LOT 4 BLOCK 2, SITE SCHEMATIC

Reference: Lot boundaries and roadway alignments provided by Taylor Engineering, dated February 13, 2013.

① PROJECT UNDERSTANDING

Existing Conditions

Lot 4 of Block 2 is part of an approximate 40 acre development called Palouse Business Center, located immediately south of the existing Pullman Regional Hospital in Pullman, Washington. The site was previously used for agriculture. Development on the site established a gently sloping pad (2%); this pad spans both a 3-foot soil cut and up to a 19-foot structural fill to establish the finished subgrade. Cut was excavated and re-used as structural fill during 2013 mass grading; generally placed and compacted between 92 and 95 percent of ASTM D1557 (Modified Proctor). Additionally, approximately 0- to 3-feet of structural fill was placed and compacted to City of Pullman earthwork standards along the northwest side of Lot 4 Block 2 during original site grading by the Pullman Hospital in 2003. STRATA observed and documented site grading accomplished during 2003 and 2013. Final grades received approximately 1 foot of topsoil.

Proposed Construction

We anticipate the future construction of 1 to 2 story, commercial office-type structures that will generate light structural loads (20-30 kips per column; 2-3 kips per lineal foot along walls) with no below grade spaces. At this time, we anticipate these loads will be planned to be supported by conventional spread footings bearing directly on structural fill or native soil. Based on our current understanding of the anticipated development, it is unlikely deep or intermediate foundation support systems will be required unless heavy (>50 kip) column loads are planned. Access drives and parking areas are anticipated to be constructed during construction activities. Utilities such as City water and sewer and franchise services were installed as part of the initial lot development and are stubbed into the lot.

Stormwater from each Lot will be temporarily collected on-site and routed to a detention pond constructed along the Business Center's eastern boundary. The detention pond has been constructed with dual purpose; to incorporate a park-like setting and to control stormwater from lots as they are developed with impervious areas. This project aspect will include a water feature, pedestrian pathway, and stormwater management facilities to discharge water at pre-development rates. Lot specific, civil stormwater, bioinfiltration, and drainage design must be performed and take into account the site surface and subsurface conditions outlined herein.

It is important for future Lot specific site development, specifically for foundation performance, that STRATA be afforded the opportunity to review planned structures relative to foundation design, additional planned earthwork, and configuration in order to estimate settlement and verify the preliminary allowable bearing pressure discussed herein. This is also a City of Pullman requirement during earthwork and foundation plan review.

Subsurface Conditions

Lot 4, Block 2 subgrade soil consists of native loess soil and loess mined from on-site and recompacted as structural fill placed during 2013 mass grading activities, plus structural fill soil placed in 2003 at the base of the 2013 structural fill. Lot 4, Block 2 is situated with soil cuts along the southwest lot boundary (see Sheet G4) and structural fill elsewhere. Beneath the structural fill placed during 2003 and 2013 or at the ground surface of soil cuts, clay loess was encountered in TP-11, TP-16 and TP-17 comprising reddish brown, very stiff, and moist to wet soil. TP-11 and TP-16 were terminated in the native clay loess between 10 and 11 feet below the original ground surface. Bedrock was encountered in TP-17 during exploration at 13 feet below the original ground surface. Bedrock is not anticipated to impact future construction on this lot, as current fill conditions place bedrock greater than 13 feet below the current ground surface. Groundwater seeps were observed in TP-11 at about 9 feet below the original ground surface during exploration.

The Developer has installed a temporary surface drains along the south, east and north boundaries of this lot to collect and route stormwater from the completed pad and prevent runoff over adjacent slopes. The drains are connected to small catchment basins located in the southeast corner and along the north boundary of this lot. The temporary drain structures may be replaced by plans that individual lot developers implement specific to their planned lot developments and permanent stormwater needs designed to address surface water runoff. However, the drain should not otherwise be disrupted or terminated.

② REFERENCES

The field investigation and laboratory testing are based upon the originally authorized geotechnical scope dated October 4, 2012, and the latest version of the following *ASTM International* (ASTM) standards, American Concrete Institute (ACI), Washington State Department of Transportation (WSDOT) and other reference standards listed below:

Field Exploration
- D5434 Guide for field logging of subsurface explorations of soil and rock
- D2487 Test method for classification of soils for engineering purposes (USCS)
- D2488 Practice for description & identification of soil (Visual-manual procedure)

Laboratory Investigation
- D2216 Test method for laboratory determination of water content of soil and rock
- D2937 Test method for density of soil in place by the drive-cylinder method

Construction Standards
- D6938 Test method for in-place density and water content of soil and soil-aggregate by nuclear methods (shallow depth)
- WSDOT 2012 , Standard Specification for Road, Bridge and Municipal Construction (WSDOT Standards)
- City of Pullman Design Standards 2012 Edition
- STRATA's February 14, 2013 Geotechnical Engineering Evaluation for Infrastructure.
- Taylor Engineering Inc.'s (Taylor) July 3, 2013 Construction Plans
- Stormwater Management Manual for Eastern Washington - Appendix 6B.3, Estimating Field Permeability of Soil-in-Place Methods.

③ IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL DELIVERABLE

Adapted from ASFE, The Geoprofessional Business Association

Geotechnical Deliverable Use

These documents are prepared for the Palouse Business Center - Lot 4 of Block 2, commercial development in Pullman, Washington. These documents include STRATA's geotechnical design recommendations, soil engineering design characteristics, and design criteria. The project team (KIP Development (KIP), KIP's design team, prospective owner's and their design teams) must read, understand, and implement the geotechnical recommendations in their entirety. The project team should regularly consult with and include the geotechnical consultant in design meetings to verify the intentions of our recommendations are fully understood and properly incorporated into lot design. Reliance on these documents for design is contingent on the prospective buyer and their team maintaining continuity with the geotechnical consultant.

The information presented herein is based on assumed construction until verified by the geotechnical engineer-of-record representing the ultimate owner/user of the individual lot. These geotechnical deliverables are valid only for the assumed project type, description, and location as presented in the Project Understanding. If the project concept changes from our understanding, we must be notified. The City of Pullman will require STRATA or the geotechnical engineer-of-record to review your site specific development plans and verify that the geotechnical recommendations are appropriately applied.

Geologic Impacts

Unknown or unanticipated subsurface conditions are a principal cause of construction delays, cost overruns and disputes. The following information is provided to help you manage your risk associated with subsurface conditions.

STRATA's Services Are Performed for Your Specific Project

STRATA structures our services to meet your and the project's specific needs. For example, a geotechnical engineering evaluation conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect. Because each geotechnical engineering evaluation is unique, each geotechnical engineering deliverable is unique, prepared solely for you, the client and the ultimate site use. No one except the ultimate user and their designated team should rely on STRATA's geotechnical engineering deliverable without first conferring with the geotechnical engineer who prepared it. And no one should apply the deliverable for any purpose or project except for the one for which it has been prepared.

Read the Full Deliverable

Serious problems can occur because those relying on geotechnical engineering deliverables did not read it all. Do not rely solely on an executive summary or cursory review. Do not read selected elements only and do not detach exploration logs from the remainder of the document.

STRATA's Deliverables are Based on a Unique Set of Project-Specific Factors

STRATA considers a number of unique, project-specific factors when establishing the scope of our geotechnical services. Typical factors include: your goals, objectives and risk management preferences; the general nature of the structure involved, its size and configuration; the location of the structure on the site; and other planned or existing site improvements such as access roads, parking lots and underground utilities. This document assumes these aspects of your project and requires your understanding of these limitations. Unless STRATA specifically indicates otherwise, do not rely on a geotechnical engineering deliverable that:
- Does not represent your intended us, configuration, or intent,
- Does not align with planned construction,
- Was not prepared for the specific site explored, or completed before important project design changes were made.

Typical changes that can reduce the reliability of an existing geotechnical engineering deliverable include those that affect:
- The function of the proposed structure(s).
- Elevation, configuration, location, orientation, loading, or performance requirements of the proposed structure.
- Composition of the design team or project ownership.
- Site grades and drainage features.
- Other factors that are not consistent with our analysis or recommendations.

