**Civil Site Design Competition Rules**

*Updated February 16, 2018*

# Overview

In the land development sector of Civil Engineering, it is common for a developer to have an interest or option on parcel of land for months or even years. As part of the developer’s investigations, they may have hired the services of a professional surveyor to perform a comprehensive field investigation of the site’s boundaries, topography, utilities, roadways, easements, and other features. Afterwards, the developer may provide an engineer a CAD file that contains this comprehensive survey for the purposes of quickly establishing the feasibility of improving the site for any number of uses. The civil engineer provides value to the developer by quickly establishing a site plan based on local zoning codes and the desired goals of the developer. The civil engineer is asked to not only tests site plan feasibility for different uses, but also identifies liabilities and challenges that may accompany connections to existing utilities, earthworks balancing, storm water control, and site access. By performing site plans for feasibility, the engineer provides a basis for a developer to refine their pro-forma before investing significant quantities of time, effort, and money into a project.

# Objective

The goal of the 2018 OVSC Civil Site Design Competition is to evaluate the characteristics of a survey for a 35-acre parcel of land for purposes of land development. The engineering team will be provided a CAD file with a survey of the parcel, including contours and points, various topographic features, boundary information, and utility locations. From this file, and utilizing zoning restrictions that are provided, the engineering teams will develop a conceptual site plan that tests project feasibility to a high degree, but falls short of committing time and resources to a full engineering design.

# Significant Milestones

Teams interested in participating in the Civil Site Design Competition will have two milestones. The first milestone is for the entire team, where the completed conceptual site plan will be submitted to OVSC organizers no later than the date established below in the Milestone Requirements. The second milestone will be at the OVSC competition at Ohio University. The second milestone will involve one team member from each team being provided a change order, and executing that change within a CAD environment within a limited period of time.

# CAD Platform & Milestone Requirements

Engineering teams may utilize any CAD platform to perform their conceptual site planning work, though the survey file provided is in AutoCAD 2016 dwg format. The OVSC site at Ohio University will also offer computers that are running AutoCAD 2016. While engineering teams may consider utilizing Civil 3D for developing their initial conceptual site plan for the first milestone submittal, Civil 3D will not be available at the OVSC. The intent is for the engineering teams to be able to quickly use standard AutoCAD to make any modifications related to the second milestone’s change order. Engineering teams may change layer names, colors, linetypes, or other features within the provided CAD file at their discretion.

The first milestone submittal of the site plan should be sent to ovsc@ohio.edu and must be received prior to April 5, 2018 at 5:00pm. The submittal must be in PDF format and no larger than 11x17 ledger paper size. The PDF should be a single file, but the engineering teams may utilize as many pages within the PDF file as necessary to communicate their site plan effectively and legibly. Engineering teams may work collaboratively to create the submittal for the first milestone.

The second milestone will involve a change order the day of the OVSC competition, April 14, 2018. The day of the competition, the engineering team will be issued the change order and may select one team member to perform all AutoCAD activities, though other team members may provide verbal assistance. The change order will be provided in a narrative format and will also include handwritten notes and sketches on the team’s submitted site plan. At the start of the second milestone, each team will have 30 minutes to review the change order and also load whatever CAD files as necessary onto the provided computer to complete the change. Calculators, scales, and drawing implements are permitted for use, and team members may write on the provided drawing of their site plan as necessary. No cell phone calculators will be permitted.

Only one team member may load their files onto the computer and perform the changes in AutoCAD for the entirety of the second milestone. Each team will have a two-hour period to complete all changes and publish their drawings to a new PDF. Teams should bring their CAD files, including any pen tables or custom user interface files, with them on a flash drive or have them on a site where they can easily be downloaded (OVSC is not responsible for teams that have issues with their flash drives, download access to external sites, custom pen tables, CUI files, or any other issues with technology not provided by OVSC the day of the competition).

# Site Concept

The OVSC developer has requested your engineering team develop a concept that maximizes space for a new development of single family homes, while retaining the natural topography and character of the site as much as possible. The developer is looking for the following characteristics and amenities, in context with the *Site Plan Submittal & Zoning Requirements* section:

* All site serviced by public water and sanitary sewer, whose existing infrastructure is located along North Road
* Proposed road right of way shall be 50-feet wide. The internal development roadway should be 24-feet wide from back of curb to back of curb. A 5-foot sidewalk is required on only one side of any new road.
* Each single-family residence will be on an individual lot with its own dedicated driveway that connects directly to a roadway. Shared driveways are not permitted.
* Basement walkouts are encouraged whenever possible. Basement finish floor elevations may be assumed at 8-feet below finish grade elevation.
* A typical single family footprint is below and provided as part of the CAD file.



