Geotechnical Engineering Report

Residential Development

70th and Oak Street

Omaha, Nebraska

March 27, 2017

Terracon Project No. 05175005

Prepared for:

J Development Company
Omaha, Nebraska

Prepared by:

Terracon Consultants, Inc.
Omaha, Nebraska

March 27, 2017

J Development Company
2430 South 73rd Street, Suite 200
Omaha, Nebraska 68124

Attn: Mr. Nick Ramge
P: 402.210.8913
E: nick@j-dev.com

Re: Geotechnical Engineering Report
Residential Development
70th and Oak Street
Omaha, Nebraska
Terracon Project No. 05175005

Dear Mr. Ramge:

Terracon Consultants, Inc. (Terracon) has completed a subsurface exploration for the referenced project. The accompanying geotechnical report presents the findings of the subsurface exploration and provides recommendations for the design and construction of footing foundations, grade-supported slabs, and pavements. Earthwork recommendations are also included.

We appreciate the opportunity to provide the geotechnical consulting services for this project and look forward to being of further assistance as design proceeds, reviewing the plans and specifications, and providing observation and testing services during construction. Please contact us with any questions regarding the attached report, or if we may be of further service.

Sincerely,
Terracon Consultants, Inc.

Ryan D. Sisk, E.I.
Staff Geotechnical Engineer

Michael D. Ringler, P.E.
Senior Engineer

RDS/MDR:rds/nlm

Distribution: Addressee (pdf)

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RESIDENTIAL DEVELOPMENT
70TH AND OAK STREET
OMAHA, NEBRASKA

Terracon Project No. 05175005
March 27, 2017

INTRODUCTION

This report presents the results of our subsurface exploration for the proposed Residential Development at 70th and Oak Street in Omaha, Nebraska. Five borings extending to depths ranging from about 5 to 35 feet and two cone soundings ranging to depths of about 80.8 to 83.3 feet below existing grade were performed to obtain information on the subsurface conditions. The individual boring and cone sounding logs are included in Appendix A. The approximate boring locations are shown on the Exploration Plan included in Appendix A.

Our work was completed in general accordance with our proposal-agreement no. P05175005 dated February 13, 2017.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- soil conditions
- groundwater conditions
- site preparation and earthwork
- shallow foundation design and construction
- grade-supported slab design and construction
- pavement subgrade preparation
- minimum pavement thicknesses
- lateral earth pressures and drainage

PROJECT DESCRIPTION

Item	Description
Structures	Two, four-story apartment buildings with below-grade parking in the lower level of each building. Each apartment building will have a width of about 72 feet and lengths of about 320 and 380 feet. The buildings will be connected by an elevator lobby core in the southwest corner of the facility.
Construction	Wood-framed above-ground levels with cast-in-place concrete below-grade walls.

Item	Description
Finished floor elevation	West Building: Lower Level = 1118 feet / Main Level = 1129 feet South Building: Lower Level = 1105 feet / Main Level = 1118 feet
Maximum loads	Columns: 315 kips Walls: 12 kips/lf Grade-supported Slabs: 125 psf
Below grade areas	Lower levels of both buildings will be partially below-grade and will be used for vehicle parking; the parking level is not expected to freeze. The west wall of the west building and the north and south walls of the south building will be below-grade.
Pavements	Concrete-paved access drives and parking areas in the north and central portions of the site, with a small parking area and entrance drive located off the east end of the south building.
Grading	Cuts of up to about 9 feet in the west building and up to about 14 feet on the northern edge south building. Majority of the south building cut will be in areas behind the existing basement walls. Grade changes in paved areas will generally be less than about 2 to 4 feet of cut and fill, with the exception of the far southeast parking/entrance area which will have up to about 12 feet of cut.
Free-standing retaining walls	Segmental block walls off the northeast corner of the south building. Walls will vary between one and two tiers, with an overall height of about 12 feet and a length of about 160 feet. Per request of the client, retaining walls have not been addressed in this report.

Should any of the above information or assumptions be inconsistent with the planned construction or site development, please let us know so we may review the information and make appropriate modifications to this report.

SITE CONDITIONS

Site Location and Description

Item	Description
Location	East side of 72nd Street and south of Oak Street in Omaha, Nebraska. Latitude 41° 13.92' N / Longitude 96° 1.37' W. Refer to **Site Location**.
Existing Improvements	Shallow foundations and basement walls are present along the east and south sides of the site from a previous construction project that was not completed. A one-story building with a “walk-out” basement is located in the northeast corner of the site.

Item	Description
Current ground cover	Asphalt parking lot is present over the majority of the site with lawn landscape areas around the perimeter.
Existing topography	Based on the topographic plan provided by Lamp Rynearson & Associates, the site slopes down to the south/southeast with about 30 feet of grade change. Abrupt grade changes occur at the locations of the existing basement walls.
Site history	Review of aerial photos dating to 1941 indicates the site was not developed prior to construction of the existing improvements.

Mapped Soil Units

Surface soils at the project site were mapped as part of the effort to develop the Douglas County NRCS-USDA Soil Survey. According to this document, the Urban land – Udarents complex was mapped at the site. The seasonal high water level is noted as greater than 6 feet below native grade.

More information is presented in the Soil Survey of Douglas and Sarpy Counties, Nebraska.

Typical Profile

Subsurface conditions in the borings can be generalized as follows:

Layer	Approximate Depth to Bottom of Stratum	Material Encountered	Consistency/ Density
Surface	N/A	Grass, ACC	N/A
Stratum 1	8 feet (B-4 only)	Fill: Lean Clay	N/A
Stratum 2	to termination depths	Lean Clay	Soft to Very Stiff

The conditions encountered at the boring locations are indicated on the individual boring logs. Additional information is also presented on the boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual.

The electronic cone penetrometer soundings indicated soil stratigraphy similar to that described above for the borings. The measured tip and sleeve resistance correlations indicate cohesive soils for the entire depths of the cone soundings that are relatively consistent with the soil conditions observed in the borings. The cone soundings were terminated at depths of about 80.8 to 83.3 feet.

Variations could occur between boring and cone sounding locations or across the site. Construction associated with previous grading and construction may have created additional variations.

Groundwater Conditions

The boreholes were observed while drilling for the presence and level of groundwater. The water levels observed are noted on the boring logs and are summarized below.

Boring Number	Depth to water while drilling, ft.
B-1, B-2, B-3, B-5	Not encountered
B-4	8

A relatively long period of time is necessary for a groundwater level to develop and stabilize in a borehole. Longer term monitoring in cased holes or piezometers would be required for a more accurate evaluation of the groundwater conditions.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may vary from the levels indicated on the boring logs. Perched water can also develop overlying dense native clay and over compacted cohesive fill. The possibility of groundwater level fluctuations and perched water conditions should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

Existing fill was encountered in Boring B-4 to a depth of about 8 feet. Terracon is not familiar with the compaction specifications associated with the existing fill and has not been provided any reports of observations or density tests performed during fill placement. Any such records would aid our evaluation of the existing fill.

There is a risk to the owner when footings, floor slabs, and pavements are constructed on or above existing fill material due to potential variations in site preparation, composition, and compaction. The fill poses a risk of larger than tolerable settlement. Complete removal of the fill is necessary to eliminate these risks; however, based on the boring information, it is our opinion the existing fill can be left in place with a low level of risk if it is tested and approved during construction.

We anticipate soils with high moisture contents (> 25%) will be encountered at the surface and at excavation depths in the south building. These soils may provide poor support of construction activity. Support of construction equipment by these soils will depend upon weather conditions immediately preceding and during construction, with better support expected during hot and dry weather. Care should be taken during construction to avoid rutting and disturbance in these soils. Construction traffic on the subgrade should be limited. Additional discussion and recommendations are presented in **Site Preparation**.

The soil borings encountered natural loess (wind-deposited) soils. In general, loess soils are known to be collapse-susceptible upon wetting, particularly when the soils exist at relatively low in situ dry densities (e.g., less than about 85 pcf). Borings B-1, B-2, and B-3 encountered loess which may be collapsible, and other zones within the footprint of the east building may be present. Although these soils have sufficient strength to support the expected foundation loads in their current condition, low-density loess soils present a risk of foundation settlement should they become wetted at any time during the life of the structure. We recommend the soils encountered at the footing bearing level in the west building be reworked and recompacted to a depth of 4 feet below footings.

The grading plan indicates up to 10 feet of grade-raise fill will be placed on the south side of the south building wall. Placement of grade-raise fill in combination with the building footing loads will result in settlement due to consolidation of native clays. Settlement should be allowed to occur prior to construction by preloading and surcharging the south building footprint. The surcharge should be placed and compacted according to the recommendations presented in **Site Preparation**.

We recommend the buildings be supported on spread footing foundations bearing on tested and approved soils. The west building footings should bear on at least 4 feet of reworked and recompacted structural fill. The south building can bear on native soil after preloading and surcharge loading has been completed. Recommendations for design and installation of a spread footing foundation system are presented in **Shallow Foundations**.

We recommend floor slabs be underlain by a granular base and drainage system, in turn underlain by a layer of reworked and recompacted soil Recommendations for design and installation are presented in **Site Preparation** and **Floor Slabs**.

We recommend pavements be underlain by a layer of structural fill. Recommendations for design and installation are presented in **Site Preparation** and **Pavements**.

SITE PREPARATION

Site Stripping and Preparation

Stripping of all existing pavement, vegetation, organic topsoil, and any other materials unsuitable for re-use as engineered fill should be performed within all cut, fill, paving, and building areas. A stripping depth of about 6 to 9 inches is expected to be adequate in grassy areas; however, areas requiring deeper stripping may be encountered. Tree and shrub root systems should be removed as well as any soil desiccated by the root systems. We recommend that site stripping and subgrade preparation procedures extend at least 5 feet beyond the building perimeters and 2 feet beyond pavements. A Terracon geotechnical representative should help evaluate actual stripping depths at the time of construction.

Existing utility lines and subsurface features associated with the previous buildings are present on the south side of the site and will extend through the footprint of the south building. It is our experience that poorly compacted backfill is commonly found in utility line trenches and adjacent to existing subsurface structures. Existing utility lines should be rerouted outside of the proposed building area, and features from the existing structures should be removed. Backfill associated with these features should be reworked and recompacted.

We recommend the west building floor slab be underlain by a 6 to 8-inch granular base and drainage system, in turn underlain by 1 foot of reworked and recompacted on-site soil. We anticipate the recompacted on-site soil will be formed with mass grading for the building and foundation undercuts. The granular layer should be placed only immediately prior to placing floor slab concrete.

We recommend the east building floor slab be underlain by a 2-foot granular base and drainage system, in turn underlain by 8 inches of reworked and recompacted on-site soil. The granular layer should be placed only immediately prior to placing floor slab concrete.

We recommend pavements be supported on at least 8 inches of structural fill. In areas below design grade, this layer will be formed incidentally due to site grading. In areas above design grade, this layer can be formed by scarifying and recompacting the soils at pavement subgrade level.

Prior to placing fill in areas below design grade and after rough grading is completed in other areas, the subgrade should be proofrolled. Proofrolling aids in providing a firm base for compaction of fill and delineating soft or disturbed areas that may exist below subgrade level. Unsuitable areas observed at this time should be improved by scarification and recompaction or by undercutting and replacement with structural fill. Proofrolling may be accomplished with a fully loaded, tandem-axle, dump truck with a minimum gross weight of 25 tons or other equipment providing an equivalent subgrade loading. Consideration can be given to half-loading dump trucks in areas of soft, wet subgrade at the south end of the site. Proofrolling should be performed in the presence of a Terracon geotechnical representative prior to placing and compacting fill.

Terracon should be retained to monitor stripping, subgrade stability, utility relocating, backfill removal, site excavation, and removal of unsuitable materials. Terracon can assist in identifying low density fill or disturbed native soils that should be undercut and removed, as well as identifying additional corrective measures for conditions that may become apparent during construction.

Structural Fill Material Requirements

Structural fill should meet the following material property requirements:

Fill Type [1]	USCS Classification	Acceptable Location for Placement
Low-plasticity, cohesive soil	CL (LL ≤ 45 and 10 ≤ PI ≤ 25) [2, 3]	All locations and elevations.
On-site soil [4]	CL	Generally appears suitable for use as low-plasticity, cohesive fill; confirmatory testing is recommended during construction.
Granular [5]	SP, SW, GW	Directly below slabs-on-grade.
Drainage Fill [6]	SP, SW, GW	Free-draining granular backfill placed adjacent to below-grade building walls, around drain tile, as trench backfill, and as the permanent drainage system blanket.

1. Structural fill should consist of approved materials that are free of organic matter or debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. Each proposed fill material should be sampled and evaluated by the geotechnical engineer prior to its delivery and/or use.
2. LL = Liquid Limit, PI = Plasticity Index.
3. Cohesive fill with a Plasticity Index of 20 or less is preferred; however, this criterion may limit the use of some on-site soils as cohesive fill. It is our opinion that on-site soils with a Plasticity Index of up to 25 can be used. However, this will slightly increase the risk of post-construction shrink-swell movements. Imported cohesive fill should have a Plasticity Index of 20 or less.
4. Sorting of topsoil and on-site soils containing debris, organics, etc., will be necessary. Delineation of unsuitable on-site soils should be performed in the field by a Terracon representative. Moisture conditioning of the on-site soils will be necessary to facilitate compaction.
5. Well-graded, crushed stone or crushed concrete, containing 100 percent passing the 1-inch sieve, less than about 40 percent passing the No. 40 sieve, and less than 5 percent passing the No. 200 sieve. Should be placed only immediately prior to placing slab concrete.
6. Well-graded, free-draining granular material. A general gradation should be 100 percent passing the 1½-inch sieve, about 40 percent passing the No. 10 sieve, and less than 6 percent fines. Terracon can review proposed materials.

Terracon should be retained to evaluate proposed fill materials, including sampling and performing laboratory tests on proposed fill to evaluate compliance with the project specifications. We can also review data for proposed materials which are generated by the contractor or suppliers.

Structural Fill Compaction Requirements

Item	Description
Fill Lift Thickness [1]	8 inches or less in loose thickness.
Compaction Requirements [2, 3]	
Upper 8 inches of pavement subgrade and below footing bearing level in the building envelope	98% of the material's standard Proctor maximum dry density (ASTM D 698), or at least 65% of the material's relative density (ASTM D 4253/4254).
All other locations	95% of the material's standard Proctor maximum dry density (ASTM D 698), or at least 65% of the material's relative density (ASTM D 4253/4254).
Moisture Content - Cohesive Soil	Within the range of -1 to +3 percent of the optimum moisture content value as determined by the standard Proctor test at the time of placement and compaction.
Moisture Content - Granular Material [4]	Workable moisture levels.

1. Thinner lifts may be required in confined areas or within excavations, or when hand-operated compaction equipment is used.
2. We recommend structural fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
3. Consideration can be given to compacting all fill below pavements to 95% during mass grading. Immediately prior to paving, we recommend that the subgrade below exterior pavements be rough-graded as needed, and then scarified and recompacted. We recommend this process include scarifying the subgrade to a depth of about 8 inches, moisture conditioning the scarified soil to within -2 to +3 percent of the material's optimum, and compacting the scarified soil to at least 98%. Scarified soils which cannot be recompacted to this degree should be undercut and replaced with stable material.
4. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proofrolled or containing excess water (ponding).

Terracon should be retained to monitor fill placement and to perform field density tests as each lift of fill is placed in order to evaluate compliance with the design requirements. Terracon should be retained to observe and test floor slab and pavement subgrades immediately prior to paving.

Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction, including backfill placement and compaction. Utility trenches are a common source of water infiltration and migration. If utility trenches are backfilled with relatively clean granular material, they should be capped with at least 18 inches of cohesive fill in non-pavement areas to reduce the infiltration and

conveyance of surface water through the trench backfill. We also recommend constructing an effective clay "trench plug" that extends at least 5 feet out from the face of the building exterior. The plug material should consist of clay compacted at a water content at or above the soil's optimum water content. The clay fill should be placed to completely surround the utility line and be compacted in accordance with recommendations in this report.

Construction Considerations

The clays encountered in the borings will be sensitive to disturbance from construction activity and water seepage. If precipitation occurs immediately prior to or during construction, the near-surface clay soils could increase in moisture content and become more susceptible to disturbance. Construction activity should be monitored and should be curtailed if subgrade disturbance occurs.

Surface water should not be allowed to pond on the site and soak into the soil during construction. Construction staging should provide drainage of surface water and precipitation away from the building and pavements. Any water that collects over or adjacent to construction areas should be promptly removed along with any softened or disturbed soils. Surface water control in the form of sloping surfaces, drainage ditches and trenches, and sump pits and pumps will be important to avoid ponding and associated delays due to precipitation and seepage.

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of floor slabs and pavements. Construction traffic over the completed subgrade should be avoided. If the subgrade should become disturbed, saturated, frozen, or desiccated, the affected material should be removed or should be scarified, moisture conditioned, and recompacted prior to floor slab and footing construction.

As a minimum, all temporary excavations should be sloped or braced as required by Occupational Safety and Health Administration (OSHA) regulations to provide stability and safe working conditions. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of the excavation sides and bottom. All excavations should comply with applicable local, state, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

Grading and Drainage

Poor site drainage and ponding of surface water can increase the potential for frost heave or settlement. Excessive moisture can reduce the soil's bearing capacity and contribute to slab settlement and cracking. Final surrounding grades should slope away from the building and pavements. Gutters and downspouts that drain water a minimum of 5 feet beyond the footprint of the building are recommended. This can be accomplished through the use of splash-blocks, downspout extensions, and flexible pipes that are designed to attach to the end of the downspout. Flexible pipe

should only be used to gravity drain collected water. Splash-blocks should also be considered below hose bibs and water spigots.

Overwatering of grass or landscaping vegetation is a significant source of water, and should be avoided near the building and pavements. Sprinkler heads should be adjusted to miss the exterior building walls and pavements. Automated watering systems should be programmed to not run after natural rain events, and to not overwater. Any utility leaks should be promptly repaired. Lining the bottom of irrigated planter areas along the building with an impermeable moisture barrier, and installing tile lines leading to gravity outlets or sump pits and pumps, would also help to control surface water that infiltrates into these features.

The soils on this site are considered susceptible to frost action. Grade-supported pavements are expected to heave. The amount of heave may be reduced by providing surface drainage away from the building and slabs and toward the site storm drainage system. Structural stoops are recommended adjacent to stairs, exterior doors, and other movement-sensitive exterior slabs.

Settlement

We estimate the weight of the fill required to raise grade, in combination with the footing loads, will result in larger than tolerable settlement of building foundations in the south building. These settlements would likely cause adverse foundation and structure performance. Therefore, we recommend preloading and surcharge loading be implemented over the south building footprint and in grade-raise areas south of building to cause this settlement to occur prior to floor slab and foundation construction.

For the west building, we recommend site grading fill be placed to grade within the building footprint and for 20 feet around the building. Surcharge loading is not required for the west building.

Preload Fill and Surcharge Fill Placement

To preload, all permanent fill should be placed up to finished subgrade elevation on the south side of the south building. The permanent fill should be placed and compacted according to the recommendations presented in **Site Preparation**.

Placement of additional surcharge fill is recommended to compensate for foundation and fill loads. We recommend the surcharge fill be placed 4 feet above the FFE in the south building and 4 feet above final grade of the grade-raise fill on the south side of the building. The top height of the surcharge fill should extend at least 15 feet beyond the south edge of the building perimeter. The surcharge fill can be placed in lifts 12 inches thick and tracked into place with loaded scrapers or dump trucks. A minimum compaction criterion is not required, but we recommend the as placed surcharge fill have a minimum in situ wet unit weight of at least 100 pcf. The top of the surcharge fill should be sloped to drain to reduce moisture infiltration. The sideslopes of the surcharge outside of the building footprint should be at a slope of 1H:1V. The top of surcharge elevation

should transition at 4H:1V between the grade-raise fill on the south side of the building and the building footprint.

Settlement Monitoring

After placement of the permanent fill and prior to placement of surcharge fill, survey monuments should be installed for settlement monitoring. We recommend a minimum of three monuments. The monuments should consist of 2-foot square steel plates firmly embedded on the permanent fill, with metal riser pipe coupled to the top of the settlement plate and extending above the preload fill height. Plastic pipe should be installed around the steel riser pipes. Care should be taken not to disturb the monuments during preload fill and surcharge fill placement. A monument which is damaged or disturbed should be repaired or replaced immediately.

We recommend surveying the elevations of the settlement monuments to the nearest 100th of a foot, and the elevation of the top of the adjacent preload fill and surcharge fill to the nearest 10th of a foot, according to the following schedule:

Time Period	Monitoring Schedule
At Time of Monument Seating	Initial Readings
During Preload Fill and Surcharge Fill Placement	Daily
For Three Weeks Following Fill Placement	Three times per week
Between Three and Six Weeks Following Fill Placement	Two times per week
More Than Six Weeks Following Fill Placement, if required	Once per week

The monitoring data should be submitted to Terracon for analysis and evaluation of when construction may proceed. A settlement period of about 6 to 8 weeks is estimated to achieve adequate consolidation of the compressible layers. This is only an estimate based on our experience with the soil conditions observed in the borings. Other factors affecting the effective drainage path and permeability of the soils may reduce the time for the settlement to occur. We anticipate at least 4 weeks of settlement data will be required, after surcharge fill placement, before we can begin evaluation of eventual total settlements and refinement of our time frame estimates.

SHALLOW FOUNDATIONS

Design Recommendations

In our opinion, the proposed building can be supported by a shallow, spread footing foundation system. The west building footings should bear on 4 feet of reworked and recompacted structural fill, and the south building footings should be supported on tested and approved native soil.

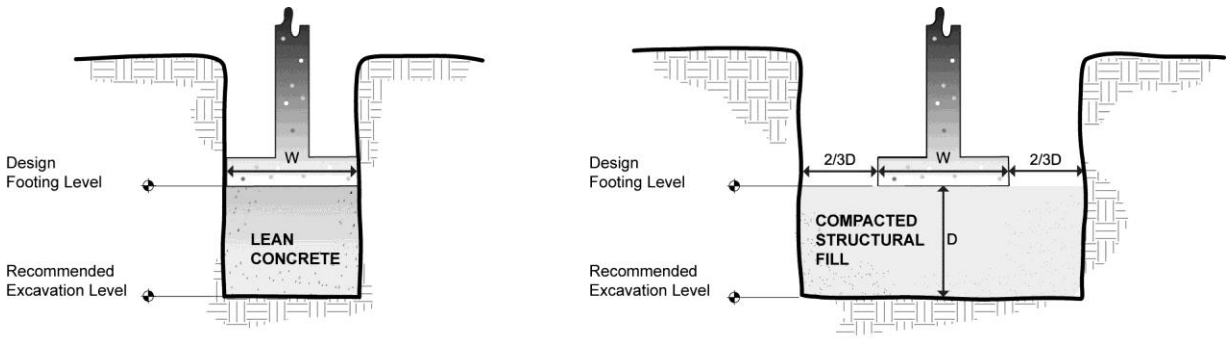
Design recommendations for shallow foundations for the proposed buildings are presented in the following tables.