As a general rule, always inform STRATA of project changes - even minor ones - and request an assessment of their impact. Therefore, if our Project Understanding, as outlined in these documents, is not correct, please notify STRATA immediately. STRATA cannot accept responsibility or liability for problems that occur because our documents do not consider developments of which we were not informed.

Subsurface Conditions Can Change

Site exploration identifies only a small portion of the site's subsurface conditions and subsurface conditions can change significantly between exploration locations. STRATA reviews field and laboratory data and then applies our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those identified in our document. Retaining STRATA to provide construction observation is the most effective method of managing the risks associated with unanticipated or changed site conditions.

STRATA's geotechnical engineering evaluation is based on specific surface and subsurface conditions that existed at the time the our evaluation and site testing was performed, and applied specifically to the proposed construction. *Do not rely on a geotechnical engineering deliverable* whose adequacy may have been affected by: man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, changes in soil moisture or groundwater fluctuations. *Always* contact STRATA before applying the geotechnical documents to determine if they are still reliable specific to your development. Additional consultation, testing or analysis could prevent major problems.

STRATA's Deliverables can be Subject to Misinterpretation

Other design team members' misinterpretation of STRATA's deliverables may result in costly problems. You can lower that risk by having STRATA confer with appropriate members of the project team during the entire design process. Also, retain STRATA to review pertinent elements of the project team's plans and specification. Contractors can also misinterpret a geotechnical engineering deliverable. Again, this risk can be reduced by having STRATA participate in pre-bid, pre-construction and pre-installation conferences and by providing construction observation. This deliverable is specific to the assumed development outlined in the *Project Understanding* section.

Geotechnical Recommendations are not Final for Construction Purposes

Do not over-rely on the construction recommendations included in STRATA's deliverables. *Those recommendations are not final,* because STRATA engineers develop them principally from judgment, opinion and assumed development plans. Construction continuity is a requirement and critical element of the geotechnical design process. STRATA can confirm our recommendations only by observing actual subsurface conditions revealed during construction. If a firm or individual other than STRATA is retained to observe, test, or interpret actual field conditions, they must assume the role of geotechnical engineer-of-record. It is your responsibility to notify this entity of their role and responsibility. *STRATA cannot assume responsibility or liability for our document's recommendations if STRATA does not perform construction observation.*

Do Not Redraw STRATA's Logs

STRATA prepares final exploration logs based upon our interpretation of soil profiles described during exploration and laboratory data. To prevent errors or omissions, the logs included in our deliverable should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the final deliverable can elevate risk of misinterpreting our geotechnical recommendations.*

Give Contractors a Complete Deliverable and Guidance

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

Read Responsibility Provisions Closely

Some clients, design professionals and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims and disputes. To help reduce the risk of such outcomes, STRATA includes a "Limitations" section herein to indicate where STRATA's responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions.* Ask questions. STRATA will respond fully and frankly.

STRATA is a member of ASFE. Rely on STRATA for Additional Assistance

Membership in ASFE, The Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. The above information is based upon an ASFE document and has been modified with their permission to meet STRATA's and this deliverable's intent. Confer with STRATA for more information.

④ GEOTECHNICAL DESIGN BASIS

- Construction plans provided by Taylor Engineering, dated July 3, 2013.
- International Building Code, 2012
  - IBC section 1613 - Earthquake Loads
  - IBC section 1615 - Structural Integrity
  - IBC section 1804.3 - Excavation Grading and Fill
  - IBC section 1809 - Shallow Foundations
- STRATA's Field Exploration
  - Test Pits performed on December 18 and 19, 2012 (reference sheet G4)
- STRATA's Laboratory Testing (reference sheet G4)
- Frost Depth - 30 inches
- Typical anticipated structural loads
  - Maximum isolated total column loads: 20-30 Kips
  - Maximum conventional strip footing loads: 2.0-3.0 KLF
- Typical displacement tolerances
  - Maximum estimated settlement: 1.0 inch total, 0.75 inch differential (30-ft span)
- Settlement Estimates are unfactored
- Bearing Capacity Failure, Factor of Safety (FOS) = 3 or greater
- Groundwater 20 feet or more below finished floor elevation
- ACI: specifically ACI 302.1R-04, ACI 330R-08, and ACI 504R
- Detwiler, R.J. 2008 L&M Construction Chemicals, Inc., Concrete News January 2008

⑤ ADDITIONAL RECOMMENDED SERVICES

Geotechnical Design Continuity

We base the information contained in this deliverable on anticipated site development concepts provided by KIP and site conditions established during 2013 mass grading activities. The final floor elevations, floor and footing configurations, loading conditions, stormwater disposal system, site geometry, and other factors can significantly alter our opinions and design recommendations. Specifically, changes in structural design loads and the site geometry may require additional analyses specific to the actual anticipated construction conditions. Therefore, it is important STRATA provide geotechnical continuity through final planning and design for the planned construction as individual aspects become available during design phases specific to this lot. Specifically, we recommend that prospective owner's and individual lot developers retain STRATA to review geotechnical-related sections of the project plans and specifications to verify the plans and specifications are commensurate with our geotechnical recommendations.

It has been our experience that having consultants from the design team review the construction documents prior to bidding helps reduce the potential for errors, and also reduces costly changes to the contract during construction. We also recommend STRATA, in support of the construction personnel, be retained on prospective owner's and individual lot developers' behalf to be on site during earthwork, mass grading, foundation and slab subgrade preparations to verify the conditions encountered during original exploration and subsequent mass grading are encountered during construction. Verifying the subsurface conditions during construction is an important part of the geotechnical design process. If we are not provided such opportunities, we cannot be responsible for soil-related design or construction related errors, omissions, delays or increased costs that are identified during construction. If a firm other than STRATA is selected to observe and interpret the subsurface conditions during construction, they will become the geotechnical engineer of record; we request that prospective owner's and individual lot developers notify the selected firm of these responsibilities and require the firm to interpret and implement our report for the project. This can be accomplished by requiring the selected material testing firm to issue to prospective owner's and individual lot developers a statement that they understand and agree with the geotechnical report used for design and that they agree to implement it in its entirety as the geotechnical engineer-of-record.

⑥ EVALUATION LIMITATIONS

General

These deliverables are prepared to assist in site specific development planning for the Palouse Business Center - Lot 4 of Block 2, commercial development in Pullman, Washington. The geotechnical services described herein consist of professional services, provided in accordance with generally accepted geotechnical engineering principles and practices, as they exist at the time and in the area of this report. The geotechnical information provided herein is based on the premise that STRATA will provide final geotechnical design for the specific lot owner and/or developer once the project concept is established, and an adequate program of tests and observations will be conducted by STRATA during construction in order to verify compliance with our recommendations and to confirm conditions between exploration and material testing locations. This acknowledgement is in lieu of all express or implied warranties.

Geoenvironmental Concerns Are not Covered

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

ISSUED FOR
- ☒ PRELIMINARY DESIGN USE
- ☐ PRELIMINARY REVIEW
- ☒ YOUR APPROVAL
- ☒ REFERENCE
- ☐ CONSTRUCTION
- ☐ DESTROY PREVIOUS PRINTS

REV	DATE	DESCRIPTION
1	2/11/14	DRAFT 90%
2	2/14/14	FINAL DESIGN
		KIP REVIEWED

DRAWN: CWS

DESIGN: TJW

CHECK: TJW

FILE: KIPDEV PU12186C

PROJECT:

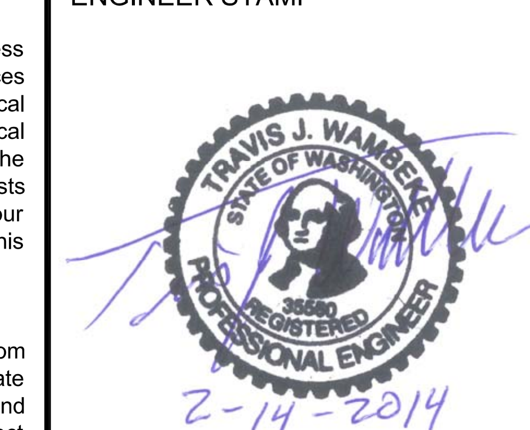
PALOUSE BUSINESS CENTER
LOT 4 BLOCK 2
CLEARWATER AVENUE
PULLMAN, WASHINGTON 99163

