Instructor Reflection

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The landscape performance education grant was applied to the University of Arizona's core LAR 554 – Site Engineering course, which is the first of our two-course, 1st professional MLA technical sequence (LAR 555 – Site Construction in Spring). The course engaged, 1st year MLA students with various backgrounds on Tuesdays and Thursdays from 2:00-4:50pm (4 credit hours). The learning objectives of the course were refined from the previous year to include:

Communication

Develop the ability to clearly communicate your work visually using hand drafting tools and CAD, and by using appropriate symbols and notations.

Design Decisions and Performance

Develop an understanding of design decision implications related to the four elements of Earth, Water, Fire, and Air with means to measure and evaluate landscape performance in those areas.

Comprehension and Skills

Develop a thorough working knowledge of the conceptual approaches to grading and drainage through understanding the trade-offs and synergies for social and environmental welfare related to:

Human safety, comfort and universal accessibility

Surface water management

Aesthetic and spatial perception

Environmental health and stewardship

Develop familiarity with SITES and LEED rating systems and evidence-based design precedents and opportunities.

Develop an understanding of techniques and operation of measuring equipment for surveying and performance analysis.

The intent of these refined objectives was to preserve the teaching of the necessary knowledge, skills and abilities from this important core class, while also providing depth to the learning process through the natural link between the material and landscape performance. Landscape performance was seen as the "why" behind the "how" of Site Engineering to provide students with a more robust and comprehensive knowledge of their design actions. It was anticipated that by reformatting the Site Engineering course to emphasize landscape performance, the necessary technical skills could be deeply engrained on a foundation of evidence-based design. The increase in understanding of the "why" of this technical work was intended to reinforce the true nature of creative problem solving with measurements to back it up. Linking creativity and technical skills in this way was intended to change the generally negative student perception of this course to be more positive and engaging, and create a more conducive learning experience that better prepares students to be more balanced and effective professionals with integrated technical and creative abilities centered around landscape performance.

The course was divided into modules with the four elements as an organizational strategy that could touch on the various forces that are involved in site engineering. Critical

content from the traditional course was newly classified into each module, with most time devoted to Earth and Water. Weekly lectures and assignments introduced students to material that was reinforced through class field exercises that emphasized landscape performance related to the module theme. A comprehensive grading and drainage problem was then introduced to assess the technical abilities for grading and drainage and comprehension and knowledge of design decisions and performance.

Students finished the course with a technical Grading Plan and a supplemental sheet with diagrams that inform their decision process, and reflection questions on landscape performance involving soil and vegetation, storm water management, and optimizing accessibility, safety, and way finding. Their reflections indicate an emerging understanding of landscape performance, and its importance and relation to design decisions in the built environment. Their attention to landscape performance issues required them to think more comprehensively about their decisions in the grading challenge. This required more time and effort compared to the traditional instruction, which presumably reinforces the "why" behind their actions, intending to more fully establish and engrain the "how" of site engineering.

Time was a challenge and constraint at times to fully execute the class field exercises. They require a lot of planning and familiarity with the surrounding campus or locations that are reasonable to visit during class time. Some of the activities were more challenging than others to keep students engaged and allow all to use a limited number of tools.

In the future and with more planning and refinement, it would be beneficial to more fully tie the field exercises to the classroom lectures and assignments with more follow-up, as well as graphics and visuals that correlate to what is seen in the field. The final project could

also use some refinement to keep students focused on the most important objectives and not get lost in more trivial material beyond the focus of this course.

Overall I was pleased with the changes to the course to integrate landscape performance. Thoughts on introducing landscape performance in a logical and comprehensive way spurred the reformatting to modules involving the four elements, which proved to give the course more structure and connectivity between subjects covered. The class exercises provided a welcomed change in environment for a learning experience which triangulated well with lecture and studio-based work, touching many learning styles. Landscape performance seemed to fit well with the essential content of Site Engineering and is a timely introduction as a first semester course. While students did complete the course with remaining questions about landscape performance, this introduction will hopefully put them on a trajectory where they can think and explore the subject through studios and other courses that follow in throughout the MLA curriculum.