Description	Column	Wall
Net allowable soil bearing pressure [1]		
West Building	3,000 psf	3,000 psf
South Building	2,000 psf	2,000 psf
Minimum dimensions	30 inches	18 inches
Minimum embedment [2]	42 inches	42 inches
Estimated total settlement [3]	< 1 inch	< 1 inch
Estimated differential settlement [3]	2/3-inch between columns	2/3-inch over 40 feet

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Assumes any low-density fill and disturbed or soft soils will be undercut and replaced with engineered fill.
2. For perimeter footings and footings in unheated areas. For frost protection and to reduce the effects of seasonal moisture variations in the subgrade soils. If construction extends into freezing weather, we recommend that either all footings extend to frost depth (as measured from adjacent grade at the time of construction) or that the foundations be protected from the elements by straw, frost blankets, or similar means.
3. The foundation settlement assumes surcharge loading is completed as addressed in **Site Preparation**. The foundation settlement will depend upon the variations within the soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations. The above settlement estimates assume the maximum footing size is 9 feet for column footings, 3 feet for continuous footings, and relatively uniform loading.

Construction Considerations

Terracon should be retained to observe and test the bearing materials exposed in all foundation excavations. Due to the presence of low-density loess, four feet of recompacted soil should be provided below the footings in the west building. If disturbed or otherwise unsuitable bearing materials are encountered in a footing excavation, the excavation should be extended deeper, as necessary, to suitable materials. The footing could bear directly on the suitable materials at the lower level or on lean concrete backfill placed back up to design bearing level. The footings could also bear on approved, properly compacted backfill extending down to the suitable materials. Overexcavation for compacted backfill placement below footings should extend laterally at least 8 inches beyond the edges of the footings for each foot of depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with approved fill placed and compacted as recommended in **Site Preparation**. The adjacent figures depict these options.



Lean Concrete Backfill **Overexcavation / Backfill**

NOTE: Excavations in sketches shown vertical for convenience. Excavations should be sloped as necessary for safety.

The clay soils on this site are susceptible to disturbance from construction activities, particularly if the soils have high natural moisture contents or become wetted by surface water or seepage. Care should be taken during excavation and construction of footings to avoid disturbing the bearing soils. The base of all foundation excavations should be free of water and loose material prior to placement of concrete. Concrete should be placed within a few hours after excavating to reduce disturbance of the bearing materials. If the materials at bearing level become excessively dry, disturbed or saturated, the affected material should be removed prior to placing concrete.

SEISMIC CONSIDERATIONS

Based upon the results of the borings and cone soundings, we estimate the project site as "Site Class D" according to the 2006 International Building Code (IBC). This site class assumes that the stiff clays encountered at the bottom of the deeper borings and cone soundings continue to a depth of 100 feet. A more detailed and accurate Site Class evaluation can be achieved by retaining Terracon to perform a deeper soil boring, to perform a cone sounding with shear wave measurements, or to use the SeisOpt®ReMi™ method to develop the full depth shear wave profile.

In our opinion, the following spectral response accelerations are applicable to this site location based on the applicable response maps: S_s = 0.126 g and S_1 = 0.042 g.

The City of Omaha has adopted the 2006 IBC. Amendments were installed upon adoption, including the allowed use of the following spectral accelerations: S_s = 0.125 g and S_1 = 0.041 g.

These values are based on a 2% probability of exceedance in 50 years, and were obtained from the Interpolated Probabilistic Ground Motion for the continuous 48 states by Latitude and Longitude, USGS 2002 Data Base. The S_s and S_1 values were developed for a Site Class B, and are used in conjunction with coefficients based on site class to determine the maximum acceleration, S_{m1} and S_{ms}.

FLOOR SLABS

Design Recommendations

Item	Description
Floor slab support [1]	
West Building	Free draining granular base (minimum 6 inches) and drain system underlain by a 1 foot of reworked and recompacted structural fill prepared in accordance with the recommendations in **Site Preparation**.
South Building	Free draining granular base (minimum 2 feet) and drain system underlain by a layer of scarified and recompacted structural fill prepared in accordance with the recommendations in **Site Preparation**.
Modulus of subgrade reaction	100 pounds per square inch per in (psi/in) for point loading conditions

1. Floor slabs should be structurally independent of any building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.

Slabs-on-grade should be isolated from structures and utilities to allow for their independent movement. Joints should be constructed at regular intervals as recommended by the American Concrete Institute (ACI) to help control the location of any cracking. Keyed and doweled joints should be considered. The owner should be made aware that differential movement between the slabs and foundations could occur.

The use of a vapor retarder should be considered beneath concrete slabs-on-grade that will be covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Drainage System

A drainage system, including a layer of free-draining granular material and collector drains, is recommended below the lower level slab in both buildings. The drain lines should consist of perforated, rigid pipe with a minimum diameter of 4 inches. We recommend the subdrains be placed around the interior of the perimeter wall footings, adjacent to elevators, below low points of the slab, and at a minimum spacing of 30-foot centers. The inverts of these drain lines should be embedded at least 4 inches into the subgrade below the granular material. The drain lines should be surrounded by free-draining granular material graded to prevent the intrusion of fines into the drainage fill, and loss of drainage fill into the drain tile. The trenches should be wrapped with non-woven geotextile filter fabric (Contech C60NW or equivalent), and the filter fabric should

lap onto the subgrade, away from the trenches, for a distance of at least 3 feet. The drain lines should be sloped to a reliable discharge point (i.e., storm sewer or sump pit and pump). If gravity drainage cannot be provided, the drainage system will require a system of sump pits and pumps. As a precautionary measure, multiple pumps would be required for redundancy, and the pumping system should be provided with a backup power supply.

We understand an elevator is planned, and we anticipate a pit will be installed below the elevator to about 4 feet below the adjacent slab. The elevator pit can be designed to resist buoyant uplift forces and hydrostatic lateral earth pressures associated with the groundwater level up to the FFE of the adjacent slab, and will require waterproofing of the pit concrete. Alternately, the floor slab subdrain system alongside the elevator pit can be lowered to provide drainage down to the bottom of the elevator pit.

Construction Considerations

On most project sites, the floor slab subgrades are generally developed early in the construction phase; however, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, rainfall, etc. As a result, the floor slab subgrade may not be suitable for placement of base rock and concrete, and corrective action will be required.

We recommend the floor slab subgrade be rough graded and then proofrolled prior to fine grading and placement of base rock. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to backfilled trenches. Areas where unsuitable conditions are located should be repaired by removing and replacing the affected material with properly compacted fill. All floor slab subgrades should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to placement of the aggregate base course and concrete.

PAVEMENTS

Subgrades

At a minimum, pavement subgrades should be prepared in accordance with the recommendations presented in **Site Preparation**. The subgrade should be observed and tested immediately prior to pavement construction.

Typical construction in the Omaha area is not to place an untreated granular base or subbase course below pavements for this type of project. Rather, the ACC (Asphaltic Cement Concrete) or PCC (Portland Cement Concrete) pavements are supported directly on the cohesive subgrade soils. If the project design results in a granular base being installed below the pavement, Terracon should be retained to provide additional recommendations.

Design Recommendations

We recommend the following pavement sections as a minimum for this project. Greater thickness may be considered to improve pavement performance, particularly due to the potential for variable subgrade support conditions and differential settlement posed by the existing fill:

- Standard Duty Pavements: For parking areas subjected to low volumes of automobile traffic, a full-depth ACC section having a total thickness of at least 6 inches, or a PCC pavement section having a thickness of at least 5 inches, is recommended.

- Heavy-Duty Pavements: Entry drives and truck driveways carrying weekly single-unit delivery trucks or garbage trucks require increased pavement thicknesses. A minimum 7-inch thick ACC section, or a minimum 6-inch thick PCC section, is recommended in these areas.

- Truck Pads: A minimum 7-inch thick PCC section is recommended for aprons in front of truck loading docks, delivery truck parking areas, and refuse pick-up areas. Such areas should have a concrete section wide enough to accommodate the vehicles that would use it.

Terracon has observed dishing in some parking lots surfaced with ACC. Dishing is usually observed in frequently-used parking stalls and occurs under the wheel footprint in these stalls. The use of higher grade asphaltic cement such as PG70-28, or surfacing these areas with PCC, is recommended. The dishing is exacerbated by factors such as irrigated islands or planter areas, sheet surface drainage to the front of the building, and placing the ACC directly on a compacted clay subgrade. The use of lower grade asphalt cement, such as PG64-22 is relatively common in this area and may be considered, but would provide lower reliability against rutting and creeping during warm weather.

Minimum surface course thicknesses of 2 inches in automobile areas and 3 inches in driveways are recommended for asphaltic cement concrete pavement sections. An ACC base course thickness of 4 inches is recommended. A granular base or subbase course is not recommended.

We recommend that ACC and PCC pavement specifications reference Sections 400 and 500, respectively, of the City of Omaha Standard Specifications for Public Works Construction, 2014 Edition. We recommend a surface mix type CMR for ACC pavements and mix type L65 for PCC pavements.

A formal pavement design has not been completed for this project. The above recommended pavement sections are typical minimum values and thicker pavement sections could be used to reduce maintenance and extend the expected service life of the pavements. We recommend that a formal pavement design be completed if unusually high vehicle loads or frequencies are anticipated.

Construction Considerations

Construction scheduling often involves grading and paving by separate contractors and can involve a time lapse between the end of grading operations and the commencement of paving. Disturbance, desiccation or wetting of the subgrade soils between grading and paving can result in deterioration of the previously completed subgrade. A non-uniform subgrade can result in poor pavement performance and local failures relatively soon after pavements are constructed. We recommend the moisture content and density of the subgrade be evaluated within two days prior to commencing paving operations. A proof roll using heavy equipment similar to that required for pavement construction is recommended to verify subgrade stability for pavement construction. Scarification and recompaction may also be required.

Drainage Considerations

Reducing subgrade saturation is an important factor in maintaining the subgrade strength. Water allowed to pond on or next to pavements could saturate the subgrade and cause premature pavement deterioration. Positive surface drainage should be provided away from the edges of paved areas, and all pavements should be sloped to provide rapid surface drainage. Pavements should drain toward the edges rather than the center, and perimeter subsurface drains should be installed next to irrigated planters or other areas where surface water could pond.

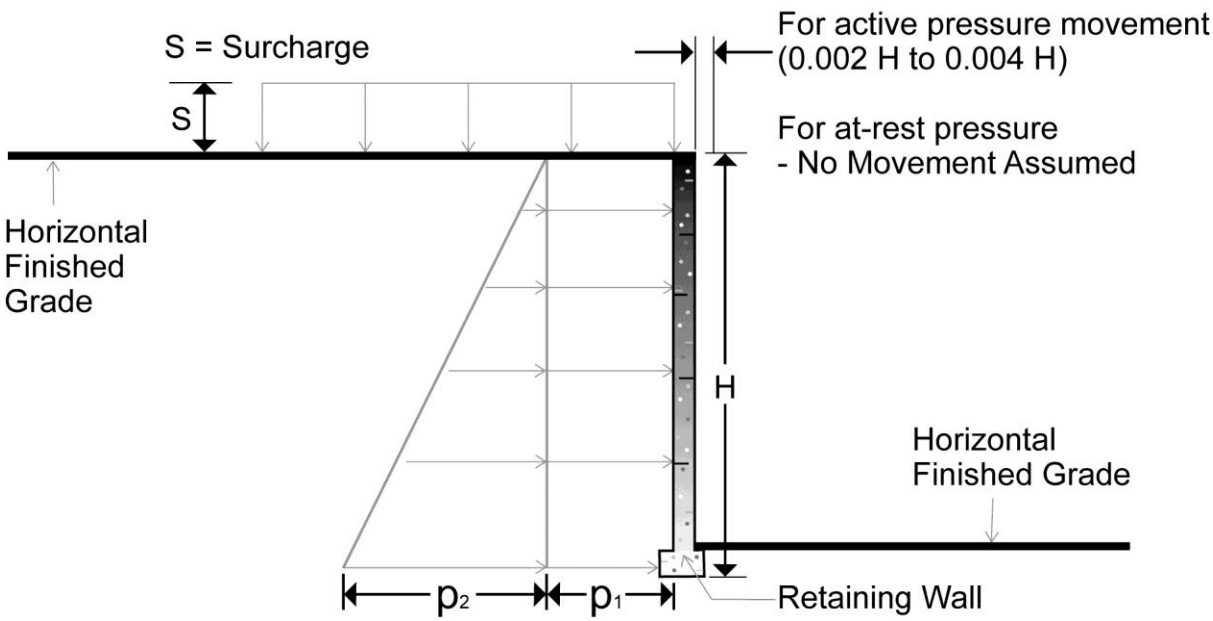
BELOW GRADE STRUCTURES

Rigid Retaining Walls

Design

The lateral earth pressure recommendations given in this subsection are applicable to the design of rigid retaining walls subject to slight rotation, such as cantilever, or gravity type concrete walls. These recommendations are not applicable to the design of modular block - geogrid reinforced backfill walls (also termed MSE walls).

Reinforced concrete walls with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls.



Earth Pressure Coefficients

Earth Pressure Conditions	Coefficient for Backfill Type	Equivalent Fluid Density (pcf)	Surcharge Pressure, p_1 (psf)	Earth Pressure, p_2 (psf)
Active (Ka)	Granular - 0.33	30	(0.33)S	(40)H
	Lean Clay - 0.42	45	(0.42)S	(50)H
At-Rest (Ko)	Granular - 0.46	60	(0.46)S	(55)H
	Lean Clay - 0.50	60	(0.50)S	(60)H
Passive (Kp)	Granular - 3.0	360	---	---
	Lean Clay - 2.4	290	---	---

Applicable conditions to the above include:

- For active earth pressure, wall must rotate about base, with top lateral movements of about 0.002 H to 0.004 H, where H is wall height
- For passive earth pressure to develop, wall must move horizontally to mobilize resistance
- Uniform surcharge, where S is surcharge pressure
- In-situ soil backfill weight a maximum of 120 pcf
- Horizontal backfill, compacted between 95 and 98 percent of standard Proctor maximum dry density
- No hydrostatic pressure acting on wall
- No loading from compaction equipment
- No loading from nearby footings or slabs
- No dynamic loading

- Finished grade is horizontal both behind wall and at toe of wall
- No safety factor included in soil parameters
- Ignore passive pressure in frost zone

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For the granular values to be valid, the granular backfill must extend out from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active/at-rest and passive cases, respectively.

The preceding earth pressure parameters are based on effective drainage being provided by a perimeter drain installed at the foundation level. If installed, we recommend a drain be installed along the base of the wall with a collection pipe leading to a reliable discharge. If an effective drainage system is not installed, then the retaining wall should be designed for combined hydrostatic and lateral earth pressures calculated using the following values:

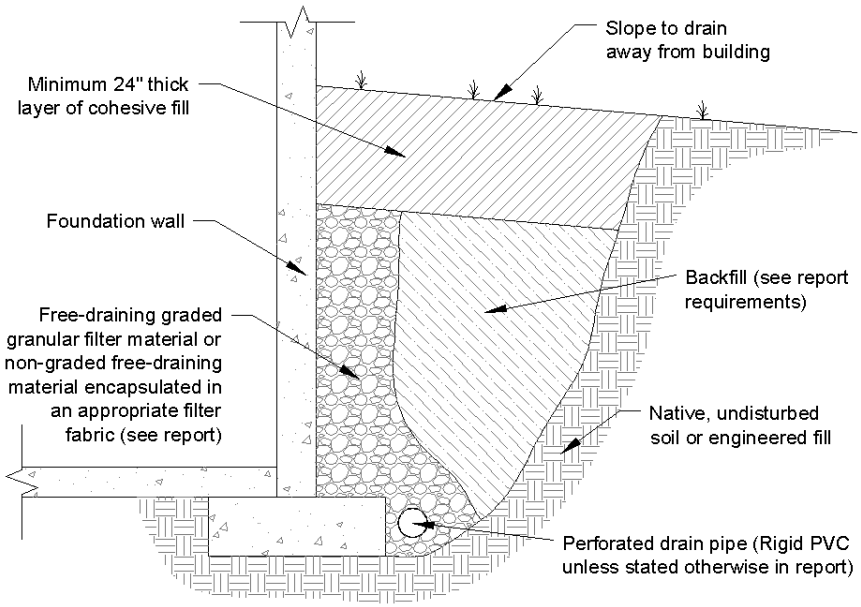
Material	Active Condition *	At-Rest Condition *
Clay Backfill	90 pcf	100 pcf
Granular Backfill	85 pcf	95 pcf

1. These pressures do not include the influence of surcharge, equipment, or floor loading, which should be added.

Drainage

A perforated rigid plastic or metal drain line should be installed behind the base of walls extending below adjacent grade. The invert of a drain line around below-grade areas should be at least 8 inches below the top of subgrade elevation for the low side of the wall. The drain line should be sloped to provide positive gravity drainage to a sump or other suitable outlet. The drain line should be surrounded by free-draining granular material graded to prevent the intrusion of soil fines into the granular material or the intrusion of the granular material into the drain pipe perforations. Alternatively, a coarse, clean, free-draining granular material could be used to surround the pipe if this material is encapsulated with suitable filter fabric.

At least a 2-foot wide section of free-draining granular fill is recommended for backfill above the drain line and adjacent to the wall and should extend to within 2 feet of final grade. The granular backfill should be capped with compacted cohesive fill to help prevent infiltration of surface water into the drain system.



A prefabricated drainage structure may be used above a drain line and the surrounding filter, in lieu of free-draining granular fill. A prefabricated drainage structure is a plastic drainage core or mesh which is covered with filter fabric to prevent soil intrusion, and is fastened to the wall prior to placing backfill.

GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

Support of footings, floor slabs, and pavements above existing fill soils is discussed in this report. However, even with the recommended construction testing services, there is an inherent risk for the owner that compressible fill or unsuitable material within or buried by the fill will not be discovered.

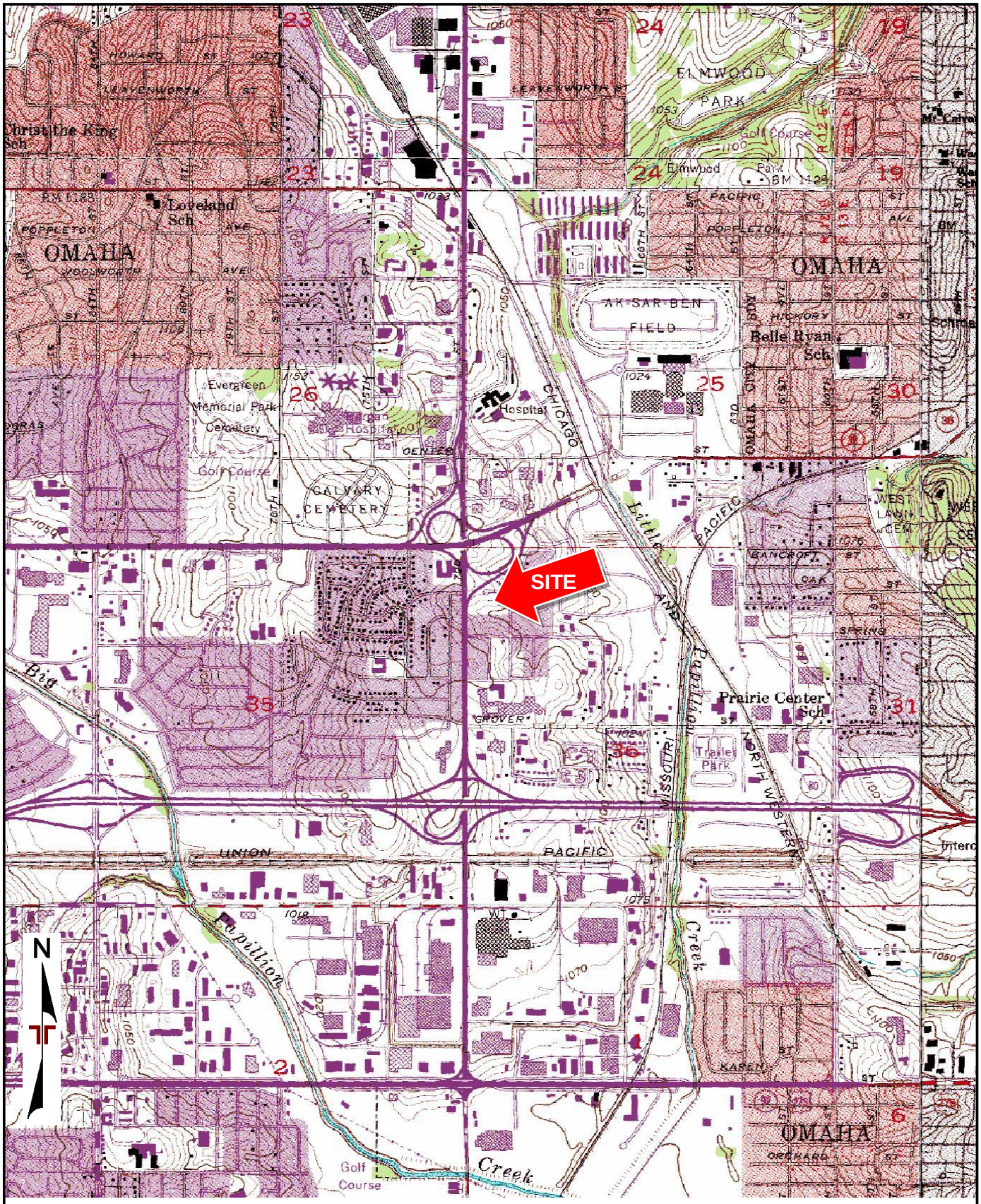
This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill, but can be reduced by performing additional testing and evaluation.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

