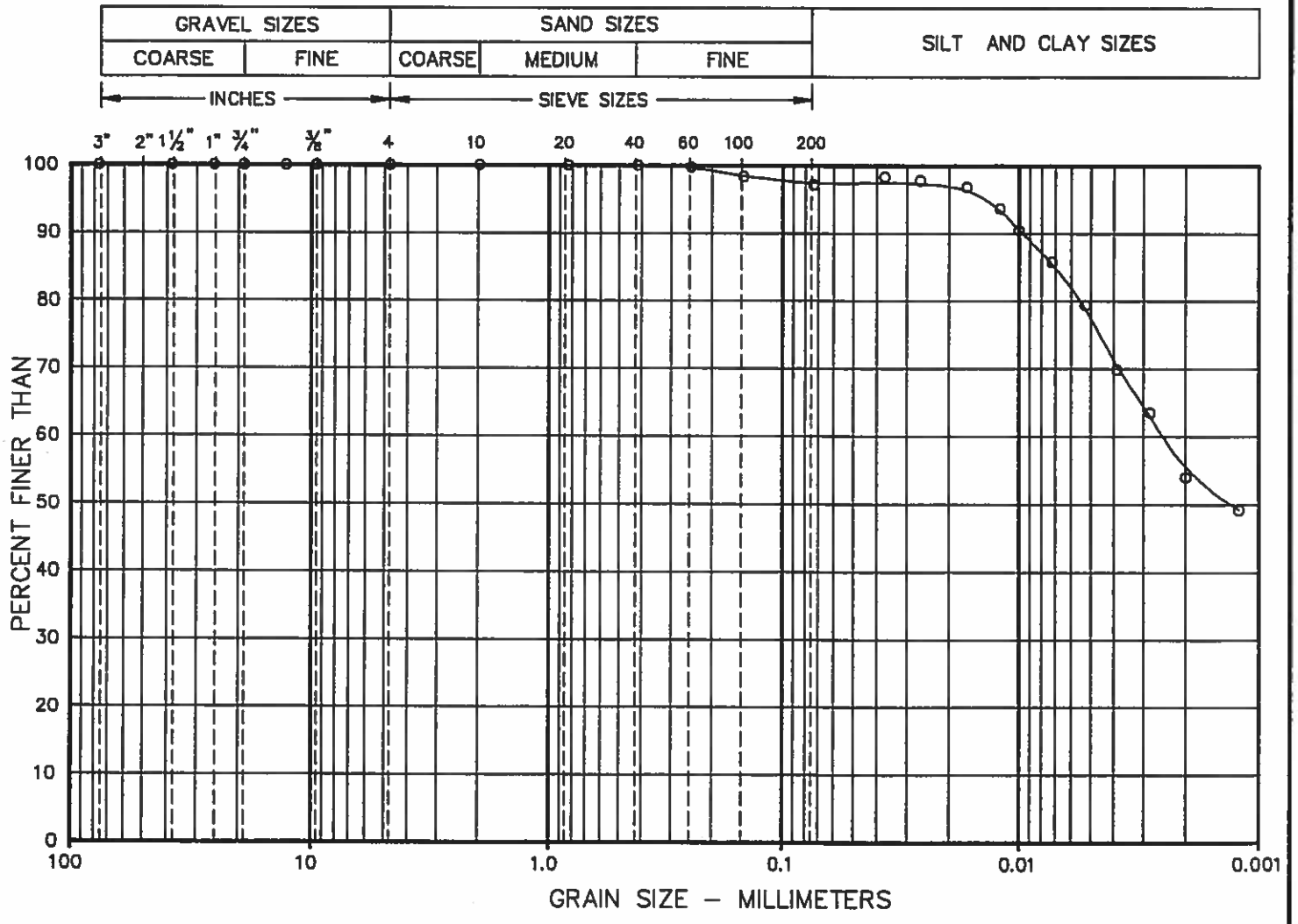
Sample No.: 72

Depth (m): 1.5

Remarks:

Material Description

% Gravel Sizes	% Sand Sizes	% Silt Sizes	% Clay Sizes
0	3	43	54

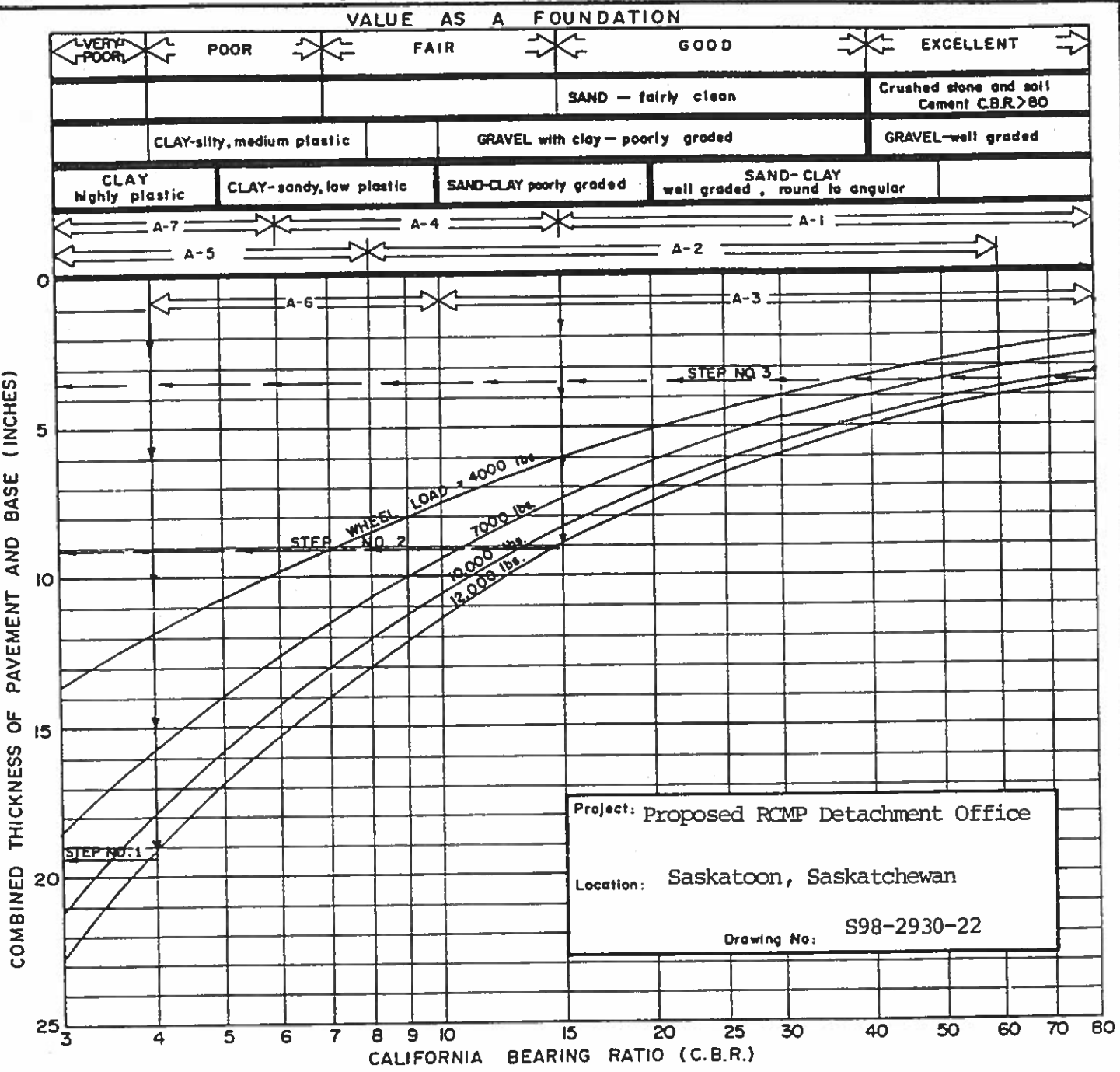


P. MACHIBRODA ENGINEERING LTD.

DRAWING NO.

S98-2930-21

DESIGN OF PAVEMENT & BASE BY CALIFORNIA METHOD



DESIGN CURVES :

The curves give the total base and pavement thickness over any subgrade or sub-base of known C.B.R. The C.B.R. of a material is its bearing value expressed as a percentage of that of crushed stone at 100%. The curves are empirical, and were developed by California's Highway Dept. for a tire pressure of 60 p.s.i. The ranges for soil types are approximate only. The soil types are used only when actual laboratory tests are not available.

NOTE :

Using base material with a high C.B.R. for lower layers in place of materials with a lower C.B.R. does not decrease the total thickness which is governed by the C.B.R. of the subgrade. In any case the combined thickness of pavement and non-frost action base material such as clean sand or gravel should be from 1/2 to full depth of frost penetration. The minimum C.B.R. of the upper base material for a depth of 5" to 8" beneath the pavement should be 80 for 10,000 lbs. and 12,000 lbs. wheel loads and 40 to 65 for 4,000 lbs. and 7,000 lbs. wheel loads.

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises:

.1 A 39-stall expansion to the existing parking lot at the Central District Building, 400 Brand Place, Saskatoon, SK. New stalls are non-electrified. All associated site work, including specific demolition, re-grading, re-construction, installation of new light standards, and landscape repair, is included.

1.2 WORK SEQUENCE

.1 The General Contractor will be responsible for the coordination of all work.

.2 The existing parking lot must remain operational during construction of the expansion. Retain access to existing parking lot.

.3 Maintain fire access/control.

1.3 CONTRACTOR USE OF SITE

.1 Limit use of site for Work to allow:

.1 Owner occupancy of existing site.

.2 Work by other contractors.

.2 Coordinate use of site under direction of Departmental Representative.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative

.5 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

.6 Cooperate with other contractors employed by the Departmental Representative for other work on site.

1.4 OWNER OCCUPANCY

.1 Owner will occupy site during entire construction period for execution of normal operations.

.2 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Owner usage.

1.5 EXISTING SERVICES

.1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Where Work involves breaking into or connecting to existing services carry out work at times as directed by governing authorities with minimum disturbance to pedestrian and vehicular traffic.

.3 Establish location and extent of service lines in area of work before starting Work. Locations of utilities shown on drawings are approximate. Notify Departmental Representative of findings.

.4 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.5 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.6 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.7 Record locations of maintained, re-routed, and abandoned service lines.

.8 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.6 PERMITS AND FEES

.1 The Contractor shall obtain and pay for all building permits. Obtain and pay for all other permits, licences, certificates, fees and governmental inspections or notices required for the performance of the work. Note: Permit drawings are the property of the owner. Contractor to forward "approved" permit drawings and a copy of the building permit to the Departmental Representative prior to the submission of the first request for progress payment.

1.7 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.
- .5 List of Outstanding Shop Drawings.
- .6 Change Orders.
- .7 Other Modifications to Contract.
- .8 Field Test Reports.

.9 Copy of Approved Work Schedule.

.10 Health and Safety Plan and Other Safety Related Documents.

.11 Other documents as specified.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

.1

END OF SECTION

Part 1 General

1.1 SPECIAL REQUIREMENTS

.1 Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.2 Keep within limits of work and avenues of ingress and egress.

.3 Provide and pay for commissionaires required to accompany Contractor, Contractor employee or sub-contractor employee engaged in the work in secure zones.

1.2 GOVERNMENT OF CANADA SECURITY CLEARANCE REQUIREMENTS (LAW ENFORCEMENT CHECKS)

.1 Security forms and documents are appended at the end of this Section.

.2 All personnel engaged in the execution of the work shall have at a minimum, the requisite Facility Access Clearance. Higher levels of security clearance may be requested.

.3 The Contractor shall prepare and submit the following attached requisite forms and documents for facility access clearance, for each Contractor employee and sub-contractor employee to be engaged in the work:

.1 TBS 330-23e – Personnel Screening, Consent and Authorization Form

.4 Also, contractor's employees and sub-contractor employees must include with their completed requisite forms, the following documents:

.1 Valid government issued photo identification: photocopy of front and back of document (photo must be clear), certified to be a true copy by their supervisor or colleague. Examples of government issued photo identification include Driver's License, Passport or Treaty card.

.2 Additional requirements may be requested for those requiring higher security clearance levels.

.5 To eliminate delays in the clearance process, all clearance forms/documents completed by the Contractor's employees and sub-contractor employees **MUST** be reviewed by the Contractor to ensure that all requested information has been provided, prior to submitting documents to the Government of Canada. The Government of Canada will not accept/cannot process documents with ANY requested information missing as per instruction sheets provided – NO EXCEPTIONS (ie. no abbreviations on documents anywhere ie. "AB", "CA"). *All incomplete forms will be returned to the Contractor (ensure instructions for completion of documents noted in .2 above are read and followed by each applicant, prior to submitting to the Government of Canada).*

.6 The Contractor should batch the fully completed submissions, based on priority work on site and allow for a minimum eighty (80) working days processing time in the project schedule for the review to occur (from the date the "fully completed" documents are received by the Government of Canada). The inability to submit the fully completed requisite forms and documents will not be reason for an extension to the project schedule or additional compensation.

1.3 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. No smoking will be allowed in or around the building. Smoking is allowed only in areas indicated by Departmental Representative.

END OF SECTION

Government of Canada / Gouvernement du Canada

PROTECTED (when completed)

PERSONNEL SCREENING, CONSENT AND AUTHORIZATION FORM

OFFICE USE ONLY		
Reference number	Department/Organization number	File number

NOTE: For *Privacy Act* Statement refer to Section C of this form and for completion instructions refer to attached instructions.
Please typewrite or print in block letters.

A ADMINISTRATIVE INFORMATION (To be completed by the Authorized Departmental/Agency/Organizational Official)

☑ **New** ☐ **Update** ☐ **Upgrade** ☐ **Transfer** ☐ **Supplemental** ☐ **Re-activation**

The requested level of reliability/security check(s)

☐ Reliability Status ☐ Level I (CONFIDENTIAL) ☐ Level II (SECRET) ☐ Level III (TOP SECRET)

☑ Other Facility Access without escort (FA-1)

PARTICULARS OF APPOINTMENT/ASSIGNMENT/CONTRACT

☐ Indeterminate ☐ Term ☑ Contract ☐ Industry ☐ Other (specify secondment, assignment, etc.)

Justification for security screening requirement
SRCL: 2015 1111 5553

Position/Competition/Contract number	Title Contractor for Parking Lot expansion		Group/Level (Rank if applicable)
Employee ID number/PRI/Rank and Service number (if applicable)	If term or contract, indicate duration period ▶	From	To
Name and address of department / organization / agency	Name of official	Telephone number ( )	Facsimile number ( )

B BIOGRAPHICAL INFORMATION (To be completed by the applicant)

Surname (Last name)	Full given names (no initials) underline or circle usual name used	Family name at birth

All other names used (i.e. Nickname)	Sex ☐ Male ☐ Female	Date of birth Y M D	Country of birth	Date of entry into Canada if born outside Canada Y M D

RESIDENCE (provide addresses for the last five years, starting with the most current) Home address	Daytime telephone number ( )	E-mail address

	Apartment number	Street number	Street name	Civic number (if applicable)	From Y M	To present
1						
	City	Province or state	Postal code	Country	Telephone number ( )	
	Apartment number	Street number	Street name	Civic number (if applicable)	From Y M	To Y M
2						
	City	Province or state	Postal code	Country	Telephone number ( )	

Have you previously completed a Government of Canada security screening form? ☐ Yes ☐ No	If yes, give name of employer, level and year of screening. Y

CRIMINAL CONVICTIONS IN AND OUTSIDE OF CANADA (see instructions)

Have you ever been convicted of a criminal offence for which you have not been granted a pardon? ☐ Yes ☐ No	If yes, give details. (charge(s), name of police force, city, province/state, country and date of conviction) ▼	
Charge(s)	Name of police force	City
Province/State	Country	Date of conviction ▶ Y M D

Government of Canada / Gouvernement du Canada

PERSONNEL SCREENING, CONSENT AND AUTHORIZATION FORM

PROTECTED (when completed)

Surname and full given names	Date of birth Y M D

C CONSENT AND VERIFICATION (To be completed by the applicant and authorized Departmental/Agency/Organizational Official)

Checks Required (See Instructions)	Applicant's initials	Name of official (print)	Official's initials	Official's Telephone number
1. ☑ Date of birth, address, education, professional qualifications, employment history, personal character references				( )
2. ☑ Criminal record check				( )
3. ☑ Credit check (financial assessment, including credit records check)				( )
4. ☑ Loyalty (security assessment only)				
5. ☑ Other (specify, see instructions) Law Enforcement Records Checks				( )

The Privacy Act Statement
The information on this form is required for the purpose of providing a security screening assessment. It is collected under the authority of subsection 7(1) of the *Financial Administration Act* and the Government Security Policy (GSP) of the Government of Canada, and is protected by the provisions of the *Privacy Act* in institutions that are covered by the *Privacy Act*. Its collection is mandatory. A refusal to provide information will lead to a review of whether the person is eligible to hold the position or perform the contract that is associated with this Personnel Screening Request. Depending on the level of security screening required, the information collected by the government institution may be disclosed to the Royal Canadian Mounted Police (RCMP) and the Canadian Security Intelligence Service (CSIS), which conduct the requisite checks and/or investigation in accordance with the GSP and to entities outside the federal government (e.g. credit bureaus). It is used to support decisions on individuals working or applying to work through appointment, assignment or contract, transfers or promotions. It may also be used in the context of updating, or reviewing for cause, the reliability status, security clearance or site access, all of which may lead to a re-assessment of the applicable type of security screening. Information collected by the government institution, and information gathered from the requisite checks and/or investigation, may be used to support decisions, which may lead to discipline and/or termination of employment or contractual agreements. The personal information collected is described in Standard PIB PSU 917 (Personnel Security Screening) which is used by all government agencies, except the Department of National Defence PIB DND/PPE 834 (Personnel Security Investigation File), RCMP PIB CMP PPU 065 (Security/Reliability Screening Records), CSIS PIB SIS PPE 815 (Employee Security), and PWGSC PIB PWGSC PPU 015 (Personnel Clearance and Reliability Records) used for Canadian Industry Personnel. Personal information related to security assessments is also described in the CSIS PIB SIS PPU 005 (Security Assessments/Advice).