LAR554

Site Engineering

School of Landscape Architecture and Planning
University of Arizona | Fall 2016
TR 2:00p-4:50p | Architecture Rm 304X

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Architectural Expansion A303J | Office Hours: MW 10:30a-12:00p

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Syllabus

Course Description

Engineering aspects of landscape design site planning. Development of technical competency in grading, storm water management, and earthwork utilizing aesthetics and design principles as well as an understanding of ecological sensitivity and landscape performance.

Course Objectives and Learning Outcomes

Site Engineering for landscape architects requires you to develop the comprehension and skills necessary to enhance and/or maintain health, safety, and welfare for both users and the environment through the manipulation of topography, and clearly communicate those plans to other professionals and stakeholders. Thus, anticipated learning outcomes will emphasize development in *communication*, *design decisions and performance*, and *comprehension and skills* as follows:

Communication

Develop the ability to clearly communicate your work visually using hand drafting tools and CAD, and by using appropriate symbols and notations.

Design Decisions and Performance

Develop an understanding of design decision implications related to the four elements of Earth, Water, Fire and Air with the means to measure and evaluate landscape performance in those areas.

Comprehension and Skills

Develop a thorough working knowledge of the conceptual approaches to grading and drainage through understanding the trade-offs and synergies for social and environmental welfare related to :

- Human safety, comfort and universal accessibility
- Surface water management
- Aesthetic and spatial perception
- Environmental health and stewardship

Develop familiarity with SITES and LEED rating systems and evidence-based design precedents and opportunities.
Develop an understanding of techniques and operation of measuring equipment for surveying and performance analysis.

Course Approach

Site Engineering is the first course in the two course design implementation sequence. It is designed to introduce many of the knowledge and skill objectives that you will require in order to undertake the technical challenges of our profession. It should come as no surprise that the skills that you learn in this and the subsequent course will put you in a good position to work in many entry level positions and to move along in your professional career.

During the initial weeks of the term we will be introducing you to AutoCAD and its role in communication. This will normally be in the

first hour of the class. During the remainder of class time, and during the bulk of the semester, you will engage in site engineering through lectures, exercises, and assignments relating to the four elements (Earth, Water, Fire, and Air) with a particular focus on landscape performance. In the final weeks, you will apply your knowledge to a final project that demonstrates evidence-based design in grading and drainage.

The approach I take in teaching this course and other courses of this nature is one of active consultation. It is my intent to actively engage you in your learning by using a problem-based approach that challenges you to make decisions. Throughout the semester I will be stressing the importance of not only being able to solve the problem at-hand, but also to understand the conceptual approach to solving projects of this nature, and implications in your decision making.

My intention is to help you build a foundation for understanding not only how landscapes are built but how the decisions you make impact social and environmental welfare. Additionally, I am to ensure that you are prepared for the subsequent course in the construction sequence, LAR 555 Landscape Construction. My approach in teaching this course is to closely monitor your learning so I can emphasize or de-emphasize aspects to maximize your development. This is done by close consultation with you. I have the expectation that you will arrive on time to every class having reviewed the assigned reading material and that you will have with you the studio equipment (listed below) so that you can work in class. In studio, I may occasionally call the class together when there is a common problem where a general discussion might be of benefit. You will be responsible for all information communicated during class times. I also welcome and encourage your "listening in" on other student's reviews in studio. It is often said that you will learn more from your classmates than from me. Please do not hold back and do be forthcoming in your professional curiosity. Finally, Please don't hesitate to visit me during office hours or set up a time to meet outside of class. I believe very strongly that, if you have a question or a problem, you should not hesitate to come by and see me.

Assignments

Two important points should be noted concerning the numerous assignments.

1. Work submitted in this course will be completed on an individual basis. Exceptions to this point will be made very clear in the problem statement. You should pay very close attention to this because a) by not completing the work yourself you are forfeiting your learning opportunity and b) you are engaging in plagiarism (also know as academic misconduct) which carries severe penalties.