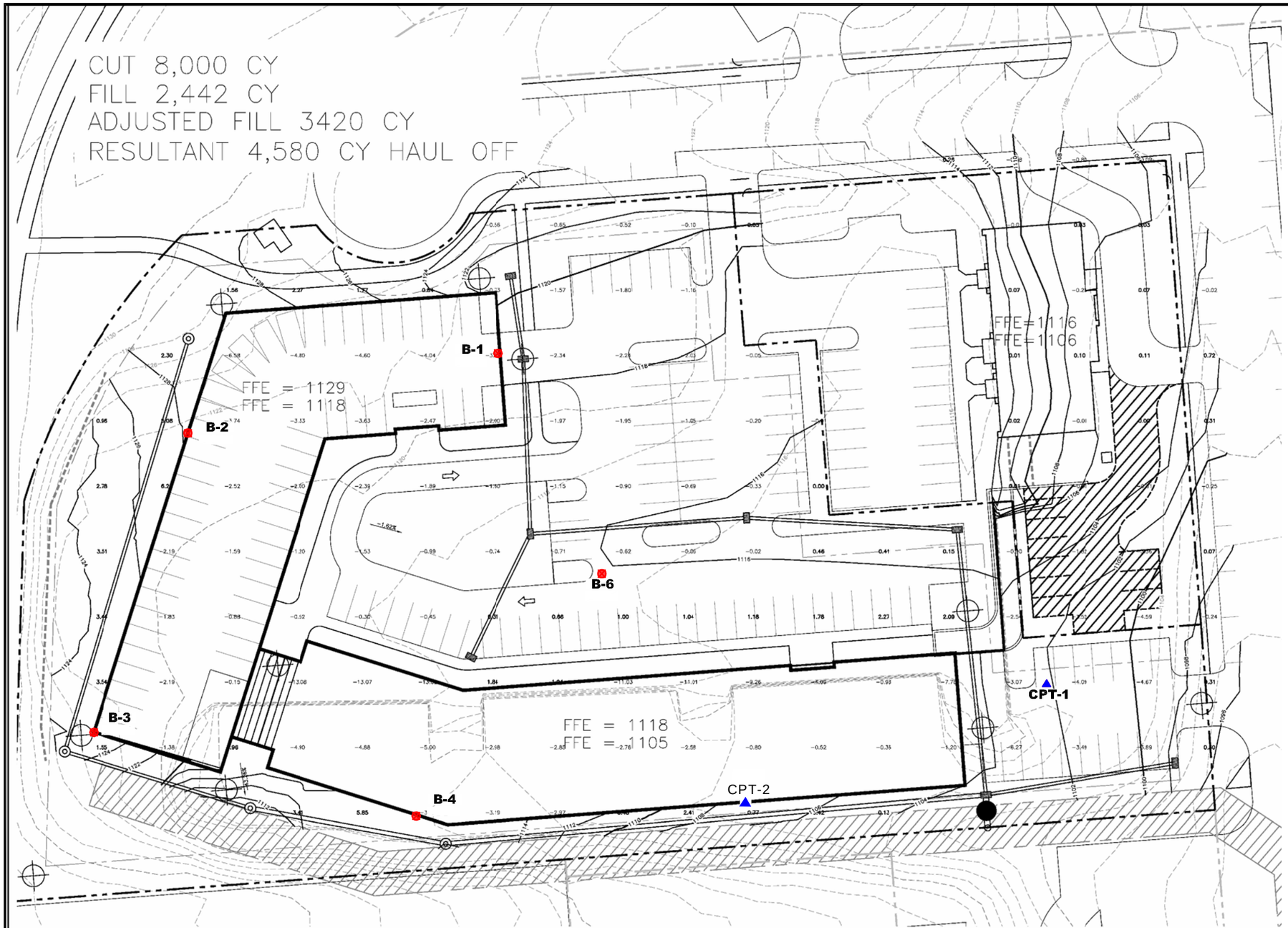
APPENDIX A

FIELD EXPLORATION



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: IRVINGTON, NE (1/1/1984), OMAHA NORTH, NE (1/1/1994), RALSTON, NE (1/1/1984) and OMAHA SOUTH, NE (1/1/1994).

Project Manager: RDS	Project No. 05175005	Terracon 15080 A Cir Omaha, NE 68144-5558	SITE LOCATION	Exhibit
Drawn by: RDS	Scale: 1"=2,000'		Residential Development **70th and Oak St** **Omaha, NE**	A-1
Checked by: MDR	File Name:			
Approved by: MDR	Date: 3/27/2017			



LEGEND

- Approximate Boring Location
- Approximate CPT Location

N

0 10 20 30 60

SCALE IN FEET

DESIGNED BY:	SGM
DRAWN BY:	PAI
APPV'D. BY:	SGM
SCALE:	AS SHOWN
DATE:	2/13/17
JOB NO.	05175005
ACAD NO.	P05175005P01
FIGURE NO.:	A-2

EXPLORATION PLAN

RESIDENTIAL DEVELOPMENT

72nd & OAK STREETS

OMAHA NEBRASKA

Terracon
Consulting Engineers and Scientists
15080 A CIRCLE
OMAHA, NE 68144
PH. (402) 330-2202
FAX. (402) 330-7606

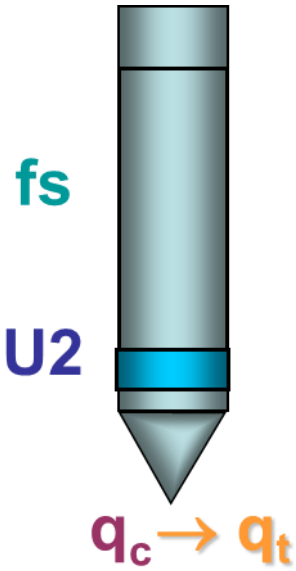
REV.	DATE	BY	DESCRIPTION

Field Exploration Description

The drill crew spotted the boring locations relative to existing features, and documented the boring locations using a handheld GPS unit with lateral accuracy of about 20 feet. The approximate boring locations are shown on the **Exploration Plan**. The ground surface elevation at each boring location was interpolated using a topographic plan provided by Lamp Rynearson & Associates. The boring elevations have been rounded to the nearest foot on the logs. The locations and elevations of the soil borings should be considered accurate only to the degree implied by the means and methods used to define them.

The borings were advanced with an ATV-mounted drilling rig utilizing hollow stem augers and continuous flight augers. Representative samples were obtained using thin-walled tube sampling procedures, in which a thin-walled, 3-inch OD, seamless steel tube with a sharp cutting edge is pushed hydraulically into the ground to obtain relatively undisturbed samples of cohesive or moderately cohesive soils. The samples were sealed and transported to the laboratory for testing and classification.

The drill crew prepared a field log for each boring. Each log included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.



The cone soundings were performed with a dedicated, track-mounted rig. The CPT hydraulically pushes an instrumented cone through the soil while nearly continuous readings are recorded to a portable computer. The cone is equipped with electronic load cells to measure tip resistance and sleeve resistance and a pressure transducer to measure the generated ambient pore pressure. The face of the cone has an apex angle of 60° and an area of 10 cm^2. Digital data representing the tip resistance, friction resistance, pore water pressure, and probe inclination angle are recorded about every 2 centimeters while advancing through the ground at a rate between 1½ and 2½ centimeters per second. These measurements are correlated to various soil properties used for geotechnical design. No soil samples are gathered through this subsurface investigation technique.CPT testing is conducted in general accordance with ASTM D5778 "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils." Upon completion, the data collected were downloaded and processed by the project engineer. The results of the cone penetrometer testing are provided in Appendix A, including estimated soil behavior type. It should be noted the soil behavior type is an interpretation based on empirical correlation and should be evaluated accordingly.

BORING LOG NO. B-1

PROJECT: Residential Development

CLIENT: J Development Company
Omaha, NE

SITE: 70th and Oak St
Omaha, NE

LOCATION See Exhibit A-2

Latitude: 41.2322° Longitude: -96.0228°

Surface Elev.: 1121 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)
		Grass, root zone at surface								
		LEAN CLAY (CL), trace sand, brown, medium stiff			■		9000+ (HP)	1840	21	92
3.0	1118									
		LEAN CLAY (CL), trace sand, brown, very stiff			■		5500 (HP)		22	83
			5							
					■		6000 (HP)		24	82
					■		4500 (HP)		25	84
			10							
					■		5500 (HP)		24	89
			15							
18.0	1103									
		LEAN CLAY (CL), trace sand, reddish brown, medium stiff to stiff			■		3500 (HP)	1900	24	96
			20							
					■		9000 (HP)	2920	23	97
25.0	1096		25							
		Boring Terminated at 25 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Not encountered while drilling

Terracon
15080 A Cir
Omaha, NE

Boring Started: 3/2/2017	Boring Completed: 3/2/2017
Drill Rig: 735	Driller: M. Ramirez
Project No.: 05175005	Exhibit: A-4

BORING LOG NO. B-2

PROJECT: Residential Development

CLIENT: J Development Company
Omaha, NE

SITE: 70th and Oak St
Omaha, NE

LOCATION See Exhibit A-2

Latitude: 41.2322° Longitude: -96.0233°

Surface Elev.: 1122 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)
Grass, root zone at surface							
LEAN CLAY (CL), trace sand, brown to light brown, stiff to very stiff				3000 (HP)		24	94
				8500 (HP)		22	92
		5					
				6000 (HP)		24	91
				5000 (HP)		25	83
		10					
				5500 (HP)		23	87
		15					
				5000 (HP)		25	90
		20					
23.0	1099						
LEAN CLAY (CL), trace sand, reddish brown, stiff				4500 (HP)	2750	23	99
25.0	1097	25					
Boring Terminated at 25 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings and topped with sackrete upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Not encountered while drilling

Terracon
15080 A Cir
Omaha, NE

Boring Started: 3/2/2017 | Boring Completed: 3/2/2017
Drill Rig: 735 | Driller: M. Ramirez
Project No.: 05175005 | Exhibit: A-5

BORING LOG NO. B-3

PROJECT: Residential Development

CLIENT: J Development Company
Omaha, NE

SITE: 70th and Oak St
Omaha, NE

LOCATION See Exhibit A-2

Latitude: 41.2319° Longitude: -96.0235°

Surface Elev.: 1122 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)
0.3	1122	**ASPHALTIC CEMENT CONCRETE**, 3 inches				
		LEAN CLAY (CL), trace sand, reddish brown to brown, stiff to very stiff	5000 (HP)		23	100
			4000 (HP)		21	105
6.0	1116					
		LEAN CLAY (CL), trace sand, dark brown, stiff	4000 (HP)		28	86
8.0	1114					
		LEAN CLAY (CL), trace sand, brown, stiff	3500 (HP)		27	92
		medium stiff below about 13 ft.	1500 (HP)		27	90
18.0	1104					
		LEAN CLAY (CL), trace sand, grayish brown, medium stiff	1500 (HP)	1840	31	89
23.0	1099					
		LEAN CLAY (CL), trace sand, reddish brown, medium stiff to stiff	2000 (HP)	1900	26	98
30.0	1092		5500 (HP)	3810	25	98
		Boring Terminated at 30 Feet				

DEPTH (Ft.): 5, 10, 15, 20, 25, 30

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

FIELD TEST RESULTS

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Not encountered while drilling

Terracon
15080 A Cir
Omaha, NE

Boring Started: 3/1/2017	Boring Completed: 3/1/2017
Drill Rig: 735	Driller: M. Ramirez
Project No.: 05175005	Exhibit: A-6

BORING LOG NO. B-4

PROJECT: Residential Development

CLIENT: J Development Company
Omaha, NE

SITE: 70th and Oak St
Omaha, NE

LOCATION See Exhibit A-2

Latitude: 41.2316° Longitude: -96.0230°

Surface Elev.: 1108 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)
		Grass, root zone at surface								
		FILL - LEAN CLAY, trace sand, light brown to dark brown					2000 (HP)		26	92
							3000 (HP)		25	90
			5							
							4500 (HP)		27	94
8.0	1100									
		LEAN CLAY (CL), trace sand, dark gray, medium stiff					1500 (HP)		29	92
			10							
13.0	1095									
		LEAN CLAY (CL), trace sand, dark grayish brown, medium stiff					2500 (HP)	1120	30	92
			15							
18.0	1090									
		LEAN CLAY (CL), trace sand, grayish brown, soft					1000 (HP)	860	32	89
			20							
23.0	1085									
		LEAN CLAY (CL), trace sand, reddish brown, medium stiff					2000 (HP)	1490	27	95
			25							
28.0	1080									
		LEAN CLAY (CL), trace sand, light reddish brown, stiff					2500 (HP)		26	97
			30							
33.0	1075									
		LEAN CLAY (CL), trace sand, light reddish brown, soft					3000 (HP)	980	28	93
35.0	1073		35							
		Boring Terminated at 35 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

8 ft. while sampling

Terracon
15080 A Cir
Omaha, NE

Boring Started: 3/1/2017 | Boring Completed: 3/1/2017
Drill Rig: 735 | Driller: M. Ramirez
Project No.: 05175005 | Exhibit: A-7

BORING LOG NO. B-5

PROJECT: Residential Development

CLIENT: J Development Company
Omaha, NE

SITE: 70th and Oak St
Omaha, NE

LOCATION See Exhibit A-2

Latitude: 41.2319° Longitude: -96.0226°

Surface Elev.: 1117 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)
	0.4 **ASPHALTIC CEMENT CONCRETE**, 5 inches	1116.5								
	LEAN CLAY (CL), trace sand, grayish brown, stiff to very stiff						3000 (HP)		22	96
							8500 (HP)		24	98
	5.0	1112	5							
	Boring Terminated at 5 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Continuous Flight Auger

Abandonment Method:
Boring backfilled with auger cuttings and topped with sackrete upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Not encountered while drilling

Terracon
15080 A Cir
Omaha, NE

Boring Started: 3/2/2017	Boring Completed: 3/2/2017
Drill Rig: 735	Driller: M. Ramirez
Project No.: 05175005	Exhibit: A-8

CPT LOG NO. CPT - 1

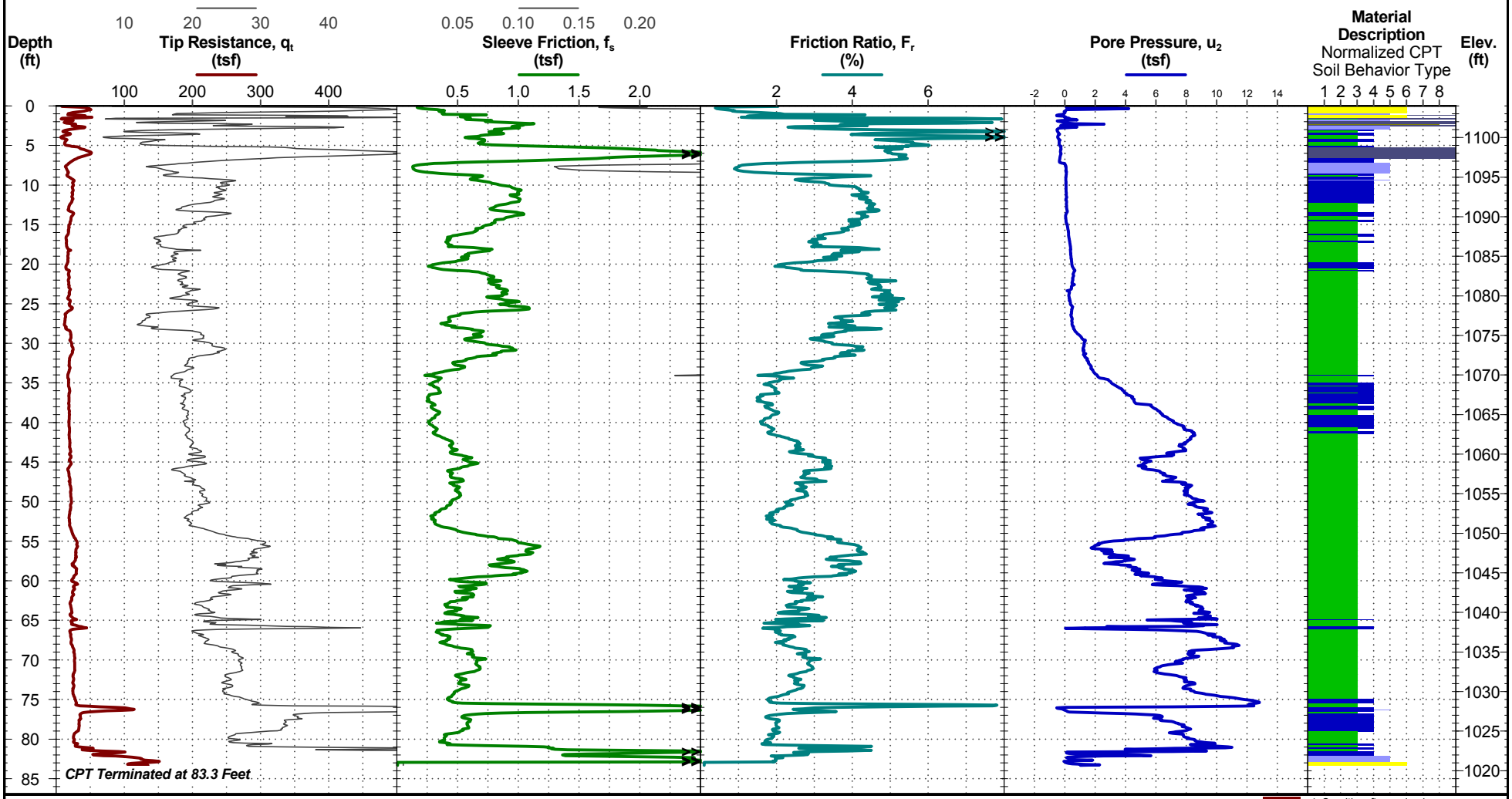
PROJECT: Residential Development

CLIENT: J Development Company
Omaha, NE

TEST LOCATION: See Exhibit A-2

Surface Elev.: 1104 ft
Latitude: 41.8690°
Longitude: -96.0219°

SITE: 70th and Oak Streets
Omaha, NE



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

Probe no. DPG1341 with net area ratio of 0.807
U2 pore pressure transducer location
Manufactured by Vertek; calibrated 4/19/2016
Tip and sleeve areas of 15 cm^2 and 225 cm^2
Ring friction reducer with O.D. of 2 in

Terracon

CPT Started: 1/18/2017	CPT Completed: 1/18/2017
Rig: 713	Operator: M. May
Project No.: 05175005	Exhibit: A-9

CPT LOG NO. CPT - 2

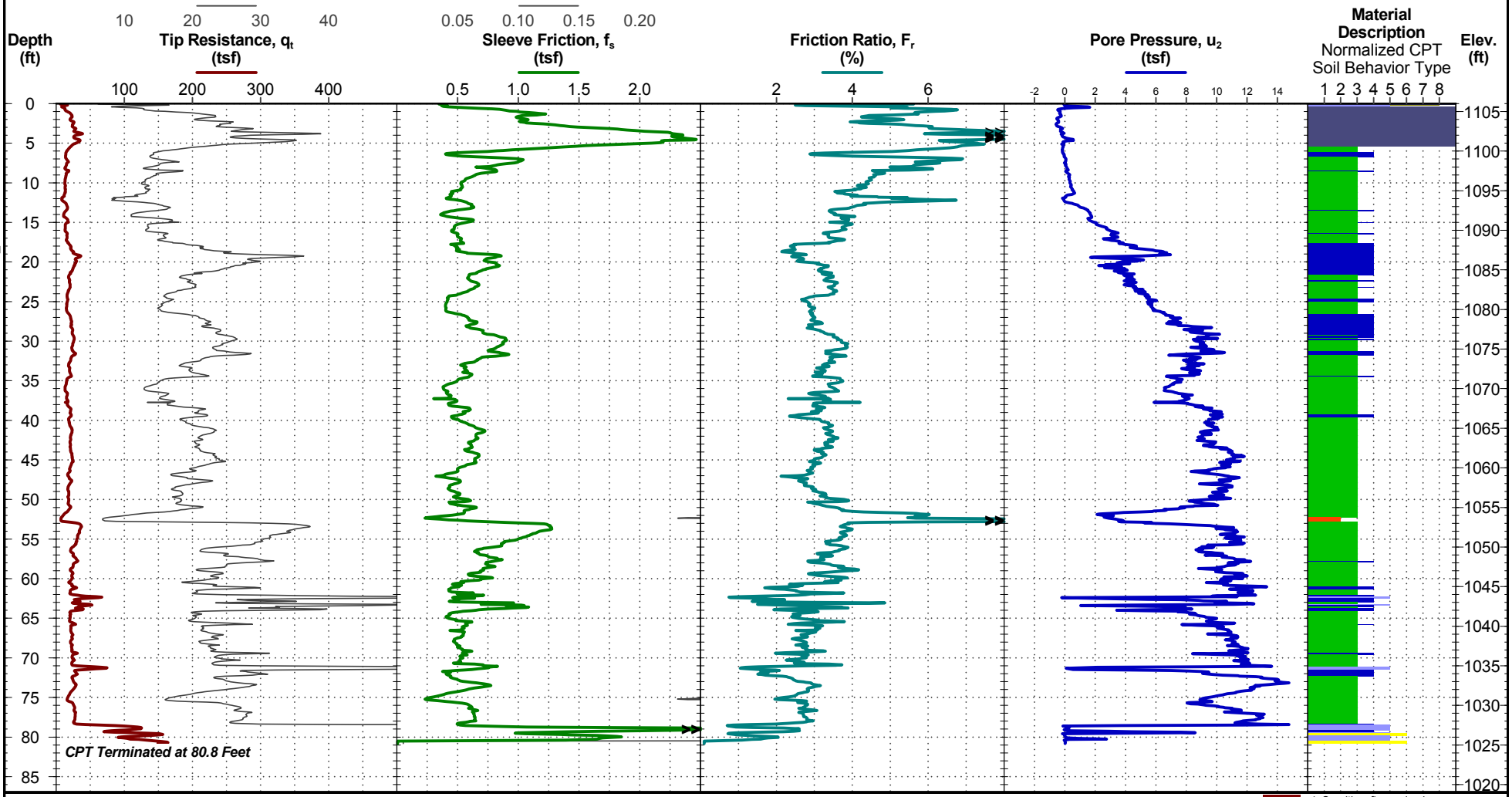
PROJECT: Residential Development

CLIENT: J Development Company
Omaha, NE

TEST LOCATION: See Exhibit A-2

Surface Elev.: 1106 ft
Latitude: 41.2318°
Longitude: -96.0225°

SITE: 70th and Oak Streets
Omaha, NE



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

Probe no. DPG1341 with net area ratio of 0.807
U2 pore pressure transducer location
Manufactured by Vertek; calibrated 4/19/2016
Tip and sleeve areas of 15 cm^2 and 225 cm^2
Ring friction reducer with O.D. of 2 in

Terracon

CPT Started: 2/15/2017	CPT Completed: 2/15/2017
Rig: 713	Operator: M. May
Project No.: 05175005	Exhibit: A-10

APPENDIX B

LABORATORY TESTING

Laboratory Testing Description

Water content tests (ASTM D2216) were performed on the samples. Density determinations (ASTM D7263) were performed on most of the thin-walled tube samples, and unconfined compression tests (ASTM D2166) were performed on selected samples. The unconfined compressive strength of many samples was estimated with a hand penetrometer test. The results of these laboratory tests are provided on the boring logs.