I, the undersigned, do consent to the disclosure of the preceding information including my photograph for its subsequent verification and/or use in an investigation for the purpose of providing a security screening assessment. By consenting to the above, I acknowledge that the verification and/or use in an investigation of the preceding information may also occur when the reliability status, security clearance or site access are updated or otherwise reviewed for cause under the Government Security Policy. My consent will remain valid until I no longer require a reliability status, a security clearance or a site access clearance, my employment or contract is terminated, or until I otherwise revoke my consent, in writing, to the authorized security official.

Signature _____ Date (Y/M/D) _____

D REVIEW (To be completed by the authorized Departmental/Agency/Organizational Official responsible for ensuring the completion of sections A, B and C)

Name and title	Telephone number
Address	Facsimile number

E APPROVAL (To be completed by authorized Departmental/Agency/Organizational Security Official only)

I, the undersigned, as the authorized security official, do hereby approve the following level of screening.

Reliability Status

☐ Approved Reliability Status ☐ Not approved

Name and title _____

Signature _____ Date (Y/M/D) _____

Security Clearance (if applicable)

☐ Level I ☐ Level II ☐ Level III ☐ Not recommended

Name and title _____

Signature _____ Date (Y/M/D) _____

Comments

PHOTO (for Level III T.S., and/or upon request - see instructions)

Government of Canada / Gouvernement du Canada

INSTRUCTIONS FOR PERSONNEL SCREENING CONSENT AND AUTHORIZATION FORM TBS/SCT 330-23E (Rev. 2002/02)
Once completed, this form shall be safeguarded and handled at the level of Protected A.

General:
If space allotted in any portion is insufficient please use separate sheet using same format.

1. Section A (Administrative Information) Authorized Departmental/Agency/Organizational Official
The Official, based on instructions issued by the Departmental Security Officer, may be responsible for determining, based on five year background history, what constitutes sufficient verification of personal data, educational and professional qualifications, and employment history. References are to be limited to those provided on the application for employment or equivalent forms.

SUPPLEMENTAL INFORMATION REQUIREMENTS
Persons who presently hold a SECURITY CLEARANCE and subsequently marry, remarry or commence a common-law partnership, in addition to having to update sections of the *Security Clearance Form (TBS/SCT 330-60)*, are required to submit an original *Personnel Screening, Consent and Authorization Form*, with the following parts completed:

Part A - As set forth in each question
Part B - As set forth in each question, excluding CRIMINAL CONVICTIONS IN AND OUTSIDE OF CANADA.
Part C - Applicant's signature and date only are required

"Other". This should be used to identify if the security screening is for Site Access, NATO, SIGINT etc.

2. Section B (Biographical Information)
To be completed by the ***applicant***. If more space is required use a separate sheet of paper. Each sheet must be signed.

Country of Birth - For "NEW" requests, if born abroad of Canadian parents, please provide a copy of your Certificate of Registration of Birth Abroad. If you arrived in Canada less than five years ago, provide a copy of the Immigration Visa, Record of Landing document or a copy of passport.

- List only criminal convictions for which a pardon has NOT been granted. Include on a separate attached sheet of paper, if more than one conviction. Applicant must include those convictions outside Canada.
- Offences under the *National Defence Act* are to be included as well as convictions by courts-martial are to be recorded.

3. Section C (Consent and Verification)
A copy of Section "C" may be released to institutions to provide acknowledgement of consent.

Criminal record checks (fingerprints may be required) and credit checks are to be arranged through the Departmental Security Office or the delegated Officer.

Consent: may be given only by an applicant who has reached the age of majority, otherwise, the signature of a parent or guardian is mandatory.

The age of majority is:
19 years in NFLD., N.S., N.B., B.C., Yukon, Norhwest Territories and Nunavut;
18 years in P.E.I., Que., Ont., Man., Sask. and Alta.

The applicant will provide initials in the " applicant's initials box".

The official who carried out the verification of the information will print their name, insert their initials and telephone number in the required space.
- Reliability Screening (for all types of screening identified within Section A): complete numbers 1 and 2 and 3 if applicable.
- Security Clearance (for all types of screening identified within Section A): complete numbers 1 to 4 and 5 where applicable.
- Other: number 5 is used only where prior Treasury Board of Canada Secretariat approval has been obtained.

4. Section D (Review)
To be completed by authorized Departmental/Agency/Organizational Official who is responsible for ensuring the completion of sections A to C as requested.

5. Section E (Approval)
Authorized Departmental/Agency/Organizational Security Official refers to the individuals as determined by departments, agencies, and organizations that may verify reliability information and/or approve/not approve reliability status and/or security clearances. Approved Reliability Status and Level I, II and III, as well as the signature of the authorized security official or manager are added for Government of Canada use only. Applicants are to be briefed, acknowledge, and be provided with a copy of the "Security Screening Certificate and Briefing Form (TBS/SCT 330-47)".
Note: Private sector organizations do not have the authority to approve any level of security screening.

Photographs: Departments/Agencies/Organizations are responsible for ensuring that three colour photographs of passport size are attached to the form for the investigating agency. Maximum dimensions are 50mm x 70mm and minimum are 43mm x 54mm. The face length from chin to crown of head must be between 25mm x 35mm. The photographs must be signed by the applicant and an authorized security official. The photographs must have been taken within the last six months. It is required for new or upgrade Level III security clearances for identification of the applicant during the security screening investigation by the investigating agency. The investigating agency may in specific incidents request a photograph for a Level I or II clearances when an investigation is required.

Part 1 General

1.1 ADMINISTRATIVE

.1 Project meetings will be scheduled throughout the progress of the work and at the call of Departmental Representative.

.2 Provide physical space and make arrangements for meetings.

.3 The Consultant shall chair meetings.

.4 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

.1 Within 10 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Agenda to include:

- .1 Appointment of official representative of participants in the Work.
- .2 Schedule of Work: in accordance with Section 01 32 16 - Construction Progress Schedules - Bar (GANTT) Chart.
- .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Requirements for temporary facilities, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
- .5 Delivery schedule of specified equipment.
- .6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .8 Owner provided products and work.
- .9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work, progress meetings will be held on a regular basis. Schedule to be determined.

.2 Contractor, major Subcontractors involved in Work, Departmental Representative, Consultant and Owner's representatives are to be in attendance.

.3 Minutes of meetings will be recorded by the Consultant. Minutes will be distributed within 72 hours.

.4 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.
.2 Review of Work progress since previous meeting.
.3 Field observations, problems, conflicts.
.4 Problems which impede construction schedule.
.5 Review of off-site fabrication delivery schedules.
.6 Corrective measures and procedures to regain projected schedule.
.7 Revision to construction schedule.
.8 Progress schedule, during succeeding work period.
.9 Review submittal schedules: expedite as required.
.10 Maintenance of quality standards.
.11 Review proposed changes for affect on construction schedule and on completion date.
.12 Other business.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Project Schedule and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Departmental Representative within 7 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

1.4 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule.

.1 Project milestone will be identified through discussion with the Contractor and Departmental Representative at the outset of the project.

1.5 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.6 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

END OF SECTION

1.1 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit where required in the specifications, shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Saskatchewan, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 7 days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.9 After Departmental Representative's review, distribute copies.

.10 Submit 1 electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit 1 electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit 2 copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit 2 copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit 1 electronic copy of manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.16 Submit 2 copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.17 Delete information not applicable to project.

.18 Supplement standard information to provide details applicable to project.

.19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.20 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that Departmental Represenetaive approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains

solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

.21 Electronic submission of Shop Drawings

.1 Electronic Shop Drawings (PDF format) shall not exceed 11x17 actual size. Electronic transfer of shop drawings relies on Architect and Engineering Consultants to print a record copy for their files - this can be done providing shop drawings do not exceed 11x17. Larger shop drawings would require hard copies for review.

.2 General Contractor to review shop drawing and place their electronic stamp signifying review.

.3 General Contractor to email all shop drawings to Architect with copy to Engineering Consultant as applicable.

.4 Engineering Consultant to review and place their electronic stamp / marks up, then email to Architect only (Engineering Consultant will not copy anyone else).

.5 Architect to check for coordination and transmit reviewed shop drawings by email to General Contractor.

1.3 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's business address.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UPS

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control and as specified in each applicable Section.

END OF SECTION

Part 1 General

1.1 SITE PROTECTION

.1 Prevent damage to all existing items which are to remain (e.g. fencing, signs, trees, shrubs, turf, natural features, buildings, asphalt, surface or underground utility lines). Make good any damage.

.2 Preserve and protect existing benchmarks and survey monuments. Inform Consultant immediately if benchmarks or survey monuments are encountered during construction. Make good any damage.

1.2 FINES AND PENALTIES

.1 Abuse to any plant material or unauthorized pruning or removal, in whole or in part, of plant material is not permitted.

.2 Be responsible to monitor all sub-trades for plant material abuse. Restitution for all damages found will be solely upon the Contractor.

.3 A fine for not less than plant material repair or replacement costs plus for loss of aesthetic or intrinsic value per individual plant, will be levied. The decision of the Consultant in determination of damage will be final.

1.3 FIRES

.1 Fires and burning of rubbish on site is not permitted.

1.4 DISPOSAL OF WASTES

.1 Burying of rubbish and waste materials on site is not permitted.

.2 Disposal of waste, or volatile materials such as mineral, spirits, oil or paint thinner, into water-ways, storm or sanitary sewers prohibited.

.3 Remove rubbish, waste products and debris in accordance with regulations of authorities having jurisdiction.

1.5 CARE OF EXISTING PLANT MATERIAL

.1 Use all means necessary to protect plant materials before start up and during construction.

.2 Do not disturb the existing grade or store heavy equipment within the drip line of existing trees. If access is required within the drip line of existing trees, then protect the access route with a moveable timber bridge to cushion/spread weight of vehicles over a greater surface area. Consultant to approve access route and timber bridge construction before work begins.

.3 Protection of branches that are interfering with construction: All branches that pose temporary interference to the process of construction, are to be tied up or back under the supervision of the Consultant. Bindings thus provided will be removed as soon as feasible by the completion of construction (or phase of construction) to reduce possible water sprouting or structural damage.

.4 Pruning trees that are interfering with construction: Remove interfering branches, without injury to trunks only when directed by the Consultant. The Consultant will determine all trees which require pruning, the extent of pruning allowed, and will identify the amount of compensatory pruning required for loss of roots or tops. The Contractor will adhere to limitations of on-site construction movement around identified trees.

.5 Monitor condition of trees, in particular, possible wind damage or snow load damage to branches that are tied up.

.6 Wash foliage should excessive construction dust build up on plant material.

1.6 TRAFFIC PROVISIONS AND STORAGE

.1 Determine interference of trees and their root zones before moving equipment or supplies on site to avoid any damage to trees.

.2 Traffic provisions:

.1 Use only approved access routes for vehicular and heavy pedestrian movement.

.3 Parking areas shall be pre-designated at each construction site.

.1 Contractor responsible to provide soil aeration of compacted tree root areas through holes bored into the soil at the direction of the Consultant.

.4 Storage:

.1 Store construction materials, fuels, chemicals, etc., in approved areas only.

.2 Store equipment, soil, building materials and debris beyond the drip-line of trees.

1.7 EXCAVATING ADJACENT TO EXISTING TREES

.1 Locate and stake locations of electric service utility lines, and other underground construction.

.2 Excavations within 2.0 metres of trees will be permitted only with prior approval of the Consultant. Prior to excavating, all tree roots along the side to be exposed must be severed with a trencher to a depth of 500mm along the line of excavation. Prune all exposed roots with a sharp pruning tool, in order to provide a clean severance of roots.

.3 Excavations beyond two (2) metres from trees do not require trenching. Immediately after excavation, prune all exposed roots with a sharp pruning tool, in order to provide a clean severance of roots. Place a tarp over excavation wall to prevent exposed roots from drying out. Backfill around tree roots as soon as possible.

1.8 HERBICIDES / PESTICIDES

.1 Use only with approval of Consultant and Owner and in strict accordance with applicable regulations and manufacturer’s instructions.

1.9 DRAINAGE

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Province of Saskatchewan

.1 Occupational Health and Safety Act, 1993, S.S. 2005.

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit 1 copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Requirements.

.7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.

.8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

.10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.4 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

.1 Schedule and administer Health and Safety Meeting with Departmental Representative prior to commencement of Work.

1.6 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.7 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.8 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.9 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Regulations, 1996.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.10 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.11 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with overhead work.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work .

1.12 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.

1.13 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.14 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.15 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

END OF SECTION

Part 1 General

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions and municipal by-laws.

.2 Smoking on site is restricted to within personal vehicles or designated smoking locations.

END OF SECTION

Part 1 General

1.1 INSPECTION

.1 Allow Departmental Representative and Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative or Consultant, instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.2 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.3 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.4 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.5 REPORTS

.1 Submit two (2) copies of inspection and test reports to Departmental Representative.

.2 Provide copies to subcontractor of work being inspected or tested.

1.6 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

1.7 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to Departmental Representative and as specified in specific Section.

.3 Prepare mock-ups for Departmental Representative and Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.

.6 Mock-ups may remain as part of Work.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.3 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.4 WATER SUPPLY

.1 Provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.

.3 Pay for utility charges at prevailing rates.

1.5 TEMPORARY HEATING AND VENTILATION

.1 Provide and pay for temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Refer to Mechanical and Electrical sections for specific requirements regarding temporary use of utilities.

.3 Pay costs for maintaining temporary heat.

.4 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.5 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.6 TEMPORARY POWER AND LIGHT

.1 Provide and pay for temporary power and lighting throughout project.

1.7 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone, fax, data hook up, lines and equipment necessary for own use.

1.8 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by Authorities Having Jurisdiction and governing codes, regulations and bylaws.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.4 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.5 CONSTRUCTION PARKING

.1 Parking will NOT be permitted on site.

.2 Provide and maintain adequate access to project site.

1.6 OFFICES

.1 If necessary, provide and maintain, during the entire progress of the Work, a suitable office on the site, for own use, with suitable tables or benches for the examination of drawings, specifications, etc., and where all notices and instructions from the Consultant may be received and acknowledged. Provide suitable meeting space for site meetings. Provide adequate heating, ventilating and lighting. Location of these offices to be coordinated with the Departmental Representative.

.2 Provide marked and fully stocked first-aid case in a readily available location.

1.7 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.8 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

.3 Contractor shall be responsible for cleaning and maintenance of designated facilities.

1.9 CONSTRUCTION SIGNAGE

.1 No signs or advertisements, other than warning signs, are permitted on site.

1.10 PROTECTION AND MAINTENANCE OF TRAFFIC AND PEDESTRIANS

.1 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.2 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.3 Protect travelling public from damage to person and property.

.4 Do not block roads without obtaining approval to do so from the Departmental Representative.

.5 Contractor's traffic on roads selected for hauling material shall not interfere with on-going training on site.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.8 Dust control: adequate to ensure safe operation at all times.

.9 Provide snow removal during period of Work.

1.11 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways on an on-going basis.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.2 GUARD RAILS, BARRICADES, AND SIGNAGE

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

.2 Provide Construction Zone warning and access control signage.

1.3 HOARDING

.1 Erect temporary site enclosure using 1.8 m high chainlink fence with steel posts spaced at maximum 2.4 m on centre. Maintain fence in good repair.

.2 Provide lockable truck entrance gates and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.

.3 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.4 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.5 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

1.6 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.7 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.8 PROTECTION OF FINISHES

.1 Provide protection for finished and partially finished finishes, assemblies and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Be responsible for damage incurred due to lack of or improper protection.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

PART 1 General

1.1 CARE OF EXISTING PLANT MATERIAL

.1 Use all means necessary to protect plant materials before start up and during construction. Review working conditions on-site, prior to start of construction, with Consultant.

.2 Do not disturb the existing grade or store heavy equipment within the drip line of existing trees. If access is required within the drip line of existing trees, then protect the access route with a moveable timber bridge to cushion/spread weight of vehicles over a greater surface area. Consultant to approve access route and timber bridge construction before work begins.

.3 Provide drainage where, as a result of construction, water is ponding over existing root zones.

.4 Protection of branches that are interfering with construction: Branches that pose temporary interference to the process of construction, are to be tied up or back under the supervision of the Consultant. Bindings thus provided will be removed as soon as feasible after the completion of construction (or phase of construction) to reduce possible water sprouting or structural damage.