PREPARED FOR:
KIP DEVELOPMENT
594 SOUTHEAST BISHOP
BOULEVARD #102
PULLMAN, WASHINGTON 99163

Attn: MR. KEVIN KIRKMAN

PALOUSE BUSINESS CENTER

ENGINEER STAMP



STRATA
A PROFESSIONAL SERVICES CORPORATION
Integrity from the Ground Up

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Fax #: (509) 339-2001
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⑦ EARTHWORK

Subgrading

1. Achieve building subgrades with smooth blade equipment to reduce disturbance to the site soil.
2. If the subgrade surface exhibits disturbance, is pumping or rutting, soft, wet or frozen, the surface must be moisture conditioned and recompacted to at least 95 percent of ASTM D1557 (Modified Proctor).
3. Do not interrupt subsurface trench drains traversing this lot during earthwork, foundation or other activities or development. If subsurface trench drain functionality is impeded, reroute, replace or repair drains to sustain continuous gravity flow of groundwater seepage around or through the lot and/or into site stormwater facilities.
4. Specific recompaction effort is required at foundation, slab, and pavement sections as outlined herein depending on the conditions encountered.
5. Areas which cannot be remediated by moisture conditioning must be removed at least 12 inches to firm, unyielding native or structural fill soil. Replace these over-excavations with granular structural fill as described in the *Structural Fill* section of sheet G2.
6. STRATA or the retained geotechnical engeineer-of-record shall review all site preparations and over-excavations prior to granular structural fill placement.
7. If earthwork occurs during wet periods, accomplish work at or near final subgrades using equipment that imparts low bearing pressures, track-mounted, drum and low tire pressure equipment. Using high bearing pressure equipment such as dump trucks and scrapers can readily pump and rut the subgrade and their applications must be carefully considered.
8. STRATA or the retained geotechnical engeineer-of-record shall review and approve all exposed subgrades prior to structural fill or concrete placement.

Excavation Characteristics

1. Site soil is expected to be excavatable using conventional excavation techniques and equipment.
2. Bedrock is not expected within the planned construction limits (5 to 10 feet).
3. Temporarily excavate, slope, shore or brace excavations in accordance with *Washington Industrial Safety and Health Act* (WISHA) and *Washington Administrative Code* (WAC) guidelines. Regulations outlined in WAC Section 296-155 provide temporary construction slope requirements for various soil types and slopes less than 20 feet tall.
4. Recompacted site soil or undisturbed native clay loess is classified as *Type C* soil referencing WAC Section 296-155, and must be temporarily sloped back at least 1.5H:1V.
5. Construction vibrations, seepage, or surface loading can cause excavations to slough or cave and should be avoided.
6. **Ultimately, the contractor is solely responsible for site safety and excavation configurations and maintaining WISHA approved personnel for excavation monitoring.**
7. Plan excavations carefully, allowing water collection points and utilizing conventional sumps and pumps to remove nuisance water from runoff, seeps, springs or precipitation.
8. Coordinate construction activities and excavation backfilling as rapidly as possible following excavation to reduce the potential for subgrades to degrade under construction traffic.
9. Grade subgrades aggressively to direct surface water away from work areas and avoid infiltration.
10. Maintain dewatering systems to facilitate good drainage during construction and reduced over-excavation.

Wet Weather/Soil Construction

1. Ideally, perform earthwork construction during dry weather conditions (typically June-October).
2. The site soil is susceptible to pumping or rutting from heavy loads such as rubber-tired equipment or vehicles any time of the year.
3. Complete earthwork by track-mounted equipment that reduces vehicular pressure applied to the soil if construction commences in wet areas or before soil can dry.
4. Depending on precipitation and runoff the site soil may be over optimum moisture content. Contractor shall expect these conditions and be prepared to install runoff management facilities and to replace wet or disturbed soil with granular structural fill.
5. During good weather that allows soil drying, site soil is suitable for reuse. However, during wet cool weather, site soil may not be suitable for reuse.

Over-Excavation

1. If the soil cannot achieve the required compaction following adequate efforts to moisture condition the soil; over-excavate to undisturbed, firm soil. Over-excavation for convenience shall be at the contractor's expense.
2. Additionally, over-excavations may be required to complete shallow, granular soil improvements below foundations as illustrated in Figure G2.1 on sheet G2, if final design contemplates higher structural loads, different bearing configurations or construction during wet weather. Consult STRATA or the geotechnical engeineer-of-record for granular soil improvement depth to achieve higher bearing capacities.
3. Soft soil over-excavation criteria shall be determined during construction with STRATA or the geotechnical engeineer-of-record, the contractor, and the lot developer/owner, but is anticipated to extend at least 1.5 to 2 feet below the subgrade.
4. After achieving subgrade, the contractor must take precautions to protect the subgrade from becoming disturbed or saturated. The contractor must limit construction traffic to any prepared subgrades and reduce the subgrades' exposure to precipitation and water.
5. Subgrades must be graded to aggressively direct surface water away from subgrades to avoid infiltration.

⑧ STRUCTURAL FILL

Material Requirements

1. Structural fill is required to achieve site grades, to help support concrete slabs-on-grade and pavement sections.
2. Site soil should be near or below optimum moisture content and can be relied on for reuse as structural fill in the building footprint, when earthwork is accomplished during dry weather.
3. Our recommended material requirements for structural fill generally reference the latest WSDOT Standards.
4. Embankments constructed during mass grading for Lot 4, Block 2, were placed and compacted per the City of Pullman Earthwork Standards, STRATA's geotechnical report recommendations, and Taylor's grading plan.
5. Project structural fill products are described in Table G2.1 below.

Table G2.1: Structural Fill Specifications and Allowable Use

Fill Label	Fill Product Description	Allowable Use	Material Specifications
NSF	**Non-Structural Fill** (Landscape or Slope Dressing Fill)	• Any area that will not support pavements, sidewalks, curbs, buildings, or other improvements (typically landscape areas)	• Soil classified as GP, GM, GW, GC SP, SM, SW, SC, CL, or ML according to the USCS. • Soil may not contain particles larger than 12 inches in median diameter. • Soil must be reasonably free from deleterious substances such as wood, metal, plastic, waste, etc.
SF-1	**General Structural Fill**	• Fill placement within building, pavement and hardscapes envelopes, including utility trench backfill • Non-structural fill	• Soil classified as GP, GM, GW, GC SP, SM, SW, CL, or ML according to the USCS. • Soil may not contain particles larger than 6 inches in median diameter. • Soil must contain less than 3 percent (by weight) of organics, vegetation, wood, metal, plastic, or other deleterious substances.
SF-2	**Granular Structural Fill** (Structural areas)	• General structural fill • Fill placement, construction entrances, and earthwork during wet weather • Over-excavations	• Soil meeting requirements stated in *Section 9-03.14(2) – Select Borrow* of WSDOT Standards.
CS-1	**Crushed Surfacing Top Course**	• Granular structural fill • General structural fill • Concrete slab-on-grade, pavement, and foundation support	• Soil meeting requirements stated in *Section 9-03.9(3) – Crushed Surfacing* of WSDOT Standards.
DA-1	**Drainage Aggregate**	• Drain trench fill	• Soil meeting requirements stated in *Section 9-03.12(4) – Gravel Backfill Drains* of WSDOT Standards[1].
PB	**Pipe Bedding**	• Utility pipe bedding within 6 inches of the pipe invert	• Soil meeting requirements stated in *Section 9-03.12(3) – Gravel Backfill for Pipe Zone Bedding* of WSDOT Standards.
-	**Unsatisfactory Soil**	**NONE**	• Soil classified as MH, OH, CH, OL, or PT **may not** be used at the project site. • Any soil type not maintaining moisture contents within 5 percent of optimum during compaction is unsatisfactory soil which must be moisture conditioned prior to disposal and replacement. • Any soil containing more than 3 percent (by weight) of organics, vegetation, wood, metal, plastic or other deleterious substances.

Table G2.1 Notes:
1. WSDOT Standard Specification for Road, Bridge and Municipal Construction, 2012 (WSDOT Standards)

Required Compaction

Backfill supporting any structure, hardscape, embankment, foundation, or other improvement must be compacted to structural fill requirements presented in Table G2.2 below.