2. All work will be due at the beginning of class unless otherwise stated or agreed upon with you. There are numerous smaller assignments in this course. The workload will tend to be steady as opposed to a few larger projects. I will try to accommodate due dates with other classes but there are always unavoidable conflicts particularly at the end of the semester.

Equipment

Please come prepared to class with the following tools and materials.

- Laptop computer that meets the minimum specifications for AutoCAD or AutoCAD for Mac. (https://knowledge.autodesk.com/support/autocad/troubleshooting/caas/sfdcarticles/sfdcarticles/System-requirements-for-AutoCAD.html?_ga=1.59262893.1869717164.1471630001)
- An 18" roll of yellow or white tracing paper (a larger roll is OK but it is awkward) One idea is to buy both an 18" roll & a 36" OR buy a 36" roll and literally saw it in half (you may save a few dollars). Note that you will want to have a wide roll for design class.
- Premium quality drawing pencils (6B, 4B, 2B, HB, 2H, 6H)
- Scales: An Architect's scale and an Engineer's scale.
- A roll of drafting tape.
- A 30/60 drafting triangle. The preferred size is 10"/300mm or slightly larger. When triangles are too small you cannot draw the longer lines without a break (yuk!). When they are too large they are very awkward.
- A 45/45 drafting triangle. The preferred size is 8"/250 mm or 10"/300mm.

- A circle template
- Any reasonably sized calculator (you can also use your phone if needed).
- An Ames Lettering Guide or equivalent (I've never seen an equivalent but it might be out there!)
- 3 or 4 different colored pencils
- A drafting brush (or a 4" paintbrush (a new one!) will also work).
- Gray Roma Plastilina Modeling Clay (1 lb minimum... may be able to split 2 lb packages with classmates)
- Modeling Clay tools: Ribbon Scraper, Metal Scraper, Needle Tool

Optional

- 2 drafting pencils. These are the 'lead clinch' type not the .5 mm 'click type'.
- A lead pointer. This is used to sharpen your drafting pencils.
- Drafting leads of various hardnesses. I'd suggest you have each of the following: '2B' 'H', '2H', '6H' (a '5H' could be substituted for a '6H'). Just buy one lead of each. They are often sold in quantities of two so you can share with a classmate.

Again, PLEASE have this equipment with you at every class!

Course Textbooks

Harris, Charles and Nicholas Dines, Time Saver Standards for Landscape Architects (Second Edition), New York: McGraw Hill, 1998 (Required)

Strom, Steven, Kurt Nathan, and Jake Woland, Site Engineering for Landscape Architects (Sixth Edition, New Jersey: John Wiley & Sons, 2013 (Recommended; Full text available online) (http://site.ebrary.com/lib/arizona/detail.action?docID=10650019)

Grading Policy

You are encouraged to discuss your progress with me at any time.

Final grades will be based only on the submitted projects and only completed work will be accepted. No partial assignments will be considered.

Late submissions are strongly discouraged. Documented illness or documented compassionate grounds only will be accepted to excuse late submissions. Late work will be downgraded in accordance with the policy adopted by the School. This policy, established by faculty and students, calls for a deduction of 10% per day for late work.

Grade A Work which reflects superior technical design and graphic ability. It is logically thought out and represented.

Grade B Work which shows a good understanding of technical design and which is graphically well presented. Some revisions would be necessary.

Grade C Work which shows satisfactory understanding and execution of the project. Moderate revisions necessary.

Grade D Work which shows an inconsistent technical design and/or poor graphic presentation.

Grade F Work incomplete and/or project which shows a failure to comprehend or present subject matter.

Project	% of final grade
Exercises	55%
Final Project	35%
Participation	10%

Attendance Policy

Attendance during regularly scheduled class time is expected and will be factored into your final grade. Each unexcused absence will result in a deduction of 1 point from your final grade. Late arrivals may result in a .5 point deduction from your final grade.