.5 Pruning trees that are interfering with construction: Remove interfering branches, without injury to trunks only when directed by the Consultant. The Consultant will determine all trees which require pruning, the extent of pruning allowed, and will identify the amount of compensatory pruning required for loss of roots or tops. The Contractor will adhere to limitations of on-site construction movement around identified trees.

.6 Monitor condition of trees, in particular, possible wind damage or snow load damage to branches that are tied up.

.7 Wash foliage should excessive construction dust build up on plant material.

1.2 TRAFFIC PROVISIONS AND STORAGE

.1 Determine interference of trees and their root zones, before moving equipment or supplies on site, to avoid any damage to trees.

.2 Traffic provisions:

- .1 Use only approved access routes for vehicular and heavy pedestrian movement. Parking areas shall be pre-designated at each construction site.
- .2 Contractor responsible to provide soil aeration of compacted tree root areas through holes bored into the soil at the direction of the Consultant.

.3 Storage:

- .1 Store construction materials, fuels, chemicals, etc., in approved areas only.
- .2 Store equipment, soil, building materials and debris beyond the dripline of trees.

1.3 EXCAVATING ADJACENT TO EXISTING TREES

.1 Locate and stake locations of electrical service, utility lines, and other underground construction.

.2 Place all underground lines in utility "corridors" to reduce root zone disturbance on site.

.3 Underground service/utility line installations within two (2) metres of trees are to be tunneled at a minimum depth of 600mm. Review the location of the utility line with the Consultant, for approval before tunneling.

.4 Excavations within 1.5 - 2.0 metres of trees will be permitted only on one side of any tree. Prior to excavating, all tree roots along the side to be exposed must be severed with a trencher to a depth of 500mm along the line of excavation. Prune all exposed roots with a sharp pruning tool,in order to provide a clean severance of roots.

.5 Excavations beyond two (2) metres from trees do not require trenching. Immediately after excavation, prune all exposed roots with a sharp pruning tool, in order to provide a clean severance of roots. Place a tarp over excavation wall to prevent exposed roots from drying out. Backfill around tree roots as soon as possible.

1.4 HOARDING REQUIREMENTS TO PROTECT TREES

.1 Contractor to erect hoardings in compliance with the standards outlined below:

- .1 Trees within 3 to 5 metres of construction and lay down area: standard snow fence at farthest possible distance from trees.
- .2 Trees within 1 to 3 metres of construction and lay down area: plywood 12mm thick, 1220mm height, enclosing trees at farthest possible distance from trees.
- .3 Trees within 1 metre of construction and lay down area: 39 x 89 x 2400mm boards secured vertically at 300mm intervals around tree trunk with strapping or equivalent.

.2 Contractor is responsible for costs of erecting, maintaining and removing hoardings, and for regular watering and maintenance of trees while so enclosed.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Within text of each specifications section, reference may be made to reference standards.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 Cost for such testing will be born by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber, steel members, doors and frames on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.8 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 CONCEALMENT

.1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.10 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

1.12 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.13 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.15 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location and depth of capped service.

END OF SECTION

Part 1 General

1.1 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Departmental Representative.

1.2 SURVEY REFERENCE POINTS

.1 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.2 Make no changes or relocations without prior written notice to Departmental Representative.

.3 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.4 Require surveyor to replace control points in accordance with original survey control.

1.3 SURVEY REQUIREMENTS

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

.3 Establish lines and levels, locate and lay out, by instrumentation.

.4 Stake for grading, fill and top soil placement and landscaping features.

.5 Stake slopes and berms.

.6 Establish pipe invert elevations.

.7 Stake batter boards for foundations.

.8 Establish foundation column locations and floor elevations.

.9 Establish lines and levels for mechanical and electrical work.

1.4 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative

1.5 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.6 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative.

.2 On request of Departmental Representative submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conforms and does not conform with Contract Documents.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit written request in advance of cutting or alteration which affects:

- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 Include in request:

- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 FORMS

.1 Special forms may be required during the course of this Work. Forms will be supplied by the Departmental Representative.

1.3 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.4 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.5 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping or firestopping sealant material using UL or ULC rated assembly in accordance with manufacturer's instructions.

.12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise. Coordinate Work with mechanical and electrical divisions.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Dispose of waste materials and debris off site.

.6 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.8 Provide adequate ventilation during use of volatile or noxious substances.

.9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy. Remove debris and surplus materials from accessible concealed spaces.

.3 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.4 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures.

.5 Clean lighting reflectors, lenses, and other lighting surfaces.

.6 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.7 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.8 Remove dirt and other disfiguration from exterior surfaces.

.9 Clean and sweep roofs, gutters, areaways, and sunken wells.

.10 Sweep and wash clean paved areas.

.11 Clean drainage systems.

.12 Remove snow and ice.

END OF SECTION

Part 1 General

1.1 WASTE MATERIAL STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal do not become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from required list of salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect salvaged materials from movement or damage.

.6 Provide and pay for on-site facilities for collection, handling, and storage of anticipated quantities of waste materials.

.7 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

1.2 DIVERSION OF MATERIALS

.1 Separate materials and equipment required to be salvaged from general waste stream and stockpile in appropriate storage area, as reviewed by Departmental Representative and consistent with applicable fire regulations.

.1 Mark containers or stockpile areas.

.2 Provide instruction on disposal practices.

.2 On-site sale of salvaged materials is not permitted.

1.3 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, and paint thinner into waterways, storm, or sanitary sewers.

1.4 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Maintain security measures established by existing facility and where required provide temporary security measures approved by Departmental Representative.

.3 Burning of waste on site is not permitted.

1.5 SCHEDULING

.1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.Execution

1.6 APPLICATION

.1 Handle waste materials in accordance with appropriate regulations and codes.

1.7 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

END OF SECTION

Part 1 General

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Departmental Representative Inspection.

.2 Departmental Representative Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and balanced and are fully operational.

.4 Certificates required by Fire Commissioner and Utility companies have been submitted.

.5 Operation of systems have been demonstrated to Owner's personnel.

.6 Commissioning of systems is complete.

.7 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative, Consultants and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

.5 Where re-inspection is required due to uncompleted deficiencies, the time required by the Departmental Representative and Consultants will be recorded and reimbursement of this time may be charges back to the Contractor by deducting from amounts retained.

1.2 CLEANING

.1 In accordance with Section 01 74 11 - Cleaning.

.2 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Refer to Mechanical and Electrical Divisions for information specific to the mechanical and electrical close-out submittals.

.3 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.4 Copy will be returned after final inspection, with Departmental Representative's comments.

.5 Revise content of documents as required prior to final submittal.

.6 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, two (2) final copies of operating and maintenance manuals in English.

.7 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.8 Furnish evidence, if requested, for type, source and quality of products provided.

.9 Defective products will be rejected, regardless of previous inspections. Replace products at Contractor’s own expense.

.10 Pay costs of transportation.

1.2 FORMAT

.1 Organize data as instructional manual.

.2 Provide two (2) bound copies including 1 PDF copy on DVD or CD in each of the manuals.

.3 Provide two (2) additional PDF copies on DVD or CD.

.4 Binders: cloth, hard covered, expandable, loose leaf paper size 219 x 279 mm. Colour “black.” Provide two (2) copies.

.5 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.

.6 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents. Lettering to be “gold” colour.

.7 Provide printed title on DVD/CD version to coincide with title on bound version.

.8 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.9 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.10 Text: manufacturer's printed data, or typewritten data.

.11 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.3 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Shop Drawings: illustrating details of a portion of work.

.4 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.5 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.6 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.4 AS-BUILTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

1.5 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of opaque drawings, provided by Departmental Representative.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

- .1 Measured depths of elements of foundation in relation to finish first floor datum.
- .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
- .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
- .4 Field changes of dimension and detail.
- .5 Changes made by change orders.
- .6 Details not on original Contract Drawings.
- .7 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
- .2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.

.7 Refer to Mechanical and Electrical Divisions for information specific to the mechanical and electrical close-out submittals.

1.6 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Include manufacturer's printed operation and maintenance instructions.

.7 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.8 Provide installed control diagrams by controls manufacturer.

.9 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.10 Additional requirements: as specified in individual specification sections.

1.7 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-Protection and Weather-Exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.8 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.6 Additional Requirements: as specified in individual specifications sections.

1.9 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.10 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

1.11 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.12 WARRANTIES AND BONDS

.1 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

.2 Assemble approved information in binder and submit upon acceptance of work. Organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.3 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.4 Respond in a timely manner to oral or written notification of required construction warranty repair work.

.5 Written verification will follow oral instructions. Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.13 PRE-WARRANTY CONFERENCE

.1 Meet with Departmental Representative, to develop understanding of requirements of this section. Schedule meeting prior to contract completion, and at time designated by Departmental Representative.

.2 Departmental Representative will establish communication procedures for:

.1 Notification of construction warranty defects.

.2 Determine priorities for type of defect.

.3 Determine reasonable time for response.

.3 Provide name, telephone number and address of licensed and bonded company that is authorized to initiate and pursue construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

END OF SECTION

PART 1 General

1.1 WORK INCLUDED

.1 Removal of existing sitework in preparation for new construction.

1.2 MATERIAL OWNERSHIP

.1 All useable lumber, bricks, and miscellaneous materials shall become the property of the Owner.

1.3 SAFETY

.1 Take all precautions for the safety and the protection of the employees, public vehicle and pedestrian traffic by adequate fencing, hoarding, flagmen and barricades as may be required in the interest of safety and in accordance with provincial and municipal requirements.

1.4 DAMAGE TO MUNICIPAL STRUCTURES

.1 Care shall be taken to avoid damage to sidewalks, pavement and any and all municipal works. Be responsible for repair or replacement of any damaged public property or utility to the satisfaction of the property owner.

1.5 DAMAGE TO ADJACENT PROPERTIES

.1 Take all precautions necessary for the protection of fences, trees, structures, pavement and excavations on adjoining properties. Be responsible for any damages resulting from whatever causes; make good any such damages to the satisfaction of adjacent property owners, and settle any claims which may arise.

1.6 DISCONNECTION OF SERVICES

.1 Arrange, and pay the cost of, disconnection of any services by the appropriate utility company. No claims shall be made for delays which may result in such disconnections. Should municipal authority elect to shut off the water supply by closing the service valve only, mark and protect the valve during the course of construction. If a water leak develops, immediately bring the matter to the municipal authority's attention and pay for the cost of repair if due to Contractor negligence.

1.7 TREES

.1 **Do not remove trees in contravention of current *Migratory Birds Convention Act.*** Trees designated for removal shall be cleared, without damage to adjacent trees or structures. Thoroughly grub out roots and stumps to minimum 500 mm below grade. Take particular care to avoid damage to root systems of trees to be retained. **Remove elm trees in accordance with provincial and municipal regulations.**

.2 Dispose of cleared vegetation, stumps and roots off-site at approved municipal location.

1.8 BACKFILL

.1 Where necessary to provide backfill, provide in accordance with Section 31 22 13 Site Grading.

1.9 DEMOLITION

.1 Be responsible for the demolition of existing structures, as shown on drawings. Pay costs required by the City of Martensville, SaskPower, SaskTel, SaskEnergy, and any other party or agency involved. Remove all abandoned and terminated water, gas, sewer, telephone and electrical lines. Co-ordinate the termination and removal of all services involved. Be responsible for the removal or relocation of any services necessary for the completion of the work

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This Section covers items common to Sections of Electrical Contractor. This section supplements requirements of Division 00 – Procurement and Contracting Requirements, Division 01 – General Requirements

.2 Provide complete and fully operational electrical systems with facilities and services to meet requirements described herein, as shown on the drawings, and in complete accord with applicable codes and ordinances.

.3 Only those items that are specifically indicated as not in contract (N.I.C.) will be omitted.

.4 Contract documents of Divisions 26 are diagrammatic and approximately to scale, unless detailed otherwise. They establish scope, material and installation quality, and are not detailed installation instructions.

.5 Follow manufacturers' recommended installation details and procedures for equipment supplemented by details given herein and on plans subject to approval of the Consultant.

.6 Examine all drawings to ensure that work under this Division can be properly installed without interference.

.7 Where discrepancies, ambiguities, obvious omissions or errors have been made in drawings and specifications, it shall be the responsibility of the contractor to clarify same prior to tender closing. No allowance will be made after contract award for any expense incurred by him for having to adjust his work to properly conform.

1.2 REFERENCES AND CODES

.1 The Electrical Contractor shall be bound by industry standards, as interpreted by the Consultant, whether or not specifically referenced in this document. Comply with Electrical Protection Act and rules and regulations made pursuant thereto, including the Canadian Electrical Code. Also, comply with applicable standards of the following:

.1 CSA C22.1-2012, Canadian Electrical Code, Part 1.
.2 Electrical and Electronic Manufacturers Association of Canada (EEMAC).
.3 National Electrical Manufacturers Association (NEMA).
.4 National Building Code 2010 (NBC 2010)
.5 National Fire Protection Association (NFPA)
.6 Institute of Electrical and Electronic Engineers (IEEE).
.7 Audio Engineering Society (AES).
.8 Other Applicable CSA and UL approvals.

1.3 CODES AND STANDARDS

.1 The electrical installation shall comply with all SaskPower requirements and regulations.

.2 In the event of any inspection authority requesting deviation from the design, notify the Consultant and obtain approval before proceeding with any change.

.3 In no instance, shall the standard established by the drawings and specification be reduced by any code or ordinance. All references to codes and standards shall be to the latest edition.

1.4 CARE, OPERATION AND START-UP

.1 Instruct operating personnel in the operation, care and maintenance of systems, system equipment and components.

.2 Connect to equipment furnished in other Divisions and by Owner including start-up and test.

.3 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.4 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.5 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.6 PERMITS, FEES AND INSPECTION

.1 Submit to SaskPower necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Notify Consultant of changes required by Electrical Inspection Department prior to making changes.

.4 Furnish Certificates of Acceptance from Electrical Inspection Department and authorities having jurisdiction on completion of work to Consultant.

1.7 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 All goods and materials shall be new and carry CSA approval seal. Equipment and material shall be CSA certified. Where there is no alternative to supplying equipment which is not

CSA certified, obtain special approval from the Consultant and the Electrical Inspection Department.

.3 No deviation from specified materials shall be allowed, except where alternative materials have been specifically accepted in writing.

.4 Where materials are not directly specified by catalogue number and manufacturer's name, a high industry specification grade product shall be provided. The Consultant shall be the sole judge of whether this standard is being met.

.5 All references to known standard specifications shall mean and intend the latest edition of such specifications.

.6 Each major component of equipment shall have manufacturer's name, address, catalogue and serial number in a conspicuous place.

.7 Upon request, provide a complete list of all materials and their manufacture. The contractor will be required to use the materials indicated. Changes in manufactures at a future date will not be acceptable.

1.8 WORKMANSHIP

.1 All work under this Division shall be executed in a workmanlike and substantial manner, neat in its mechanical appearance and arrangement.

.2 A competent representative shall constantly supervise the work of this Division from beginning to completion and final acceptance. So far as possible, the same supervisor and workmen shall be employed throughout the project's duration.

.3 Material and workmanship not meeting the standard intended and required by this specification shall, upon instruction from the Consultant, be properly replaced without further charge or consideration.

1.9 ELECTRICAL DRAWINGS

.1 They indicate the general location and route of conduit and cable to be installed. Conduit shall be installed in coordination with other services. These include both new and existing services. Prior to excavation anywhere on site, arrange to have all existing services marked.

.2 Install equipment generally in locations and routes shown. Remove and replace improperly installed equipment to the satisfaction of the Consultant at no extra cost.

1.10 COORDINATION WITH OTHER DIVISIONS

.1 Cooperate fully with the Consultant and other trades of electrically operated equipment to ensure proper arrangement of and provision for all electrical equipment.

.2 Where outlets or equipment may affect architectural or site treatment desired, contact Consultant and for instructions or detailed drawings.

.3 Before commencing work, examine the work of other Divisions, and report at once any defects or interference affecting the work under this Division, or the guarantee of same.

.4 Allow for all hoisting and setting of material and equipment.

1.11 OWNER SUPPLIED EQUIPMENT

.1 Reconnect all existing electrical services from new and existing electrical sources modified by the work of this contract.

1.12 INSPECTION AND TESTING

.1 During construction and up to final acceptance, make accessible any equipment or wiring for inspection purposes.

.2 All electrically operating equipment shall be left as a complete installation in perfect operating condition, and receive final test in the presence of the Consultant.

1.13 SHOP DRAWINGS

.1 Submit shop drawings, where specifically called for, or as requested. Shop drawings shall show detailed dimensional and technical information, and shall properly describe each piece of equipment. Where applicable, shop drawings shall include complete schematics and wiring diagrams. These shop drawings shall be sufficiently detailed to permit the Owner's technicians to trouble-shoot and repair the equipment. Equipment shall not be ordered and/or fabricated until shop drawings have been reviewed by the Consultant. Shop Drawings shall include, but not be limited to the following Sections on systems and equipment:

.1 26 50 00 – Lighting

.2 Review of shop drawings shall be for general design, arrangement and appearance only. This Division shall check and correct, if necessary, all manufacturer's drawings before submitting, and shall so indicate on each copy, along with a dated approval stamp. All shop drawings must bear an approval stamp and be signed by the Contractor. This review does not relieve this Division from the responsibility for the final installation being correct in all detail, and fully acceptable to the Consultant. Refer to each section for further shop drawing information.