The samples were classified in the laboratory based on visual observation and texture (ASTM D2488). Additional laboratory testing could be performed to more accurately classify the samples. The soil descriptions presented on the boring logs for native soils are in accordance with our enclosed General Notes and Unified Soil Classification System (USCS, ASTM D2487). The estimated group symbol for the USCS is also shown on the boring logs, and a brief description of the Unified System is included in this report.

Procedural standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

APPENDIX C

SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING

Auger	Split Spoon
Shelby Tube	Macro Core
Ring Sampler	Rock Core
Grab Sample	No Recovery

WATER LEVEL

- Water Initially Encountered
- Water Level After a Specified Period of Time
- Water Level After a Specified Period of Time

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

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UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.

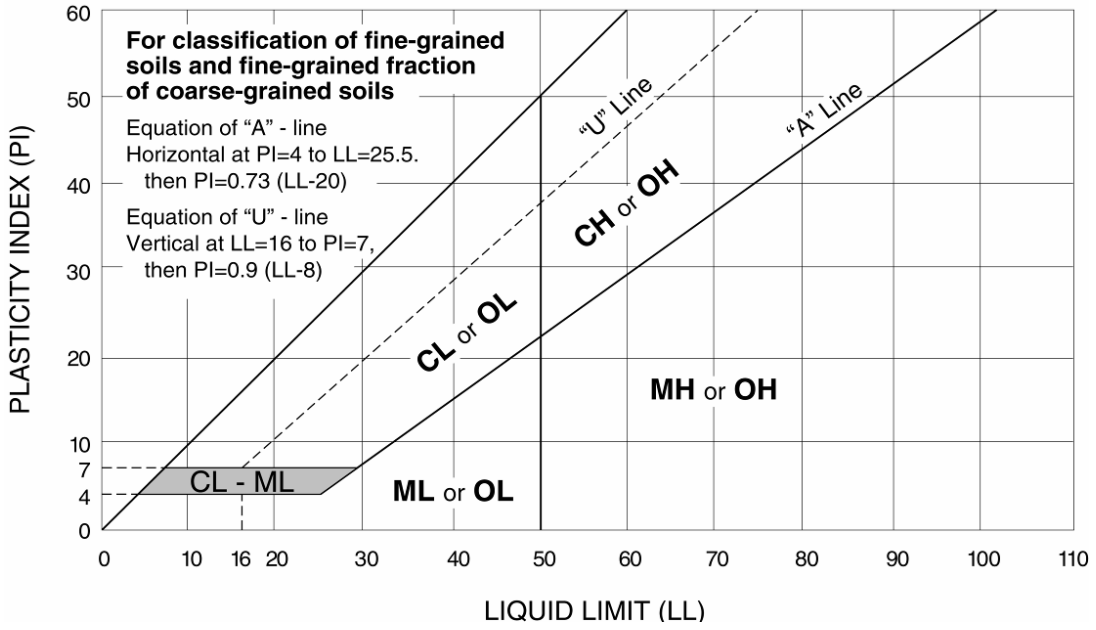

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Exhibit C-2

CPT GENERAL NOTES

DESCRIPTION OF MEASUREMENTS AND CALIBRATIONS

To be reported per ASTM D5778:

Uncorrected Tip Resistance, q_c
Measured force acting on the cone divided by the cone's projected area

Corrected Tip Resistance, q_t
Cone resistance corrected for porewater and net area ratio effects
$q_t = q_c + U2(1 - a)$
Where a is the net area ratio, a lab calibration of the cone typically between 0.70 and 0.85

Pore Pressure, U1/U2
Pore pressure generated during penetration
U1 - sensor on the face of the cone
U2 - sensor on the shoulder (more common)

Sleeve Friction, fs
Frictional force acting on the sleeve divided by its surface area

Normalized Friction Ratio, FR
The ratio as a percentage of fs to q_t, accounting for overburden pressure

To be reported per ASTM D7400, if collected:

Shear Wave Velocity, Vs
Measured in a Seismic CPT and provides direct measure of soil stiffness

DESCRIPTION OF GEOTECHNICAL CORRELATIONS

Normalized Tip Resistance, Q_t
$Q_t = (q_t - \sigma_{v0})/\sigma'_{v0}$

Over Consolidation Ratio, OCR
$OCR (1) = 0.25(Q_t)^{1.25}$
$OCR (2) = 0.33(Q_t)$

Undrained Shear Strength, Su
$Su = Q_t \times \sigma'_{v0}/N_{kt}$
N_{kt} is a geographical factor (shown on Su plot)

Sensitivy, St
$St = (q_t - \sigma_{v0}/N_{kt}) \times (1/fs)$

Effective Friction Angle, ϕ'
$\phi' (1) = \tan^{-1}(0.373[\log(q_t/\sigma'_{v0}) + 0.29])$
$\phi' (2) = 17.6 + 11[\log(Q_t)]$

Unit Weight
$UW = (0.27[\log(FR)]+0.36[\log(q_t/atm)]+1.236) \times UW_{water}$
σ_{v0} is taken as the incremental sum of the unit weights

Small Strain Shear Modulus, G_0
$G_0 (1) = \rho Vs^2$
$G_0 (2) = 0.015 \times 10^{(0.55Ic + 1.68)}(q_t - \sigma_{v0})$

Soil Behavior Type Index, Ic
$Ic = [(3.47 - \log(Q_t))^2 + (\log(FR) + 1.22)^2]^{0.5}$

SPT N_{60}
$N_{60} = (q_t/atm) / 10^{(1.1268 - 0.2817Ic)}$

Elastic Modulus, Es (assumes $q/q_{ultimate} \sim 0.3$, i.e. FS = 3)
$Es (1) = 2.6\Psi G_0$ where $\Psi = 0.56 - 0.33\log Q_{t,clean\ sand}$
$Es (2) = G_0$
$Es (3) = 0.015 \times 10^{(0.55Ic + 1.68)}(q_t - \sigma_{v0})$
$Es (4) = 2.5q_t$

Constrained Modulus, M
$M = \alpha_M(q_t - \sigma_{v0})$
For Ic > 2.2 (fine-grained soils)
$\alpha_M = Q_t$ with maximum of 14
For Ic < 2.2 (coarse-grained soils)
$\alpha_M = 0.0188 \times 10^{(0.55Ic + 1.68)}$

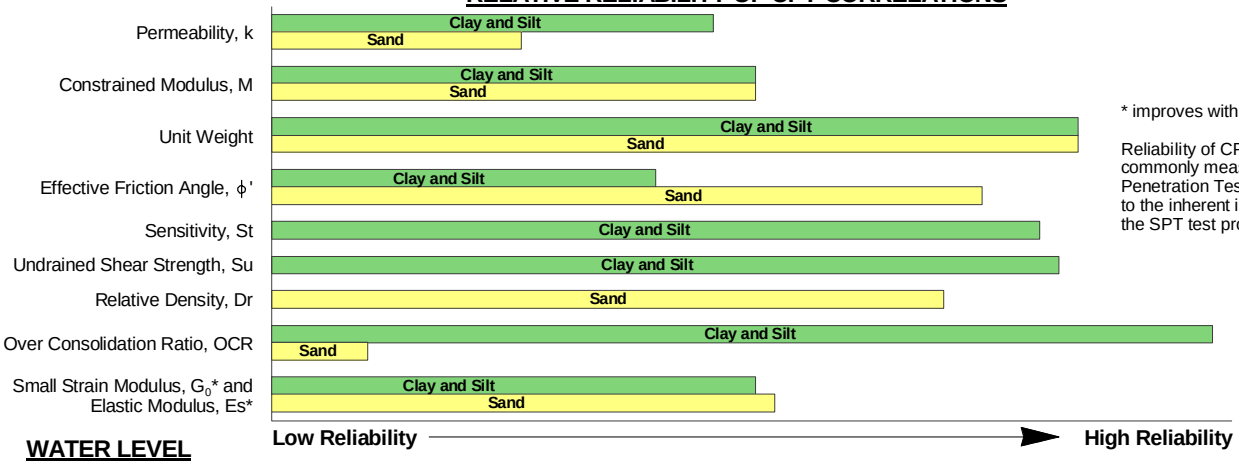
Hydraulic Conductivity, k
For $1.0 < Ic < 3.27$ $k = 10^{(0.952 - 3.04Ic)}$
For $3.27 < Ic < 4.0$ $k = 10^{(-4.52 - 1.37Ic)}$

Relative Density, Dr
$Dr = (Q_t / 350)^{0.5} \times 100$

REPORTED PARAMETERS

CPT logs as provided, at a minimum, report the data as required by ASTM D5778 and ASTM D7400 (if applicable). This minimum data include tip resistance, sleeve resistance, and porewater pressure. Other correlated parameters may also be provided. These other correlated parameters are interpretations of the measured data based upon published and reliable references, but they do not necessarily represent the actual values that would be derived from direct testing to determine the various parameters. The following chart illustrates estimates of reliability associated with correlated parameters based upon the literature referenced below.

RELATIVE RELIABILITY OF CPT CORRELATIONS



* improves with seismic Vs measurements

Reliability of CPT-predicted N_{60} values as commonly measured by the Standard Penetration Test (SPT) is not provided due to the inherent inaccuracy associated with the SPT test procedure.

WATER LEVEL

The groundwater level at the CPT location is used to normalize the measurements for vertical overburden pressures and as a result influences the normalized soil behavior type classification and correlated soil parameters. The water level may either be "measured" or "estimated:"

Measured - Depth to water directly measured in the field

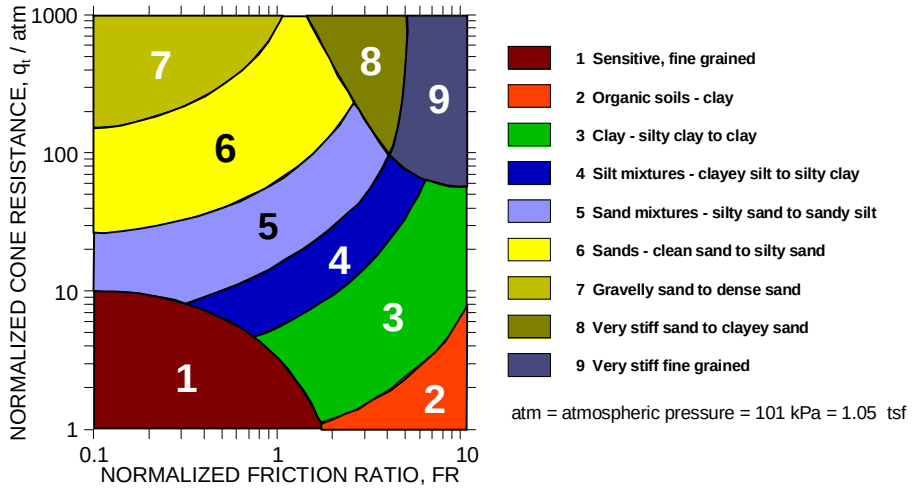
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

While groundwater levels displayed as "measured" more accurately represent site conditions at the time of testing than those "estimated," in either case the groundwater should be further defined prior to construction as groundwater level variations will occur over time.

CONE PENETRATION SOIL BEHAVIOR TYPE

The estimated stratigraphic profiles included in the CPT logs are based on relationships between corrected tip resistance (q_t), friction resistance (fs), and porewater pressure (U2). The normalized friction ratio (FR) is used to classify the soil behavior type.

Typically, silts and clays have high FR values and generate large excess penetration porewater pressures; sands have lower FRs and do not generate excess penetration porewater pressures. Negative pore pressure measurements are indicative of fissured fine-grained material. The adjacent graph (Robertson et al.) presents the soil behavior type correlation used for the logs. This normalized SBT chart, generally considered the most reliable, does not use pore pressure to determine SBT due to its lack of repeatability in onshore CPTs.



atm = atmospheric pressure = 101 kPa = 1.05 tsf

REFERENCES

Kulhawy, F.H., Mayne, P.W., (1997). "Manual on Estimating Soil Properties for Foundation Design," Electric Power Research Institute, Palo Alto, CA.
Mayne, P.W., (2013). "Geotechnical Site Exploration in the Year 2013," Georgia Institue of Technology, Atlanta, GA.
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Schmertmann, J.H., (1970). "Static Cone to Compute Static Settlement over Sand," *Journal of the Soil Mechanics and Foundations Division*, 96(SM3), 1011-1043.

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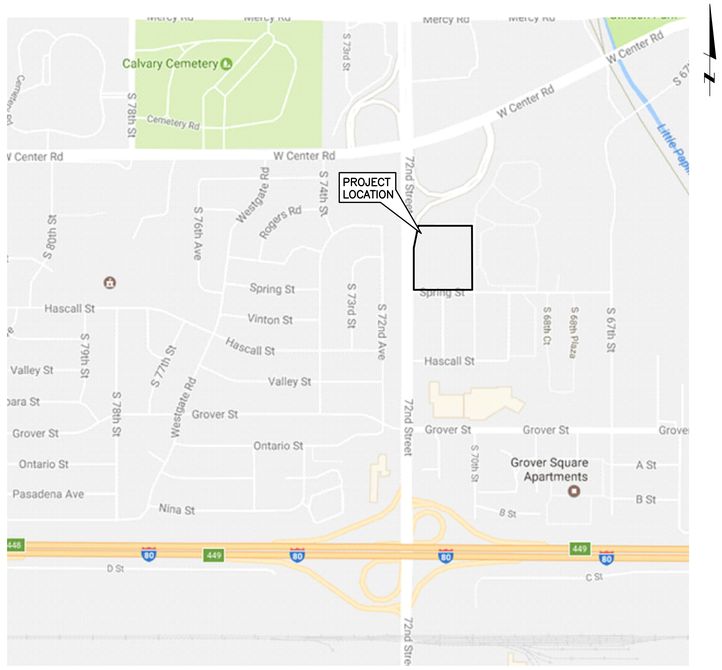
United States Geological Survey, 7.5-minute series Quadrangle Map, “Irvington, Nebraska," 1984

United States Geological Survey, 7.5-minute series Quadrangle Map, “Omaha North, Nebraska," 1994

United States Geological Survey, 7.5-minute series Quadrangle Map, “Ralston, Nebraska," 1984

United States Geological Survey, 7.5-minute series Quadrangle Map, “Omaha South, Nebraska," 1984

CENTERLINE
OMAHA, NEBRASKA
OVERLOT GRADING PLAN



LOCATION MAP

INDEX OF SHEETS

GENERAL NOTES

1. ALL SITE WORK SHALL BE IN ACCORDANCE WITH THE CITY OF OMAHA "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION", 2014 EDITION AND ANY REVISIONS OR AMENDMENTS THERETO SHALL APPLY TO THIS PROJECT. EXCEPT AS MODIFIED BY THESE SPECIFICATIONS, SPECIAL CONDITIONS, AND/OR THE CONSTRUCTION DRAWINGS.
2. EXISTING UTILITIES ARE SHOWN AS A CONVENIENCE FOR THE CONTRACTOR. THE LOCATIONS OF ALL AERIAL AND UNDERGROUND UTILITIES MAY NOT BE INDICATED IN THESE PLANS. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES 48 HOURS BEFORE WORK IS STARTED TO VERIFY UTILITY LOCATIONS (ONE CALL 344-3565).
3. BARRICADES SHALL CONFORM TO OMAHA PUBLIC WORKS "BARRICADING STANDARDS, SPECIFICATIONS, METHODS & MATERIALS", AND/OR THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
4. THE CONTRACTOR SHALL PROVIDE THE ENGINEER/ARCHITECT WITH A CONSTRUCTION RECORD DRAWING INDICATING ALL CHANGES IN GEOMETRY, GRADES, ELEVATIONS OR MATERIAL ON THE PROJECT PRIOR TO FINAL ACCEPTANCE.
5. THE OWNER SHALL OBTAIN THE GRADING PERMIT. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL OTHER PERMITS REQUIRED TO COMPLETE THIS PROJECT AND IS RESPONSIBLE FOR THE PAYMENT OF ALL FEES ASSOCIATED WITH THESE PERMITS.
6. THE CONTRACTOR SHALL CONTACT THE SOILS ENGINEER TO OBSERVE THE SUBGRADE PRIOR TO PLACING PAVEMENT TO DELINEATE ANY AREAS WHERE SUBGRADE OVEREXCAVATION MAY BE REQUIRED.
7. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND ELEVATIONS OF ALL PROPOSED UTILITY CONNECTIONS WITH THE ARCHITECTURAL CONSTRUCTION DOCUMENTS.
8. THE INSTALLATION OF UTILITIES MAY REQUIRE THE DISTURBANCE OF EXISTING DRAINAGE AND EROSION CONTROL MEASURES. THESE ITEMS MAY INCLUDE SILT BASINS, LEVEL TERRACES, INTERCEPTOR SWALES, SILT FENCE AND ROCK CONSTRUCTION ENTRANCES. THE CONTRACTOR SHALL MAKE HIMSELF AWARE OF THE EXISTING SITE CONDITIONS PRIOR TO BIDDING THIS WORK. THE FUNCTION OF THESE ITEMS MUST BE MAINTAINED THROUGHOUT CONSTRUCTION WITH EMPHASIS PLACED ON RESTORING THEIR INTEGRITY PRIOR TO ANY RAINFALL EVENT. AS PART OF THIS CONTRACT, ALL DISTURBED DRAINAGE AND EROSION CONTROL STRUCTURES SHALL BE RESTORED TO GOOD CONDITION AFTER COMPLETION OF THE WORK OR AS DIRECTED BY THE ENGINEER/ARCHITECT.
9. SEE PLAN SHEETS FOR ADDITIONAL NOTES.

LAMP RYNEARSON & ASSOCIATES
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www.LRA-Inc.com
402.496.2498 | P
402.496.2730 | F

PROFESSIONAL CIVIL ENGINEER
JASON E. ALBERS
E-15489
STATE OF NEBRASKA
7-11-17

U:\Projects\0116163 70th and Oak Apartments MAP\DRAWINGS\CONSTRUCTION DRAWINGS\0116163-000-01.dwg, 7/11/2017 3:24:20 PM, RANDY KUCERA, LAMP RYNEARSON & ASSOCIATES
0116163.01-016 – 06/13/2017
CENTERLINE – OVERLOT GRADING 70TH AND OAK ST, OMAHA, NEBRASKA

EXISTING LEGEND

- PROPERTY LINE
- ADJACENT LOT LINE
- SECTION LINE
- SANITARY SEWER
- STORM SEWER
- FIBER OPTIC
- GAS
- WATER
- UNDERGROUND POWER
- OVERHEAD POWER
- TELEPHONE
- CABLE TELEVISION
- SANITARY SEWER (FROM RECORD DRAWINGS)
- STORM SEWER (FROM RECORD DRAWINGS)
- FIBER OPTIC (FROM RECORD DRAWINGS)
- GAS (FROM RECORD DRAWINGS)
- WATER (FROM RECORD DRAWINGS)
- UNDERGROUND POWER (FROM RECORD DRAWINGS)
- OVERHEAD POWER (FROM RECORD DRAWINGS)
- TELEPHONE (FROM RECORD DRAWINGS)
- CABLE TELEVISION (FROM RECORD DRAWINGS)
- MANHOLE
- CLEAN OUT
- CURB INLET
- FLARED END SECTION
- AREA INLET
- GRATE INLET
- HOODED GRATE INLET
- BEEHIVE GRATE
- FIRE HYDRANT
- YARD HYDRANT
- WATER METER
- WATER VALVE
- CURB STOP
- WATER SERVICE
- WATER HYDRANT
- SPRINKLER VALVE BOX
- AUTO SPRINKLER
- GAS MANHOLE
- GAS METER
- GAS VALVE
- GAS WARNING SIGN
- GAS VENT
- GAS SERVICE
- LARGE GALVANIZED POLE
- POWER POLE AND GUY
- STREET LIGHT
- YARD LIGHT
- BUILDING LIGHT
- LIGHT POLE
- GROUND/ LANDSCAPE
- A/C
- TRANSFORMER
- POWER MANHOLE
- POWER METER
- POWER RISER
- POWER PULL BOX
- POWER POLE
- BRACE POLE
- TELEPHONE MANHOLE
- TELEPHONE
- TELEPHONE RISER
- TELEPHONE PULL BOX
- CABLE TELEVISION RISER
- CABLE TELEVISION PULL BOX
- FIBER OPTICS RISER
- FIBER OPTICS PULL BOX
- TRAFFIC LIGHT
- MAST ARM TRAFFIC POLE
- TRAFFIC SIGNAL PULL BOX
- STOP SIGN
- UNIDENTIFIED PULL BOX
- BUILDING
- MAIL BOX
- RAILROAD SIGNAL
- RIGHT-OF-WAY MARKER
- R.O.W. RIGHT-OF-WAY
- CENTER LINE
- SECTION CORNER
- CONTROL POINT
- GUARD POST
- FLAG POLE
- SIGN
- INFORMATION SIGN
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- WOOD PRIVACY FENCE
- WOVEN WIRE FENCE
- STEEL PIPE FENCE
- 12" DECIDUOUS TREE AND SIZE
- 12" CONIFEROUS TREE AND SIZE
- BUSH
- PARKING METER
- HANDICAP PARKING
- IE INVERT ELEVATION
- FL FLOW LINE
- CORNERS SET (5/8" REBAR WITH 1 1/4", YELLOW PLASTIC CAP STAMPED)
- CORNERS FOUND
- M MEASURED DIMENSIONS
- P PLAT DIMENSIONS
- L LEGAL DIMENSIONS
- PT PINCH TOP PIPE
- OT OPEN TOP PIPE
- SB SOLID BAR
- RB REBAR
- R RECORDED