All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. The student should contact the instructor as soon as an unavoidable absence is known.

Classroom Behavior

The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self.

Inclusive Excellence and Student Resources

Inclusive Excellence is a fundamental part of the University of Arizona's strategic plan and culture. As part of this initiative, the institution embraces and practices diversity and inclusiveness. These values are expected, respected and welcomed in this course.

This course supports elective gender pronoun use and self-identification; rosters indicating such choices will be updated throughout the semester, upon student request. As the course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect.

Other resources: Office of Diversity (http://diversity.arizona.edu/)
Counseling & Psych Services (http://www.health.arizona.edu/counseling-and-psych-services)
OASIS Sexual Assault and Trauma Services (https://www.health.arizona.edu/oasis-sexual-assault-and-trauma-services)

Special Needs and Accommodations

Students who need special accommodation or services should contact the Disability Resources Center, 1224 East Lowell Street, Tucson, AZ 85721, (520) 621-3268, FAX (520) 621-9423, email: uadrc@email.arizona.edu, http://drc.arizona.edu/. You must register and request that the Center or DRC send me official notification of your accommodations needs as soon as possible. Please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate. The need for accommodations must be documented by the appropriate office.

Student Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/codeofacademicintegrity/.

Confidentiality of Student Records

http://www.registrar.arizona.edu/ferpa/default.htm

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

Class Exercises

Class Exercises were conducted to involve students in hands-on examples of material covered in lectures and assignments relating to the major themes of Earth, Water, Fire and Air. Class Exercises were not graded, but participation was expected and assessed for factoring into the final grade.

Earth
Field Measuring Exercise: Students utilized tools to survey the landscape and familiarize students with standard dimensions and slopes associated with ADA Acessibility Guidelines (ADAAG) and overall comfort. Tools included Automatic Levels, Clinometer, Measuring Tapes/Wheel, and Digital Levels.

Universal Accessibility Exercise: Students were paired to record travel times for campus navigation from a starting point near a bus stop/parking lot, and end point at the entrance of our building. The paths were navigated with and without crutches to evaluate the difference in arrival time considering curbs/stairs and surface materials. Conditions were assessed and time differences were calculated to spur a conversation of the opportunities and challenges of designing and evaluating landscape performance of social aspects such as universal accessibility.

Water
Garden Example: Class time was dedicated for an outdoor lecture in the Sonoran Underwood Garden (included in LAFs Case Study Investigations) with visual explanation of the landscape performance related to storm water management.

Basin Surveying/Photogrammetry: Students were tasked to record dimensions of micro-basins near a campus building and conglomerate volume potential to be compared with surface runoff. Students experimented with photogrammetry for 3D modeling using cameras/smartphones along with traditional surveying equipment to determine volumes. Local long-term rainfall records were evaluated to determine percentile storm events to measure landscape performance.

Air
Infiltrometer: Students measured infiltration rates of various soils (compacted and undisturbed) to understand soil health and permeability.

Fire
Thermal Imaging: Students explored landscapes and exposures through thermal imaging to understand passive solar energy and benefits of planning for aspect and shading to increase landscape and building performance.

Final Project

Landscape Performance in Site Engineering

Assignment

LG101:
Complete a technical grading plan for the provided site (see L-SP.dwg on D2L). Place the building footprint and parking lot within the project boundary while considering the existing grades, constraints, and opportunities for landscape performance. Provide accessibility from the parking lot to the building entrance while allowing for surface drainage. Technically communicate proposed grades with appropriate spot elevations and contour lines.

LG801:
Respond to the following through calculations, narratives, and diagrams:

I. Create a soil/vegetation management plan:
Indicate locations of existing healthy soils on site and Vegetation and Soil Protection Zones (VSPZs)
Specify how construction activities are designed to minimize soil disturbance (Limit of construction - see slide 13 of Soils lecture, cut and fill estimates)
Identify disturbed soils that will be re-vegetated (due to current construction and disturbed by previous development)

II. Manage precipitation on site:
Calculate the precipitation volume from 60th, 80th, 90th, and 95th percentile precipitation event.
Calculate the total volume capacity of stormwater features.
Diagram to identify which impervious surfaces drain to which basins.