.3 Refer to General Conditions of the Contract.

.4 Provide One (1) printed copies and one PDF copy for each Section. Each shop drawing shall be complete with a cover page with the following information:

.1 Specification Section and name
.2 Project name, Owner's name and address
.3 Number of pages in submittal
.4 Contractor and Supplier's name and contact information
.5 Approval stamps with room for Consultant's stamp

.5 Shop drawings for complementary systems and/or equipment shall be submitted at the same time. Partial submittals of related equipment will be rejected or held until all other related shop drawing information has been submitted (i.e. submit all shop drawings for power equipment at the same time). Submittals of shop drawings that are incomplete will be rejected.

1.14 CHANGES

.1 Refer to General and Supplemental Conditions.

.2 Submit complete itemized breakdowns of all extras, deletions, and changes to the Consultant. Breakdown shall include quantities, unit costs and extensions. If requested, support claim by certified copies of supplier's invoices.

.3 The right is reserved to move equipment 3000 mm from location shown without further charge or consideration, provided that such re-location is requested prior to finish being applied.

1.15 OPERATING INSTRUCTIONS AND SERVICE MANUALS

.1 Upon completion of the installation, provide complete and comprehensive identical sets of operating and maintenance manuals.

.2 The Consultant shall review the operating and maintenance manuals and approve same prior to the manuals being sent to the Owner.

.3 The operating and maintenance manuals shall include but not be limited to the following information when applicable in the project:

.1 Certification reports.
.2 Documentation indicating Owner’s receipt of operating instructions.
.3 Complete list of all materials turned over to the Owner c/w receipts for same.
.4 Shop drawings properly indexed and contained in suitably sized binders.
.5 Schematic drawings for all systems indexed and contained in suitably sized envelopes or attached efficiently in the above binders.
.6 Catalogue brochures for light fixtures.

The above information shall be bound in binders as noted in specifications. Incomplete or poorly reproduced manuals will be rejected.

.4 Maintain, on a daily basis, a complete set of marked-up prints as as-built drawings that show in complete detail the final arrangement and location of all electrical components and the interconnecting wiring.

.5 All conduit runs (size and routing) shall be marked on plans. These are to be maintained in a neat and substantial manner, so as to properly and fully illustrate the way in which the installation has been completed.

.6 The Owner’s personnel shall be instructed in the operation and maintenance of the equipment to the satisfaction of the Owner.

.7 The above instructions shall be given by personnel experienced in the operation of the particular system or equipment. Each item or type of equipment, and all controls, shall be operated in the presence of the Owner's personnel to ensure their understanding of equipment function and individual working parts. The Owner reserves the right to set the period or periods during which the instruction shall be given. The contractor shall submit a program of instruction for approval by the Owner.

.8 Operating and maintenance manuals shall include written documentation bearing name and signature of Owner's personnel who received the above instructions

1.16 STORAGE AND PROTECTION

.1 Maintain and protect all work provided under this Division. Store all materials within a protected enclosure to prevent exposure to weather or construction dirt.

.2 Protect all finished and unfinished work of this and other divisions from damage during the course of construction. Cover floors and other surfaces, if necessary. Any damaged work or finishes shall be repaired or replaced without further charge to the Owner.

1.17 WARRANTY

.1 All materials and workmanship shall be guaranteed for a period of one year from date of substantial completion.

.2 Properly repair and replace all defective work and other work which becomes defective during the term of warranty.

.3 Service on equipment or systems critical to the Owner's operation shall be provided on an emergency basis which may necessitate overtime and service outside of normal working hours. The contractor shall ensure that all suppliers comply with this requirement.

1.18 FINISHES

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

1.19 ABBREVIATIONS

.1 Abbreviations used in this specification are common to and in general use within the related trades.

1.20 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1.

.4 An installed cable is any cable that is run through a conduit, run from one area in a building to another area or any cable that travels farther than the adjacent equipment cabinet in a series of cabinets.

1.21 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

1.22 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.23 MANUFACTURERS AND CSA LABELS

.1 Visible and legible, after equipment is installed.

1.24 EXCAVATION AND BACKFILL

.1 Any excavation and backfilling work that is necessary to accommodate the work under this Division shall be the responsibility of Divisions 26 in accordance with the requirements of Division 31.

.2 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected and approved installations.
.2 Departmental Representative has inspected and approved of construction below finish grade.
.3 Inspection, testing, approval, and recording location of underground utilities.
.4 Removal of concrete formwork.

.3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.4 Do not use backfill material which is frozen or contains ice, snow or debris.

1.25 SITE EXAMINATION AND REVIEW OF WORK

.1 It is recommended that the contractor visit the existing site during the tendering period to familiarize himself with the construction conditions and electrical work provided to date. The contractor shall thoroughly satisfy himself that the work contained in these drawings and specifications can be carried out and that all costs have been included in the tender submitted.

.2 The Contractor shall review all sets of tender documents associated with the project to ensure that they have an idea as to the scope of work involved in the other trades and to assist with their coordination of required interface procedures and inter-connection requirements.

1.26 SITE WORK

.1 The electrical contractor shall be responsible for all necessary trenching and backfilling for all exterior work in connection with underground feeders. All trenches shall be a minimum 1000 mm deep or to top of bedrock. Care must be exercised to ensure a proper grade line is used, and that suitable drainage has been provided.

.2 All excavated material shall be removed from the site.

.3 Trenches shall be filled with granular fill and compacted to 95% proctor. Prior to backfilling, all trenches must be inspected by the Consultant.

.4 Supply and install all cable and conduit in trenches, as described herein or detailed on the drawings.

.5 Electrical contractor shall be responsible for all concrete and reinforcing in connection with site lighting. All concrete and reinforcing on the project shall be in accordance with the quality required for reinforced concrete and reinforcing as specified under Division 3, and as detailed on the drawings.

1.27 MATERIAL SAFETY DATA AND HAZARDOUS MATERIALS

.1 The Contractor shall provide material safety data sheets on all materials prior to shipping materials to site. These data sheets shall be submitted in triplicate to the Owner.

.2 The Contractor shall coordinate and provide necessary information for the Owner's "Work Place Hazardous Material Information System".

1.28 SCHEDULING OF WORK AND DEMOLITION

.1 Refer to Division 1 specifications.

.2 Refer to the overall project schedule for further scheduling requirements.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.

.2 Cooperate and coordinate with the requirements of other units of work specified in other Sections.

1.2 REFERENCES AND CODES

.1 The Electrical Contractor shall be bound by industry standards, as interpreted by the Consultant, whether or not specifically referenced in this document. Comply with Electrical Protection Act and rules and regulations made pursuant thereto, including the Canadian Electrical Code. Also, comply with applicable standards of the following:

.1 CSA C22.1-2012, Canadian Electrical Code, Part 1.

.2 Electrical and Electronic Manufacturers Association of Canada (EEMAC).

.3 National Electrical Manufacturers Association (NEMA).

.4 National Building Code 2010 (NBC 2010)

.5 National Fire Protection Association (NFPA)

.6 Institute of Electrical and Electronic Engineers (IEEE).

.7 Audio Engineering Society (AES).

.8 Other Applicable CSA and UL approvals.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with:

.1 Section 01 33 00 - Submittal Procedures

.2 26 05 01 – Common Work Results

.2 Shop drawings shall include but not be limited to device types, cable types, and special mounting details.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors: with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors: with current carrying parts of copper sized to fit copper conductors #10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:

.1 Connector body and stud clamp for round copper conductors.

.2 Clamp for round copper conductors.

.3 Stud clamp bolts.

.4 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, aluminum sheathed cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required.

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2No.65.

.3 Install fixture type connectors and tighten. Replace insulating cap.

.4 Install bushing stud connectors in accordance with NEMA.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.

.2 Cooperate and coordinate with the requirements of other units of work specified in other Sections.

1.1 REFERENCES AND CODES

.1 The Electrical Contractor shall be bound by industry standards, as interpreted by the Consultant, whether or not specifically referenced in this document. Comply with Electrical Protection Act and rules and regulations made pursuant thereto, including the Canadian Electrical Code. Also, comply with applicable standards of the following:

.1 CSA C22.1-2012, Canadian Electrical Code, Part 1.

.2 Electrical and Electronic Manufacturers Association of Canada (EEMAC).

.3 National Electrical Manufacturers Association (NEMA).

.4 National Building Code 2010 (NBC 2010)

.5 National Fire Protection Association (NFPA)

.6 Institute of Electrical and Electronic Engineers (IEEE).

.7 Audio Engineering Society (AES).

.8 Other Applicable CSA and UL approvals.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with:

.1 Section 01 33 00 - Submittal Procedures

.2 26 05 01 – Common Work Results

1.3 PRODUCT APPROVALS

.1 Products proposed as alternatives to those specified, shall only be considered if submitted for approval no later than 15 working days before tender close. Submit alternates, for approval, as one complete listing. Provide complete product specification sheets with request for approval.

Part 2 Products

2.1 BUILDING WIRES

.1 All conductors shall be copper, minimum No. 12 gauge, unless specifically noted otherwise.

□

.2 All conductors #12 AWG to #8 AWG shall be rated for minimum 600V RWU-90 XLPE. Conductors #6 AWG and larger shall be rated for minimum 600V RWU-90 XLPE. Size, grade of insulation, voltage and manufacturer's name shall be marked at regular intervals.

.3 All wiring shall be rated at 75 Deg C when connected to equipment rated 75 Deg C.

.4 Wiring for major feeders may be NUAL aluminum and shall be installed only where specifically noted on the drawings.

.5 Conductor utilized in conduit run under slab on grade or in conduit underground shall be Type 'RWU-90'.

.6 Wire shall be as manufactured by Nexans, Alcan, Pirelli, BICC General Wire or Superior Essex.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Termination for #8 AWG and larger shall be by means of approved solderless connector lug. For parallel conductors, a common lug with separate termination for each conductor shall be employed.

.2 Conductor splices shall be made in accordance with specifications. Provide sufficient length for joint remake, and no less than 200 mm spare length. On through wiring, leave 300 mm loop.

.3 Wiring in cabinets, pull boxes, panels and junction boxes shall be neatly trained and held with nylon cable ties.

.4 Conductors shall be tag identified where passing through junction boxes.

END OF SECTION

□

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.

.2 Cooperate and coordinate with the requirements of other units of work specified in other Sections.

1.2 REFERENCES AND CODES

.1 The Electrical Contractor shall be bound by industry standards, as interpreted by the Consultant, whether or not specifically referenced in this document. Comply with Electrical Protection Act and rules and regulations made pursuant thereto, including the 2012 Canadian Electrical Code. Also, comply with applicable standards of the following:

.1 CSA C22.1-2012, Canadian Electrical Code, Part 1.
.2 Electrical and Electronic Manufacturers Association of Canada (EEMAC).
.3 National Electrical Manufacturers Association (NEMA).
.4 National Building Code 2010 (NBC 2010)
.5 National Fire Protection Association (NFPA)
.6 Institute of Electrical and Electronic Engineers (IEEE).
.7 Audio Engineering Society (AES).
.8 Other Applicable CSA and UL approvals.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with:

.1 Section 01 33 00 - Submittal Procedures
.2 Section 26 05 01 – Common Work Results

.2 Shop drawings shall include but not be limited to connectors used, specialty ground bars, etc.

1.4 PRODUCT APPROVALS

.1 Manufacturers' and model numbers named in these specifications indicate an acceptable technical standard of performance and are not intended to be exclusive. Products submitted as alternates must result in a control system that meets or exceeds all technical performance criteria as described.

.2 Products proposed as alternatives to those specified, shall only be considered if submitted for approval no later than 15 working days before tender close. Submit alternates, for approval, as one complete listing. Provide complete product specification sheets with request for approval.

.3 The Bidder must provide a complete list of primary system products offered with their bid.

□

Part 2 Products

2.1 EQUIPMENT

.1 Grounding conductors: bare stranded copper, soft annealed, size as indicated.

.2 Insulated grounding conductors: green

.3 All ground conductors shall be bare or insulated, stranded, medium hard drawn copper wire. All insulated ground wires shall be green.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Electrical equipment and wiring shall be grounded in accordance with the Canadian Electrical Code, and local inspection authority's rules and regulations.

.2 All metallic raceways and conduits for communications, cable and conductors shall be grounded.

.3 All grounding conductors outside the electrical rooms and closets shall be insulated and installed in conduits, unless otherwise noted.

.4 Install connectors in accordance with manufacturer's instructions.

.5 Protect exposed grounding conductors from mechanical injury.

.6 Install separate ground conductor to outdoor lighting standards.

3.2 FIELD QUALITY CONTROL

.1 All grounding conductors outside the electrical rooms and closets shall be insulated and installed in conduits, unless otherwise noted.

END OF SECTION

□

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.

.2 Cooperate and coordinate with the requirements of other units of work specified in other Sections.

1.2 REFERENCES AND CODES

.1 The Electrical Contractor shall be bound by industry standards, as interpreted by the Consultant, whether or not specifically referenced in this document. Comply with Electrical Protection Act and rules and regulations made pursuant thereto, including the 2012 Canadian Electrical Code. Also, comply with applicable standards of the following:

.1 CSA C22.1-2012, Canadian Electrical Code, Part 1.
.2 Electrical and Electronic Manufacturers Association of Canada (EEMAC).
.3 National Electrical Manufacturers Association (NEMA).
.4 National Building Code 2010 (NBC 2010)
.5 National Fire Protection Association (NFPA)
.6 Institute of Electrical and Electronic Engineers (IEEE).
.7 Audio Engineering Society (AES).
.8 Other Applicable CSA and UL approvals.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with:

.1 Section 01 33 00 - Submittal Procedures
.2 Section 26 05 01 – Common Work Results

.2 Shop drawings shall include but not be limited to speakers, riser diagram, cable types, and special mounting details.

1.4 PRODUCT APPROVALS

.1 Manufacturers' and model numbers named in these specifications indicate an acceptable technical standard of performance and are not intended to be exclusive. Products submitted as alternates must result in a control system that meets or exceeds all technical performance criteria as described.

.2 Products proposed as alternatives to those specified, shall only be considered if submitted for approval no later than 15 working days before tender close. Submit alternates, for approval, as one complete listing. Provide complete product specification sheets with request for approval.

.3 The Bidder must provide a complete list of primary system products offered with their bid.

□

Part 2 Products

2.1 CONDUITS

.1 Rigid PVC conduit: to CSA C22.2 No. 211.2.

2.2 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 INSTALLATION

.1 Cap ends of all conduits to prevent entrance of foreign matter during construction. Manufactured caps shall be employed.

.2 Empty conduits, installed under this Division but in which wiring will be installed by others, shall be swabbed out with "Jet Line" foam packs, and be c/w Polypropylene pull wire or polytwine.

.3 Use rigid PVC conduit in corrosive areas or as indicated on plans.

.4 Minimum conduit size for lighting and power circuits: 19 mm.

.5 Install pulltwine in all empty conduits / raceways and conduits / raceways that are less than 40% filled.

.6 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

3.2 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

3.3 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance information for incorporation into manual specified in:

.1 Section 01 78 00 - Closeout Submittals

.2 Include:

.1 List specifying each piece of equipment in system or subsystem by its original manufacturer name and model number.

.2 Parts list specifying parts used in equipment by identification numbers that are standard to electronic industry.

□

3.4 WARRANTY

.1 The contractor must make available to the Owner a local service department of a duly authorized distributor of the equipment manufacturer, which shall stock the manufacturer's standard parts. The service department shall have at least one factory trained repair technician available to the Owner on 24 hours' notice.

.2 Provide warranty of installation of equipment installed by this contractor to be free of defects for a period of (1) one year from date of Substantial Completion.

Provide during the warranty period, all service, maintenance, parts, etc., required for normal operation of the systems, such that Owner needs not purchase additional maintenance agreement or contracts.

END OF SECTION

□

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.

.2 Cooperate and coordinate with the requirements of other units of work specified in other Sections.

1.2 REFERENCES

.1 The Electrical Contractor shall be bound by industry standards, as interpreted by the Consultant, whether or not specifically referenced in this document. Comply with Electrical Protection Act and rules and regulations made pursuant thereto, including the 2012 Canadian Electrical Code. Also, comply with applicable standards of the following:

.1 CSA C22.1-2012, Canadian Electrical Code, Part 1.

.2 Electrical and Electronic Manufacturers Association of Canada (EEMAC).

.3 National Electrical Manufacturers Association (NEMA).

.4 National Building Code 2010 (NBC 2010)

.5 National Fire Protection Association (NFPA)

.6 Institute of Electrical and Electronic Engineers (IEEE).

.2 American National Standards Institute (ANSI)

.1 ANSI C82.1, Electric Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.

.2 ANSI C82.4, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps.

.3 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.4 ANSI/IEEE C62.41, Surge Voltages in Low-Voltage AC Power Circuits.