REMOVALS

- BUILDING TO BE REMOVED
- PAVEMENT/SIDEWALK TO BE REMOVED
- Remove W — WATER LINE
- Remove G — GAS LINE
- Remove P — POWER LINE
- Remove ST — STORM SEWER
- Remove SS — SANITARY SEWER
- REMOVE POWER POLE
- REMOVE MANHOLE
- REMOVE INFORMATION SIGN
- REMOVE GRATE INLET

GRADING

- 1100 CONTOUR
- 1100 FUTURE CONTOUR
- 1100 CONTOUR
- WETLANDS AREA NOT TO BE DISTURBED
- FILL AREA
- STABILIZED ACCESS ROAD
- VEGETATED BUFFER STRIP
- SF SILT FENCE
- LT LEVEL TERRACE
- INTERCEPTOR SWALE
- ID INTERCEPTOR DIKE
- RIDGE
- FLOW PATH
- xxxx.xx SPOT ELEVATION
- 2A DRAINAGE AREA NAME
- 1.18 AC C=0.44 DRAINAGE AREA RUNOFF COEFFICIENT
- LIMITS OF CONSTRUCTION, GRADING, CLEARING & GRUBBING AND REMOVALS
- DRAINAGE BASIN DELINEATION
- DRAINAGE SUB BASIN DELINEATION
- GRA 254 @ 7.85% TIME OF CONCENTRATION DRAINAGE PATH
- 1 PIPE NUMBER
- W WATTLE
- VEHICLE TRACKING PAD
- TS TEMPORARY SEEDING
- STB STRAW HAY BALE
- SP SLOPE PROTECTION
- PS PERMANENT SEEDING
- IP INLET PROTECTION

UTILITIES

- 18"ST STORM SEWER
- 8"SS SANITARY SEWER
- SANITARY SEWER SERVICE
- FLOW ARROW
- 8"DR SLOTTED UNDER DRAIN
- UGP UNDERGROUND POWER
- G GAS
- T TELEPHONE
- 2"W WATER
- AIR TAP
- MANHOLE
- F.E.S.
- F.E.S. WITH ROCK APRON
- CURB INLET
- AREA INLET
- GRATE INLET
- GABIONS
- POST INDICATOR VALVE
- BIORETENTION GARDEN
- VALVE
- FIRE HYDRANT ASSEMBLY
- REDUCER
- BOLTED COMPRESSION COUPLING

PAVING

- PAVEMENT
- FUTURE PAVEMENT
- PC CURB AND GUTER
- RETAINING WALL
- X" PC CONCRETE SIDEWALK (4" OR 5")
- X" PC CONCRETE PAVEMENT WITH INTEGRAL CURB AND GUTTER (NORMAL THICKNESS)
- X" PC CONCRETE PAVEMENT WITH INTEGRAL CURB AND GUTTER (R.O.W. THICKNESS)
- ASPHALT PAVEMENT
- TYPE III BARRICADE
- SIGN
- BUILDING
- FENCE
- 15 PARKING STALL COUNT
- 5" SOLID LINES
- 30' (Typ.) 10' (Typ.) 5" SKIP (BROKEN) LINES
- PAVEMENT MARKINGS
- SAWED TRANSVERSE CONTRACTION JOINT
- SAWED LONGITUDINAL JOINT W/ NO. 5 TIE BARS @ 2'-6" O.C.
- KEYED LONGITUDINAL JOINT W/ NO. 5 TIE BARS @ 2'-6" O.C.
- EXPANSION JOINT (1") AND THICKENED EDGE

GENERAL ABBREVIATIONS

ADA	AMERICANS WITH DISABILITIES ACT
BOC	BACK OF CURB
BOSW	BACK OF WALK
BOP	BOTTOM OF PIPE
BOW	BOTTOM OF WALL
CATV	CABLE TELEVISION
CF	CUBIC FOOT
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CP	CONTROL POINT
CY	CUBIC YARD
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
E	EAST
ELEV.	ELEVATION
EOG	EDGE OF GRAVEL
FES	FLARED END SECTION
FFE	FINISH FLOOR ELEVATION
FH	FIRE HYDRANT
FL	FLOWLINE
G	GAS
GB	GRADE BREAK
HP/LP	HIGH POINT/LOW POINT
HORIZ	HORIZONTAL
I.E.	INVERT ELEVATION
LF	LINEAR FEET
MH	MANHOLE
ME	MATCH
N	NORTH
N.T.S.	NOT TO SCALE
PC	POINT OF CURVATURE
PI	POINT OF INTERSECTION
PL	PROPERTY LINE
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
P.V.C.	POINT OF VERTICAL CURVE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
X 1020.12	SPOT ELEVATION
RCP	REINFORCED CONCRETE PIPE
ROW	RIGHT OF WAY
S	SOUTH
SF	SQUARE FEET
SS	SANITARY SEWER
ST	STORM
STA	STATION
STD	STANDARD
T	TELEPHONE
TOC	TOP OF CURB
TOF	TOP OF FOUNDATION
TOG	TOP OF GRADE
TOI	TOP OF ISLAND
TOP	TOP OF PAVEMENT
TOW	TOP OF WALL
TYP.	TYPICAL
VERT	VERTICAL
W	WEST
WQCV	WATER QUALITY CAPTURE VOLUME

DRAWN BY PVG
DESIGNED BY RSK
DATE 6/12/2017
JOB NUMBER 0115163.01-016
BOOK AND PAGE
REVISIONS

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Omaha, Nebraska 68154-2027 402.496.2730 | F
www.LRA-inc.com

CENTERLINE – OVERLOT GRADING
70TH AND OAK ST, OMAHA, NEBRASKA

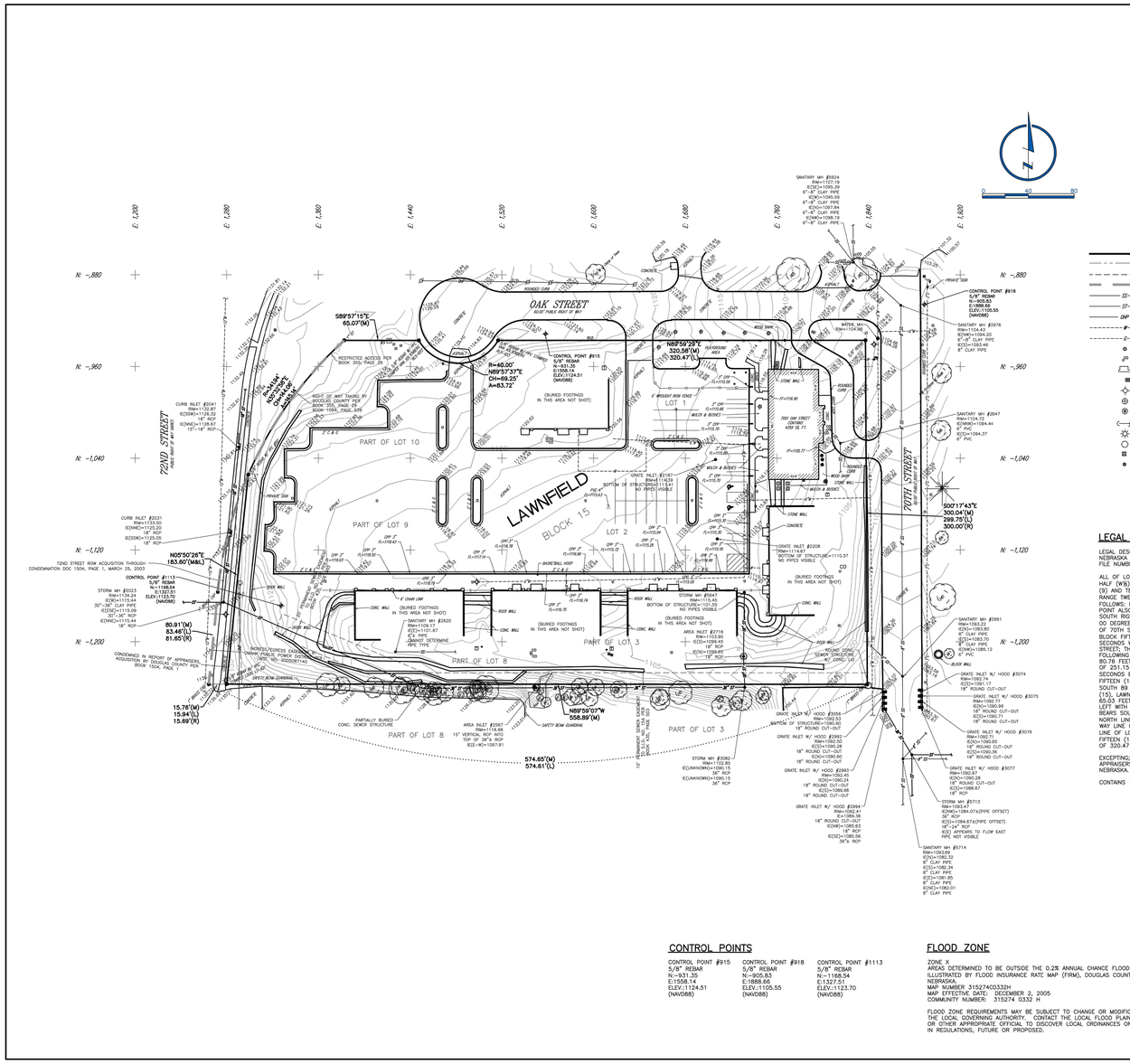
LEGEND SHEET

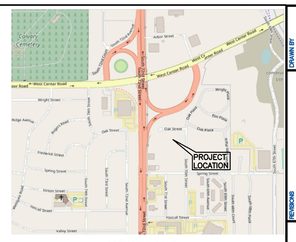
LAMP RYNEARSON - ENGINEERS

PROFESSIONAL CIVIL ENGINEER
RANDY K. KUCERA
E-15439
6-13-17
STATE OF NEBRASKA

SHEET
2 OF 7

L:\Projects\0115163 70th and Oak Apartments HBG\DRAWINGS\CONSTRUCTION DRAWINGS\0115163-001-01.dwg, 6/12/2017 3:37:54 PM, RANDY KUCERA, LAMP RYNEARSON & ASSOCIATES





VICINITY MAP

LEGEND

PROPERTY LINE	A/C
LOT LINE	LIGHT POLE
EASEMENT LINE	TRANSFORMER
RESTRICTED ACCESS	POWER METER
SANITARY SEWER	TELEPHONE RISER
STORM SEWER	UNIDENTIFIED PULL BOX
OVERHEAD POWER	INFORMATION SIGN
RECORD WATER	POST INDICATOR VALVE
RECORD GAS	UNIDENTIFIED RISER
MANHOLE	CABLE TELEVISION RISER
CLEAN OUT	HANDICAP PARKING
CURB INLET	CHAIN LINK FENCE
GRATE INLET	GUARDRAIL
FIRE HYDRANT	WROUGHT IRON FENCE
CURB STOP	DECIDUOUS TREE AND SIZE
WATER MANHOLE	CONIFEROUS TREE AND SIZE
POWER POLE AND GUY	BUSH
STREET LIGHT	CORNERS FOUND
LARGE GALVANIZED POLE	CONTROL POINT
GAS METER	YELLOW PLASTIC CAP
GUARD POST	PINK PLASTIC CAP
	OPEN TOP PIPE

LEGAL DESCRIPTION

LEGAL DESCRIPTION SHOWN HEREON AS PER OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY ISSUED BY NEBRASKA TITLE COMPANY
FILE NUMBER 0261879, EFFECTIVE DATE: FEBRUARY 4, 2015 AT 8:00 A.M.

ALL OF LOTS ONE (1) AND TWO (2), BLOCK FIFTEEN (15), LAWNFIELD, A SUBDIVISION LOCATED IN THE WEST HALF (W½) OF SECTION THIRTY-SIX (36); AND ALSO TOGETHER WITH PART OF LOTS THREE (3), EIGHT (8), NINE (9) AND TEN (10), SAID BLOCK FIFTEEN (15), LAWNFIELD, ALL LOCATED IN TOWNSHIP FIFTEEN (15) NORTH, RANGE TWELVE (12) EAST OF THE 6TH P.M., DOUGLAS COUNTY, NEBRASKA, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTHEAST CORNER OF SAID LOT ONE (1), BLOCK FIFTEEN (15), LAWNFIELD, SAID POINT ALSO BEING THE POINT OF INTERSECTION OF THE WEST RIGHT OF WAY LINE OF 70TH STREET AND THE SOUTH RIGHT OF WAY LINE OF OAK STREET, SAID POINT ALSO BEING THE POINT OF BEGINNING; THENCE SOUTH 00 DEGREES 17 MINUTES 52 SECONDS EAST (ASSUMED BEARING), ALONG THE SAID WEST RIGHT OF WAY LINE OF 70TH STREET, SAID LINE ALSO BEING THE EAST LINE OF SAID LOTS ONE (1), TWO (2) AND THREE (3), BLOCK FIFTEEN (15), LAWNFIELD, A DISTANCE OF 299.75 FEET; THENCE NORTH 89 DEGREES 59 MINUTES 45 SECONDS WEST, A DISTANCE OF 574.61 FEET TO A POINT ON THE EASTERLY RIGHT OF WAY LINE OF 72ND STREET; THENCE NORTHEASTERLY ALONG SAID EASTERLY RIGHT OF WAY LINE OF 72ND STREET ON THE FOLLOWING DESCRIBED COURSES: THENCE NORTH 05 DEGREES 39 MINUTES 17 SECONDS EAST, A DISTANCE OF 80.76 FEET; THENCE NORTHEASTERLY ON A CURVE TO THE RIGHT WITH A RADIUS OF 341.94 FEET, A DISTANCE OF 251.15 FEET, SAID CURVE HAVING A LONG CHORD WHICH BEARS NORTH 26 DEGREES 41 MINUTES 46 SECONDS EAST, A DISTANCE OF 245.54 FEET TO A POINT ON THE NORTH LINE OF SAID LOT TEN (10), BLOCK FIFTEEN (15), LAWNFIELD, SAID LINE ALSO BEING SAID SOUTH RIGHT OF WAY LINE OF OAK STREET; THENCE SOUTH 89 DEGREES 59 MINUTES 45 SECONDS EAST ALONG SAID NORTH LINE OF LOT TEN (10), BLOCK FIFTEEN (15), LAWNFIELD, SAID LINE ALSO BEING SAID SOUTH RIGHT OF WAY LINE OF OAK STREET, A DISTANCE OF 65.03 FEET; THENCE EASTERLY ALONG SAID SOUTH RIGHT OF WAY LINE OF OAK STREET, ON A CURVE TO THE LEFT WITH A RADIUS OF 40.00 FEET, A DISTANCE OF 83.78 FEET, SAID CURVE HAVING A LONG CHORD WHICH BEARS SOUTH 89 DEGREES 59 MINUTES 45 SECONDS EAST, A DISTANCE OF 69.28 FEET TO A POINT ON SAID NORTH LINE OF LOT TEN (10), BLOCK FIFTEEN (15), LAWNFIELD, SAID LINE ALSO BEING SAID SOUTH RIGHT OF WAY LINE OF OAK STREET; THENCE SOUTH 89 DEGREES 59 MINUTES 45 SECONDS EAST ALONG SAID NORTH LINE OF LOT TEN (10), BLOCK FIFTEEN (15), LAWNFIELD, AND THE NORTH LINE OF SAID LOT ONE (1), BLOCK FIFTEEN (15), LAWNFIELD, SAID LINE ALSO BEING SAID SOUTH RIGHT OF WAY LINE OF OAK STREET, A DISTANCE OF 320.47 FEET TO THE POINT OF BEGINNING.

EXCEPTING; THAT PART TAKEN BY CITY OF OMAHA, NEBRASKA, A MUNICIPAL CORPORATION BY REPORT OF APPRAISERS, RECORDED MARCH 25, 2003 IN BOOK 1504, PAGE 1 IN THE RECORDS OF DOUGLAS COUNTY, NEBRASKA.

CONTAINS 158,349 SQUARE FEET OR 3.635 ACRES AS FIELD MEASURED.

UTILITY NOTES

1. THIS DRAWING INCLUDES OBSERVED EVIDENCE OF SERVICES AND UTILITIES EVIDENT AT THE TIME OF SURVEY, RECORD LOCATIONS PROVIDED BY THOSE COMPANIES RESPONDING TO OUR REQUEST AND THOSE MARKED BY "ONE CALL**" LOCATORS. NO RESPONSIBILITY OR LIABILITY IS ASSUMED BY THE SURVEYOR FOR THE FAILURE TO SHOW ANY BURIED SERVICE AND/OR UTILITY LINES EVEN THOUGH THEY MAY EXIST. CONTACT "ONE CALL" (1-800-331-5666) PRIOR TO ANY EXCAVATION ON THIS SITE.

**TICKET NO. 150400555, DATED FEBRUARY 9, 2015

CONTROL NOTE

- HORIZONTAL DATUM IS BASED ON MODIFIED NEBRASKA STATE PLANE COORDINATES.
- VERTICAL DATUM IS BASED ON NAVD88 (GEOID-12A).

LAND SURVEYOR'S CERTIFICATION

I HEREBY CERTIFY THAT THIS TOPOGRAPHIC SURVEY WAS MADE BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF NEBRASKA.

DATE OF SIGNATURE:

LICENSED LAND SURVEYOR
JON L. CARRELL
LS-693
STATE OF NEBRASKA

CONTROL POINTS

CONTROL POINT #915	CONTROL POINT #918	CONTROL POINT #1113
5/8" REBAR	5/8" REBAR	5/8" REBAR
N-931.35	N-905.83	N-1168.54
E:1558.14	E:1888.66	E:1327.51
ELEV.:1124.51	ELEV.:1105.55	ELEV.:1123.70
(NAVD88)	(NAVD88)	(NAVD88)

FLOOD ZONE

ZONE X
AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN AS ILLUSTRATED BY FLOOD INSURANCE RATE MAP (FIRM), DOUGLAS COUNTY, NEBRASKA.
MAP NUMBER 31527C0332H
MAP EFFECTIVE DATE: DECEMBER 2, 2005
COMMUNITY NUMBER: 315274 0332 H

FLOOD ZONE REQUIREMENTS MAY BE SUBJECT TO CHANGE OR MODIFICATION BY THE LOCAL GOVERNING AUTHORITY. CONTACT THE LOCAL FLOOD PLAIN MANAGER OR OTHER APPROPRIATE OFFICIAL TO DISCOVER LOCAL ORDINANCES OR CHANGES IN REGULATIONS, FUTURE OR PROPOSED.

REVISIONS	DRAWN BY	DESIGNED BY	DATE	JOB NUMBER	BOOK AND PAGE
7/10/17 - RER	RER	JLC	1/15/17	0115153.01-130	18-153, 1-3

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Omaha, Nebraska 68154-2027
402.496.2498 | P
402.496.2730 | F
www.LRA-Inc.com

70TH AND OAK STREETS
OMAHA, DOUGLAS COUNTY, NEBRASKA

TOPOGRAPHIC SURVEY

SHEET 1 OF 1

LAMP RYNEARSON & ASSOCIATES
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CENTERLINE – OVERLOT GRADING
70TH AND OAK ST, OMAHA, NEBRASKA

ORIGINAL TOPOGRAPHIC SURVEY
FOR INFORMATION ONLY

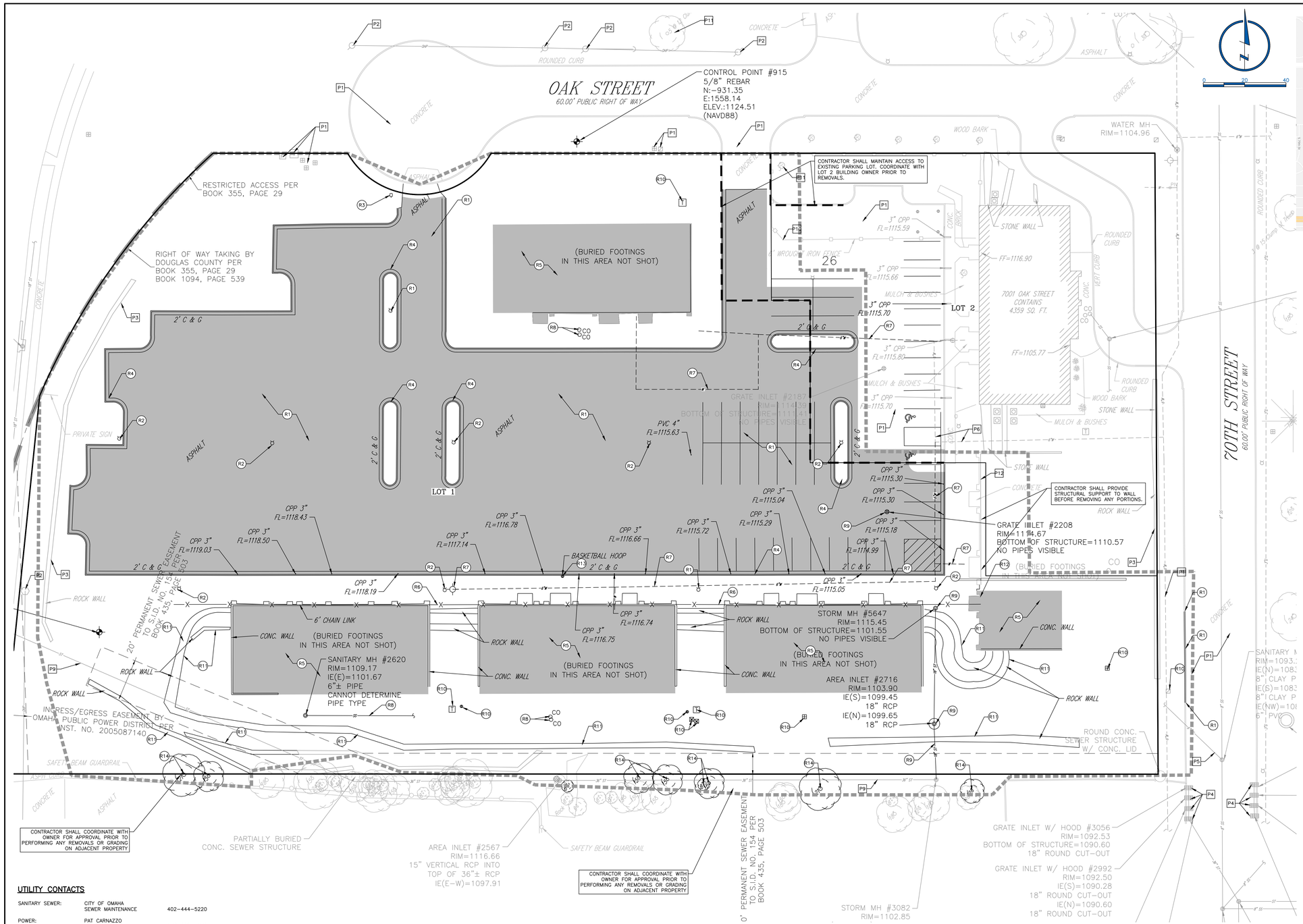
REVISIONS	DRAWN BY	DESIGNED BY	DATE	JOB NUMBER	BOOK AND PAGE
	PVG	RER	8/14/17	0115153.01-016	

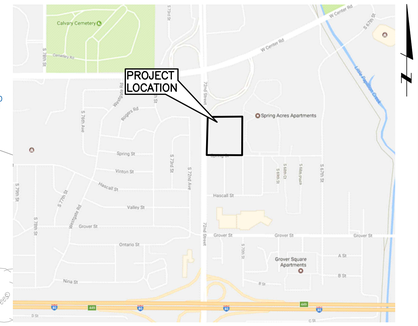
LAMP RYNEARSON - ENGINEERS

SHEET 3 OF 7

811 Know what's below. Call before you dig.

ALL UTILITIES ARE SHOWN BASED ON THE INFORMATION AVAILABLE TO THE ENGINEER. THERE IS NO GUARANTEE ALL FACILITIES ARE SHOWN OR THAT THE LOCATION, DEPTH, AND SIZE OF EACH FACILITY IS CORRECT. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES AND SERVICE LINES PRIOR TO CONSTRUCTION.