Table G2.2: Required Structural Fill Products for Designated Project Areas

Project Area	Required Structural Fill Product	Compaction Requirement[1]
In-situ native subgrades	Native soil[2]	Undisturbed (pocket pen > 2 tsf)
Within 10 lateral and 3 vertical feet of building or hardscape footprints or fill placed on/in slopes	General, Granular, and Crushed Surfacing Structural Fill	95%[3]
Utility trench backfill below slabs, pavements, and buildings	Utility Trench Fill	95%
All other fills (more than 10 feet outside or 3 feet below the building or hardscape footprints)	General Structural Fill	92%
Landscape areas sloped flatter than 5H:1V	Topsoil	88%

Table G2.2 Notes:
1. Relative compaction requirement compared to the maximum dry density of the soil as determined by ASTM D 1557 (Modified Proctor).
2. Native soil must be verified by STRATA or the project geotechnical engineer-of-record.
3. Some granular structural fill products require method compaction efforts (reference Oversized Soil fill).

1. Fill placed outside any building or pavement envelope (plus 10 feet) can be placed as non-structural fill (i.e. landscape fill) providing there are no structures (sidewalk, curbs, utilities, signs, etc.) or embankment planned directly above the landscape fill. Landscape fill compaction requirements also apply to stemwall backfill that does not support overlying structures such as asphalt, slabs or other improvements free of structures.
2. Structural fill products must be moisture conditioned to near optimum moisture content and placed in maximum 10-inch-thick, loose lifts.
3. Structural fill shall be compacted in 10-inch-thick, loose lifts providing compaction equipment weighs a minimum of 5 tons. If smaller or lighter compaction equipment is provided, reduce the lift thickness to meet the compaction requirements presented herein.
4. The site soil is expected to be suitable for reuse as general structural fill providing it can meet the criteria presented in Table G2.1 above and earthwork is attempted during warm, dry weather.
5. Perform compaction testing on each lift, every 1,000 s.f. or every 50 feet along trenches.

⑧ STRUCTURAL FILL

Oversize Soil Fill

1. Any material with greater than 30 percent retained above the ¾-inch sieve is too coarse for Proctor density testing, but may be used as general structural fill. Coarse fill must be compacted using a "method specification" developed during construction that is based on the material characteristics and the contractor's means and methods.
2. Separate oversize fill from fine grained subgrades using geosynthetics, see Table G2.3.
3. Method specifications will be developed during construction, specific to the materials, compaction equipment and conditions encountered.
4. At a minimum, place all oversize material in maximum 18-inch lifts and compact with 5 complete passes of a 10-ton, vibratory or grid roller.
5. Vibratory rollers must have a dynamic force of at least 30,000 pounds per impact per vibration and at least 1,000 vibrations per minute. Coarse fill must be compacted to a dense, interlocking and unyielding surface.

Utility Trench Backfill

1. Remove all saturated, loose or disturbed soil from the bottom of the utility trenches prior to placing pipe bedding.
2. Accomplish bedding for pipes and utility trenches in accordance with Division 7 of the latest edition of the *WSDOT Standard.*
3. Backfill the remainder of utility trenches in accordance with the *Structural Fill* specification.

⑨ GEOSYNTHETICS

Geosynthetic uses and material requirements are provided in Table G2.3.

Table G2.3: Geosynthetic Specifications

Geosynthetic Type	Use	Material Specifications
Non-Woven Geosynthetic	Pavement subgrade preparations, footing soil improvements	• Must meet *Soil Stabilization – Non-Woven* requirements in *WSDOT Standards* Section 9-33.2(1). Table 3.
Triaxial or Biaxial Geogrid	Extremely soft subgrade conditions	• 93 percent junction efficiency (GRI-GG2-05) • 3.0 kg-cm/degree Aperture Stability (U.S. Army Corp of Engineers Ref. 3.3.1.2000) • Extruded polypropylene • Minimum Radial Stiffness of 15,400 lb/ft at 0.5% Strain (ASTM D6637)

Geosynthetics

1. Geosynthetic fabrics are applicable when constructing on soft or wet soil, for soil improvement applications, or any area where *Oversize Soil Fill* must be separated from the fine-grained subgrade.
2. Where required for foundation support, to aid construction or increase long-term performance, apply geosynthetics directly on approved subgrades, taut, free of wrinkles and over-lapped at least 12 inches.
3. Consult STRATA to review geosynthetic applications or other subgrade improvement alternatives.
4. We recommend woven geosynthetic fabrics conform to *Section 9-33 - Construction Geosynthetic* and specifically meet or exceed the properties presented in *Table 3, Section 9-33.2(1) - Geotextile Properties* from WSDOT Standards.
5. Geogrid is not expected to be required unless extremely soft subgrades develop during construction due to unusually high groundwater or construction during wet seasons. However, project specifications should delineate requirements for geogrid in extremely soft subgrade conditions and require the contractor to supply a unit rate if they are required, as shown in Table G2.3.

⑩ SITE DRAINAGE

Foundations/Walls

1. Place interior fill around stemwalls as granular structural fill to within 8 inches of the finish grade. Then place crushed surfacing within the last 8 inches beneath finish grade.
2. Place exterior stemwall backfill as drainage aggregate as shown of Figure G3.1.
3. Install perimeter foundation drains at the lowest possible elevation that maintains gravity drainage as shown on Figure G3.1.
4. Divert stormwater to an appropriate disposal system specified by Civil Engineering.

Exterior Grading

1. Site grading design and construction must allow for positive drainage of surface runoff water away from the proposed structure and not be allowed to infiltrate foundation and slab subgrades.
2. Runoff or water migrating along the ground surface must be conveyed away from structures by an appropriately designed series of ditches, swales, or other surface water management procedures by the Civil Engineer.
3. Per IBC Section 1804.3, slope all surfaces within 10 feet of the structure away at 5 percent except where ADA requirements must be met. Where IBC standards cannot be met, slope ground as aggressively as possible to direct water away from the building's perimeter.
4. Slope the remaining sidewalks and paved surfaces at least 2 percent away from the structures. This reduces the risk of subsurface soil near the foundation becoming saturated due to water ponding near the structure.
5. Provide and connect roof downspouts to a solid pipe placed away from structures and do not allow water to infiltrate into the soil underlying the structure. Never connect roof drain to foundation drainpipes.
6. Avoid landscaping which requires irrigation adjacent to or within 10 feet of the building.

Stormwater Disposal

1. Washington State Department of Ecology (WDOE) requires site specific stormwater discharge permits for any construction site disturbing more than 1 acre.
2. Divert stormwater to an appropriate disposal system specified by site Civil Design.
3. Connect to the Palouse Business Center's stormwater system per development covenants.
4. Design stormwater lot specific disposal facilities in accordance with the *WDOE Eastern Regional Stormwater Management* manual and the City of Pullman requirements. Specifically, avoid depositing stormwater into the subsurface in a manner that will impact down slope or adjacent properties.
5. The soil profile encountered in explorations was classified as clay and has low permeability and no capacity for vertical stormwater infiltration. Based on gradation results and previous exploration in the area, USDA classifications correlate to clay at depth.
6. Stormwater may be treated in grassed lined, bio-infiltration swales, but swales must be sufficiently sized to store water and rapidly convey it to the on-site stormwater detention facility, ultimately to be metered out to the City of Pullman, Stormwater system.
7. Direct collected stormwater at least 50 feet away from structures.
8. If Civil Design or other issues will not allow appropriate collection and disposal points set away from structures the minimum distance recommended above, the design team must evaluate alternate stormwater disposal plans.
9. Providing regular site stormwater inspections during construction by a *Certified Erosion Control Sediment Lead* (CESCL) is required by *WDOE* for SWPPP implementation.