.5 American Society for Testing and Materials (ASTM)

.6 ASTM F1137, Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.7 United States of America, Federal Communications Commission (FCC)

.8 FCC (CFR47) EM and RF Interference Suppression.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with:

.1 Section 01 33 00 - Submittal Procedures

.2 Section 26 05 01 – Common Work Results

.2 Shop drawings for each fixture shall include but not be limited to, lamps, ballasts, fixture cuts, custom colors, and special mounting details. All pertinent information for each fixture shall be stapled separately from other fixtures.

1.4 PRODUCT APPROVALS

.1 Manufacturers' and model numbers named in these specifications indicate an acceptable technical standard of performance and are not intended to be exclusive. Products submitted as alternates must result in a control system that meets or exceeds all technical performance criteria as described.

.2 Products proposed as alternatives to those specified, shall only be considered if submitted for approval no later than 10 working days before tender close. Submit alternates, for approval, as one complete listing. Provide complete product specification sheets with request for approval.

.3 The Bidder must provide detailed lighting calculation drawings for fixtures that are submitted for approval for closed office areas, open office areas, training rooms or as requested by the consultant. These shall be submitted no later than 10 working days before tender close.

.4 The Bidder must provide a complete list of primary system products offered with their bid.

Part 2 Products

2.1 LED LIGHTING – LAMP MODULES AND DRIVERS

.1 Solid-State Lighting (LED luminaires) shall comply with ENERGY STAR® SSL test standards for the following qualification requirements:

.1 Testing: SSL testing standards including IES LM-79-2008 and LM-80-2008 as performed by an independent test lab.

.2 Efficacy: The luminaire test data and submitted report shall demonstrate a minimum of 35 lumens per watt and 575 lumens for the least efficient LED for apertures ≥ 4.5" (345 lumens for apertures ≤ 4.5"), lowest efficient optic, and hottest luminaire configuration for the product group submitted for qualification.

.3 Colour: LED luminaire shall demonstrate colour uniformity across the aperture.

.4 Power: The driver/power supply must have a power factor of > 0.90 for all non-residential products, meet FCC requirements, sound rating of A and provide transient protection.

.5 Reliability: The LED luminaire shall demonstrate 70% lumen maintenance at 35,000 hours for non-residential products, as calculated using the DOE's linear extrapolation model.

.2 Tight chromaticity specification and LED colour binning process shall ensure LED colour uniformity, sustainable Colour Rendering Index (CRI) and Correlated Colour Temperature (CCT) consistency over the useful life of the LED.

.3 LED modules shall be InGaN (Indium Gallium Nitride) semiconductor material, absent of UV and minimal IR wavelengths. The conglomeration of diodes covered with remote phosphor technology shall provide consistent colour uniformity and tight colour control.

.4 LED Light Engine (Driver)

.1 Over-voltage, over-current and short-circuit protected

.2 Thermal management of the LED system shall be designed to yield 70% lumen maintenance after 50,000 hours of operation

.3 Total Harmonic Distortion: < 20% THD

.5 Warranty: The light engine and power components of LED luminaires shall be free from defects in material and workmanship for a minimum period of three (3) years from date of original purchase. Warranty shall cover only product failure due to defective material or workmanship, and does not include labour to remove or install fixtures. Defective LED's shall be considered if a minimum of 5% of LEDs per luminaire are non-operative in the fixture or module.

2.2 LUMINAIRES

.1 Contractor is responsible for all required mounting details for all lighting fixtures. If mounting of fixture is uncertain, contractor shall confirm prior to finalising pricing.

.2 Lighting fixtures shall be of the makes indicated. Similar types of fixtures shall be by one manufacturer.

.3 Only clean luminaires and lamps will be accepted at time of final inspection.

.4 Fixtures shall bear appropriate CSA labels.

.5 Cooperate with all other trades for the proper installation of all lighting fixtures.

.6 Verify the quantity of fixtures before placing orders.

.7 Provide lighting fixtures of type and quality as specified in the following schedule. Fixtures shall be complete with necessary accessories, lamps and ballasts. The contractor shall advise of any restrictions on providing luminaire, lamp and ballast as specified during tender period.

.8 The lighting fixtures shall be as specified in the following schedule, and the manufacturer's numbers shown shall not reduce or amend the requirements as outlined under the description of each fixture type.

2.3 LUMINAIRE SCHEDULE

.1 Fixture type 'G'

.1 Luminaire: Exterior pole mounted LED suitable for wet locations, extruded aluminum driver enclosure, die cast aluminum housing in powder coat grey finish, vandal resistant one-piece injection molded clear polycarbonate lens. Type III cut-off lighting distribution pattern, 347 volt LED driver, <20% total harmonic distortion, >0.9 power factor, start-up operation -40 degree C to 40 degree C, 90% lumen maintenance at 60,000 hours. 157 input watts, 15,669 delivered lumens, 4000°K, c/w c/w integral photocell control. Luminaire shall have five year warranty. Poles shall be 155mm square steel, 9144 mm (30 foot) and shall include anchor bolts, full base cover, hand hole, ground lug, top cap and all necessary accessories as required. Post

top luminaire and lamp pole standard shall match existing exterior fixture color.. Refer to site plan drawings and details.

.2 Manufacturers:
Cooper Lighting # GLEON series
Philips Gardco # ECOFORM series
Beacon #Viper Large 64NB series
Or approved equal.

Part 3 Execution

3.1 INSTALLATION

.1 The contractor under this Division shall be responsible for expediting the delivery and installation of the fixtures to suite the construction schedule and the work of other trades.

.2 Remove packing material and debris from the job site immediately after installation of fixtures and lamps. Debris shall not be allowed to accumulate more than a reasonable amount.

.3 Conduit installation shall conform to the specifications.

3.2 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance information

.1 Section 01 78 00 - Closeout Submittals

.2 Include:

.1 Operation instructions

.2 Description of system operation

.3 Description of each subsystem operation

.4 List specifying each piece of equipment in system or subsystem by its original manufacturer name and model number.

.5 Parts list specifying parts used in equipment by identification numbers that are standard to electronic industry.

3.3 LUMINAIRE ALIGNMENT

.1 Luminaires shown in continuous lines or rows shall be carefully aligned so that all rows appear as straight lines.

.2 Fixtures shall be installed accurately in line and level. Any fixtures which are not installed properly shall be taken down and re-installed at no change to the contract sum.

3.4 WARRANTY

.1 The contractor must make available to the Owner a local service department of a duly authorized distributor of the equipment manufacturer, which shall stock the manufacturer's standard parts. The service department shall have at least one factory trained repair technician

available to the Owner on 24 hours' notice.

.2 Provide warranty of installation of equipment installed by this contractor to be free of defects for a period of (1) one year from date of Substantial Completion.

.3 Provide during the warranty period, all service, maintenance, parts, etc., required for normal operation of the systems, such that Owner needs not purchase additional maintenance agreement or contracts. Upon request, the manufacturer and his agent shall provide direct to the Owner the following proposals:

.1 Continuation, after the warranty period, of full maintenance, including all service, labour, parts, etc. required to maintain the systems in a fully operational condition.

3.5 VERIFICATION

.1 Perform tests in accordance with:

.1 Section 26 05 01 - Common Works Results - Electrical

.2 The entire installation shall be performed under the supervision of the manufacturer. Upon completion of the installation, the manufacturer shall check and test the entire system. Certification of all tests shall be submitted in writing to the Consultant and shall certify the following:

.1 That the system is complete in accordance with this specification

.2 That the system is installed in accordance with the manufacturer's best recommendations

.3 During the certification tests, the contractor shall provide one (1) electrician and (1) helper to assist the manufacturer's representative. The contractor shall also provide any required equipment such as ladders, scaffolding, etc.

3.6 TRAINING

.1 Perform training in accordance with:

.1 Section 26 05 01 - Common Works Results - Electrical

.2 Written documentation bearing name and signature of Owner's personnel who received the above instructions shall be included in the operating instructions and service manuals.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 Site grading including loading, hauling, spreading, compaction and backfill in landscape areas.

1.2 RELATED WORK

.1 Topsoil and Finish Grading Section 32 91 19

1.3 LAYING OUT WORK

.1 Lay out work and be responsible for accuracy. Provide the necessary personnel to assist the Consultant in checking the work.

.2 Verify locations and depth of bury for all underground services and lines, whether or not shown on the plans.

1.4 PROTECTION

.1 Protect from damage all fencing, trees, landscaping, natural features, bench marks, existing structures, surface and underground utilities and lines which are to remain. Make good any damage.

1.5 TESTING

1.6 Quality Control: Section 01 00 05.

.1 Test for compaction densities of rough grading in fill areas exceeding 300 mm. The cost of testing will be paid for by the Contractor.

Part 2 Products

2.1 MATERIALS

.1 **Earth Fill**: unfrozen, granular fill or non-expansive (low plastic), fine grained soils, free of stones larger than 75 mm, concrete, sticks, roots and other debris; to Geotechnical Consultant approval.

.2 Excavated or graded material to be approved before use as fill for grading work.

.3 Protect fill material from contamination.

.4 **Waste Material**: materials found on site which are deemed by the Consultant to be unsuitable for fill, grading or landscaping. Waste material includes, but is not limited to the following: soil contaminated with toxic materials;

- soil contaminated with toxic materials;
- asphaltic rubble;
- concrete and other waste building materials;
- spongy or yielding material;

- organic material;
- frozen material;
- wet or saturated materials;
- alkaline material; and
- other materials detrimental to plant growth.

.5 **Surface debris:** includes, but is not limited to roots, vegetation, branches and stones in excess of 50 mm diameter.

Part 3 Execution

3.1 PREPARATION

.1 Establish and stake extent of excavation by area and elevation. Designate and identify datum elevations.

.2 Establish and identify all required lines, levels and datum.

.3 Maintain bench marks, monuments and other reference points. Re-establish if disturbed or destroyed, at no additional cost.

.4 Remove all debris, waste paper, and unsuitable material from the area to be graded.

.5 Remove all weed growth, from the area to be graded, by cutting or other acceptable means.

.6 Remove all organic material and topsoil from areas designated for regrading, paving or structures. Stockpile for re-use in landscape development.

3.2 GRADING

.1 Rough grade to levels, profiles and contours allowing for surface treatment as indicated.

.2 Slope rough grade as indicated. Grade ditches and drainage swales to required gradients as indicated.

.3 Prior to placing fill over existing ground scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.4 Excavate soft subgrade areas and replace with approved fill. Contact Geotechnical Consultant to review soft or wet subgrade soil conditions; provide geotextile fabric as directed.

.5 Place fill in maximum 150 mm loose lifts. Compact filled and disturbed areas to minimum 96% of standard Proctor density at optimum moisture content to current ASTM D698 or 98% of One Point Proctor Density with moisture content of 2% +/- of optimum.

.6 The CBR rating of the compacted subgrade soil should be approximately 3.

3.3 EXCAVATION OF ROCK

.1 Removal of any single boulder or buried rock in excess of 1.5 m^3 will be authorized as an extra. All other work is deemed to be within the scope of this section.

.2 Notify the Consultant and provide ample opportunity for him to investigate and make such measurements as are necessary to determine the volume of material in question.

.3 Retain boulders for reuse on site as directed by Consultant.

3.4 DEWATERING

.1 Keep excavations dry at all times. Provide necessary equipment including pumps, piping and temporary drains and trenches as required to prevent runoff accumulations.

3.5 EROSION PROTECTION

.1 Provide and maintain erosion and sediment control measures in accordance with the requirements of authorities having jurisdiction.

.2 Provide silt fence as required to control erosion and sedimentation. Install to manufacturers specifications. Maintain in effective condition.

.3 Stop work if incidents occur, and notify Consultant and authorities having jurisdiction immediately. Suspend operations until authorized to proceed.

3.6 SURPLUS MATERIAL

.1 Remove waste material, surplus material and material unsuitable for fill, grading or landscaping from site to municipally approved location.

END OF SECTION

PART 1 General

1.1 WORK INCLUDED

.1 The work under this Section shall include excavation, curb removal, asphalt removal and geotextile supply and installation.

PART 2 Products

2.1 GEOTEXTILE

.1 Naue America Combigrid 30/30 Q1

PART 3 Execution

3.1 CURB REMOVAL

.1 Cut existing curb sections as required or as shown on the drawings to be removed. Load, haul and dispose of all removed curb pieces from site.

3.2 ASPHALT REMOVAL

.1 Cut asphalt at locations as required. Ensure clean, straight cut lines are made to accommodate construction of clean joints during paving.

.2 Remove asphalt as required. Load, haul and dispose of removed asphalt from site.

3.3 EXCAVATION TO WASTE

.1 Remove excess material from roadways and dispose at a designated site or as directed by the Consultant. Level excavated material at disposal site as directed.

.2 Excavate and place material on site to the lines and grades shown on the drawing or as directed by the Consultant to within 25 mm of the design cross section but not uniformly high or low.

.3 Rocks shall be included as common excavation.

.4 Stones over 200 mm in diameter, chunks of concrete, organic or frozen material or other debris such as brush and roots are not allowed in the fill.

.5 Minimize construction traffic on excavated areas.

.6 Upon completion of excavation, ensure the subgrade conforms to the design grades and cross-section.

.7 Compact and secure loose surface material by smoothing it with a steel drum roller.

.8 The subgrade surface shall be within 20 mm of design grade, but not uniformly high.

3.4 GEOTEXTILE

.1 Install Geotextile as shown on the drawings or as directed by the Consultant..

.2 Install according to manufacturer's installation guidelines.

END OF SECTION

PART 1 General

1.1 WORK INCLUDED

.1 The work under this Section shall include the supply and placement of granular sub-base and base courses.

1.2 SUBMISSIONS

.1 Submit all granular material sieves, California Bearing Ratios and proctors to the Consultant a minimum of one week prior to commencing the work.

1.3 SURVEY CONTROL

.1 The Contractor will be responsible to provide all necessary construction surveying to ensure the site is constructed to the grades and elevations shown on the drawings or as otherwise directed by the Consultant.

.2 CAD files of the site can be made available from the office of the Consultant.

.3 The Contractor is responsible for providing the Consultant with an as-built drawing of the site within one week of completion of the work. The survey shall be of the finished surface of the work. The drawing shall be provided in CAD format and shall at a minimum show all catch basin and manhole rim elevations, top of asphalt elevations (on a 10m x 10m grid) and top of curb elevations within the work area.

1.4 TESTING

.1 The Contractor will be responsible to provide all materials testing for the site. Nuclear densometer testing shall be provided as specified or as requested by the Consultant. At a minimum, at least one test per 500 square metres of work area shall be conducted for each lift of granular material installed.

.2 Testing results will be submitted to the Consultant for review within three working days of the tests being conducted. Testing results are to be reviewed and approved by the Consultant prior to placement of any subsequent lifts of material being placed on site.

.3 All testing shall be performed by a third party licensed company certified to provide the testing.

PART 2 Products

2.1 GENERAL

.1 Materials shall conform to A.S.T.M. Specifications.

.2 Specifications for the following materials and shall be approved by the Consultant prior to construction.

2.2 SUB-BASE

.1 Granular sub-base course material shall consist of screened or crushed pitrun material consisting of gravel or stone, sand and clay binder. It shall be uniform in quality and consist of hard, strong, durable pieces, free of organics and other deleterious substances.

.2 Gradation:

Canadian Metric Sieve Designation	Percent Passing By Weight
50 mm	100
25 mm	75 - 100
12.5 mm	52 - 100
5 mm	30 - 75
2 mm	20 - 55
0.400 mm	8 - 30
0.071 mm	3 - 15

.3 Material shall have a minimum C.B.R. of 25 in the unsoaked condition at 2.54 mm (0.1") or 5.08 mm (0.2") penetration, whichever is greater, when compacted to 100% of the Standard Proctor Density

2.3 BASE COURSE

.1 The granular base course shall consist of crushed gravel or stone, sand and clay binder. It shall be uniform in quality and consist of hard, strong durable pieces, free of organics and other deleterious substances.

.2 The material shall meet the following requirements:

Canadian Metric Sieve Designation	Percent Passing By Weight
25 mm	100
18 mm	87 - 100
12.5 mm	72 - 93
5 mm	45 - 77
2 mm	29 - 56
0.900 mm	18 - 39
0.400 mm	13 - 26
0.160 mm	7 - 16
0.071 mm	6 - 11

.3 Material passing the 400 mm sieve shall have a Plasticity Index from 0 to 6.

.4 A minimum of 50% of the material retained on the 5 mm sieve shall have at least one crushed face.

.5 The material shall have a minimum C.B.R. of 65 in the unsoaked condition at 2.54 mm (0.1") or 5.08 mm (0.2") penetration, whichever is greater, when compacted to 100% of the Standard Proctor Density.

.6 If required, the Contractor shall supply a mix binder and/or filler material with the base aggregate. This material shall consist of a mixture of sand, silt and clay free of organics and other deleterious substances and meet the following requirements:

Canadian Metric Sieve Designation	Percent Passing By Weight	
	Binder	Filler
5 mm	100	100
0.400 mm	100	90
0.071 mm	50	25

.7 The Plasticity Index of binder shall be 10 and of the filler 0.

PART 3 Execution

3.1 GRANULAR SUB-BASE & BASE

.1 Upon completion of installation of geotextile, supply, place and compact granular material in lifts not less than 75 mm nor greater than 290 mm in thickness. Shape to specified cross-section.