LOCATION MAP

REMOVAL NOTES

1. THE CONTRACTOR SHALL NOTIFY THE OWNER 72 HOURS IN ADVANCE IF EXISTING UTILITIES CONFLICT WITH NEW CONSTRUCTION OR IF TEMPORARY OUTAGES ARE ANTICIPATED, INCLUDING BUT NOT LIMITED TO WATER, GAS, POWER, CABLE TELEVISION AND TELEPHONE.
2. THE CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGES TO UTILITIES THAT ARE PERMITTED TO REMAIN IN PLACE. DAMAGES DUE DIRECTLY OR INDIRECTLY TO THE CONTRACTORS OPERATIONS SHALL BE PROMPTLY REPAIRED TO THE SATISFACTION OF THE ENGINEER/ARCHITECT AND THE OWNER OF THE PROPERTY, OR SHALL MAKE PAYMENT TO SUCH OWNERS FOR REPAIRS AS MAY BECOME NECESSARY ON ACCOUNT OF DAMAGES THAT ARE DUE TO HIS OPERATIONS.
3. THE CONTRACTOR SHALL MAKE HIMSELF AWARE OF ALL OF THE PERMANENT AND TEMPORARY UTILITY APPURTENANCES IN THEIR PRESENT AND/OR RELOCATED POSITIONS. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR ANY DELAYS, INCONVENIENCE, OR DAMAGE SUSTAINED DUE TO INTERFERENCE FROM THE SAID UTILITY APPURTENANCES OR THE OPERATION OF DISCONNECTING THEM, INCLUDING THE POSSIBILITY OF UNCOVERING UTILITIES THAT HAVE BEEN ABANDONED AND/OR ARE NOT INDICATED.
4. ALL DEMOLITION RUBBISH WILL BE REMOVED FROM THE SITE BY A LICENSED TRUCKING FIRM, IN COVERED TRUCKS, AND TAKEN TO A LICENSED LANDFILL. ALL THIS WILL BE PAID FOR BY THE CONTRACTOR AND WILL BE PART OF THE CONTRACTOR'S BASE BID.
5. COORDINATION WITH FIRE DEPARTMENTS AND UTILITY COMPANIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
6. NO BURNING OF MATERIALS WILL BE PERMITTED.
7. THE OWNER SHALL BE GIVEN 5 BUSINESS DAYS NOTICE BEFORE ANY ENTRANCE OR ACCESS DRIVE CLOSURES.
8. THE LIMITS OF DEMOLITION SHOWN ON THE DRAWINGS ARE APPROXIMATE. THE EXACT LIMITS WILL BE MARKED IN THE FIELD BY THE ENGINEER/ARCHITECT.
9. CONTRACTOR SHALL FIRST COORDINATE REMOVAL OF ANY EXISTING UTILITY WITH UTILITY OWNER (GAS, WATER, POWER, ETC.) ALL TELEPHONES, WATER, ELECTRIC AND GAS METERS, AND ASSOCIATED EQUIPMENT SHALL REMAIN THE PROPERTY OF THE VARIOUS UTILITY COMPANIES.
10. EXISTING PAVEMENT SHALL BE SAW-CUT AT LOCATIONS INDICATED AS REQUIRED FOR PAVEMENT REMOVAL. THE SAW-CUT SHALL BE MADE TO THE FULL DEPTH OF THE PAVEMENT.
11. WHERE INDICATED THE EXISTING PAVEMENT SHALL BE REMOVED AND LEGALLY DISPOSED OF OFF THE PROJECT SITE. CONTRACTOR SHALL NOT USE A HEAVY BALL FOR BREAKING UP OF EXISTING PAVEMENT OVER PUBLIC WATER AND GAS MAINS.
12. TRENCH AND BASEMENT BACKFILL AND ANY SUBGRADE SOILS DISTURBED BY THE PAVEMENT REMOVAL PROCESS SHALL BE RECOMPACTED AS SPECIFIED IN THE COMPACTION REQUIREMENTS TABLE OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
13. ALL BUILDINGS TO BE DEMOLISHED SHALL HAVE ALL UTILITIES DISCONNECTED INCLUDING GAS, WATER, POWER, SANITARY SEWER, STORM SEWER, TELEPHONES, AND CABLE TELEVISION.
14. ASBESTOS ABATEMENT OF ALL ASBESTOS CONTAINING MATERIALS SHALL BE COMPLETED AS REQUIRED PER REGULATORY AGENCIES.
15. BUILDINGS SHALL BE DEMOLISHED INCLUDING THE BASEMENT OR SLAB FOUNDATION AND ALL DEBRIS HAULED OFF-SITE AND DISPOSED. COMPLETELY FILL BELOW-GRADE AREAS AND VOIDS RESULTING FROM DEMOLITION OF BUILDINGS WITH SOIL MATERIALS ACCORDING TO THE REQUIREMENTS IN THE COMPACTION TABLE OR TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS.

UTILITY CONTACTS

SANITARY SEWER:	CITY OF OMAHA SEWER MAINTENANCE	402-444-5220
POWER:	PAT CARNAZZO OPPD	402-552-4905
TELEPHONE:	CENTURY LINK BUSINESS MARKETS GROUP	800-777-9594
CABLE TV:	COX BUSINESS SERVICES	402-934-6000
WATER:	CONTRACTOR SERVICES MUD	402-504-7987
GAS:	CONTRACTOR SERVICES MUD	402-504-7987

REMOVAL KEYNOTES

R1. REMOVE PAVEMENT.

R2. REMOVE LIGHT POLE AND FOOTING.

R3. REMOVE SIGN.

R4. REMOVE CURB AND GUTTER.

R5. REMOVE BUILDING FOUNDATION AND ASSOCIATED APPURTENANCES.

R6. REMOVE CHAIN LINK FENCE.

R7. REMOVE WATER LINE AND ASSOCIATED APPURTENANCES. CAP LINE AT TEE OFF EXISTING BUILDING SERVICE.

R8. REMOVE SANITARY SEWER SERVICE. CONSTRUCT PIPE PLUG AT PROPERTY LINE.

R9. REMOVE STORM SEWER PIPE AND STRUCTURES. PRIOR TO REMOVAL, CONTRACTOR SHALL DAYLIGHT OR TEMPORARILY ROUTE ACTIVE UPSTREAM STORM SEWER PIPES TO EXISTING STORM SEWER.

R10. REMOVE TRANSFORMER AND ASSOCIATED ELECTRICAL LINES, COORDINATE REMOVAL WITH OPPD.

R11. REMOVE ROCK WALL.

R12. REMOVE FOUNDATION WALL. CONTRACTOR SHALL PROVIDE STRUCTURAL SUPPORT TO PORTION OF WALL TO REMAIN PRIOR TO REMOVAL.

R13. REMOVE BASKETBALL HOOP.

R14. REMOVE TREE. NO TREE REMOVAL SHALL TAKE PLACE BETWEEN APRIL 1ST AND SEPTEMBER 1ST UNLESS A MIGRATORY BIRD SURVEY IS PERFORMED PRIOR TO REMOVAL IN ACCORDANCE WITH THE MIGRATORY BIRD ACT.

PROTECT KEYNOTES

P1. PROTECT PAVEMENT.

P2. PROTECT LIGHTPOLE.

P3. PROTECT ROCK WALL.

P4. PROTECT GRATE INLET.

P5. PROTECT EXISTING SANITARY SEWER.

P6. PROTECT EXISTING WATER LINE.

P9. PROTECT EXISTING STORM SEWER.

P10. PROTECT IRON FENCE.

P11. PROTECT EXISTING TREES AND SHRUBS.

P12. PROTECT FOUNDATION WALL.

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Know what's **below.** **Call** before you dig.

CONTROL POINTS

CONTROL POINT #915 5/8" REBAR N:-931.35 E:1558.14 ELEV.:1124.51 (NAVD88)	CONTROL POINT #918 5/8" REBAR N:-905.83 E:1888.66 ELEV.:1105.55 (NAVD88)	CONTROL POINT #1113 5/8" REBAR N:-1168.54 E:1327.51 ELEV.:1123.70 (NAVD88)

DRAWN BY PVG
DESIGNED BY RBK
DATE 6/12/2017
JOB NUMBER LAR05-11065
0115163.01-016
BOOK AND PAGE

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CENTERLINE – OVERLOT GRADING
70TH AND OAK ST, OMAHA, NEBRASKA

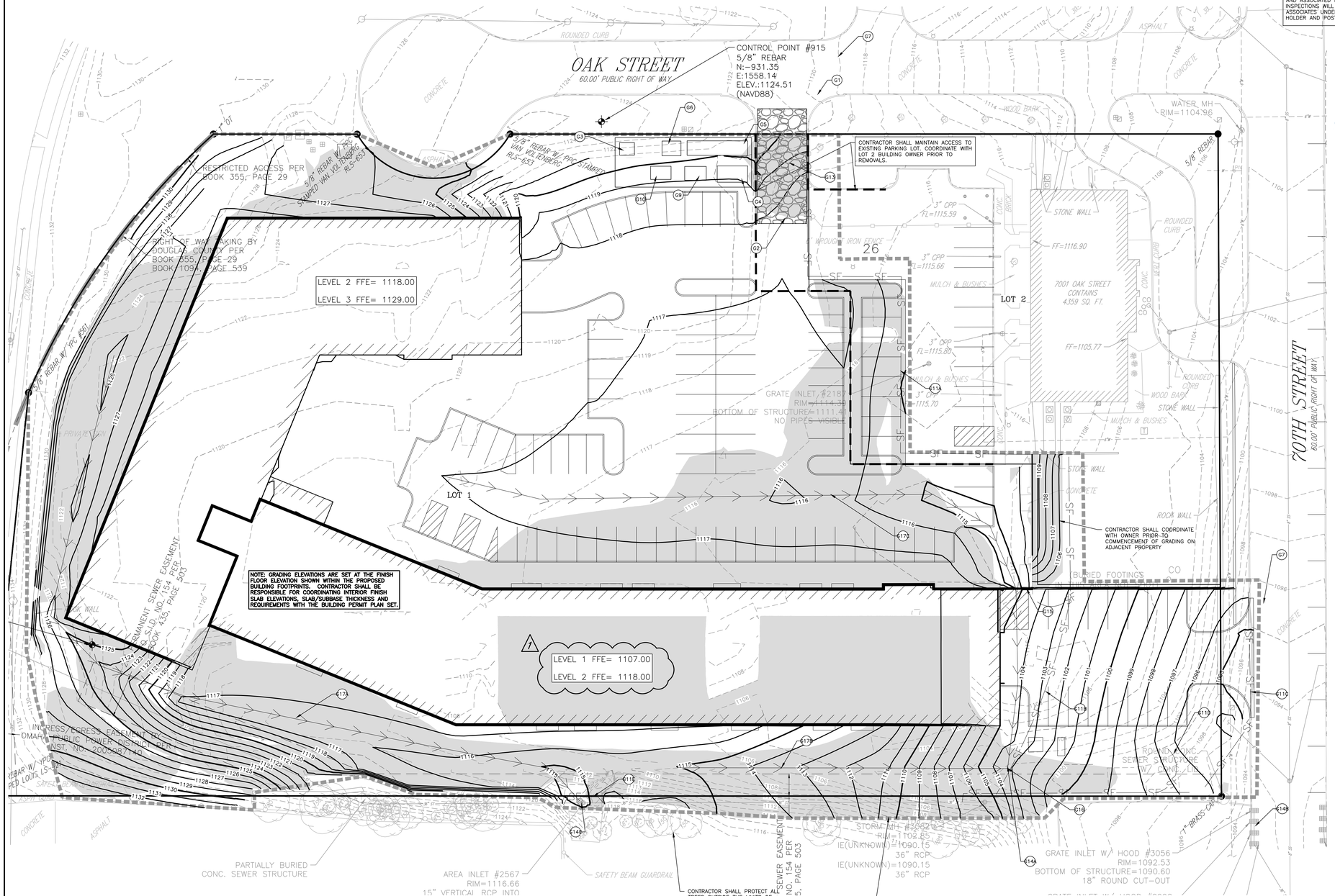
REMOVAL PLAN

LAMP RYNEARSON - ENGINEERS

SHEET 4 OF 7

THIS WORK SHALL BE PERFORMED UNDER THE AUTHORIZATION OF THE EXISTING GRADING PERMIT OMA-20170523-4121-GP2 AND ASSOCIATED NPDES PERMIT NER 160000. ALL REQUIRED INSPECTIONS WILL BE CONDUCTED BY LAMP, RYNEARSON AND ASSOCIATES UNDER THE AUTHORITY OF THE EXISTING PERMIT HOLDER AND POSTED ON THE PCWPE WEBSITE.

OMA-20170523-4121-GP2



ELEVATION NOTES

1. PROPOSED CONTOURS ARE FINISHED GRADE/TOP OF PAVEMENT ELEVATIONS. NOT SUBGRADE ELEVATIONS.
2. ALL SPOT ELEVATIONS IN PAVEMENT ARE TOP OF SLAB UNLESS NOTED OTHERWISE.

7

LEGEND

- CONTOUR
- CONTOUR
- FILL AREA
- STABILIZED ACCESS ROAD
- SILT FENCE
- INTERCEPTOR SWALE
- LIMITS OF CONSTRUCTION, GRADING, CLEARING & GRUBBING AND REMOVALS

GRADING KEYNOTES

G1. CONTRACTOR SHALL INSTALL AND MAINTAIN A SWPPP NOTIFICATION SIGN PER STANDARD SPECIFICATION 9.6.7, OMAHA REGIONAL STORMWATER DRAINAGE MANUAL.

G2. CONTRACTOR SHALL INSTALL AND MAINTAIN A STABILIZED VEHICLE AND EQUIPMENT PARKING AREA.

G3. CONTRACTOR SHALL INSTALL AND MAINTAIN A SANITARY WASTE RECEPTACLE AS NEEDED OR REQUIRED PER STANDARD SPECIFICATION 9.6.2, OMAHA REGIONAL STORMWATER DRAINAGE MANUAL.

G4. CONTRACTOR SHALL INSTALL AND MAINTAIN A DESIGNATED VEHICLE AND EQUIPMENT FUELING AREA AS NEEDED OR REQUIRED PER STANDARD STANDARD SPECIFICATION 9.6.6, OMAHA REGIONAL STORMWATER DRAINAGE MANUAL.

G5. PROPOSED LOCATION OF JOB TRAILER AS NEEDED OR REQUIRED. ANY ALTERNATE LOCATION MUST BE APPROVED BY ENGINEER.

G6. CONTRACTOR SHALL INSTALL AND MAINTAIN A DESIGNATED MATERIAL DELIVERY AND STORAGE AREA AS NEEDED OR REQUIRED PER STANDARD SPECIFICATION 9.6.4, OMAHA REGIONAL STORMWATER DRAINAGE MANUAL; ALTERNATIVE LOCATION MUST BE APPROVED BY THE ENGINEER.

G7. AS REQUIRED, THE CONTRACTOR SHALL IMPLEMENT STREET CLEANING/SWEEPING PRACTICES PER STANDARD SPECIFICATION 9.6.5, OMAHA REGIONAL STORMWATER DRAINAGE MANUAL.

G8. AS NECESSARY, CONTRACTOR SHALL IMPLEMENT DUST CONTROL MEASURES PER STANDARD SPECIFICATION 9.5.16, OMAHA REGIONAL STORMWATER DRAINAGE MANUAL.

G9. CONTRACTOR SHALL INSTALL AND MAINTAIN A CONCRETE WASHOUT PIT AS NEEDED OR REQUIRED.

G10. CONTRACTOR SHALL INSTALL AND MAINTAIN A DESIGNATED SOLID WASTE RECEPTACLE PER STANDARD SPECIFICATION 9.6.3, OMAHA REGIONAL STORMWATER DRAINAGE MANUAL.

G11. CONTRACTOR SHALL INSTALL AND MAINTAIN SILT FENCE AS SHOWN PER STANDARD SPECIFICATION 9.5.4, OMAHA REGIONAL STORMWATER DRAINAGE MANUAL.

G12. CONTRACTOR SHALL SEED ALL DISTURBED AREAS THAT ARE TO REMAIN INACTIVE FOR 14 DAYS OR GREATER WITH TEMPORARY SEED MIX .

G13. CONTRACTOR SHALL INSTALL AND MAINTAIN A STABILIZED CONSTRUCTION ENTRANCE PER STANDARD SPECIFICATION 9.5.2, OMAHA REGIONAL STORMWATER DRAINAGE MANUAL.

G14. CONTRACTOR SHALL INSTALL AND MAINTAIN INLET PROTECTION PER DETAIL THIS SHEET.

G15. FUTURE RETAINING WALL TO BE DESIGNED WITH BUILDING PERMIT PLAN SET. SEE BUILDING PERMIT SET FOR FURTHER INFORMATION.

G16. CONTRACTOR SHALL UTILIZE EXISTING AREA INLET OR CONSTRUCT TEMPORARY INLET TO MAINTAIN SITE DRAINAGE.

G17. CONTRACTOR SHALL CONSTRUCT INTERCEPTOR SWALE TO DRAIN FUTURE LOW POINTS TO EXISTING SEWER INFRASTRUCTURE.

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7

APPROXIMATE EARTHWORK VOLUME SUMMARY:

CUT:
CUT VOLUME = 8685 CY
REDUCTION IN CUT VOLUME DUE TO EXISTING PAVEMENT = -955 CY
INCREASE IN CUT VOLUME DUE TO PROPOSED PAVEMENT = 3010 CY
FUTURE CUT ON SITE FROM UG CHAMBER CONSTRUCTION = 450 CY
TOTAL SOIL VOLUME GENERATED ON-SITE = 8685 - 955 + 3010 + 450 = 11190 CY

FILL:
FILL VOLUME (UNADJUSTED) = 5610 CY
TOTAL FILL VOLUME REQUIRED (ADJUSTED BY 1.4 COMPACTION FACTOR) = 5610 X 1.4 = 7850 CY

BALANCE:
*TOTAL HAUL OFF REQUIRED = 11190 - 7850 = 3340 CY

*NOTE: THIS IS AN APPROXIMATION BASED UPON AN ASSUMED SLAB THICKNESS OF 6" FOR ALL FUTURE PAVING SLABS AND 18" FOR BUILDING SLAB AND SUBBASE. CONTRACTOR IS RESPONSIBLE FOR VERIFYING QUANTITIES LISTED AND COORDINATIONG SLAB THICKNESSES WITH THE BUILDING PERMIT PLAN SET. QUANTITIES DO NO INCLUDE ANY ADJUSTMENT FOR FOR SURCHARGE OR FOUNDATION OVERCUT, SEE SHEET 7 AND THE GEOTECH REPORT FOR MORE INFORMATION.

CONTROL POINTS

CONTROL POINT #915	CONTROL POINT #918	CONTROL POINT #1113
5/8" REBAR	5/8" REBAR	5/8" REBAR
N:-931.35	N:-905.83	N:-1168.54
E:1558.14	E:1888.66	E:1327.51
ELEV.:1124.51	ELEV.:1105.55	ELEV.:1123.70
(NAVD88)	(NAVD88)	(NAVD88)

FINAL STABILIZATION MEASURES TO BE DESIGNED AS PART OF THE BUILDING PERMIT PLAN SET

NOTE:
SEE SHEET THIS FOR EROSION CONTROL MEASURES TO BE INSTALLED. THESE ARE PROPOSED LOCATIONS. IF THE CONTRACTOR WISHES TO USE ALTERNATE LOCATIONS IT MUST BE APPROVED BY THE ENGINEER.

COMPACTION REQUIREMENTS TABLE

SEE GEOTECHNICAL ENGINEERING REPORT:	70TH AND OAK STREET		
PREPARED BY:	TERRACON (402) 330 - 2202		
ENGINEER:	MICHAEL D RINGLER		
PROJECT NO:	05175005		
DATED:	MARCH 27, 2017		
MAX. DEPTH OF LIFT FOR FILL (MEASURED LOOSE)	8"		
AREA	TEST	COMPACTION	MOISTURE
UTILITY TRENCH BACKFILL (DEPTH < 5')	STANDARD PROCTOR	95%	-1/+3
UTILITY TRENCH BACKFILL (DEPTH > 5')	STANDARD PROCTOR	95%	-1/+3
PCC PAVEMENT SUBGRADE (UPPER 8")	STANDARD PROCTOR	98%	-1/+3
ACC PAVEMENT SUBGRADE (UPPER 12")	MODIFIED PROCTOR	95%	-1/+3
PAVEMENT SUBGRADE (DEPTH > 12")	STANDARD PROCTOR	95%	-1/+3
MANHOLE + STRUCTURE BACKFILL (FULL DEPTH)	STANDARD PROCTOR	95%	-3/+4
SIDEWALK SUBGRADE (UPPER 6")	STANDARD PROCTOR	95%	-1/+3
ALL OTHER FILL	STANDARD PROCTOR	95%	-1/+3

NOTES:

1. STANDARD PROCTOR SHALL BE DETERMINED IN ACCORDANCE WITH ASTM D 698.
2. MODIFIED PROCTOR SHALL BE DETERMINED IN ACCORDANCE WITH ASTM D 1557.