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2	2/14/14	FINAL DESIGN
		KIP REVIEWED

DRAWN: CWS

DESIGN: TJW

CHECK: TJW

FILE: KIPDEV PU12186C

PROJECT:

PALOUSE BUSINESS CENTER
LOT 4 BLOCK 2
CLEARWATER AVENUE
PULLMAN, WASHINGTON 99163

PREPARED FOR:
KIP DEVELOPMENT
594 SOUTHEAST BISHOP
BOULEVARD #102
PULLMAN, WASHINGTON 99163

Attn: MR. KEVIN KIRKMAN

PALOUSE BUSINESS CENTER

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⑪ FOUNDATION DESIGN

The Lot 4 Block 2 structures and site configuration concepts are assumed. Based on the site conditions, exploration and testing performed to date and our assumptions regarding development plans, we expect the Lot developments will interface with native soil and structural fill. Providing the site soil remains protected from weather and infiltration, it is generally suitable for conventional foundation bearing. If foundations are constructed during wet weather or if wet soil conditions are exposed, it may be necessary to construct granular soil improvements beneath foundations as shown below. Consult STRATA or the geotechnical engineer-of-record for granular soil improvement depths to achieve the design requirements.

Granular Soil Improvement Construction

Where foundations are constructed during wet soil conditions or if final structural and geotechnical design dictate, construct granular soil improvements according to the following steps:

1. Over-excavate soil below the planned foundation bearing elevation and expose stiff (pocket pen >2 tsf) site soil, previously compacted or undisturbed. Excavation depth will be determined by final design.
2. Prepare the exposed subgrade referencing the *Earthwork* requirements using smooth-blade equipment.
3. Place non-woven geosynthetic fabric over the subgrade and extend it up the sidewalls to the bearing elevation. Non-woven geosynthetic fabric must meet the requirements in Table G2.3.
4. Backfill over-excavations with crushed surfacing placed and compacted referencing Table G2.1 and the *Structural Fill* section.
5. Schematics illustrating the soil improvement process are provided in Figures G3.1 and G3.2, *Granular Soil Improvement*. Foundation stem wall height may vary. Figures G3.1 and G3.2 are not structural details.

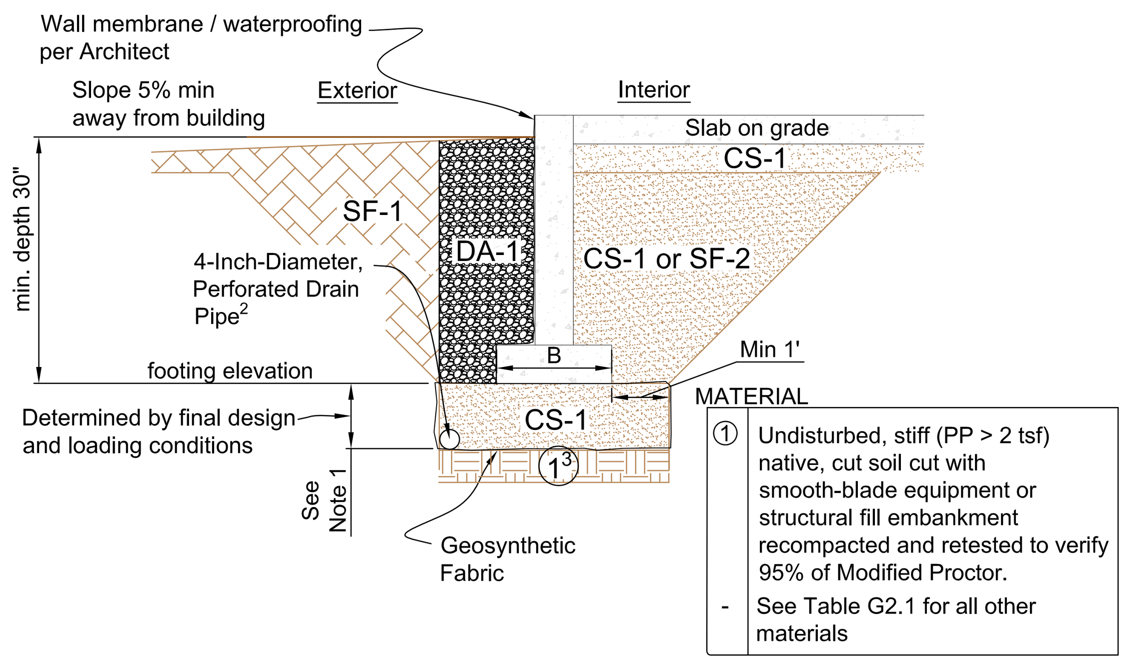

Figure G3.1: Soil Improvement Schematic - Continuous Perimeter Foundations

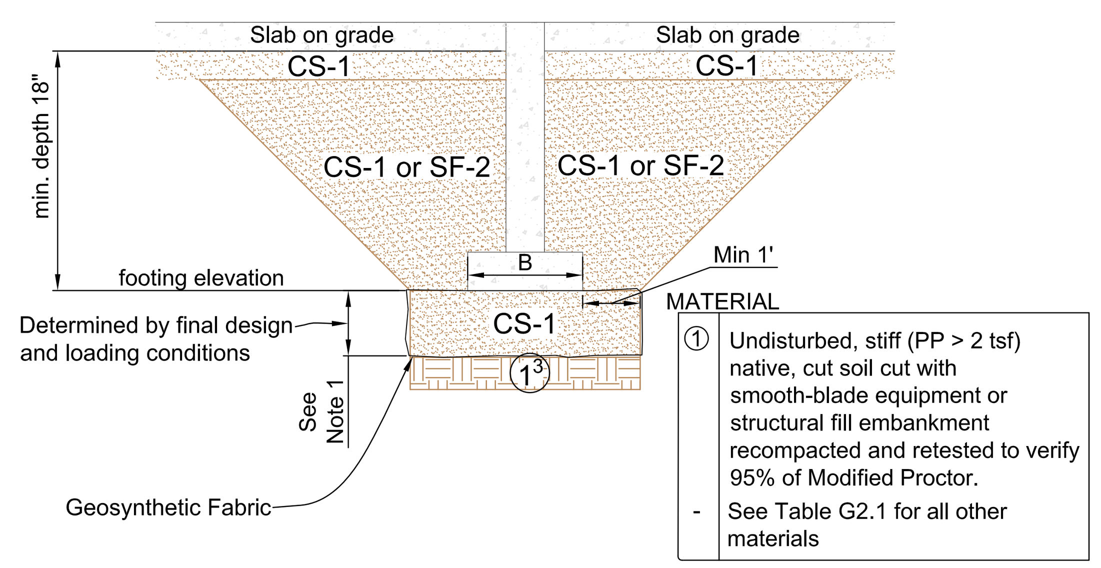

Figure G3.2: Soil Improvement Schematic - Column Foundations (Interior)

Notes:

1. Extend soil improvement below isolated column and continuous perimeter foundations as required by final structural and geotechnical design or to assist construction during wet weather.
2. Adjust foundation drain pipe elevation depending on soil improvement applications. Foundation drain shall never be placed above the foundation bearing elevation.
3. Where structural embankment (see Lot Plan, sheet G4) is exposed at foundations and verified by the project geotechnical engineer, recompact to 95% of Modified Proctor.

The following foundation design parameters are stated for total loads referenced on Sheet G1, and are based on bearing foundations on undisturbed stiff native soil, soil recompacted to structural fill requirements, or if required, granular soil improvements as described above. From mass grading in 2013, the foundation substrate soil is expected to be structural fill mantling stiff clay/silt loess or stiff clay loess. Structural fill has been placed and compacted to between 92 and 95 percent of ASTM D1557 (Modified Proctor). City of Pullman and geotechnical design requirements are that foundation and slab substrates be compacted to at least 95 percent of Modified Proctor. Some subgrade moisture conditioning and recompaction should be anticipated. From geotechnical field and laboratory testing, and engineering analyses, preliminarily design shallow foundations using the following criteria:

1. Maximum allowable bearing pressure: 2,000 psf, undisturbed stiff native soil or structural fill
   - Maximum 33 percent increase allowed for short term load increases such as wind or seismic.
   - Higher design bearing pressures are possible depending on settlement tolerances or the application of granular soil improvement. Consult STRATA or the geotechnical engineer-of-record for applicable bearing pressure for your project.
2. Estimated foundation/slab vertical settlement from assumed structural loads:
   - Total settlement: 1.0 inch
   - Differential settlement: Up to 0.75 inches in 30-foot horizontal span
3. Embankment settlement:
   - Less than 10 feet in height: 0.5% of embankment height ≈ 0.6 inches
   - Greater than 10 feet in height: 1 - 1.5% of embankment height ≈ 2.5 to 3.5 inches depending on lot location
   - **Embankment settlement will occur over 1 to 3 years and is in addition to foundation settlement**
4. Lateral load resistance:
   - Foundation base friction coefficient:
     - 0.30 for foundations cast directly on site soil bearing surface
     - Reduce friction coefficient by 1/3 for precast concrete
   - Passive soil resistance on foundation sides:
     - Equivalent fluid pressure: 250 pcf
     - Requires 1/2-inch lateral movement to mobilize full resistance
4. Extend exterior footings at least 30 inches below the final, exterior ground surface to help protect against frost action.
5. Bear interior foundations at least 18 inches below finish slab elevations and maintain at least 4 inches of soil cover between top of the footing and the bottom of the concrete slab. Thickened footings should be avoided due to their propensity for reflective cracking.
6. STRATA or the retained geotechnical engineer-of-record shall observe foundation soil improvement, bearing, and slab subgrades. Reviewing the subgrade during site and foundation preparation allows verification that vegetation, organics, and significant debris have been removed to the required elevation and that excavations have been accomplished according to these recommendations.
7. The above design criteria require maintaining drained conditions at the foundation subgrade.

Soil Corrosivity

1. Corrosion of buried metallic structures is an electrochemical process and is dependent on many factors, including type of metal or alloy, galvanic effects, and soil properties such as resistivity, pH and oxygen content. Generally, soil that has low resistivity and low pH is more corrosive than soil with high resistivity and high pH.
2. Experience with the site soil and aggregate in the Pullman area suggests these materials maintain a relatively neutral pH and moderate to low resistivity indicating a heavy to potentially severe corrosion potential.
3. Consider steel loss due to corrosion with respect to selecting pipes and other buried or underground structures.
4. Maintain maximum clearances for concrete reinforcing.

Seismic Activity Research

1. We expect the 2012 *International Building Code* (IBC) will be utilized for project structural design. Section 1613 of the IBC outlines the procedure for evaluating site ground motions and design spectral response accelerations.
2. STRATA utilized site soil and geologic data and the project location to establish earthquake-loading criteria.
3. Based on our field exploration, mapping in the area, bedrock exposures nearby, and knowledge of the upper 100 feet of soil/rock profile, we recommend a Site Class D be utilized as a basis for structural seismic design.
4. A site-specific seismic response study was not performed.
5. Liquefaction is common in loose and saturated sand. The liquefaction potential decreases when the soil profile density increases and the percentage of fine-grained soil increases. The soil beneath the planned improvements comprises firm to stiff clay soil, overlying basalt bedrock at depth. Groundwater is not expected within the upper 20 feet beneath the planned surface grades. However, due to the stiff, fine-grained soil expected beneath the site, the potential for liquefaction during a seismic event at this site appears low.

⑫ CONCRETE SLAB-ON-GRADE FLOORS

Slab Substrate

1. Place crushed surfacing structural fill, as defined in Table G2.1 on sheet G2, over stiff recompacted site soil as described in the *Earthwork* section. Compact slab subgrades to at least 95 percent of Modified Proctor.
2. Subgrade areas that become soft, wet or disturbed during slab subgrade preparations must be moisture conditioned and recompacted, or over-excavated to stiff soil (PP > 2 tsf) and replaced with crushed surfacing.
3. Compact crushed surfacing below slabs to structural fill requirements as defined in Table G2.2, sheet G2.
4. The slab's supporting aggregate course must be constructed once the majority of underslab plumbing and utilities are completed.
5. Floor and exterior slabs and supporting crushed surfacing section thicknesses must be structurally designed for the anticipated use and equipment or storage loading conditions.
6. Concrete slab design may utilize an allowable modulus of subgrade reaction (k) of 140 pounds per cubic inch (pci) (Figure G3.4) for slab sections constructed over compacted, site soil and at least 8-inches of crushed surfacing for slab support and as a capillary break. Structural design will designate crushed surfacing thickness.

Figure G3.4, *Floor Slab Schematic* illustrates a concrete slab-on-grade floor. Figure G3.4 is not structural detail.

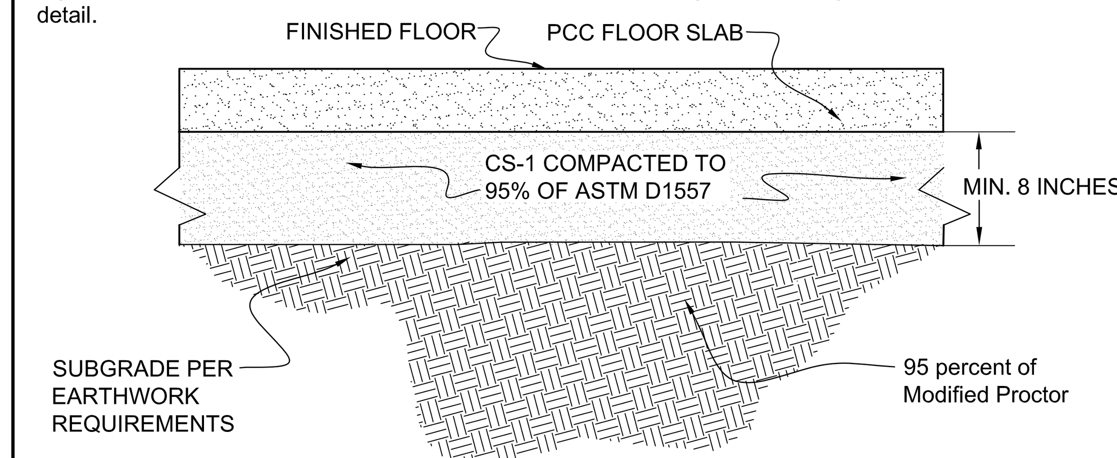

Figure G3.4: Floor Slab Schematic

Vapor Retarder

1. Interior floor slabs may be susceptible to moisture migration caused by subsurface capillary action and vapor pressure. Moisture migration through floor slabs can break down a floor covering, its adhesive, or cause various other floor covering performance problems.
2. Vapor retarders shall consist of thick, puncture proof polyethylene sheeting placed immediately below the floor slab. An example of this material is Stego Wrap™, a 15-mil retarder.
3. Alternatively, the vapor retarder may be covered with an additional 2-inch-thick layer of clean, coarse sand placed between the aggregate base course and the concrete slab-on-grade floors, if the base material and slabs are placed with a water proof roofing system in-place (See Figure G3.5 below).
4. Form stakes or other sub-slab penetrations must never be allowed to puncture the vapor retarder.
5. Plumbing penetrations and foundation edges are notoriously problematic for under-slab vapor protection.
6. Carefully design and construct any vapor retarder penetrations to reduce vapor transport through any penetrations.
7. Even when vapor retarders are used, water vapor migration through the concrete floor slab is still possible.
8. Floor covering should be selected accordingly. Manufacturer's recommendations shall be followed.
9. Where vapor retarders are utilized, the flooring and concrete slab contractors as well as the plastic sheeting manufacturer must be consulted regarding additional slab cure time requirements and/or the potential for slab curling.