.2 Granular material shall not be placed or compacted when the atmospheric temperature is 2^{o}C and falling.

.3 Granular material shall not be placed or installed on frozen ground.

.4 The Contractor shall, at his expense, add water to or dry the material to obtain optimum moisture content.

.5 Compact the granular material to an average of 100% of the Standard Proctor Density. The results of all density tests shall be greater than 98% of the Standard Proctor Density. If this density cannot be achieved with the maximum lift thickness, the Contractor is to use smaller lifts at their discretion.

.6 Conduct density testing and provide testing results to Consultant.

.7 The finished surface shall be true to grade and cross-section to within 15 mm, not uniformly high and have no high areas greater than 6 mm under a straight edge 3 metres long.

3.2 MANHOLE & CATCH BASIN ADJUSTMENTS

.1 Adjust sanitary sewer manhole to match top of finished curb elevation.

.2 Manholes and Catch Basins shall be adjusted by removing or adding adjusting rings to a maximum ring depth of 300mm with a minimum depth of 100mm. Contractor shall notify Consultant immediately if these conditions cannot be met.

.3 Valve boxes shall be adjusted by raising or lowering the telescoping top section of the box or by adding approved risers.

.4 Backfill the void around manholes and valve boxes to the top of base, level with concrete.

.5 Gravel and earth shall be kept out of valve boxes and sanitary & storm sewers. Any such material deposited in these appurtenances shall be removed by the Contractor at their

expense. The Contractor shall be completely responsible for all conditions which arise as the result of this material entering the sanitary sewer systems.

.6 Valve boxes, manholes, and curbs damaged by the Contractor shall be repaired or replaced at their expense.

END OF SECTION

PART 1 General

1.1 WORK INCLUDED

.1 This section describes the work required to construct the asphalt surface.

1.2 TESTING

.1 The Contractor shall arrange and pay for all tests required for approval of aggregates and asphalt mix designs and testing during start-up of asphalt mixing plant production. The Contractor shall pay for all subsequent testing required for control of the work. The Consultant and testing company employees shall at all times have access to the site of the work and to the Contractor's plant for purposes of inspection and testing. Where core samples are taken from asphalt materials in place, the Contractor shall patch the holes so created.

.2 All construction materials not conforming to the minimum requirements or intent of the specifications shall be removed and replaced with acceptable materials at no extra cost to the Owner. Cores shall be taken by the Contractor to measure the thickness of the completed asphalt section.

.3 Provide one complete Marshall test for each lift of asphalt placed within the work area.

.4 Payment adjustment factors will be used to adjust the contract unit price for materials not complying with the tolerances and values in this section or related specifications. Reduced payments for more than one deficiency on any one test sample will be based on the reduced payment and not the original.

PART 2 Products

2.1 ASPHALT CEMENT

.1 The asphalt cement shall be 150 - 200 Penetration Asphalt.

2.2 ASPHALT AGGREGATE

.1 The aggregate for producing asphaltic concrete shall consist of natural gravel and sand, crushed gravel and sand or a combination thereof. It shall be of a uniform quality and shall consist of hard durable fragments of rock free from adhering coatings, flat or elongated pieces and deleterious materials such as clay, shale and organics. The aggregate shall have an affinity for asphalt cement.

.2 The aggregate shall meet the following requirements:

COS Type 2:

Canadian Metric Sieve Designation	Percent Passing By Weight
12.5 mm	100
9 mm	76 - 89
5 mm	50 - 60

2 mm	30 - 48
0.900 mm	19 - 38
0.400 mm	10 - 26
0.160 mm	3 - 10
0.071 mm	2 - 5

.3 A minimum of 75% of the aggregate retained on the 5 mm sieve shall have at least one crushed face.

.4 The percentage of wear as determined by the Los Angeles Abrasion Test (A.S.T.M. C131) shall not exceed 35 for Type 2 and 30 for Type 9.The sand equivalent value (A.S.T.M. D24.9) of material passing the 5 mm sieve shall not be less than 45%.

.5 The organic content by weight of the material passing the 5 mm sieve shall not exceed 1%.

2.3 MIX DESIGN

.1 Before commencement of the work, the Contractor shall, at his own expense, supply the Consultant with a mix design. Included shall be a grain size distribution curve of the aggregate on which the mix design was based. After the mix design is established, the maximum permissible variation in the aggregate shall be:

COS Type 2:

Canadian Metric Sieve Designation	Maximum Permissible Variation in Percent Passing By Weight
16 mm	±2
12.5 mm	±5
9 mm	±6.5
5 mm	±6.5
2 mm	±6
0.900 mm	±4.5
0.400 mm	±4.5
0.160 mm	±3
0.071 mm	±2

.2 The asphaltic concrete mix shall meet the following requirements of the "Marshall Method of Mix Design" using a compactive effort of 50 blows.

COS Type 2:

Marshall Flow Index (mm)	2 – 4
Marshall Stability (kN)	8
Air Voids in Mixture (%)	3 – 5
Voids Filled with Asphalt (%)	70 – 80
Minimum Retained Stability (%)	75
Minumum Film Thickness (µm)	8
Min. Asphalt Content by Dry Mass of Aggregate (%)	5.3

2.4 PRIME AND TACK COAT

.1 Prime and Tack Coat - MC30 cutback asphalt or SS-1 Emulsified Asphalt.

.2 SS-1 shall be diluted 1:1 with water prior to application.

2.5 FOG COAT

.1 Fog coat shall be of SS-1 Emulsified Asphalt.

PART 3 Execution

3.1 PRIME COAT

.1 Uniformly distribute at a rate not exceeding 1.5 litres per square metre.

.2 Blot up excess primer with sand.

.3 Priming shall be carried out when air temperature is over 10^{o}C and when base is dry.

.4 Paint the vertical edge of the curb, gutter, manholes and valves that will be in contact with the asphaltic concrete.

.5 Application temperature shall be between 32^{o}C and 45^{o}C for MC30 primer.

.6 The distributor shall be equipped for accurately measuring material temperature and flow rates.

.7 Traffic shall be kept off of primed surface until the primer has been properly absorbed.

.8 Keep primer off of curbs and other adjacent structures. Remove priming material from adjacent structures using a method which results in an acceptable appearance.

3.2 MIXING

.1 The asphalt mixing plant shall be designed, co-ordinated and operated so as to produce a uniform mix within the limits specified.

.2 Asphalt cement shall be heated to a temperature of 120^{o}C to 150^{o}C before mixing with aggregate.

.3 Aggregates shall be dried and delivered to the mixer at a temperature between 150^{o}C and 165^{o}C.

.4 Temperature of the mixture shall be regulated according to the temperature of the atmosphere and workability of the mix, but shall be as low as possible consistent with proper mixing and laying.

.5 All particles shall be completely coated with bituminous binder.

.6 The percentage of asphalt cement shall not vary more than 0.3% from the mix design.

3.3 TRANSPORTATION

.1 Use trucks with clean metal boxes. Cover material to maintain temperature and eliminate contamination. Loss of temperature from plant to job shall not exceed 10^{o}C.

3.4 PLACING

.1 Hot asphaltic concrete shall be placed when air temperature is above 2°C and rising, and shall not be placed on frozen base. Use approved mechanical, self-propelled paver capable of spreading the mixture true to line, grade and crown and providing the required thickness and density without segregation.

.2 Minimum temperature of the asphalt mix in the paving machine shall be 120°C.

.3 Lay only on approved surface after primed base or tack coat has cured and is free from dust and other foreign matter.

.4 Place in lifts not exceeding 65 mm compacted. Where required place tack coat between lifts of asphalt. Tack coats shall be included in the price for asphalt surface.

.5 Defects in the surface shall be corrected before compacting.

.6 Before placing mixture against longitudinal joints, curbs and catch basins, paint these surfaces with thin uniform coating of primer.

.7 Joints between old and new pavements or between successive days work shall be made in such a way as to provide a thorough and continuous bond between the old and new surface. Edge of old surface shall be cut back vertically, primed and the hot mix shall be placed in contact with it and raked to proper depth and grade.

.8 Any areas not filled by paving machine shall be filled by hand with sufficient hot mix material to receive the maximum compactive effort.

3.5 COMPACTION

.1 Compact with sufficient and suitable equipment to achieve smooth dense surface and specified compaction for full depth.

.2 Steel wheel roller shall be used for initial compaction and shall not be operated at a speed in excess of 5 km per hour.

.3 Pneumatic tired compactors shall be used for subsequent compaction and shall not be operated at a speed in excess of 8 km per hour.

.4 Final rolling shall be done with a tandem roller weighing not less than 7 tonnes and shall be done while paving mixture is still warm enough for added compaction.

.5 Defective areas shall be corrected immediately to assure continuous bond and appearance.

.6 Compact until no roller marks exist.

.7 Allow testing authority to take core samples from paved surface for testing. Density shall be at least 95% of the density of the test specimen prepared by the Standard Marshall Test applying 50 blows to each face of the specimen.

.8 In areas where rollers cannot work, compact by hand or by small suitable equipment to achieve density equal to that attained by rollers.

.9 Allow testing authority to take core samples from paved surface for testing. Density shall be at least 97% of the density of the test specimen prepared by the Standard Marshall Test applying 50 blows to each face of the specimen. Repair core holes. The density payment adjustment factors are as follows:

Compacted Density % of Marshall	Payment
>96.9%	100%
96.6 to 96.9	98%
96.0 to 96.5	95%
95.0 to 95.9	90%
94.0 to 94.9	80%
93.0 to 93.9	65%
91.0 to 92.9	50%
Less than 91%	Replace Pavement (no payment for removal)

3.6 FINISH

.1 The surface of finished pavement shall be within required profile and cross-section ± 3 mm. No depressions or bumps shall exceed 5 mm beneath a 3 metre straight edge.

.2 Surface shall be uniform, dense and free from sandy or fat areas.

.3 Traffic shall not be permitted on finished surface until pavement has cooled to atmospheric temperature. An approved slurry seal coat shall be applied to all completed surfaces and traffic shall not be permitted until the slurry seal coat has sufficiently cured to prevent tracking.

.4 An approved fog coat shall be applied to all completed surfaces and traffic shall not be permitted until the fog coat has sufficiently cured to prevent tracking.

.5 Coring will be done on the asphalt surface following construction. Where the average asphaltic concrete thickness is not less than specified thickness minus 2 mm, full payment will be made. Where the average asphaltic concrete thickness is less than specified thickness minus 2 mm, the following penalty calculation will be used, and will be deducted from the final payment:

$$Penalty = \left(1 - \frac{Average\ Thickness}{Specified\ Thickness}\right)^2 * Unit\ Price$$

.6 Where the asphaltic concrete thickness is more than 10 millimetres below specification, the affected area shall be brought to specification at the Contractor's expense. If additional cores are required to determine the extent of the affected area, the cost shall be borne by the Contractor

3.7 FOG COAT

.1 All completed asphalt surfaces shall receive a fog coat of SS-1 material. It shall be applied at a rate of approximately 0.5 litres per square metre of surface. Fogging shall be done on a calm day. The Contractor shall be responsible for all damage done to private property due to drifting of the oil by the wind.

.2 The distributor shall be equipped with devices for accurately measuring material temperature and flow rates.

END OF SECTION

PART 1 General

1.1 WORK INCLUDED

.1 The work under this Section shall include the construction of concrete curbs, gutters sidewalks, swales and infills.

PART 2 Products

2.1 GENERAL

.1 Supply the following types or classes of materials. Alternatives shall be approved prior to the closing of tenders.

2.2 CONCRETE

.1 Concrete materials and method of concrete handling and construction shall conform with the latest edition of A-23.1 as published by the Canadian Standards Association.

.2 Minimum compressive strength at 28 days shall be 32 MPa.

.3 Maximum aggregate size shall be 25 mm.

.4 Cement shall be Type 10 Normal Portland Cement. A minimum of 300 kg of cement per cubic metre of mixed concrete shall be used.

.5 Maximum slump shall be 75 mm for concrete poured into forms and 25 mm when extruders are used.

.6 An approved air-entraining agent complying with ASTM C-260 shall be used. Air entrainment shall be 5 to 8 percent by volume.

.7 Water-cement ratio shall not exceed 0.38 by weight.

.8 Reinforcing steel shall conform to CSA G30.12-M and G30.5.

.9 Calcium chloride conforming to ASTM D-98 shall be used as an accelerating agent only upon approval of the Consultant. Maximum amount of calcium chloride in the mix shall not exceed 2% of cement by weight.

2.3 CURING COMPOUND

.1 Curing compound shall comply with ASTM C309, Liquid Membrane-Forming Compounds for Curing Concrete.

PART 3 Execution

3.1 SUBGRADE PREPARATION

.1 Curbs shall be constructed on subgrade compacted to a minimum of 98% of the Standard Proctor Density unless otherwise detailed. Subgrade preparation shall extending 300 mm beyond the curb face and 150 mm behind the back of curb.

.2 No portion of the subgrade shall protrude into the space required for concrete.

.3 50mm of Granular Base (Section 31 11 00) shall be installed as levelling course below concrete for curb or sidewalk not constructed with the use of extruding equipment.

3.2 FORMS

.1 Forms shall be metal or properly seasoned lumber free from warps and other defects and shall have a smooth clean surface adjacent to the concrete. They shall be well staked and braced so that they will retain their line and grade with the use of mechanical vibrators and vibrating screeds.

.2 Forms which are considered unsatisfactory, in the opinion of the Consultant, shall not be used in the work. Inferior work caused by poor forming shall be replaced by the Contractor at his expense.

3.3 OPENINGS AND ALTERATIONS

.1 Where alterations or repairs have to be made to a utility, either underground or surface, the Contractor shall leave openings in the curb to facilitate this work. The length of opening will be determined by the Consultant but will generally be 3 metres. As soon as possible after completion of the alteration or repair, the Contractor shall install the curb in the opening at no additional cost to the Owner.

.2 Where openings are left or where small amounts of concrete at the end of a block or at a curb return are to be placed after the main work has been poured, 10M reinforcing dowels 600 mm long shall be installed between the adjacent sections. Two dowels shall be placed in the curb section. Dowels shall be supplied and placed by the Contractor at his expense.

3.4 TEMPLATES

.1 Templates shall be supplied and used by the Contractor to check the subgrade finish prior to placing of the concrete and to check the shape of completed work. Templates shall be full scale and represent the true cross-section of the concrete for the type of curb being constructed.

.2 If other templates are required, they shall be constructed and used by the Contractor to control the work.

.3 Templates shall be of rigid construction with suitable handles. Damaged or worn templates shall not be used and all templates shall be checked and approved by the Consultant. The Contractor shall supply templates.

.4 No concrete shall be placed until the Consultant has checked and approved the subgrade.

3.5 TESTS

.1 Tests on concrete shall be carried out in accordance with CSA A23.2. The Contractor shall supply and pay for all aggregate tests and mix designs. The Owner shall pay for tests taken from the concrete delivered to the job. The Contractor shall supply concrete for such tests at no cost to the Owner, and shall co-operate in the making, protection and storing of the test specimens.

.2 At least 7 days prior to pouring of the concrete, the Contractor shall supply the Consultant with a concrete mix design and results of compression tests taken from the subsequent mix. If the aggregate changes or for any other reason the original mix cannot be used, a new mix design shall be submitted for approval before concrete using the new mix is placed.

.3 Ready-mixed and transit mixed concrete shall conform with CSA A23.1.

.4 During the progress of the work, a minimum of 3 test cylinders will be taken from each 450 lineal metres of curb. One cylinder shall be tested after 7 days of curing and two cylinders shall be tested after 28 days of curing. No more than one test in ten nor two consecutive tests shall be below the specified concrete strength.

.5 During the first 24 hours of setting, the test specimens shall be stored at the site of the work in containers, which will protect them from damage.

3.6 PLACING CONCRETE

.1 Concrete shall be placed in a continuous operation. The interval between placing successive batches shall not exceed 30 minutes unless the last load completed the work to an expansion joint. Maximum mixing time of concrete after water has been added shall be 45 minutes.

.2 Concrete shall be placed as close as possible to but no further than one metre from its final position in the forms. Re-handling of concrete shall not be permitted.

.3 Concrete shall be deposited in such a manner that segregation of the aggregates shall not occur.

.4 After placing, the concrete shall be tamped, vibrated or otherwise consolidated to eliminate all voids and honeycombing. Vibrating screeds, if used, shall be operated in accordance with the manufacturer's instructions. Over vibration resulting in bleeding shall not be allowed.

.5 Concrete may be placed when the atmospheric temperature is 1°C and rising. Concrete shall not be placed when the temperature is 5°C and falling. Concrete shall be covered and heated, if necessary, to maintain a temperature of 5°C for at least 36 hours. Covering shall not be removed for 72 hours. Cost of heating and covering shall be borne by the Contractor.

.6 During hot weather, an approved set retarder may be used. Concrete shall be poured at a rate such that finishing as specified can be accomplished. Surface wetting shall not be permitted during finishing. The Consultant may terminate the work temporarily if, in his opinion, the work cannot be properly finished.

.7 Finished concrete shall be adequately protected against rain, dust or other adverse weather conditions.