EROSION CONTROL SUMMARY TABLE

TOTAL AREA OF SITE	3.64 AC.
DISTURBED AREA	3.01 AC.
EROSION CONTROL MEASURES:	SILT FENCE, ROCK ACCESS ROAD, INLET PROTECTION, AND SEEDING

DRAWN BY	PVG
DESIGNED BY	RBK
DATE	
JOB NUMBER	01151630.01-016
BOOK AND PAGE	

REVISIONS: PVG 6/27/2017

LAMP RYNEARSON & ASSOCIATES
14710 West Dodge Road, Suite 100 402.496.2498 | P
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www.LRA-inc.com

CENTERLINE - OVERLOT GRADING
70TH AND OAK ST, OMAHA, NEBRASKA

GRADING AND STORMWATER POLLUTION PREVENTION PLAN

LAMP RYNEARSON - ENGINEERS

7-11-17

SHEET 5 OF 7

L:\Engineering\01151630 70th and Oak Apartments <dbx\drawings\CONSTRUCTION DRAWINGS\01151630-GP2-01.dwg, 7/11/2017 1:45:40 PM, PAUL GARGARELLA, LAMP RYNEARSON & ASSOCIATES

THIS WORK SHALL BE PERFORMED UNDER THE AUTHORIZATION OF THE EXISTING GRADING PERMIT OMA-20170523-4121-GP2 AND ASSOCIATED NPDES PERMIT NER 160000. ALL REQUIRED INSPECTIONS WILL BE CONDUCTED BY LAMP, RYNEARSON AND ASSOCIATES UNDER THE AUTHORITY OF THE EXISTING PERMIT HOLDER AND POSTED ON THE PCWPE WEBSITE.

OMA-20170523-4121-GP2

GENERAL NOTES

1. ALL OPERATORS/CONTRACTORS MUST CONFIRM WITH THE APPLICANT THAT ANY AND ALL APPLICABLE GOVERNMENTAL APPROVALS HAVE BEEN RECEIVED PRIOR TO THE START OF WORK.

2. BMP'S MAY NOT BE REMOVED WITHOUT INSPECTOR AND APPLICABLE GOVERNMENTAL APPROVAL.

3. THE APPLICANT, INSPECTOR, AND CONTRACTORS/OPERATORS MUST ADHERE TO ALL GOOD HOUSEKEEPING BMP'S PRESENTED
WITHIN THE OMAHA REGIONAL STORMWATER DESIGN MANUAL CHAPTER 9 SECTION 9.6. GOOD HOUSEKEEPING BMP'S FOCUS ON KEEPING THE WORK SITE CLEAN AND ORDERLY WHILE HANDLING MATERIALS AND WASTE IN A MANNER THAT ELIMINATES THE POTENTIAL FOR POLLUTANT RUNOFF. GOOD HOUSEKEEPING BMP'S SUCH AS SANITARY WASTE MANAGEMENT (9.6.2), SOLID WASTE MANAGEMENT (9.6.3), MATERIAL DELIVERY & STORAGE (9.6.4), STREET CLEANING / SWEEPING (9.6.5), AND VEHICLE & EQUIPMENT FUELING (9.6.6) MUST BE ADDRESSED WHEN APPLICABLE. THE AFOREMENTIONED PUBLICATION CAN BE FOUND AT HTTP://WWW.OMAHASTORMWATER.ORG.

4. THE SWPPP DOCUMENTS (E.G., NDEQ-NPDES, SWPPP-SM, SWPPP-N, ETC.) ARE ESSENTIAL AND A REQUIREMENT IN ONE PART IS AS BINDING AS THOUGH OCCURRING IN ALL. THE SWPPP DOCUMENTS ARE COMPLEMENTARY. THE DOCUMENTS DESCRIBE AND PROVIDE THE COMPLETE SWPPP. THE APPLICANT, INSPECTOR, AND/OR CONTRACTORS/OPERATORS MAY NOT TAKE ADVANTAGE OF ANY APPARENT SWPPP ERRORS OR OMISSIONS. THE INSPECTOR SHALL NOTIFY THE APPLICANT, DESIGNER, AND CONTRACTORS/OPERATORS PROMPTLY OF ANY OMISSIONS OR ERRORS. THE APPLICANT SHALL INSTRUCT THE DESIGNER TO MAKE ANY CORRECTIONS NECESSARY TO FULFILL THE OVERALL INTENT OF THE SWPPP DOCUMENTS (E.G., GRADING PERMIT MODIFICATION FORM). IN THE CASE OF A DISCREPANCY BETWEEN PARTS OF THE SWPPP DOCUMENTS, THE MOST STRINGENT REQUIREMENT SHALL RULE.

BMP'S MAINTENANCE SCHEDULE

THE FOLLOWING MAINTENANCE SCHEDULE HAS BEEN PROVIDED. THE INSPECTOR MUST PERFORM THE INSPECTIONS. THE OPERATOR/CONTRACTOR MUST PERFORM ALL NEEDED MAINTENANCE. FURTHERMORE, ALL EROSION CONTROL FEATURE REQUIRING MAINTENANCE MAY NOT BE LISTED BELOW. THE OPERATOR/CONTRACTOR AND INSPECTOR MUST PERFORM THEIR RESPECTIVE DUTIES ON ALL BMP'S THAT ARE NOT LISTED BELOW AS WELL.

1. CONSTRUCTION ENTRANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR THE WASHING AND REWORKING OF EXISTING STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY STRUCTURES USED TO TRAP SEDIMENT. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY. THE USE OF WATER TRUCKS TO REMOVE MATERIALS DROPPED, WASHED, OR TRACKED ONTO ROADWAYS WILL NOT BE PERMITTED UNDER ANY CIRCUMSTANCES.

2. SILT FENCE – THE MAINTENANCE MEASURES ARE AS FOLLOWS: (2.1) SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL, ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY; (2.2) CLOSE ATTENTION SHALL BE PAID TO THE REPAIR OF DAMAGED SILT FENCE RESULTING FROM END RUNS AND UNDERCUTTING; (2.3) SHOULD THE FABRIC ON A SILT FENCE DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE AND THE BARRIER IS STILL NECESSARY, THE FABRIC SHALL BE REPLACED PROMPTLY; (2.4) SEDIMENT DEPOSITS MUST BE REMOVED WHEN THE LEVEL OF DEPOSITION REACHES APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER; AND (2.5) ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.

3. STORM DRAIN INLET PROTECTION – THE MAINTENANCE MEASURES ARE AS FOLLOWS: (3.1) STRUCTURES SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NECESSARY AND (3.2) STRUCTURES SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE REMAINING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

4. TEMPORARY DIVERSION DIKE – THE MEASURE SHALL BE INSPECTED AFTER EVERY STORM AND REPAIRS MADE TO THE DIKE, FLOW CHANNEL, OUTLET OR SEDIMENT TRAPPING FACILITY, AS NECESSARY. ONCE EVERY TWO WEEKS, WHETHER A STORM EVENT HAS OCCURRED OR NOT, THE MEASURE SHALL BE INSPECTED AND REPAIRS MADE IF NEEDED. DAMAGES CAUSED BY CONSTRUCTION TRAFFIC OR OTHER ACTIVITY MUST BE REPAIRED BEFORE THE END OF EACH WORKING DAY.

5. TEMPORARY FILL DIVERSION – SINCE THE PRACTICE IS TEMPORARY AND UNDER MOST SITUATIONS WILL BE COVERED THE NEXT WORKING DAY. THE MAINTENANCE REQUIRED SHOULD BE LOW. IF THE PRACTICE IS TO REMAIN IN USE FOR MORE THAN ONE DAY, AN INSPECTION SHALL BE MADE AT THE END OF EACH WORK DAY AND REPAIRS MADE TO THE MEASURE IF NEEDED. THE OPERATOR/CONTRACTOR SHOULD AVOID THE PLACEMENT OF ANY MATERIAL OVER THE STRUCTURE WHILE IT IS IN USE. CONSTRUCTION TRAFFIC SHOULD NOT BE PERMITTED TO CROSS THE DIVERSION.

6. TEMPORARY SEEDING – AREAS WHICH FAIL TO ESTABLISH VEGETATIVE COVER ADEQUATE TO PREVENT RILL EROSION WILL BE RE-SEEDED AS SOON AS SUCH AREAS ARE IDENTIFIED. CONTROL WEEDS BY MOWING.

7. PERMANENT SEEDING – THE MAINTENANCE MEASURES ARE AS FOLLOWS: (9.1) IN GENERAL, A STAND OF VEGETATION CANNOT BE DETERMINED TO BE FULLY ESTABLISHED UNTIL IT HAS BEEN MAINTAINED FOR ONE FULL YEAR AFTER PLANNING; (9.2) NEW SEEDLINGS SHALL BE SUPPLIED WITH ADEQUATE MOISTURE, SUPPLY WATER AS NEEDED, ESPECIALLY LATE IN THE SEASON, IN ABNORMALLY HOT OR DRY CONDITIONS, OR ON ADVERSE SITES. WATER APPLICATIONS SHALL BE CONTROLLED TO PREVENT EXCESSIVE RUNOFF; (9.3) INSPECT ALL SEEDED AREAS FOR FAILURES AND MAKE NECESSARY REPAIRS, REPLACEMENTS, AND RESEEDINGS WITHIN THE PLANTING SEASON, IF POSSIBLE; [9.3.A] IF STAND IS INADEQUATE FOR EROSION CONTROL, OVER SEED AND FERTILIZE USING HALF OF THE RATES ORIGINALLY SPECIFIED; [9.3.B] IF STAND IS 60% DAMAGED, RE-ESTABLISH FOLLOWING SEEDBED AND SEEDING RECOMMENDATIONS; [9.3.C] IF STAND HAS LESS THAN 40% COVER, RE-EVALUATE CHOICE OF PLANT MATERIALS AND QUANTITIES OF LIME AND FERTILIZER, THE SOIL MUST BE TESTED TO DETERMINE IF ACIDITY OR NUTRIENT IMBALANCES ARE RESPONSIBLE, RE-ESTABLISH THE STAND FOLLOWING SEEDBED AND SEEDING RECOMMENDATIONS.

8. MULCHING – ALL MULCHES AND SOIL COVERINGS SHOULD BE INSPECTED PERIODICALLY (PARTICULARLY AFTER RAINSTORMS) TO CHECK FOR EROSION. WHERE EROSION IS OBSERVED IN MULCHED AREAS, ADDITIONAL MULCH SHOULD BE APPLIED. NETS AND MATS SHOULD BE INSPECTED AFTER RAINSTORMS FOR DISLOCATION OR FAILURE. IF WASHOUTS OR BREAKAGE OCCUR, REINSTALL NETTING OR MATTING AS NECESSARY AFTER REPAIRING DAMAGE TO THE SLOPE OR DITCH. INSPECTIONS SHOULD TAKE PLACE UNTIL GRASSES ARE FIRMLY ESTABLISHED, WHERE MULCH IS USED IN CONJUNCTION WITH ORNAMENTAL PLANTINGS, INSPECT PERIODICALLY THROUGHOUT THE YEAR TO DETERMINE IF MULCH IS MAINTAINING COVERAGE OF THE SOIL SURFACE; REPAIR AS NEEDED.

9. SOIL STABILIZATION BLANKETS & MATTING – ALL SOIL STABILIZATION BLANKETS AND MATTING SHOULD BE INSPECTED PERIODICALLY FOLLOWING INSTALLATION, PARTICULARLY AFTER RAINSTORMS TO CHECK FOR EROSION AND UNDERMINING. ANY DISLOCATION OR FAILURE SHOULD BE REPAIRED IMMEDIATELY. IF WASHOUTS OR BREAKAGE OCCURS, REINSTALL THE MATERIAL AFTER REPAIRING DAMAGE TO THE SLOPE OR DITCH. CONTINUE TO MONITOR THESE AREAS UNTIL WHICH TIME THEY BECOME PERMANENTLY STABILIZED; AT THAT TIME AN ANNUAL INSPECTIONS SHOULD BE ADEQUATE.

10. STREET CLEANING / SWEEPING – THE MAINTENANCE MEASURES ARE AS FOLLOWS: (12.1) EVALUATE ACCESS POINTS DAILY FOR SEDIMENT TRACKING; (12.2) WHEN TRACKED OR SPILLED SEDIMENT IS FOUND ON PAVED SURFACES, IT WILL BE REMOVED DAILY, DURING TIMES OF HEAVY TRACK-OUT, SUCH AS DURING RAINS, CLEANING MAY BE DONE SEVERAL TIMES THROUGHOUT THE DAY; (12.3) UNKNOWN SPILLS OR OBJECTS WILL NOT BE MIXED WITH THE SEDIMENT; AND (12.4) IF SEDIMENT IS MIXED WITH OTHER POLLUTANTS, IT WILL BE DISPOSED OF PROPERLY AT AN AUTHORIZED LANDFILL.

CONSTRUCTION ACTIVITIES & SCHEDULE

ACTIVITY	SCHEDULE
INSTALL ALL BMP'S NEEDED AND ASSOCIATED WITH THE GRADING PHASE SUCH AS STABILIZED CONSTRUCTION ENTRANCES, SEDIMENT BASINS, RISER PIPES, OUTLET PIPES, SEDIMENT TRAPS, SILT FENCE, DIVERSIONS, TERRACES AND ETCETERA.	PRIOR TO ANY STRIPPING OF EXISTING VEGETATION OR GRADING.
PROCEED WITH STRIPPING OF EXISTING VEGETATION AND GRADING IN ACCORDANCE WITH THE GRADING PLAN, WHILE DISTURBING NO MORE THAN NECESSARY.	AFTER INSTALLING ALL BMP'S NEEDED AND ASSOCIATED WITH THE GRADING PHASE. FURTHERMORE, INSPECTOR APPROVAL MUST BE OBTAINED BEFORE THE START OF ANY STRIPPING OF EXISTING VEGETATION OR GRADING.
PROCEED WITH INFRASTRUCTURE INSTALLATION.	INFRASTRUCTURE INSTALLATION MUST OCCUR PRIOR TO ANY LOT DEVELOPMENT.
IMPLEMENT THE INSTALLATION OF TEMPORARY SEEDING, PERMANENT SEEDING, AND/OR MULCHING.	STABILIZATION MEASURES MUST BE INITIATED AS SOON AS POSSIBLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.
IMPLEMENT THE INSTALLATION ALL BMP'S NEEDED AND ASSOCIATED WITH THE BUILDING PHASE.	BUILDING PHASE BMP'S MUST BE INSTALLED CONCURRENTLY WITH LOT DEVELOPMENT.
PROCEED WITH REMOVAL OF BMP'S.	BMP'S MAY NOT BE REMOVED UNTIL EACH IMPACTED DRAINAGE BASIN HAS BEEN FULLY DEVELOPED; FULL DEVELOPMENT SHALL MEAN INSTALLATION OF PAVEMENT, BUILDINGS, AND UTILITIES, LANDSCAPING, AND FULLY ESTABLISHED PERMANENT SEEDING. FURTHERMORE, INSPECTOR APPROVAL MUST BE OBTAINED BEFORE THE REMOVAL OF ANY BMP'S.

STANDARD DETAILS

NUMBER	NAME	LOCATION
9.5.2	CONSTRUCTION ENTRANCE	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.4	SILT FENCE	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.5	STORM DRAIN INLET PROTECTION	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.7	TEMPORARY DIVERSION DIKE	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.8	TEMPORARY FILL DIVERSION	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.14	TEMPORARY SEDIMENT TRAP	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.15	TEMPORARY SEDIMENT BASIN	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.16	DUST CONTROL	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.19	TEMPORARY SEEDING	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.20	PERMANENT SEEDING	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.22	MULCHING	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.5.23	SOIL STABILIZATION BLANKETS & MATTING	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.6.2	SANITARY WASTE MANAGEMENT	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.6.3	SOLID WASTE MANAGEMENT	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.6.4	MATERIAL DELIVERY AND STORAGE	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.6.5	STREET CLEANING / SWEEPING	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.6.6	VEHICLE AND EQUIPMENT FUELING	OMAHA REGIONAL STORMWATER DESIGN MANUAL
9.6.7	SWPPP NOTIFICATION SIGN	OMAHA REGIONAL STORMWATER DESIGN MANUAL

THE OMAHA REGIONAL STORMWATER DESIGN MANUAL CAN BE FOUND AT HTTP://WWW.OMAHASTORMWATER.ORG.

BMP RESPONSIBILITY TABLE

MAJOR ACTIVITY	CONTROL MEASURES	TIMING	RESPONSIBLE PARTY
GRADING	ROCK ACCESS ROAD	PRIOR TO STRIPPING	GENERAL CONTRACTOR
	SILT BASINS	PRIOR TO STRIPPING	GENERAL CONTRACTOR
	SILT FENCE	PRIOR TO STRIPPING	GENERAL CONTRACTOR
	TRASH CONTAINERS	PRIOR TO STRIPPING	GENERAL CONTRACTOR
	RESTROOM FACILITIES	PRIOR TO STRIPPING	GENERAL CONTRACTOR
	FUEL CONTAINMENT	PRIOR TO STRIPPING	GENERAL CONTRACTOR
	AREA CLEANUP OF ANY TRACKED MUD/DIRT FROM ADJACENT STREETS	DAILY	GENERAL CONTRACTOR
	USE OF WATER TRUCK TO CONTROL WINDBLOWN DUST	AS OFTEN AS NEEDED AND AS RECOMMENDED BY INSPECTOR	GENERAL CONTRACTOR
SEWERS	CONTINUE TO UTILIZE AND MAINTAIN ITEMS LISTED UNDER GRADING CONTROL MEASURES	AS OFTEN AS NEEDED AND AS RECOMMENDED BY INSPECTOR	GENERAL CONTRACTOR
PAVING	CONTINUE TO UTILIZE AND MAINTAIN ITEMS LISTED UNDER GRADING CONTROL MEASURES	AS OFTEN AS NEEDED AND AS RECOMMENDED BY INSPECTOR	GENERAL CONTRACTOR
	CLEAN ONSITE PAVEMENT TO REMOVE MUD AND DIRT	AS OFTEN AS NEEDED AND AS RECOMMENDED BY INSPECTOR	GENERAL CONTRACTOR
WATER, POWER, GAS AND UTILITIES	CONTINUE TO UTILIZE AND MAINTAIN ITEMS LISTED UNDER GRADING, SEWERS AND PAVING	AS OFTEN AS NEEDED AND AS RECOMMENDED BY INSPECTOR	GENERAL CONTRACTOR
BUILDING CONSTRUCTION	CLEAN ONSITE PAVEMENT TO REMOVE MUD/DIRT FROM ADJACENT STREETS	PRIOR TO DISTURBANCE OF LOT	GENERAL CONTRACTOR
	PERIODIC STREET SWEEPING TO MANAGE SEDIMENTATION	AS OFTEN AS NEEDED TO PREVENT MIGRATION OF SEDIMENT	GENERAL CONTRACTOR

SITE INFORMATION

AUGUST 2017 — ESTIMATED START DATE	OMA-20170523-4121-GP2 — PCWP PROJECT NUMBER	CSW-201701809 — NDEQ NOI NUMBER
70TH AND OAK APARTMENTS — PROJECT NAME		3036 S 70TH STREET — ADDRESS
N/A — SUBDIVISION NAME	N/A — S&B#	OMAHA — CITY; DOUGLAS — COUNTY
41.232091 — LATITUDE	-96.022643 — LONGITUDE	NEBRASKA — STATE; 68106 — ZIP CODE

TOTAL SITE AREA (ACRES)	3.64	ESTIMATED PERMIT DURATION (MONTHS)	18
DISTURBED AREA (ACRES)	3.01	CUT VOLUME (YD^3)	9465
UNDISTURBED AREA (ACRES)	0.63	FILL VOLUME (YD^3)	6510
IMPERVIOUS AREA BEFORE CONSTRUCTION (%)	38	RUNOFF COEFFICIENT BEFORE CONSTRUCTION	0.61
IMPERVIOUS AREA AFTER CONSTRUCTION (%)	62	RUNOFF COEFFICIENT AFTER CONSTRUCTION	0.72

7

APPLICANT SWPPP CERTIFICATION

LAWNFIELD DEVELOPMENT, LP — BUSINESS NAME	JROYER@J-DEV.COM — REPRESENTATIVE'S EMAIL ADDRESS	402-960-6788 — PHONE NUMBER
JIM ROYER — REPRESENTATIVE'S NAME	2430 S. 73RD ST, STE 200 — ADDRESS	N/A — FAX NUMBER
N/A — PROJECT # ASSIGNED BY APPLICANT	OMAHA — CITY; NE — STATE	68124 — ZIP CODE

DESIGNER		INSPECTOR	
LAMP, RYNEARSON & ASSOCIATES, INC. — BUSINESS NAME	RANDY KUSZAK — REPRESENTATIVE'S NAME	LAMP, RYNEARSON & ASSOCIATES, INC. — BUSINESS NAME	MATT NELSON — REPRESENTATIVE'S NAME
14710 WEST DODGE RD., STE 100 — ADDRESS	RANDY.KUSZAK@LRA-INC.COM — REPRESENTATIVE'S EMAIL ADDRESS	14710 WEST DODGE RD., STE 100 — ADDRESS	MATT.NELSON@LRA-INC.COM — REPRESENTATIVE'S EMAIL ADDRESS
OMAHA, NE 68154 — CITY, STATE, & ZIP CODE	N/A — PROJECT # ASSIGNED BY DESIGNER	OMAHA, NE 68154 — CITY, STATE, & ZIP CODE	N/A — PROJECT # ASSIGNED BY INSPECTOR
402-496-2498 — PHONE NUMBER	402-496-2730 — FAX NUMBER	402-496-2498 — PHONE NUMBER	402-496-2730 — FAX NUMBER

I HEREBY AGREE TO ACT AS APPLICANT IN ASSOCIATION WITH THIS SWPPP. FURTHERMORE, I CERTIFY UNDER PENALTY OF LAW THE FOLLOWING: (1) THAT, THIS DOCUMENT AND ALL SUPPORTING INFORMATION HAS BEEN PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED; (2) THAT, I UNDERSTAND AND AGREE TO ABIDE BY THE TERMS AND CONDITIONS CONTAINED WITHIN THIS STORM WATER POLLUTION PREVENTION PLAN — SITE MAP (SWPPP-SM), THE ASSOCIATED STORM WATER POLLUTION PREVENTION PLAN — NARRATIVE (SWPPP-N), AND THE PCWP GRADING PERMIT TERMS (HTTP://WWW.PCWPEROSIONCONTROL.ORG); (3) THAT, TO THE BEST OF MY KNOWLEDGE AND BELIEF INFORMATION CONTAINED IN THIS SWPPP IS TRUE, COMPLETE, AND ACCURATE; (4) THAT, THE SWPPP HAS BEEN REPRESENTED AND WARRANTED TO CONFORM TO ALL APPLICABLE STANDARDS, CRITERIA, ORDINANCES, LAWS, RULES, AND REGULATIONS ENACTED BY THE -- [A] PCWP AND ITS MEMBERS, [B] DOUGLAS COUNTY, [C] SARPY COUNTY, [D] STATE OF NEBRASKA, AND [E] UNITED STATES FEDERAL GOVERNMENT; (5) THAT, SOUND AND ESTABLISHED PRACTICES WERE USED FOR THE CREATION OF THIS SWPPP; (6) THAT, I AM OBLIGATED TO ENSURE INSPECTION, REPORTING, AND MAINTENANCE REQUIREMENTS OCCUR UNDER THE TERMS OF THIS SWPPP; (7) THAT, THIS SWPPP WILL BE IMPLEMENTED AS THE FIRST ELEMENT OF CONSTRUCTION; (8) THAT, I SHALL INDEMNIFY AND SAVE HARMLESS THE PCWP, ITS MEMBERS, OFFICERS, AGENTS AND EMPLOYEES FROM ALL CLAIMS AND DEMANDS OF EVERY NATURE AND DESCRIPTION GROWING OUT OF THE IMPLEMENTATION OF THIS SWPPP, INCLUDING PERSONAL INJURIES RECEIVED AND ALL PROPERTY DAMAGE SUSTAINED; (9) THAT, I WILL RETAIN THE SERVICES OF THE AFOREMENTIONED DESIGNER AND INSPECTOR, TO PERFORM ALL DESIGN AND INSPECTION DUTIES ASSOCIATED WITH THIS SWPPP, THOUGH A CONTRACTUAL AGREEMENT FOR THE LIFE OF THE SWPPP; AND (10) THAT, CORRECTIONS OF DEFECTS AND DEFICIENCIES IN DESIGN, CONSTRUCTION, INSPECTION, IMPLEMENTATION, AND TESTING SHALL BE WITHOUT EXPENSE TO THE PCWP AND ITS MEMBERS, OFFICERS, AGENTS AND EMPLOYEES AND SHALL BE MY OBLIGATIONS WHILE ACTING AS APPLICANT.