* The new development should include a playground area of a size and functionality to be determined by the engineering team. There should also be a 5-foot nature path or paths throughout the development that connects to the roadway sidewalk system, with a layout and functionality to be determined by the engineering team. A portion of the nature path, as determined by the engineering team, should be designed to meet 2010 ADAAG requirements.
* There should be at least one new tree planting in front of every lot between the road back of curb and the right-of-way boundary. The tree planting should not interfere with the driveway, roadway lines of site, utilities, sidewalks, or other features.
* A subdivision entrance monument should be provided as well as a landscape plan for the property along the North Road frontage.
* Existing roadways and buildings on the property shall be demolished, removed, and not part of the plan.

# Site Plan Submittal & Zoning Requirements

* Plans shall be submitted on a PDF no greater than 11x17 ledger size with a title block present on each plan sheet.
* In general, the plan sets should include a title page with pertinent information regarding the project, an existing conditions sheet of the entire parcel, a proposed lot layout sheet of the entire parcel without utilities or grading shown, a proposed lot layout sheet of the entire parcel with utilities and grading shown, as well as a proposed lot layout sheet with landscaping shown. The engineering teams should also provide zoomed in views of the parcels for each of the required pages above as necessary to communicate effectively and legibly. For example, the overall lot layout sheet for utilities and grading may not be appropriate to show spot grades from a legibility standpoint, but subsequent pages showing zoomed in sections of the lots will allow for legible spot grades. Profile sheets of roadway alignments and utilities are not required for this submittal.
* For the requirements below, the engineering teams should use their discretion regarding how best to present and communication the required information legibility on individual plan set sheets as appropriate.
* Date of plan (with revision dates), scale, and north arrow shown are required.
* In general, plan at a scale not greater than one inch equals 200 feet. All scales must be those customarily found on an engineer’s scale (e.g. 10, 20, 40, 50). The information shall be presented on more than one drawing if necessary.
* Name, University, street address, email address, phone and fax number of the engineering team is required.
* Lot line angles or bearings based on a boundary survey indicated on the plans are required.
* Show existing topography, shown at a 1 or 2 foot contour interval, extended beyond the site in all directions, showing existing natural features such as: trees, wooded areas, marshes, streams, ponds, and wetlands with any removals indicated.
* Note delineation of any wetlands or watercourses.
* Show existing buildings and structures, on the site , including but not limited to drives, utility poles and towers, pipelines, excavations, ditches, bridges, and culverts, with any removals indicated.
* Show existing public utilities serving the property (sanitary, storm, and water).
* All subdivision roads shall be contained within new 50-foot right-of-ways, whose center line matches the alignment of the road centerline. Where different roads intersect, those intersections shall be at angles not less than 10 degrees from perpendicular. Right-of-way intersections shall also be at the same matching angle, with no filets between right-of-way lines permitted.
* The relative elevations of the typical roadway cross section and ROW edge are as follows
	+ CL of roadway, 100.00’
	+ Edge of pavement, 99.80’
	+ Concrete gutter, 99.78’
	+ Back of curb, 100.28’
	+ Edge of right-of-way, 100.78’
* The typical lot layout shall be provided in the plans.
* Each lot may be a minimum of 60-feet wide and 120-feet deep, with a minimum lot area of 7200 square feet. Front yard setbacks are 25-feet, rear yard setbacks are 30-feet, and side yard setbacks are 10-feet either side of the lot.
* Maximum driveway slopes are 10 percent between the right-of-way and the front of the garage, which is assumed to be at the edge of the front yard setback
* Finish grade of each house must be at least 0.5-feet higher than the highest side yard elevation to ensure positive drainage away from each garage
* Provide a proposed grading plan, showing finished contours at a minimum interval of one foot. All proposed contour lines are to be connected to existing contour lines at or inside the property lines.
* Note the location and size of proposed recreational areas and open spaces.
* Show the location, width, and surface of proposed recreational pathways or sidewalks, either in plan view or with a detail.
* Show the landscape plan showing location and type of all plant materials. Plantings must not interfere with utilities or public easements.
* Provide a narrative indication of how the site will be served with sewer and water.
* Show the layout of proposed storm management system, including outlet, if applicable.
* Provide the location and size of detention/retention ponds with side slopes indicated.
* Provide proposed street and drive information including but not limited to proposed street name, right-of-way, grades and surface elevations of entries/exits, curve-radii, and turning lanes, if any.
* On and offsite permanent and temporary easements shall be shown on the plans. All proposed utilities shall be in the right-of-way or within a contained easement 20-feet wide.
* Storm sewer, sanitary sewer and water main shall be shown on the same plan view legibly.
* No new utilities shall be placed below or within a 1:1 influence of a building footprint. The limits of all removals and/or abandonment shall be shown on the plans.
* A minimum ten (10) feet wide horizontal separation shall be required between all public utilities. In addition, utilities must be a minimum of ten (10) feet from buildings.
* No water main or sanitary sewer shall be within five (5) feet (measured horizontally) from the high water elevation of a detention, retention, and/or forebay basin.
* A minimum 10 feet separation must be maintained between the sanitary sewer and any permanent structures, such as a building.
* Sanitary sewer and water main must be within the 50-foot right of way. Water main shall be on the same side of the road as the sidewalk, while sanitary sewer shall be on the opposite side of the road where there is no sidewalk.
* Sanitary – the minimum diameter of pipe shall be 8-inches, with a lead deep enough to service the first floor of each home (assume that basements will not be serviced). Manholes may be no further than 300-feet apart. Slopes and other design elements shall be per the current version of the Ten States Standards for Wastewater Facilities.
* Water Main – shut off valves for the main line shall be provided at a distance not to exceed 1000-feet. Hydrant coverage must be within a 500-foot radius from another hydrant. Hydrants must be located in the right-of-way and not conflict with sidewalk or other structures. The top