3.7 CONSTRUCTION WITH EXTRUDING EQUIPMENT

.1 Slipform sidewalk and curbing machines are permitted. The Consultant prior to commencing work shall approve type and condition of the machine.

.2 All molds must be in metric dimensions.

.3 Openings left at corners, catch basins, crossings and at other locations shall be completed if possible before the extruded concrete is set.

3.8 EXPANSION JOINTS

.1 Expansion joints consisting of 12 mm asphalt impregnated fibreboard shall be supplied and placed by the Contractor where new work adjoins existing sidewalks and curbs. Expansion joints shall be constructed to match existing.

.2 Expansion joint material shall extend through the entire cross-section of the curb and walk and shall be placed 3 mm below the level of the top surface. The edges of the concrete adjacent to the joint shall be neatly rounded off to 6mm radius.

3.9 CONNECTION TO EXISTING CURBS

.1 Saw cut existing curbs at the nearest expansion joint to provide a straight edge for connection.

.2 Install 10M epoxy coated reinforcing dowels 300 mm long at 300 mm spacing, with a minimum of 50 mm clear from concrete surface. Dowels shall be supplied and placed by the contractor at their expense.

3.10 FINISHING

.1 When the concrete has set sufficiently, the surface shall be finished with a wood float. The surface shall then be marked with approved tools with straight lines perpendicular to the curb face at intervals of 1.5 metres or as otherwise shown on the drawings. Markings shall be a minimum of 12 mm deep. The surface shall then be trowelled smooth and receive a brushed finish.

.2 After the initial set, curb forms shall be removed and the exposed surfaces shall be trowelled smooth and receive a brushed finish to a depth of 200 mm from the top of the curb.

.3 Straight face curbs shall be rounded to 25 mm at the top of the face. For separate curbs, the top of the back of the curb shall be rounded to 6 mm.

.4 Substandard work or finished surfaces which are marred or damaged prior to setting shall be replaced by the Contractor at his expense.

.5 Each block of curb constructed shall be marked at each end with a suitable tool showing the name of the Contractor and the year of construction.

.6 Mark locations of curb boxes at right angle 200 mm from the back of the sidewalk. Imprint shall have the initials C.C. The location shall be marked 50 mm from the back of curb only if no sidewalk is constructed.

.7 Curb returns shall be smooth, continuous curves and shall be tangent where they join the straight sections or another curve.

3.11 CURING COMPOUND

.1 Apply a curing compound to all exposed surfaces. The rate of application shall be as recommended by the manufacturer or as directed by the Consultant. The pressure spray distributor shall be such that a continuous even coating is applied.

3.12 TOLERANCES

.1 All exposed concrete surfaces shall not deviate in line or grade more than 6mm in 3 metres.

.2 Curb elevation shall not vary more than 10 mm from that established by the Consultant's grade stakes and the maximum variation from the given elevation between two consecutive stakes shall not exceed 10 mm.

.3 Deviation in alignment shall not exceed 25 mm in 30 metres from that established by the survey stakes.

3.13 BACKFILLING AND CLEANUP

.1 Coordinate backfilling of curbs with landscape requirements.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Section 32 93 10 - Planting

1.2 LAYING OUT WORK AND INSPECTIONS

.1 Lay out work and be responsible for accuracy. Provide the necessary personnel to assist the Consultant in checking the work.

.2 Coordinate with other contractors working on-site. In particular, ensure coordination with contractors undertaking landscape development, roadways, walkways, underground services and other work directly affected by, or which will have an effect on, irrigation installation.

.3 The Consultant will not be responsible for coordinating work of the various contractors working on site.

.4 Stake locations of heads and valves and review with the Consultant prior to excavation and installation.

.5 Do not allow, nor cause, work to be covered or enclosed until it has been inspected, tested, and approved by the Consultant. Should work be enclosed or covered before such inspection, uncover work at Contractor expense; after inspection and approval make all repairs with equal materials necessary to restore work, and that of other Contractors, to original condition.

1.3 TESTING AND ADJUSTING

.1 Upon completion of the installation, the entire system shall be tested. Air shall be flushed from the pipes and all components shall be checked for proper operation. The system shall not be accepted by the Consultant until all portions are operating as intended and until all deficiencies have been corrected.

.2 Balance and adjust the various components of the irrigation system so that the overall operation is efficient and coverage is uniform.

.3 Avoid overspray onto walks, roads or buildings.

1.4 AS-BUILT PLAN / MAINTENANCE

.1 Upon completion of the work, provide the Consultant with an as-built plan, digital or hardcopy, showing the exact location of all components of the system, and a copy (or copies, as outlined in General Requirements) of a manual outlining system operation, procedures and maintenance instructions.

.2 The maintenance manuals shall include controller operation and programming instructions, servicing and replacement procedures for all sprinklers, drip line and valves, and procedures for blowing out the system in the fall and charging the system in the spring.

1.5 MAINTENANCE (BEFORE WARRANTY PERIOD)

.1 Be responsible for all aspects of system maintenance from completion of installation to date of Substantial Performance of the Work.

.2 System maintenance shall include, but not necessarily be limited to, servicing, repair and replacement of system components as required for efficient operation and uniform coverage.

1.6 MAINTENANCE (DURING WARRANTY PERIOD)

.1 Test and adjust all equipment for smooth trouble-free operation of the irrigation system at the start of the warranty period.

.2 Defects or misalignment of any part of the work caused by settlement of bedding or backfill material within the warranty period shall be corrected at Contractor expense.

.3 Emergency repairs may be required to protect property or permit operation of the work. The Owner shall notify the Contractor immediately, who shall make all necessary repairs. The cost of such emergency repairs shall be paid by the Contractor. Maintenance not of an emergency nature shall be brought to the attention of the Contractor, in writing, who shall take the necessary action to correct the faulty work.

.4 Blow-out all irrigation water lines prior to freeze-up in the fall (October) of the year of completion, and reconnect the irrigation system in the spring of the following year.

.5 Notify the Owner two (2) weeks prior to blowing out the system to allow the proper watering-in of plant material prior to fall freeze up.

.6 Provide on-site orientation to familiarize the maintenance personnel with the operation of the irrigation system and locations of control equipment.

1.7 WARRANTY

.1 Irrigation system equipment and installation shall be warranted for one full year following the date of Substantial Performance of the Work. Exempted is equipment and installation damaged, after date of Substantial Performance of the Work, by accidental causes or vandalism.

Part 2 Products

2.1 PIPE

.1 Main line pipe: to match existing.

.2 Lateral Line Pipe: Low density minimum Series 75 polyethylene (P.E.) pipe conforming to current CSA B137.1.

2.2 FITTINGS AND CONNECTORS

.1 Pipe fittings: PVC sch. 80 solvent weld and insert fittings with stainless steel clamps and Rainbird brass saddles with stainless steel bolts.

.2 Risers & swing joints: threaded schedule 80 PVC pipe unless otherwise specified.

2.3 SPRINKLER HEADS AND ROOT ZONE WATERING SYSTEMS

.1 Match existing, understood to be:

.1 Rotors: Hunter I-20 with 100 mm popup height, check valve, filter screen, heavy duty ABS plastic, nozzles as per irrigation drawing.

.2 Bubblers: Hunter Root Zone Watering Systems, 450 mm length, nozzles as required to match existing bubblers onsite.

.2 Fittings: per manufacturer’s specifications.

2.4 VALVE BOXES

.1 For automatic and manual valves, and quick couplers: approved fibreglass reinforced plastic boxes complete with bolt down cover; Carson Brooks.

.2 Granular backfill: 19 mm diameter crushed stone, washed.

2.5 SLEEVES

.1 PVC pipe of sufficient diameter to allow clear passage of all pipes and wires required for that portion of the work; minimum two nominal sizes larger than pipe.

2.6 CONTROL WIRES

.1 If needed, match existing, understood to be: 14 gauge direct burial UF-UL listed TWU-40 wire with the common wire white and the tracer wire green. All other wires can be any colour except white or green.

.2 Splices and connections to be water-proof commercial grade connectors; DBY/R splices, as manufactured by 3M Company, or equivalent as approved by Consultant.

2.7 ZONE CONTROL VALVES

.1 Retain existing valves. If replacement required, match existing, understood to be:

.1 Electric valves: Rain Bird 200-PGA series, Hunter PGV series or Toro 252 series, construction 1030kPa working pressure high flow, low friction losses and capable of operating under dirty water conditions and contain the following features:

- angle and globe design
- corrosion / contamination resistant
- low power requirements
- manual override

.2 Valve sizes as required for layout.

Part 3 Execution

3.1 EXCAVATION

.1 Excavation shall be unclassified and shall include all materials encountered except material which cannot be excavated by normal chain trenching methods. Such exceptions shall be brought to the attention of the Consultant and an adjustment in price shall be agreed upon before excavation of these areas proceeds. Such price adjustments and agreements shall include responsibility for disposal of the unsuitable materials removed from the trench and the acquiring of additional backfill material.

.2 Depth of cover: minimum 300 mm except where structural requirements and underground service lines interfere. These areas shall have a maximum allowable depth of cover.

.3 Backfill material shall be free from rocks, large stones, and other unsuitable materials which could damage the pipe or create unusual settling problems. Backfilling shall be in maximum 150 mm layers and tamped after each layer to prevent excessive settling.

.4 Avoid damage to any and all existing trees and shrubs including those planted concurrent with the irrigation installation. Where possible, place lines outside the drip line of

existing trees. Hand trench around existing trees to avoid damage to root systems. Review conflicts with Consultant.

.5 Avoid damage to any and all underground utilities and structures. Notify utility companies including the power, gas and telephone and have locations staked prior to commencing excavations.

.6 Coordinate timing and location of sleeve placement with the General Contractor.

3.2 INSTALLATION OF PIPES AND SLEEVES

.1 Installation of pipes and fittings shall be in accordance with the manufacturer's instructions and shall proceed from the point of connection to supply. Pipes shall be secured to prevent excessive movement from water pressures. Double clamp all connections on continuously pressurized lines.

.2 Sprinkler and drip line connections to pipe: approved brass saddles with stainless steel bolts. See detail on plans.

.3 Polyethylene pipe may be installed by standard trenching techniques or by pulling in pipe. If the pull-in method is used, the pipe plow shall be a vibratory type. The mole or bullet, which precedes the pipe and is used to form the opening for the pipe, shall not be less than 25 mm larger in diameter than the outside diameter of the pipe.

.4 Install sleeves with the top of the pipe 300 to 400 mm below finished grade. Extend sleeves 300 mm beyond hard surfaces and mark locations on the edges of walks and curbs with Tapcon screws or other approved method. Verify with Consultant.

3.3 SPRINKLERS AND ROOT ZONE WATERING SYSTEM

.1 Pop-up sprinklers and bubblers shall be installed with top slightly above finished grade, level and marked with a stake to prevent damage by other equipment during construction. Where heads are adjacent to walks and curbs, install heads 25 mm below top surface of concrete. Refer to details for installation at raised planters and over roof areas.

.2 All screwed connections shall be wrapped with two layers of teflon tape.

.3 Backfill around the swing joint and sprinkler heads shall be free of rocks larger than 12 mm diameter, roots, debris, and other extraneous matter.

3.4 MANUAL AND AUTOMATIC VALVES

.1 Install valves, according to detail, in a valve box set plumb and flush with the surface. Provide 75 mm depth granular backfill at base.

.2 Valve box locations shall be clearly marked with a stake to prevent damage by equipment.

.3 Cover valve boxes with mulch at time of system turnover. Ensure location is accurate on As-builts.

3.5 CONTROL WIRES

.1 Control lines shall be installed in a neat and orderly fashion and may be installed in the pipe trenches or in separate trenches. The wires shall be bundled together and taped every 1.5 m.

.2 Splicing shall be minimized. Splices shall be made waterproof with the use of waterproof splice connection kits, as specified.

.3 All 24 volt wiring shall be installed in accordance with existing codes.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 Topsoil, planting mix, fertilizer and finish grading.

1.2 RELATED WORK

.1 Site Grading Section 31 22 13

.2 Sodding Section 32 92 19

1.3 SOIL TESTS

.1 Conduct soil tests of topsoil and planting mix as required to determine recommended soil amendments and fertilizer compositions for seeding, sodding and planting. Samples shall be taken in accordance with recommendations of approved testing laboratory. Testing regimen as follows:

.1 PSA-2 (Particle size analysis).

.2 C-TOT-ORG (organic carbon).

.3 SAL-DETAIL+TGR (detailed salinity).

.4 Soil Analysis Package 1 (for NPKS - with recommendations).

.2 Soil tests shall be paid for under cash allowance and shall be conducted by an approved testing laboratory.

.3 Submit PDF of soil test results and fertilizer recommendations to the Consultant for review.

Part 2 Products

2.1 MATERIALS

.1 **Topsoil**: free from subsoil, roots, grass, weeds, toxic materials, stones and foreign objects, and shall be subject to analysis by a testing laboratory before use. Topsoil shall consist of black topsoil, a fertile, friable natural loam, neither heavy clay nor very light sand; 5-20% organic matter by weight; acidity value ranging from pH 6.0 to 7.5. **Amend as recommended by soil tests.** Topsoil to be screened and in a moist, not wet, condition when incorporated into the work. Submit a one (1) litre sample to Consultant for approval prior to incorporation into the work.

.2 **Peatmoss**: derived from partially decomposed fibrous or cellular stems and leaves of species of Sphagnum Mosses; elastic and homogeneous, brown in colour; free of wood and deleterious material which could prohibit growth; maximum shredded particle size: 5 mm; to approved sample.

.3 **Manure:** well decomposed cattle excrement, rich in organic matter and humus containing balanced proportions of nitrogen, phosphorus and potash; reasonably free of living vegetation, weed seeds, and couch grass or brome grass rhizomes; in a pulverised,

friable condition, not containing fresh or "green" manure, clay, silt, gravel or foreign material.

.4 **Compost:** rated to CCME Category A.

.5 **Planting mix**: 80% sandy loam topsoil, 20% peat moss, well-rotted manure or compost; to approved sample.

.6 **Fertilizer**: Complete commercial synthetic slow release fertilizer with maximum 35% water soluble nitrogen; uniform in composition and free flowing. Formulation ratio: as recommended by soil tests.

Part 3 Execution

3.1 COORDINATION

.1 Ensure proper scheduling of work to avoid conflicts with completed and intended work.

3.2 PREPARATION

.1 Eliminate uneven areas and low spots from areas that have been rough graded. Ensure positive drainage in accordance with grading plans. Notify Consultant of grading problems before proceeding. Remove debris, roots, branches, stones in excess of 50 mm diameter and other extraneous materials. Remove subsoil that has been contaminated with oil, gasoline, calcium chloride or other undesirable chemicals. Dispose of removed materials off-site on a daily basis and at a location approved by local officials.

.2 Cultivate all areas, which are to receive topsoil and planting mix, to depth of 100 mm and 450 mm, respectively. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted the subgrade.

.3 Do not damage structures, membranes, fabrics, gravel or other materials adjacent to or below landscaped areas.

3.3 TOPSOIL AND PLANTING MIX

.1 Do not spread topsoil until Consultant has inspected subgrade.

.2 Spread topsoil with adequate moisture in uniform layers during dry weather over approved, dry, unfrozen subgrade, where seeding, sodding and planting is indicated.

.3 Bring topsoil to finish grade, taking mulching into account.

.4 Uniformly place topsoil or planting mix, as indicated, in maximum 150 mm loose lifts to the following minimum compacted depths:

.1 100 mm topsoil for sodded and seeded areas.

.2 300 mm planting mix for planting beds.

.3 Compact each lift to minimum 90% of standard Proctor density.

.5 Note: refer to drawings for extent of existing topsoil, already in place.

3.4 FERTILIZER

.1 Apply fertilizer at least 6 days before sodding or planting.

.2 Spread fertilizer uniformly with mechanical spreaders over entire area of topsoil at rate determined on basis of soil tests.

.3 Incorporate fertilizer thoroughly into upper 50 mm of growing media.

3.5 FINISH GRADING

.1 Remove stones, roots, grass, debris and foreign non-organic objects from growing media.

.2 Manually spread topsoil around existing trees and at areas subject to damage by equipment.

.3 Fine grade entire landscaped area to contours and elevations as indicated. Eliminate rough spots and low areas to ensure positive drainage in accordance with the grading plans. Notify Consultant of grading problems before proceeding.

.4 Fine grade and loosen topsoil prior to seeding or sodding. Prepare loose friable bed by means of shallow discing or harrowing and subsequent raking. Roll lightly and rake wherever growing media is loose.

.5 Leave surface smooth and uniform, with a fine loose texture.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 Sod and laying of sod.

1.2 RELATED WORK

.1 Topsoil and Finish Grading Section 32 91 19

Part 2 Products

2.1 MATERIALS

.1 Sod: Grade No. 1 cultured turf in accordance with the current edition of the "Canadian Standards for Nursery Stock" of the Canadian Nursery Landscape Association (CNLA), composed of a minimum 40% Kentucky Bluegrass; minimum 30% Creeping Red Fescue; maximum 5% Perennial Rye Grass or 10% Red Top; maximum 2% of other grass species or clover; maximum two (2) broad leaf weeds per 40 m2 area. Turf shall be free of disease; the thickness of the soil portion of the sod shall be of such density that no surface soil is visible when mowed to a height of 60 mm. The thickness of the soil portion of the sod shall be 20 - 25 mm. All sod shall be mowed to a height of 40-50 mm prior to cutting and delivery.