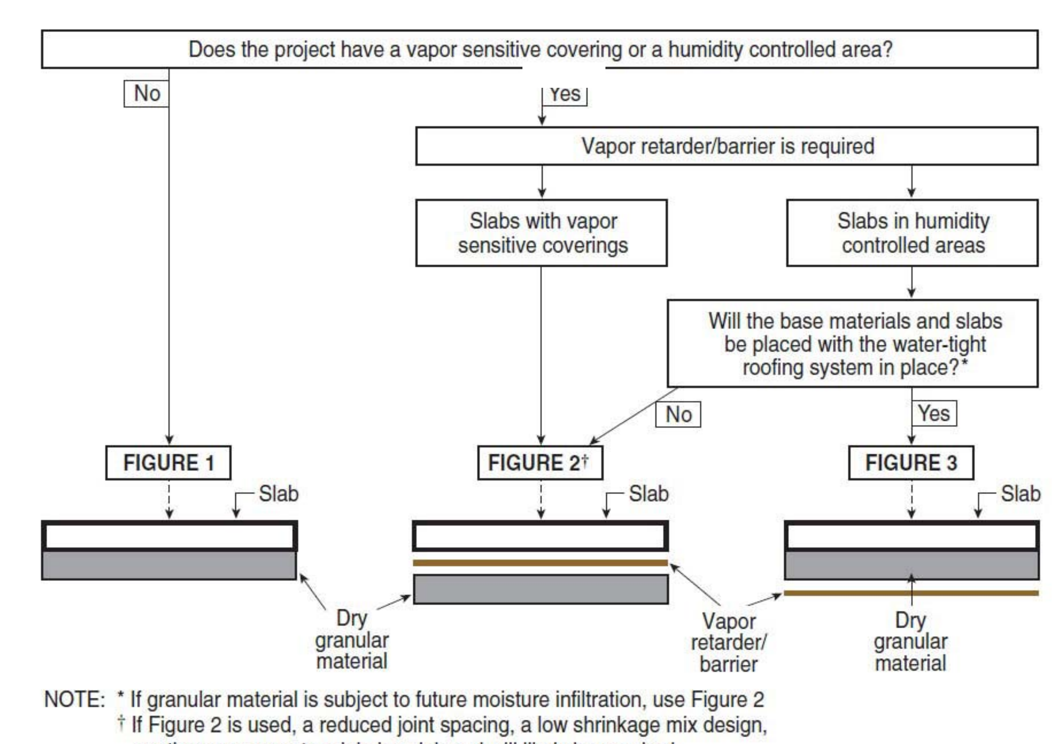

Figure G3.5. Flowchart to determine how vapor retarder should be installed (adapted from Figure 3-1 of ACI 302.1R-04)

Exterior Slab Considerations

General

1. Portland Cement Concrete (PCC) for exterior pavements and slabs shall meet WSDOT Standards and have a minimum 4,000 psi compressive strength (per City of Pullman Requirements), 650 psi modulus of rupture, and 4 to 7 percent entrained air.
2. Per Structural Design Specifications, apply curing compounds on all exterior concrete surfaces. Due not apply salts or salt solutions to the hardscape surfaces.
3. Sawcut the concrete per Structural Design and Landscape Architect pattern as soon as possible following placement to reduce the potential for shrinkage cracking.
4. Joint and cure exterior concrete referencing ACI and Landscape Architect requirements to help reduce random cracking, shrinkage cracking, and to facilitate construction and concrete curing.
5. Structurally design joints to occur through contraction joints, construction joints, and isolation joints, accounting for the concrete surface geometry and paving plan.
6. Joint details, fixture details, sealant details, and other appropriate design and construction practices are illustrated in the ACI 330R-08 document and should be incorporated into project plans.
7. For dumpster's or other equipment pads, construct the slab support section with a minimum of 18 inches of crushed surfacing.

Frost Considerations

1. Frost jacking/frost heave are rigid pavement/hardscape design concerns, particularly where abrupt changes in soil frost susceptibility occur.
2. Abrupt changes occur where rigid pavements/hardscapes meet flexible pavements or at building entrances and foundations. Soil subgrades will exist in areas where exterior slabs are planned and abut the building.
3. To accommodate these locations and reduce the frost action potential, excavate 2/3 of the frost depth (20 inches), extending 10 lateral feet from the building or at any trash enclosure or accept the risks of frost action.
4. Replace these over-excavations with granular structural fill or crushed surfacing.
5. Consult the Structural Engineer regarding additional measures to help resist frost action.

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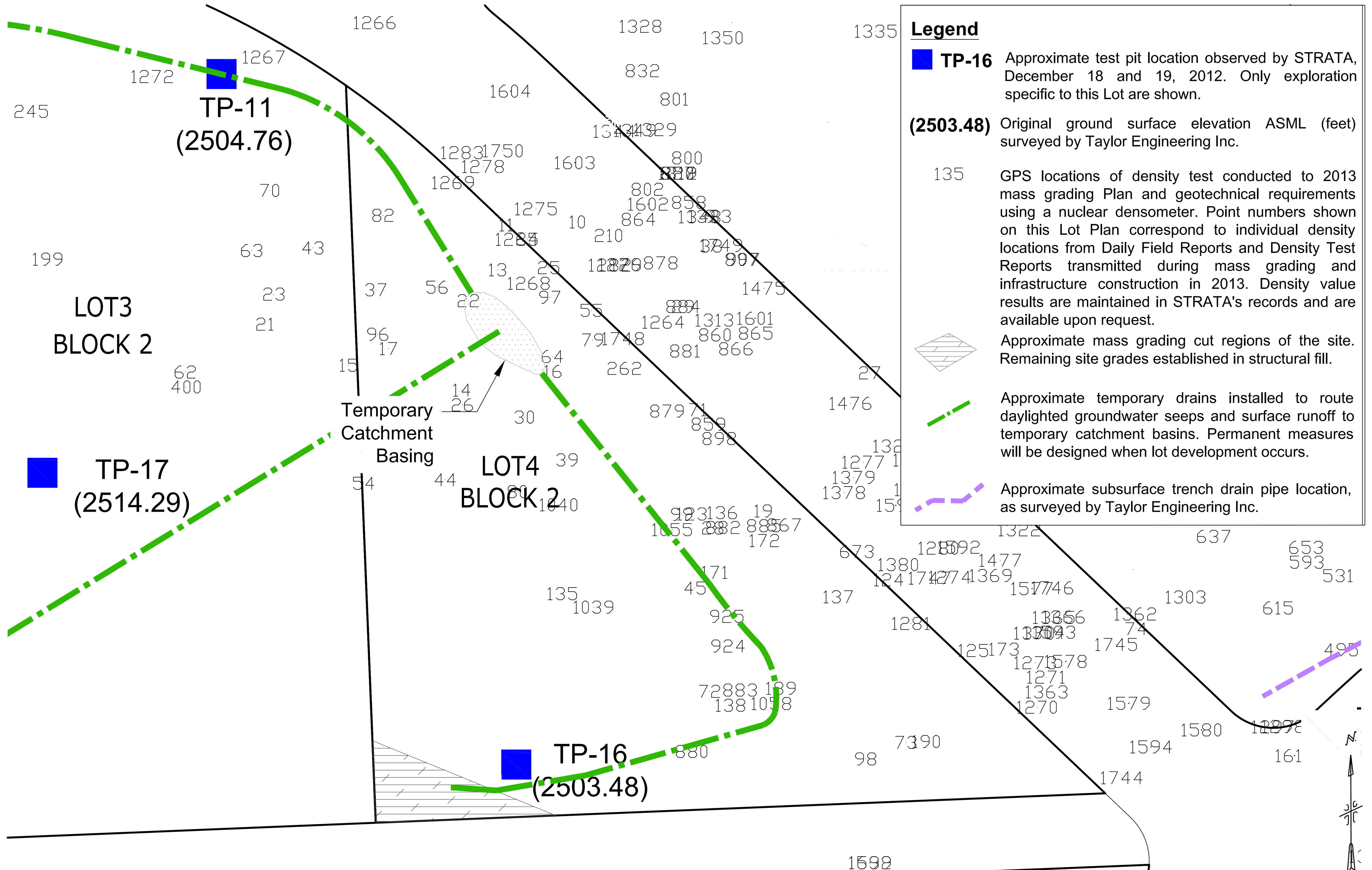
13 LOT PLAN



Legend

- **TP-16** (blue square) – Approximate test pit location observed by STRATA, December 18 and 19, 2012. Only exploration specific to this Lot are shown.
- **(2503.48)** – Original ground surface elevation ASML (feet) surveyed by Taylor Engineering Inc.
- 135 – GPS locations of density test conducted to 2013 mass grading Plan and geotechnical requirements using a nuclear densometer. Point numbers shown on this Lot Plan correspond to individual density locations from Daily Field Reports and Density Test Reports transmitted during mass grading and infrastructure construction in 2013. Density value results are maintained in STRATA's records and are available upon request.
- (hatched area) – Approximate mass grading cut regions of the site. Remaining site grades established in structural fill.
- (green dash-dot line) – Approximate temporary drains installed to route daylighted groundwater seeps and surface runoff to temporary catchment basins. Permanent measures will be designed when lot development occurs.
- (purple dashed line) – Approximate subsurface trench drain pipe location, as surveyed by Taylor Engineering Inc.