of the water main shall be no less than 48-inches below grade and no deeper than 72-inches below grade.

* Storm water shall not be diverted onto adjoining properties nor shall storm water flow be impeded from its existing drainage path due to a proposed development.
* At no time shall storm water discharge exceed a rate of 0.2 cfs/acre.
* The location of all storm sewer, including culverts, shall be shown on the plans.
* The minimum size storm sewer shall be 12” diameter.
* Storm sewer manholes and catch basins shall be a minimum of 48” diameter.
* Storm sewer inlets shall be a minimum of 24” diameter. Inlets shall only be permitted at a structure that is the first (upstream) structure in a series and 12” diameter pipe serves as the discharge.
* Storm structures (manholes and catch basins) shall generally be placed at intervals of 400 feet, at every change in grade, alignment, direction, pipe size, and at all junctions. Maximum distance between manholes shall be 325 feet for sewers 36 inches in diameter and smaller. Sewer larger than 36 inches in diameter will be considered individually.
* Catch basins shall be placed at all low points in the gutter lines and not over 500 feet from a high point. Multiple catch basins may be required at a low point based upon the drainage area (catch basins at low points shall not receive drainage from an area larger than one acre for a paved surface).
* Storm sewer catch basins shall be placed at rear lot lines to provide proper site drainage.
* All connections to storm sewer must be made at a structure. Blind taps are not allowed.
* Storm structures shall not be located in sidewalks or drive approaches.
* All public storm sewers must be located in a public right-of-way or an easement on common- owned property, not on privately owned lots.
* The easement size will vary individually as required for maintenance and access based upon sewer depth.
* Detention must accommodate all onsite drainage and any runoff entering the site from neighboring properties. Discharge rates shall not exceed 0.2 cfs/acre.
* Detention basins may be dry basins, wet basins, or storm water marsh systems. Rip-rap must be provided around the inlet and outlet pipes.
* The location of the detention, standpipe riser structure, retention, forebay, forebay filter berms, and rain garden areas shall be shown in plan view.
* While calculations for the detention/retention system are not required, the extents of each basin component shall be shown including the normal pool and high water level boundaries. The basins shall provide at least three feet of freeboard above the high water level. In addition to the standpipe riser or other primary discharge point, an emergency overflow point with stone should be provided.
* Sufficient proposed grades must be indicated to ensure that drainage is adequately discharged offsite with proper detention or retention, no upstream drainage is restricted, paving slopes are adequate, the site generally drains without standing water, site grading merges with grading on neighboring sites, and sight lines are not obstructed.
* The finished grade elevation for all proposed buildings must be provided. The engineering team will provide sufficient spot grades at each corner of each lot as well any high points or other change in slopes along the side yard lot lines.
* The maximum slope to an abutting property line is 1:4. Minimum slopes for yards is 2%.
* Grading plans shall take into account the natural features of the land as much as possible.
* Proposed grading shall be done in such a way to make the earthworks (cut/fill) of the site to balance. Engineering teams do not need to consider expansion and compaction factors of earthworks, and may assume for simplicity’s sake a 1 to 1 expansion/compaction ratio.
* Single-family lots shall be graded to drain away from the house. To ensure proper drainage, swales may have to be constructed along the lot lines. If so, swales shall discharge to a catch basin or other approved drainage course and be contained within a drainage easement.