.2 Fertilizer: refer to Section 32 91 19

Part 3 Execution

3.1 LAYING OF SOD

.1 Immediately, or as soon as possible after delivery to the site, lay the sod. Do not allow to dry before laying. Lay sod evenly and closely packed together, using an alternate pattern. Roll and pack entire sodded area to form an even surface. Complete sodded areas including patching, watering and rolling within 48 hours of laying.

.2 Edge sod to form neat 1000 mm diameter circular openings at the base of all trees. Place a full row of sod, not less than 300 mm in width, along the perimeter of sodded areas adjacent to the edges of shrub beds, walks, curbs and walls.

.3 Thoroughly water sodded areas within 24 hours of laying sod. After watering, roll edges to form an even surface and to adjoin level with existing grades, and +/- 20 mm below adjacent walks and curbs.

.4 Do not lay sod when in a frozen state or in weather conditions unfavourable for transplanting or for growth.

3.2 ACCEPTANCE

.1 Sodded areas will be accepted provided that:

.1 Sodded areas are properly established and true to grade.

.2 Sod is free of bare and dead spots and without weeds.

.3 No surface soil is visible when grass has been cut to height of 50 mm.

.4 Sodded areas have been thoroughly watered within 24 hours of acceptance.

3.3 INSPECTIONS AND APPROVALS

.1 Consultant reserves the right to approve nursery plant material at source. Notify Consultant of source, minimum 7 days in advance of shipment. No work under this Section is to proceed without approval.

.2 Acceptance of plant material at source does not prevent rejection on site prior to, or after, planting operations.

.3 Stake location of trees, shrubs and edge of planting beds for inspection by Consultant. Obtain Consultant approval before planting.

.4 Notify the Consultant if the layout has been altered from the design drawings. Adjustments may be required as a consequence of site conditions, and must be approved by the Consultant before installing plant material.

.5 Provide Consultant a minimum of 24 hours notice prior to inspection and turnover.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 Supply and installation of plant material.

1.2 RELATED WORK

.1 Section 31 91 19 - Topsoil and Finish Grading

.2 Section 32 93 20 - Mulches

.3 Section 32 93 40 - Landscape Maintenance

1.3 REFERENCE STANDARD

.1 Comply with the current edition of the Canadian Nursery Landscape Association (CNLA) Canadian Standards for Nursery Stock.

1.4 SOURCE QUALITY CONTROL

.1 Plant material must be rated with a Plant Hardiness of Zone 3a or hardier. Plant material that is not rated Zone 3a or hardier is not acceptable, unless agreed by Consultant before closing of tenders.

.2 Imported plant material must be accompanied with necessary permits and import licenses and conform to federal and provincial regulations.

.3 Trees and shrubs shall have strong fibrous root systems, and be structurally sound and free of disease, insects, insect eggs, sunscald, frost cracks, rodent damage, defects, injuries and damage.

.4 Plant material with dieback or tip kill, that adversely affects the structure of the tree, is unacceptable (e.g. damaged leader or severe tip kill to lateral branches).

.5 Plant material with stumps included in the root ball is unacceptable.

.6 Container and basket trees must have well-developed branches and foliage. Trees with sparse foliage or over-elongated branches are unacceptable.

.7 Black Ash trees must be grafted on to Green Ash rootstock unless otherwise approved by the Consultant.

.8 Plants dug from native stands, woodlots, Christmas tree lots, orchards or neglected nurseries, and have not received proper maintenance as advocated by CNLA, shall be designated as “collected” plants. “Collected” plants are unacceptable unless inspected and approved by the Consultant.

.9 Plant material shall meet or exceed the sizes specified on the Plant List. If larger plants are used, the root ball shall be increased in proportion to the size of the plant to conform to CNLA specifications. If acceptable plant material is not commercially available at the minimum size specified, smaller sizes of the same species may be acceptable, subject to Consultant approval. The Consultant reserves the right to reject plant material that does not meet the minimum size requirements.

.10 Cold storage: Consultant approval required for plant material which has been held in cold storage. Inspection to occur at site of storage.

.11 Bare root material: unacceptable outside natural dormancy period.

.12 Tree spade material: turf surrounding the source material to be free from invasive perennial species. If invasive species are present, treat with Round-Up a minimum of seven (7) days before transplanting.

.13 To prevent the importation of Dutch Elm disease:

.1 Elm trees shall not be imported from an area where Dutch Elm Disease has been confirmed (governed by federal and provincial legislation).

.2 Imported elm trees must be accompanied by written certification, stating that the trees are free of disease and have been sprayed with Dursban Turf or other approved insecticide to control the elm bark beetle.

.3 Transportation of elm trees must comply with Provincial DED regulations.

1.5 SUBSTITUTIONS

.1 Substitutions to plant material are not permitted unless written approval is obtained from the Consultant prior to tender close, except under extraordinary circumstances. Plant substitutions must be of similar species and of equal size to those originally specified.

1.6 SHIPMENT AND PRE-PLANTING CARE

.1 Coordinate shipping of plants and site preparation to ensure minimum time lapse between transport and planting.

.2 Pack plants in damp peat moss, place in bales or boxes, and keep damp until arrival at the site.

.3 Cover plant foliage with tarpaulin, to prevent loss of moisture during transit and storage. Avoid crushing or breaking of tops of plants.

.4 Keep roots moist and protected from sun and wind. If trees and shrubs cannot be planted within 24 hours of arrival on site: heel in, protect from direct sun, and water well.

.5 Place bundles of whips and seedlings in pails with 50 mm of moist peat moss. Keep roots moist at all times. Avoid breaking or stripping bark from bundles.

.6 Remove broken and damaged roots with sharp pruning shears. Make clean cuts.

.7 Protect root balls against sudden changes in temperature and exposure to heavy rainfall.

.8 Protect bales or boxes from sun and wind exposure during planting.

1.7 PLANTING TIME

.1 Provide planting schedule. Undertaking planting operations over an extended period, with limited personnel, is unacceptable.

.2 Plant only under conditions that are conducive to health and optimum physical conditions of plants.

.3 Plant material growing in containers may be planted throughout growing season.

1.8 WARRANTY

.1 Warranty plant material to remain healthy for one full year following date of Substantial Performance; and warranty that invasive perennial species are not imported into the project site with the plant material. Plant material damaged by accidental causes or vandalism is exempted from warranty provisions.

.2 The Consultant reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

1.9 REPLACEMENT

.1 During warranty period, promptly remove plant material that has died or failed to grow satisfactorily as directed by Consultant.

.2 Replace plant material the same or next planting season.

.3 Extend warranty on replacement plant material for a period equal to the original warranty period.

.4 Continue such replacement and warranty until plant material is acceptable.

1.10 INSPECTIONS AND APPROVALS

.1 Consultant reserves the right to approve nursery plant material at source. Notify Consultant of source, minimum 7 days in advance of shipment. No work under this Section is to proceed without approval.

.2 Acceptance of plant material at source does not prevent rejection on site prior to, or after, planting operations.

.3 Stake location of trees, shrubs and edge of planting beds for inspection by Consultant. Obtain Consultant approval before planting.

.4 Notify the Consultant if the layout has been altered from the design drawings. Adjustments may be required as a consequence of site conditions, and must be approved by the Consultant before installing plant material.

.5 Inspection of plant material to include, but not limited to: species; size; health; location/massing; installation; and invasive perennial species.

.6 Inspection of shrub beds to include, but not limited: clean crisp edge and smooth continuous curves.

1.11 AS-BUILT DRAWINGS

.1 Keep one set of drawings and specifications on the job for the sole purpose of recording any changes to the work. Update drawing set daily as work progresses.

1.12 PAYMENT

.1 No additional payment will be made for: excavation, tree supports, mulching of trees in grass areas, and related work which is incidental to plant material.

.2 Plant material that has been rejected after installation and prior to substantial completion will not be certified for payment.

.3 No additional payment will be made for plant material larger than the minimum size specified.

.4 Undersized plant material (caliper size specified material): unit rate will be reduced by 2% for every 1 mm caliper size under the specified size. Caliper measurement will be based on current CNLA standards.

.5 Undersized plant material (height specified B&B material): unit rate will be reduced by 2.5% for every 50 mm height increment below the specified size. Height measurement will be based on current CNLA standards.

.6 Undersized plant material (container size specified material): unit rate will be reduced by 25% for every incremental reduction in standard pot sizes based on current CNLA standards.

Part 2 Products

2.1 MATERIALS

.1 Plant list: refer to drawings.

.2 Water: free of minerals and contaminants which may be detrimental to plant growth.

.3 Supports: refer to details.

.4 Accessories: 14 gauge galvanized wire inserted into 2 ply reinforced 12mm diameter rubber hose.

.5 Mulch: refer to Section 32 93 20.

.6 Planting mix: refer to Section 31 91 19.

Part 3 Execution

3.1 PLANTING SETBACKS

.1 Locate and flag underground utilities within 5 metres of proposed planting sites.

.2 Unless otherwise approved by the Consultant, trees shall be set back the following minimum distances, measured from the center of the tree:

.1 0.6m: 120 – 240 voltage lines (e.g., streetlight power lines), traffic control lines

.2 1.0m: sidewalks, pathways

.3 1.5m: local road curb face, driveways and private walks

.4 2.0m: buried high voltage power lines, overhead power lines, SaskTel/AT&T/telephone lines, Sask Energy/gas distribution lines, Shaw/telecable lines, utility pedestals, curb face of arterial or collector roadways, roadway signs except from the front of stop and yield signs

.5 3.0m: fibre optic lines, water and sewer lines, electrical transformers, street lights, fire hydrants, buildings, side and back of bus stop signs, front of bus stop signs where tree is more than 3.0m from curb face

.6 7.0m: street corners, front of stop and yield signs

.7 10.0m: Transgas/gas transmission lines

.8 12.0m: front of bus stop signs where tree is less than 3.0m from curb face, railway tracks

.3 Set shrubs back a distance equal to one half of shrub spacing at shrub bed perimeters.

3.2 EXCAVATION

.1 Seedlings: 300mm x 300mm x 450mm deep.

.2 Shrubs: in continuous planting beds: excavated to a depth of 300 mm

.3 Small trees (up to 3.0 m): depth: equal to height of root ball; diameter: 300 mm greater than root spread or root ball.

.4 Large trees (over 3.0m): depth equal to height of root ball; diameter: 750 mm greater than diameter of root ball; if tree location has heavy clay soil, in an irrigated turf area; increase planting hole widths by 50 mm for each 100 mm of root ball diameter; if tree location has heavy clay soil, in an dryland turf area: increase planting hole widths by 100 mm for each 100 mm of root ball diameter.

.5 Provide drainage for planting holes in heavy clay soil if natural drainage does not exist; method to be approved by Consultant.

.6 Remove water from excavations prior to planting.

.7 Scarify the wall of tree holes before installing spade, basket or container material.

3.3 PLANTING MIX

.1 Refer to Section 31 91 19

3.4 PLANTING

.1 Remove tags, flagging, string, or other shipping materials. Retain protective coverings on trunks until tree is installed.

.2 Install plant material in upright position.

.3 Bare root material: position top of root system, indicated by the trunk flare or dark stain on the trunk, at finished grade; backfill with planting mix to maintain natural root structure; damaged or broken roots to be cut back with a sharp knife to living wood; roots to be spread out to prevent girdling of the root system; water immediately – refer to Section 32 93 40.

.4 Container stock: remove container without disturbing root ball; for small trees: if roots have grown to the edge of the container, cut three (3) vertical slices around the root ball; install plant immediately with top of root ball flush with proposed finished grade; backfill with planting mix and compact firmly around the plant; water immediately – refer to Section 32 93 40.

.5 Balled and burlapped plant material:

.1 Rest root ball on undisturbed / compacted subgrade.

.2 Place top of root ball at the same level as it was in the nursery (+/- 50mm), allowing for future settlement

.3 If tree location is in heavy clay soil, place top of the root ball 50mm above the level it was in the nursery (+/- 50mm).

.4 Provide planting mix at edges of excavation to support root ball.

.5 Tamp planting mix around root system in 150mm layers, eliminating air voids. When 2/3 of planting mix has been placed, fill hole with water. After water has completely penetrated into soil, complete backfilling.

.6 Remove top 1/3 of wire basket.

.7 When planting mix is installed to half the root ball height, cut and remove the top 1/3 of the burlap; remove carefully so as to not disturb the root ball.

.8 Build a 100mm high by 100mm wide soil ring around the perimeter of the root ball to assist with maintenance watering.

.9 Set trees plumb and in the centre of the tree hole and positioned to give the best appearance and relationship to adjacent structures, walkways, roadways or park features.

.10 Water immediately – refer to Section 32 93 40.

.6 Tree Spade material:

.1 Dig plant material with mechanized digging equipment of hydraulic spade type. Dig with a firm natural cone of earth of sufficient diameter and depth to encompass enough of the root systems necessary for full recovery of the plants. The following will govern the material size allowable for transplant by the tree spade method:

Tree spade size	Maximum tree caliper (300 mm above ground)	Tree height
1350 mm (44”)	75 mm (3”)	3.0 - 3.6 m (10-12')
1500 mm (60”)	100 mm (4”)	3.0 - 3.6 m (10-12')
1650 mm (66")	150 mm (6")	3.6 - 4.2 m (12-14')
2100 mm (84")	200 mm (8")	4.2 - 4.8 m (14-16')

.2 Dig tree hole with same mechanical equipment as used to dig plant material. Ensure hole dug is upright.

.3 Scarify the top half of the tree spade dug hole to a depth of 75mm.

.4 Remove excess soil from the bottom of the hole before placing tree.

.5 Place tree plumb. Backfill crevices with planting mix, and water immediately - refer to Section 32 93 40. Repeat until soil is flush with finished grade.

3.5 TREE SUPPORTS

.1 Install tree supports as detailed.

.2 Ensure tree supports penetrate minimum 300 mm into undisturbed subgrade and do not conflict with underground utilities.

3.6 PRUNING

.1 Prune dead, injured and rubbing branches.

.2 Remove projecting stubs back to branch collar.

.3 Postpone pruning of trees, where heavy bleeding may occur, until in full leaf. **Do not prune elms between 01 April and 31 August.**

3.7 EDGING OF PLANTING BEDS

.1 Edge all planting beds.

.2 Layout proposed edge of planting bed by spray painting. Notify Consultant for inspection and approval before proceeding.

.3 Spray turf inside the edge of planting bed with Round-Up or remove by hand.

.4 Trim edge of planting bed, one (1) week after spraying with Round-Up; with flat spade or edging tool; provide clean crisp edge; remove excess material before reinstating or placing mulch.

3.8 MULCH

.1 Refer to Section 32 93 20.

3.9 CLEAN UP

.1 Provide a final washing of foliage to remove settled construction dust.

.2 Prune branches damaged during construction.

.3 Remove shipping materials, tags, flags, wire, burlap and protective coverings from the plant material and beds.

END OF SECTION

QUANTITY	COMMON / *Botanical Name*	SIZE AND REMARKS
Deciduous Shrubs		
TBD by extent of damage	ALPINE CURRANT / *Ribes alpinum*	- 300 ht. min.; bushy plants with 4 major basal stems; container grown, #2 pot.

NOTES:

- sizes are in millimeters unless noted otherwise
- in the case of discrepancy between the plant list and the drawings, the planting plans shall be taken as correct

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 Landscape mulches including wood mulch and crusher dust.

1.2 RELATED WORK

.1	Topsoil and Finish Grading	Section 32 91 19
.2	Planting	Section 32 93 10

1.3 LAYING OUT WORK

.1 Lay out work and be responsible for accuracy. Provide the necessary personnel to assist the Consultant in checking the work.

Part 2 Products

2.1 WOOD MULCH

.1 Untreated shredded fibres or chips; to Consultant approved sample.

2.2 CRUSHER DUST

.1 Sound, durable particles, free from clay, organic fines and other deleterious matter; to the following gradation. Submit sieve analysis and one (1) litre sample for Consultant review.

SIEVE (mm)	PERCENT PASSING (by weight)
5.00	100
2.20	63 - 73
0.900	40 - 50
0.400	25 - 35
0.160	13 - 21
0.071	8 – 14

Part 3 Execution

3.1 WOOD MULCH

.1 Mulch shrub beds and individual trees and shrubs.

.2 Minimum uniform compacted mulch depths: 50 mm in irrigated areas; 100 mm in non-irrigated areas.

.3 Install planting bed mulch following turf establishment. Remove weeds prior to mulching.

.4 Do not install mulch within 100 mm of tree trunks.

.5 Taper mulch layer at base of shrubs to provide a 100 mm diameter saucer centered on the shrub, with no mulch directly on the base of the stem(s).

.6 Finish by hosing down to settle in place.

.7 Do not install mulch on non-vegetated swales or drainage strips.

3.2 CRUSHER DUST

.1 Place crusher dust in areas and to depths indicated. Add and mix water to obtain optimum water content +/- 1%; compact to minimum 97% of standard Proctor density.

.2 Completed surface to be free of ruts, irregularities and foreign materials and flush with adjacent grades/curbs.

END OF SECTION