III. Optimize accessibility, safety and wayfinding:
Provide site access and usability as required by the Americans with Disabilities Act as a minimum.
Provide clear visibility and good sight lines, natural survellance at entrances and walkways, access control.
Provide Clear entrances and gateways, viewpoints and sight lines, decision points or nodes.
Diagram to illustrate how the site optimizes accessibility, safety, and wayfinding.

Due

Tuesday December 6th @ 4:50pm

*Please use the following name convention for all digital submissions: LAR554_2016F_FinalProject_LASTNAME_F

Deliverables

24x36 BW PDF submitted to D2L, and two (2) hard copy sets (one full-size 24x36, one half size12x18) - staple and roll separately with the title block information facing outward.

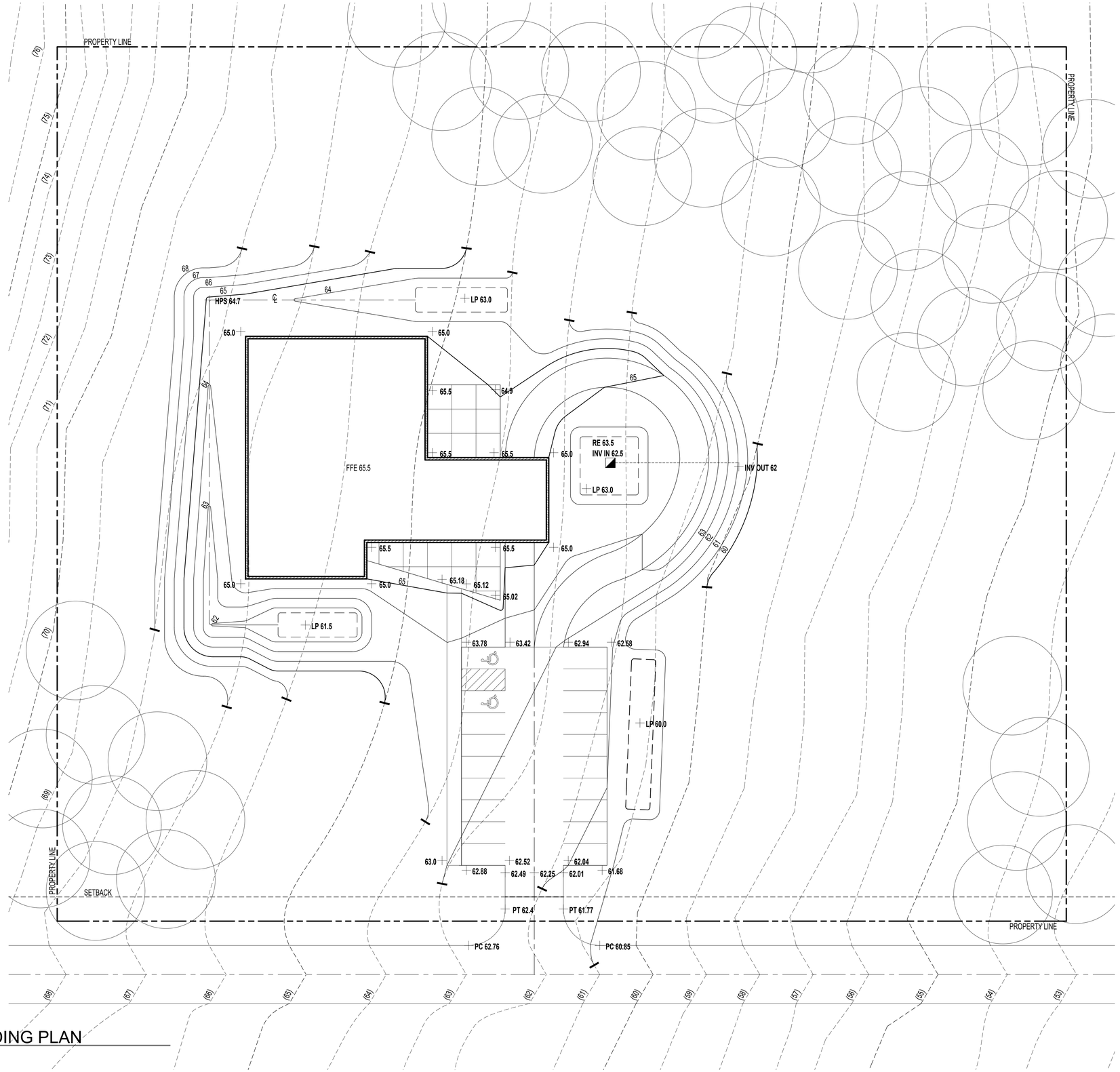
Grading Policy

See Syllabus

Resources

SITES v2 Reference Guide
Time Saver Standards for Landscape Architecture, 320-1 to 320-24
Site Engineering for Landscape Architects
Intensity Rates: http://www.ncdc.noaa.gov/cdo-web/

Follow the problem solving approach:
1. Flow arrows (always perpendicular to contours)
2. Conceptual Contours (for visualization purposes)
3. Spot elevations (to interpolate between)
4. Final contours



A1 GRADING PLAN
LG101 1" = 20'-0"

GENERAL NOTES:

LEGEND:

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- ℄ CENTERLINE
- DETENTION BASIN
- DRAINAGE PIPE

HPS	HIGHPOINT OF SWALE
LP	LOW POINT
RE	RIM ELEVATION
INV IN & OUT	CATCHBASIN IN & OUT
FFE	FINISHED FLOOR ELEVATION
PC	POINT OF CURVE
PT	POINT OF TANGENT
◪	CATCH BASIN
00.00	SPOT ELEVATION