APPLICANT'S SIGNATURE — DATE: 6/21/17

DRAWN BY	PVG
DESIGNED BY	RSK
DATE	
JOB NO.	2014-0153.01-016
SHEET	BOOK AND PAGE

REVISIONS		
1	PVG	6/27/2017

LAMP RYNEARSON & ASSOCIATES
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Omaha, Nebraska 68154-2027 | 402.496.2730 | F
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CENTERLINE – OVERLOT GRADING
70TH AND OAK ST, OMAHA, NEBRASKA

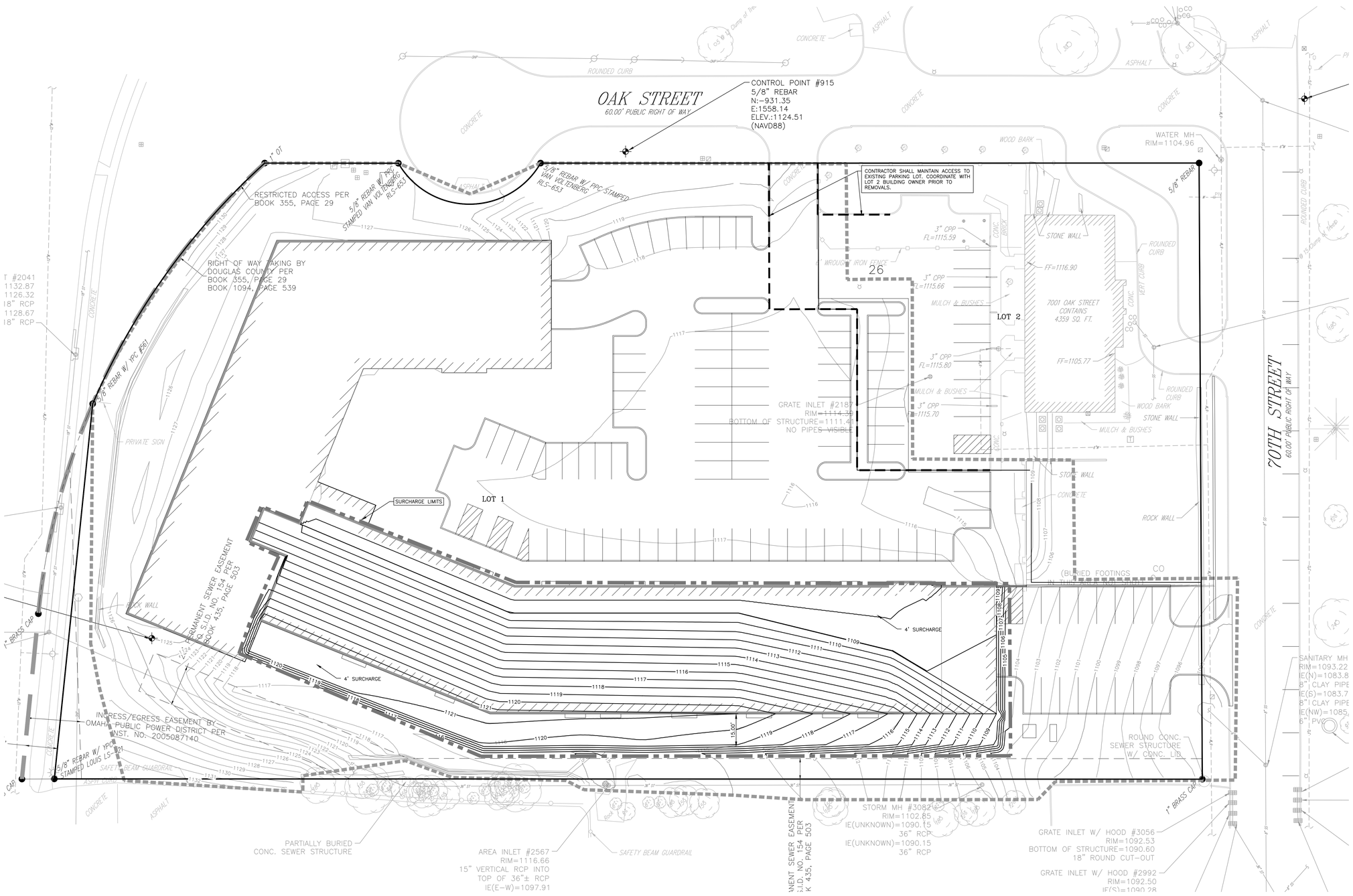
GRADING AND STORMWATER POLLUTION PREVENTION PLAN NOTES

LAMP RYNEARSON - ENGINEERS

7-11-17

THIS WORK SHALL BE PERFORMED UNDER THE AUTHORIZATION OF THE EXISTING GRADING PERMIT OMA-20170523-4121-GP2 AND ASSOCIATED NPDES PERMIT NER 160000. ALL REQUIRED INSPECTIONS WILL BE CONDUCTED BY LAMP, RYNEARSON AND ASSOCIATES UNDER THE AUTHORITY OF THE EXISTING PERMIT HOLDER AND POSTED ON THE PCWPE WEBSITE.

OMA-20170523-4121-GP2



7

NOTE: REVISED SURCHARGE PLAN FOR 1107.00 FFE

NOTE: COORDINATE SURCHARGE DURATION AND MONITORING WITH THE GEOTECHNICAL ENGINEER.

811 Know what's **below.** **Call** before you dig.

ALL UTILITIES ARE SHOWN BASED ON THE INFORMATION AVAILABLE TO THE ENGINEER. THERE IS NO GUARANTEE ALL FACILITIES ARE SHOWN OR THAT THE LOCATION, DEPTH, AND SIZE OF EACH FACILITY IS CORRECT. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES AND SERVICE LINES PRIOR TO CONSTRUCTION.

CONTROL POINTS

CONTROL POINT #915	CONTROL POINT #918	CONTROL POINT #1113
5/8" REBAR	5/8" REBAR	5/8" REBAR
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ELEV.:1124.51	ELEV.:1105.55	ELEV.:1123.70
(NAVD88)	(NAVD88)	(NAVD88)

REVISIONS		
1	PVG	6/27/2017

DRAWN BY	PVG
DESIGNED BY	RBK
DATE	6/14/2017
JOB NUMBER	015163.01-016
BOOK AND PAGE	

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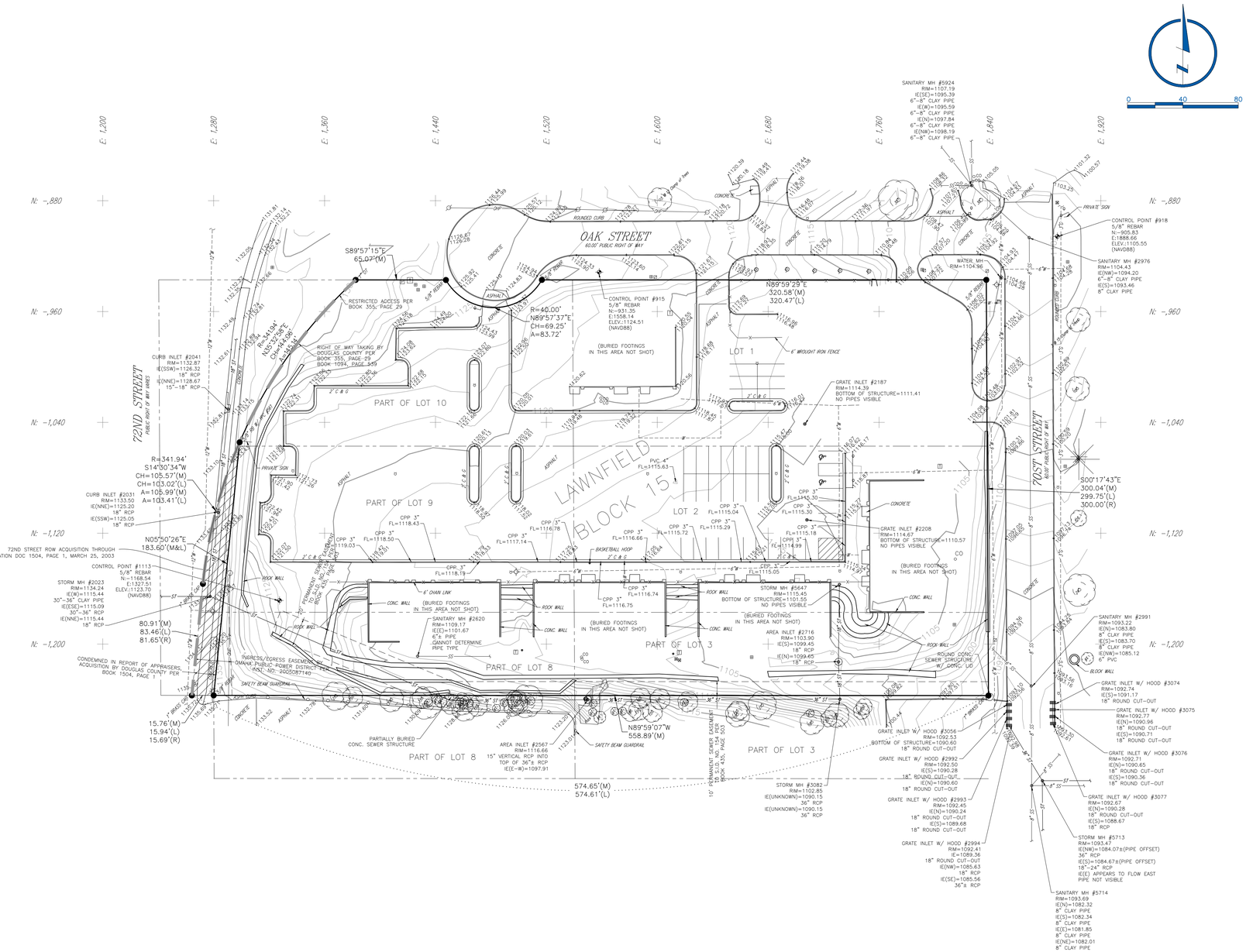
CENTERLINE – OVERLOT GRADING
70TH AND OAK ST, OMAHA, NEBRASKA

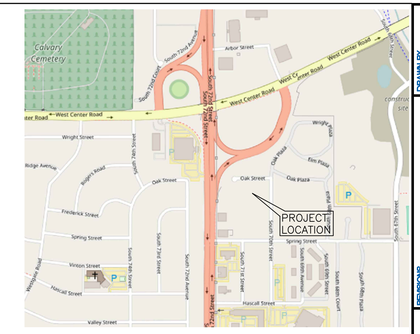
SURCHARGE PLAN

LAMP RYNEARSON - ENGINEERS

7-11-17

SHEET 7 OF 7





VICINITY MAP

LEGEND

PROPERTY LINE	LIGHT POLE
LOT LINE	TRANSFORMER
EASEMENT LINE	POWER METER
RESTRICTED ACCESS	TELEPHONE RISER
SANITARY SEWER	UNIDENTIFIED PULL BOX
STORM SEWER	INFORMATION SIGN
OVERHEAD POWER	POST INDICATOR VALVE
RECORD WATER	UNIDENTIFIED RISER
RECORD GAS	CABLE TELEVISION RISER
MANHOLE	HANDICAP PARKING
CLEAN OUT	CHAIN LINK FENCE
CURB INLET	GUARDRAIL
GRATE INLET	DECIDUOUS TREE AND SIZE
FIRE HYDRANT	CONIFEROUS TREE AND SIZE
WATER MANHOLE	BUSH
POWER POLE AND GUY	CORNERS FOUND
STREET LIGHT	CONTROL POINT
LARGE GALVANIZED POLE	

LEGAL DESCRIPTION

LEGAL DESCRIPTION SHOWN HEREON AS PER OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY ISSUED BY NEBRASKA TITLE COMPANY
FILE NUMBER 0261879, EFFECTIVE DATE: FEBRUARY 4, 2015 AT 8:00 A.M.

ALL OF LOTS ONE (1) AND TWO (2), BLOCK FIFTEEN (15), LAWNFIELD, A SUBDIVISION LOCATED IN THE WEST HALF (W½) OF SECTION THIRTY-SIX (36); AND ALSO TOGETHER WITH PART OF LOTS THREE (3), EIGHT (8), NINE (9) AND TEN (10), SAID BLOCK FIFTEEN (15), LAWNFIELD, ALL LOCATED IN TOWNSHIP FIFTEEN (15) NORTH, RANGE TWELVE (12) EAST OF THE 6TH P.M., DOUGLAS COUNTY, NEBRASKA, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTHEAST CORNER OF SAID LOT ONE (1), BLOCK FIFTEEN (15), LAWNFIELD, SAID POINT ALSO BEING THE POINT OF INTERSECTION OF THE WEST RIGHT OF WAY LINE OF 70TH STREET AND THE SOUTH RIGHT OF WAY LINE OF OAK STREET, SAID POINT ALSO BEING THE POINT OF BEGINNING; THENCE SOUTH 00 DEGREES 17 MINUTES 52 SECONDS EAST (ASSUMED BEARING), ALONG THE SAID WEST RIGHT OF WAY LINE OF 70TH STREET, SAID LINE ALSO BEING THE EAST LINE OF SAID LOTS ONE (1), TWO (2) AND THREE (3), BLOCK FIFTEEN (15), LAWNFIELD, A DISTANCE OF 299.75 FEET; THENCE NORTH 89 DEGREES 59 MINUTES 45 SECONDS WEST, A DISTANCE OF 574.61 FEET TO A POINT ON THE EASTERLY RIGHT OF WAY LINE OF 72ND STREET; THENCE NORTHEASTERLY ALONG SAID EASTERLY RIGHT OF WAY LINE OF 72ND STREET ON THE FOLLOWING DESCRIBED COURSES; THENCE NORTH 05 DEGREES 39 MINUTES 17 SECONDS EAST, A DISTANCE OF 80.76 FEET; THENCE NORTHEASTERLY ON A CURVE TO THE RIGHT WITH A RADIUS OF 341.94 FEET, A DISTANCE OF 251.15 FEET, SAID CURVE HAVING A LONG CHORD WHICH BEARS NORTH 26 DEGREES 41 MINUTES 46 SECONDS EAST, A DISTANCE OF 245.54 FEET TO A POINT ON THE NORTH LINE OF SAID LOT TEN (10), BLOCK FIFTEEN (15), LAWNFIELD, SAID LINE ALSO BEING SAID SOUTH RIGHT OF WAY LINE OF OAK STREET, THENCE SOUTH 89 DEGREES 59 MINUTES 45 SECONDS EAST ALONG SAID NORTH LINE OF LOT TEN (10), BLOCK FIFTEEN (15), LAWNFIELD, SAID LINE ALSO BEING SAID SOUTH RIGHT OF WAY LINE OF OAK STREET, A DISTANCE OF 65.03 FEET; THENCE EASTERLY ALONG SAID SOUTH RIGHT OF WAY LINE OF OAK STREET, ON A CURVE TO THE LEFT WITH A RADIUS OF 40.00 FEET, A DISTANCE OF 83.78 FEET, SAID CURVE HAVING A LONG CHORD WHICH BEARS SOUTH 89 DEGREES 59 MINUTES 45 SECONDS EAST, A DISTANCE OF 69.28 FEET TO A POINT ON SAID NORTH LINE OF LOT TEN (10), BLOCK FIFTEEN (15), LAWNFIELD, SAID LINE ALSO BEING SAID SOUTH RIGHT OF WAY LINE OF OAK STREET; THENCE SOUTH 89 DEGREES 59 MINUTES 45 SECONDS EAST ALONG SAID NORTH LINE OF LOT TEN (10), BLOCK FIFTEEN (15), LAWNFIELD, AND THE NORTH LINE OF SAID LOT ONE (1), BLOCK FIFTEEN (15), LAWNFIELD, SAID LINE ALSO BEING SAID SOUTH RIGHT OF WAY LINE OF OAK STREET, A DISTANCE OF 320.47 FEET TO THE POINT OF BEGINNING.

EXCEPTING; THAT PART TAKEN BY CITY OF OMAHA, NEBRASKA, A MUNICIPAL CORPORATION BY REPORT OF APPRAISERS, RECORDED MARCH 25, 2003 IN BOOK 1504, PAGE 1 IN THE RECORDS OF DOUGLAS COUNTY, NEBRASKA.

CONTAINS 158,349 SQUARE FEET OR 3.635 ACRES AS FIELD MEASURED.

UTILITY NOTES

1. THIS DRAWING INCLUDES OBSERVED EVIDENCE OF SERVICES AND UTILITIES EVIDENT AT THE TIME OF SURVEY, RECORD LOCATIONS PROVIDED BY THOSE COMPANIES RESPONDING TO OUR REQUEST AND THOSE MARKED BY "ONE CALL**" LOCATORS. NO RESPONSIBILITY OR LIABILITY IS ASSUMED BY THE SURVEYOR FOR THE FAILURE TO SHOW ANY BURIED SERVICE AND/OR UTILITY LINES EVEN THOUGH THEY MAY EXIST. CONTACT "ONE CALL" (1-800-331-5666) PRIOR TO ANY EXCAVATION ON THIS SITE.
**TICKET NO. 150400555, DATED FEBRUARY 9, 2015

CONTROL NOTE

- HORIZONTAL DATUM IS BASED ON MODIFIED NEBRASKA STATE PLANE COORDINATES.
- VERTICAL DATUM IS BASED ON NAVD88 (GEOID-12A).

CONTROL POINTS

CONTROL POINT #915	CONTROL POINT #918	CONTROL POINT #1113
5/8" REBAR	5/8" REBAR	5/8" REBAR
N:-931.35	N:-905.83	N:-1168.54
E:1558.14	E:1888.66	E:1327.51
ELEV.:1124.51	ELEV.:1105.55	ELEV.:1123.70
(NAVD88)	(NAVD88)	(NAVD88)

FLOOD ZONE

ZONE X
AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN AS ILLUSTRATED BY FLOOD INSURANCE RATE MAP (FIRM), DOUGLAS COUNTY, NEBRASKA.
MAP NUMBER 315274C0332H
MAP EFFECTIVE DATE: DECEMBER 2, 2005
COMMUNITY NUMBER: 315274 0332 H

FLOOD ZONE REQUIREMENTS MAY BE SUBJECT TO CHANGE OR MODIFICATION BY THE LOCAL GOVERNING AUTHORITY. CONTACT THE LOCAL FLOOD PLAIN MANAGER OR OTHER APPROPRIATE OFFICIAL TO DISCOVER LOCAL ORDINANCES OR CHANGES IN REGULATIONS, FUTURE OR PROPOSED.

LAND SURVEYOR'S CERTIFICATION

I HEREBY CERTIFY THAT THIS TOPOGRAPHIC SURVEY WAS MADE BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF NEBRASKA.

DATE OF SIGNATURE:

REGISTERED LAND SURVEYOR
JON L. CARRELL
LS-693
STATE OF NEBRASKA

LAMP RYNEARSON & ASSOCIATES
14710 West Dodge Road, Suite 100
Omaha, Nebraska 68154-2027
402.496.2498 | P
402.496.2730 | F
www.LRA-Inc.com

DRAWN BY	RER
DESIGNED BY	JLC
DATE	1/16/17
JOB NUMBER	0-7-0363
BOOK AND PAGE	0116TOP1-250 16 163, 1-6

REVISIONS

70TH AND OAK STREETS
OMAHA, DOUGLAS COUNTY, NEBRASKA

TOPOGRAPHIC SURVEY

SHEET 1 OF 1

L:\Engineering\0116163 70th and Oak Apartments HBA\SURVEY\DRAWINGS\116TOP01.dwg, 1/23/2017 9:33:58 AM, JON CARRELL, LAMP RYNEARSON & ASSOCIATES