Reference: Lot boundaries and roadway alignments provided by Taylor Engineering, dated February 2013. Exploration locations and their elevations surveyed by Taylor Engineering.

14 EXPLORATION LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL NAMES
COARSE GRAINED SOIL	GRAVEL	CLEAN GRAVEL		GW	Well–Graded Gravel, Gravel–Sand Mixtures.
				GP	Poorly–Graded Gravel, Gravel–Sand Mixtures.
		GRAVEL WITH FINES		GM	Silty Gravel, Gravel–Sand–Silt Mixtures.
				GC	Clayey Gravel, Gravel–Sand–Clay Mixtures.
	SAND	CLEAN SAND		SW	Well–Graded Sand, Gravelly Sand.
				SP	Poorly–Graded Sand, Gravelly Sand.
		SAND WITH FINES		SM	Silty Sand, Sand–Silt Mixtures.
				SC	Clayey Sand, Sand–Clay Mixtures.
FINE GRAINED SOIL	SILT AND CLAY LIQUID LIMIT LESS THAN 50%			ML	Inorganic Silt, Sandy or Clayey Silt.
				CL	Inorganic Clay of Low to Medium Plasticity, Sandy or Silty Clay.
				OL	Organic Silt and Clay of Low Plasticity.
	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%			MH	Inorganic Silt, Micaceous Silt, Plastic Silt.
				CH	Inorganic Clay of High Plasticity, Fat Clay.
				OH	Organic Clay of Medium to High Plasticity.
				PT	Peat, Muck and Other Highly Organic Soil

BORING LOG SYMBOLS	GROUNDWATER SYMBOLS	TEST PIT LOG SYMBOLS
Standard 2–Inch OD Split–Spoon Sample	Groundwater After 24 Hours	BG Baggie Sample
California Modified 3–Inch OD Split–Spoon Sample	(7–3–07) Indicates Date of Reading	BK Bulk Sample
Rock Core	Groundwater at Time of Drilling	RG Ring Sample
Shelby Tube 3–Inch OD Undisturbed Sample		

Shorthand Notation:
BGS = Below Existing Ground Surface
N.E. = None Encountered

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EXPLORATORY TEST PIT LOG – TP-11

USCS Description	DEPTH (ft)	U.S.C.S. CLASS	Sample Type	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	REMARKS (Note: BGS = Below Ground Surface)
TOPSOIL - SILT, (ML) dark brown, soft, moist	0.0	ML					Vegetation and organics observed to 12" BGS. Some basalt cobbles from 0-18" BGS.
FILL - MIXED SILT AND CLAY, With Cobbles, (CL-ML) reddish brown with dark brown staining, stiff to very stiff, moist		CL-ML					
LOESS - CLAY, (CL) reddish brown, very stiff, moist		CL					Seeps observed

Test Pit Terminated at 11.0 Feet.

Elevation 2504.76 AMSL (feet)
Lot 3 South of Columbia Drive

Client: KIPDEV	Test Pit Number: TP-11	EXPLORATORY TEST PIT LOG
Project: PU12186A	Date Excavated: 12-18-2012	
Backhoe: HITACHI EX120	Bucket Width: 30	
Depth to Groundwater: N.E.	Logged By: CWS	Sheet 1 Of 1

14 EXPLORATION LOGS CONTINUED

EXPLORATORY TEST PIT LOG – TP-16

USCS Description	DEPTH (ft)	U.S.C.S. CLASS	Sample Type	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	REMARKS (Note: BGS = Below Ground Surface)
TOPSOIL - SILT, (ML) dark brown, soft, moist	0.0	ML				0.5-1.0	Vegetation and organics observed to 12" BGS
LOESS - CLAY, (CL) reddish brown, very stiff, moist		CL		96.5	18.1		
						3.5-4.5	
						2.5-3.5	

Test Pit Terminated at 10.0 Feet.

Loosely backfilled with site cuttings upon completion.

Elevation 2503.48 AMSL (feet)
Lot 4 South of Columbia Drive

Client: KIPDEV	Test Pit Number: TP-16	EXPLORATORY TEST PIT LOG
Project: PU12186A	Date Excavated: 12-18-2012	
Backhoe: HITACHI EX120	Bucket Width: 30	
Depth to Groundwater: N.E.	Logged By: CWS	Sheet 1 Of 1

EXPLORATORY TEST PIT LOG – TP-17

USCS Description	DEPTH (ft)	U.S.C.S. CLASS	Sample Type	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	REMARKS (Note: BGS = Below Ground Surface)
TOPSOIL - SILT, (ML) dark brown, soft, moist	0.0	ML					Vegetation and organics observed to 12" BGS
FILL - MIXED SILT AND CLAY, With Cobbles, (CL-ML) reddish brown dark brown, stiff to very stiff, moist		CL-ML	RG	104.3	18.1	1.5-2.0	
ORIGINAL TOPSOIL - SILT, (ML) dark brown, firm to stiff, moist	7.5	ML				1.5-2.5	
LOESS - CLAY, (CL) reddish brown, very stiff, moist		CL	BG			4.5+	
(RX) BEDROCK - BASALT, moderately weathered, slightly fractured, dark gray with orange staining		RX					Loosely backfilled with site cuttings upon completion.

Test Pit Terminated at 13.0 Feet.

Elevation 2514.29 AMSL (feet)
Lot 3 South of Columbia Drive

Client: KIPDEV	Test Pit Number: TP-17	EXPLORATORY TEST PIT LOG
Project: PU12186A	Date Excavated: 12-18-2012	
Backhoe: HITACHI EX120	Bucket Width: 30	
Depth to Groundwater: N.E.	Logged By: CWS	Sheet 1 Of 1

15 LABORATORY RESULTS

Index Laboratory Test Results Summary

Test Pit	Depth (feet)	Lab Number	Description and remarks (classification)	Liquid Limit	Plasticity Index	In situ Moisture, %	In situ Dry Density, pcf
TP-16	2-2.5	PUL12-224J	Clay (CL)	-	-	18.1	96.5
TP-17	2-2.5	PUL12-224D	Clay (CL)	-	-	18.1	104.3

16 MASS GRADING SUMMARY

Criteria Work

Lot 4 in Block 2 of the Palouse Business Center were graded through the 2013 construction season. Mass grading was accomplished to the City of Pullman Standards, the Geotechnical Engineering Evaluation for Infrastructure prepared by STRATA and dated July 3, 2013, and the final Grading Plan prepared by Taylor Engineers and dated February 13, 2013. KIP Development retained STRATA to provide geotechnical continuity between design and construction; specifically to provide periodic testing and observation during earthwork operations. As the site was stripped of vegetation and organics, STRATA documented the subgrade conditions. Fill placement was monitored on a periodic basis as individual lifts were placed and compacted by the earthwork contractor. A nuclear densometer was used to perform random density and moisture tests for comparison to ASTM D1557 (Modified Proctor) and the structural fill specifications (92% of Modified Proctor). Density tests are valid for the specific location and depth tested. A sufficient number of tests and observations were performed to allow STRATA to verify that the fill placed met or exceeded the project specifications and therefore, can be relied on as structural fill. The test results and specific observations are retained in STRATA's and KIP's files and are recorded with the City of Pullman.

Summary

There are limitations that you should be aware of when relying on this earthwork data. The test locations were documented by GPS tied to the site survey and specific control points. However, handheld GPS has an estimated accuracy of +/- 20 feet laterally. The elevation of each test was estimated based on construction fill stakes and has an estimated accuracy of +/- 5 feet. The test data can change based on future construction disturbance, water infiltration, different instruments used to measure future density, and various other factors. Care in future earthwork is critical to realizing similarity between the density and moisture measurements performed during mass grading and future test results which you will rely on to meet project geotechnical and City of Pullman requirements. The structural fill embankments on your lots were, at all locations tested, compacted to between 92 and 95% of Modified Proctor. Finish subgrades at foundations, hardscapes, pavement and slab sections are required to achieve 95% compaction and therefore, some compaction effort should be expected by your contractor.

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