Dan Zedick

UNIVERSITY OF ARIZONA
SITE ENGINEERING
LAR 554 . FALL 2016
KIRK DIMOND

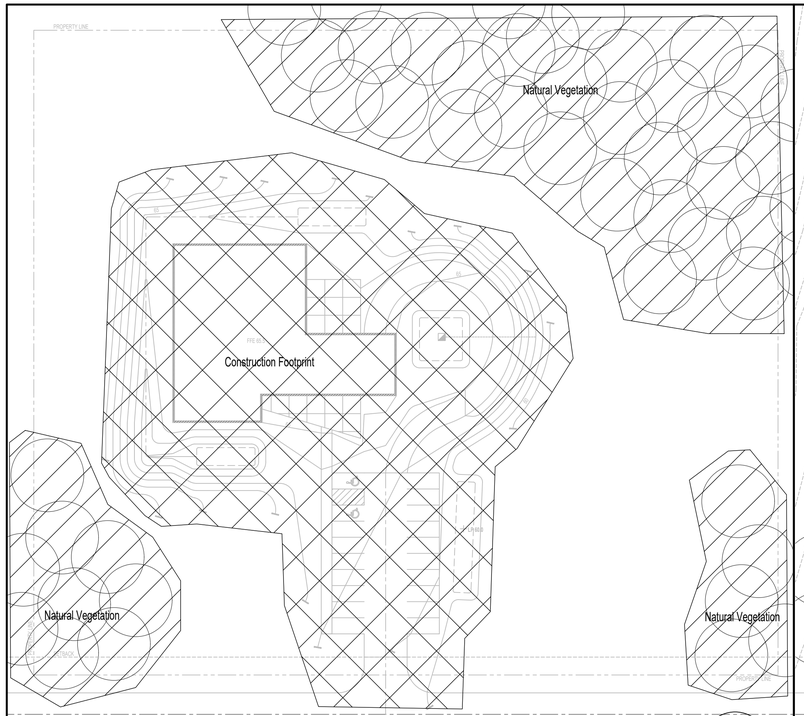
Final Assignment

REVISIONS

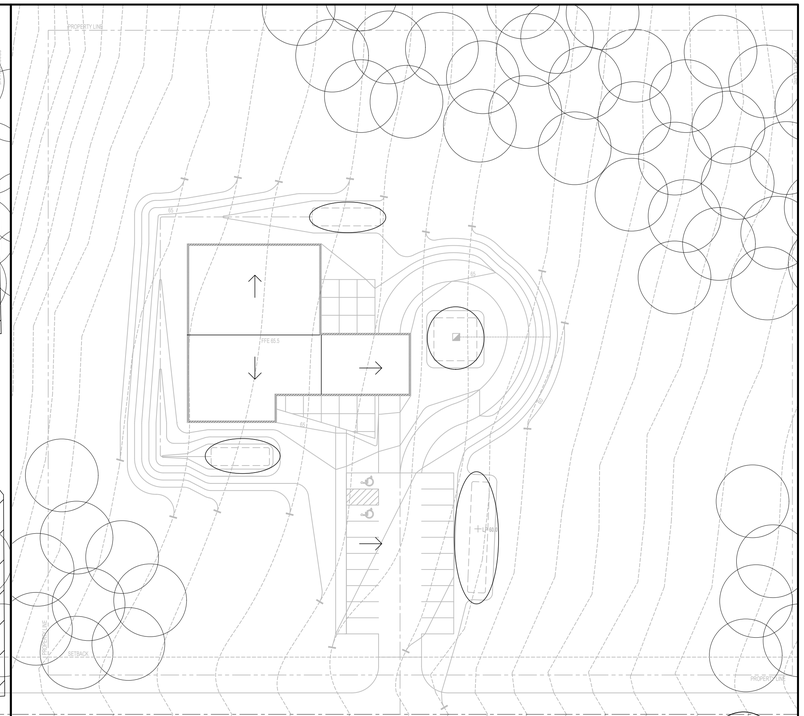