* No filling will be allowed within the floodplain of a river, stream, creek, or lake.
* All single family lots shall be graded for rear to front drainage per the Standard
* The general direction of overland drainage in the rear yard shall be indicated on each lot with arrow.
* High and low street grade points, slope direction (by arrow) and the location of all catch basins inlets and drainage ditches shall be shown on the grading plan.
* A maximum slope of 4 feet horizontal to 1 foot vertical shall not be exceeded for all terracing. The toe of slope shall be located outside of the rear and/or side lot line drainage easements.
* Grading plans shall include details of typical lot grading and drainage patterns intended to be used. The grading plans shall show the existing elevation topography by contour lines.
* Catch basins shall be placed in rear yard swales at low points where front to rear grading is used.
* All vertical alignment design shall follow the latest edition of the AASHTO Policy on Geometric
* Design for Streets and Highways. The design speed shall be thirty-five (35) mph for interior subdivision streets.
* A vertical curve shall be required where the algebraic difference in slopes of the tangent sections exceeds 1.0%. The minimum length of the vertical curve shall be 100’.
* Plan and profile sheets for roadways and utilities are not required.
* Road grades within 100’ of an intersection shall not exceed a slope of three (3) percent regardless of the surface type.
* All paved roads with curb and gutter shall have an enclosed storm sewer system.
* Pathways and Sidewalks shall be located in the right of way and one (1) foot from the ultimate right-of-way line.
* Proposed grades must be shown along the property line, driveways, and intermittent locations along the length of the path or walk.
* No construction or earth disturbance shall be permitted within 20-feet of any surveyed wetland or lake edge.

# Judging & Scoring

Teams will be judged by a panel of land development professionals. There will be 3 judges; they will make their decision based on:

* Presentation & Layout efficiency
* Achievement of all requirements
* Sustainability features
* Creativity

These will be ranked in order from greatest to least and awarded points accordingly. The decisions of the judges are final, and the team captain is the only team member that may interact with judges during the competition. Judging criteria are as follows:

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| **Milestone 1 Team Portion** | **Scoring** |
| Drawing Requirements Met | 20 Points |
| Playground & Nature Path | 20 Points |
| Sustainability & Landscaping | 20 Points |
| Conceptual Earth Balancing | 30 Points |
| Zoning Requirements Met | 30 Points |
| Overall Development Creativity | 30 Points |
| Plan Presentation Quality | 30 Points |

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| **Milestone 2 Individual Portion** | **Scoring** |
| Drafting / Plan Presentation Quality | 30 Points |
| Design Solution for the Change Order | 30 Points |

# Milestone 2 - Penalties

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| --- | --- |
| More than one team member utilizes the CAD work station | 10 points |
| Failure to complete the change order in the allotted time | 2 points per minute after the two-hour period |

**Awards**

An overall total of 240 points are available to be awarded; the team with the most points will be deemed the overall winner.

# Questions

Teams may submit questions to ovsc@ohio.edu no later than March 31, 2018. Please include “OVSC 2018 Civil Site Design Question” in the subject heading. All questions and answers will be provided to all of the teams participating in the competition.

# Acknowledgements

These rules and procedures are based on previous OVSC and other environmental competitions, modified as appropriate for the specifics of this year’s challenge.