

Civil Engineering

Subdivision: Arcade Creek

Subject Area: Civil Engineering/CAD Grade Levels: 9-12 Date: 12/2/2009

Students will reproduce a subdivision map and then add details such as house footprint, water, sewer, and lights.

Materials Included in this Lesson

- General map of subdivision
- 3 county maps of area
- Sample set of professional plans
- Sample plot plan

Other Materials for this Lesson

- AutoCAD
- Internet access
- Sketch paper

Skills the Student will Learn

- use and understand bearings
- polar coordinates and polar snap
- arcs, chords, angular displacement
- extend, lengthen command
- concept of Public Utility Easements
- setup of sheets and layers
- Plan for easements and setbacks
- concepts of area: section, acre, lot size, computation
- Utilities: planning for and drawing schematics

Student Deliverables

- Subdivision map (1 per student)
- Model House plans: Blocks of right and left footprint (1 per student)
- Updated map with houses and driveways inserted (1 per team)
- Report on Utilities
- Final map with utilities inserted (1 per team)
- Plot plans (1 per student)

Length of Lesson: 15 Days

Activity One: Reproduce subdivision map: (5 days)

Day 1: Intro Civil Engineering: Surveying, utilities, easements, grading, roads, etc.

Template setup: Layers, Sheets, Dimensions, Text

Math skills: Polar coordinates with bearings as angle measurement

Maps: Look at official maps; Google map; Google earth

Day 2 & 3:

Finish drawing map:

AutoCAD commands: polar snap, extend, lengthen

Math skills: arcs, chords, angular displacement

Day 4: Documentation: Dimensions, notes, legends, symbols, etc.

Activity Two: House Plans (2 days)

Students will be placed in teams of 3 at the beginning of the project. Each student will draw the map described above. On day 2 they will be given the assignment of discovering a floor plan to use as a model in their subdivision. Stress that these houses must FIT on the given plots.

Discuss easements and setbacks. They can use house plans found in books, magazines, or on the internet. They will then draw a footprint of the model and make blocks of the right and left footprint.

Math Skills: Area – Section, Acre, Sq. footage, computing area

AutoCAD: Blocks, computing area

Vocabulary: Easements, Setbacks, Footprint, Section, Acre

Activity Three: Updated map (1 day)

Each team will:

- Choose one of their subdivision maps to use as a team map.
- Decide which houses go on the lots. All 6 footprints must be used.
- Put in the driveways

Review: Block, easements, setbacks

Discuss: Rationale for placing houses.

Activity Four: Final map with utilities inserted (5 days)

Each team will plan and draw the schematic plan for the water, sewer and street lighting of the subdivision.

- Discuss needs of utilities
- Study examples of schematics on professional plans
- Each student chooses one topic to study and develop (water, sewer or lighting)
- Research and report on their topic: Description of process, where placed, tools used, materials used, pertinent information for their drawing.

Take a field trip to Bishop Ranch after studying plans

Activity Five: Individual Plot Plans (2 days)

Each student will take one lot and develop a plot plan that shows where the house is located along with all the easements and setbacks and all appropriate dimensions.

Enrichment Suggestions

Take a field trip to a local neighborhood and looking at the infrastructure. I was able to get the plans for a neighborhood across the street from my school. After spending some time drawing the assigned sub-division, we spent a day looking at the professional plans and learning how to read where the utilities would be located. The next day we went across the street and explored the neighborhood. It was a good day of seeing exactly what the symbols on the maps indicated and how they related to what you would see in the yards and streets.

Student Resources

The legal maps are included. During my externship the engineers were able to go directly into the county online documents and reproduce the actual map for the 1988 subdivision as well as the 1910 document that the newer map was based on. Copies of these are in the “map” folder.

State Standards Met

<http://www.cde.ca.gov/ci/ct/sf/documents/ctestandards.pdf>

CTE standards at the above link.

- 3.0 Career Planning
- 4.0 Technology
- 5.0 Problem Solving
- 9.0 Leadership and Teamwork

Lesson Plan Relevance To Externship

I did my externship at Baker-Williams Engineering Group. The focus of their business is doing all the planning for developing a site: from surveying to drawing the plans to getting the plans through the approval process. I was able to go to a city/county planning meeting about one of their site developments. I visited a job site and I spent a lot of time studying plans they had already completed. All of this gave me a better understanding of what must go into developing a set of plans for a building site.

During the week I was there I showed them a site that I had assigned my students in the past. They helped me find the real site plan and the location of the subdivision in Sacramento. Up to that point, I did not even know if it was a real location! Now we can google map it and also look at the official maps. It lends some legitimacy to the project that it is based on an official map.

Rubric for the Arcade Creek Project

Student Deliverables	1 Exceeds Expectations	2 Meets Expectations	3 Approaches Expectations	4 Fails to meet Expectations
Subdivision map				
Model House plans				
Updated map				
Report on Utilities				
Final map				
Plot plans				

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