PROJECT NO.:	11
CHECKED BY:	KD
DRAWN BY:	DZ
DATE:	12/12/2016

SHEET CONTENTS
GRADING PLAN

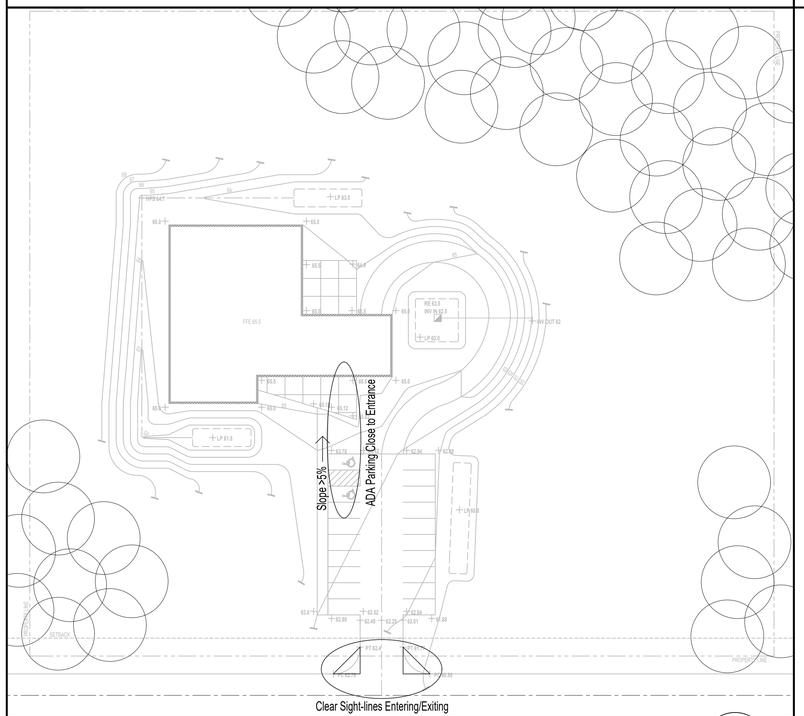
LG101



C2 SOIL/VEG MGMT PLAN
LG801 1" = 40'-0"



C4 PRECIPITATION MGMT PLAN
LG101 1" = 40'-0"



A2 ACCESSIBILITY, SAFETY, WAY-FINDING PLAN
LG101 1" = 40'-0"

KEY NOTES:

LEGEND:

	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
℄	CENTERLINE
	DETENTION BASIN
	DRAINAGE PIPE
HPS	HIGHPOINT OF SWALE
LP	LOW POINT
RE	RIM ELEVATION
INV IN & OUT	CATCHBASIN IN & OUT
FFE	FINISHED FLOOR ELEVATION
PC	POINT OF CURVE
PT	POINT OF TANGENT
	CATCH BASIN
00.00	SPOT ELEVATION

QUESTIONS:

DESCRIBE 1) HOW YOUR GRADING PLAN LIMITS SOIL AND VEGETATION DISTURBANCE, AND 2) WHAT DIFFERENCE DID IT MAKE?:

1. The proposed grading plan limits soil and vegetation disturbance by keeping the perimeter/boundary of development as small as possible, and by not developing into the surrounding plant communities.
2. The difference that this made was a resulting steeper slope, 25-33%, depending on the area, but kept the development footprint smaller and didn't require the removal of any of the vegetation.

DESCRIBE 1) HOW YOUR GRADING PLAN MANAGES PRECIPITATION ON SITE, 2) WHAT DIFFERENCE DOES IT MAKE, AND 3) HOW DO YOU KNOW?:

1. The grading plan manages precipitation on-site by being equipped, through appropriately sized basins, to handle a rain event in the 95th percentile. Based on calculations of impervious surface on-site, and the amount of water that can be expected as runoff in a 95th percentile rain event, the basins would need to be able handle 1760 cubic feet of rain water. The basins can handle almost 1900 cubic feet of water. This ensures that the site can easily manage any storm event.
2. The difference that this makes is that rather than simply disregarding the disturbance that runoff and rainwater can have on the adjacent areas, the proposed grading takes this into account by going above and beyond to deal with high intensity rain events.
3. Based on water quality volume calculations, as well as calculations of area and depth, the basins are the appropriate size for high intensity storms.

DESCRIBE 1) HOW YOUR GRADING PLAN OPTIMIZES ACCESSIBILITY , SAFETY, AND WAY-FINDING, 2) WHAT DIFFERENCE DOES IT MAKE, AND 3) CAN THESE DIFFERENCES BE DESCRIBED IN TERMS OF QUALITATIVE OR QUANTITATIVE METRICS? :

1. The plan optimizes accessibility and wayfinding by keeping all pathway slopes under 5%, also by placing the ADA parking closest to the building entrance. Additionally, there is a 45' line of sight radius for optimal vision and safety around the transition zone.
2. The difference is that the paths were marginally longer due to the smaller slope, and the transition zone was slightly wider to accommodate the clear sight lines.
3. The quantitative measurements that would correspond to the differences would be in slope and distance, with the less accessible pathways being steeper but shorter, and the transition zone with a smaller radius of sight would cut less into the adjacent earth.

HOW DID CONSIDERING LANDSCAPE PERFORMANCE AFFECT YOUR GRADING DESIGN DECISIONS?

Having to consider landscape performance required that the project have a certain amount of accountability. By having stricter metrics regarding building footprint, slopes, water quality volume, accessibility, and others, it made the grading take on a more inviting and also sustainable approach, as opposed to the alternative of doing the easiest option available.

DAN ZEDICK

UNIVERSITY OF ARIZONA
SITE ENGINEERING
LAR 554 . FALL 2016
KIRK DIMOND

FINAL ASSIGNMENT

REVISIONS

PROJECT NO.:	11
CHECKED BY:	KD
DRAWN BY:	DZ
DATE:	12/12/2016

SHEET CONTENTS
GRADING DIAGRAMS

LG801