

# Technology for Inclusive Greenway Planning

An overview of entry-level and professional landscape design software



# Introduction

- Tony Perkins
  - Designer
- Pacific Coast Land Design
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  - [tony@pc-ld.com](mailto:tony@pc-ld.com)
  - (805)644-9697





# Introduction

- Professional Work Experience
  - Pacific Coast Land Design
    - April 2015 - Present
  - Sustainable Recreation Design/Cal Olson Golf Architecture
    - June 2013 - Present
  - Tuleyome
    - April 2012 – July 2015
- Education
  - 2013: Bachelor of Science, Landscape Architecture (Honors)- University of California, Davis; Davis, CA
  - 2007: Associate of Arts, General Education (Honors)- Cerro Coso Community College; Mammoth Lakes, CA





[disabledsportseasternsierra.org](http://disabledsportseasternsierra.org)

# Introduction

- Memberships/Volunteer Experience
  - Member: CORBA, 2015 - present
  - Member: FATRAC, 2013-2015
  - Member: EcoLandscapes California, 2012-Present
  - Volunteer: FATRAC- Mountain Bike Assistant- Auburn State Recreation Area, 2015
  - Volunteer: UC Davis Student Advisory Committees- Transportation & Parking Services, Campus Unions & Recreation, Athletics, Child Care, 2010-2013
  - Volunteer: Disabled Sports Eastern Sierra- Summer Guide, Secind Chance Thrift Shop, 2009-2010



Rider: Gregorio Botello

Photo: Russell Pihl



# Background

- First exposed to trails as youth at YMCA camp
- Camping in High Sierras
- Fell in love with trails as Mountain Biker in Mammoth
- Started riding/building illegal trails in spring
- Discovered landscape architecture while searching for legal ways to design/build trails
- Eager to share what I've learned!



Rider:  
Tony Perkins

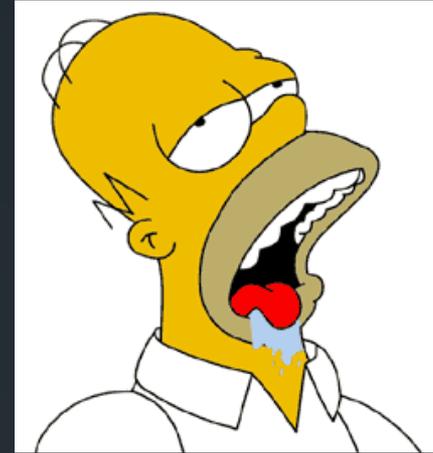
Photo:  
Brad Peatross



# Digital Design Tools

- MS Office
- Google Earth Pro
- Adobe Creative Suite
- SketchUp
- Lumion
- AutoCAD
- Vectorworks
- Online Resources
  - GIS Data
  - Census Data
  - Other Resources

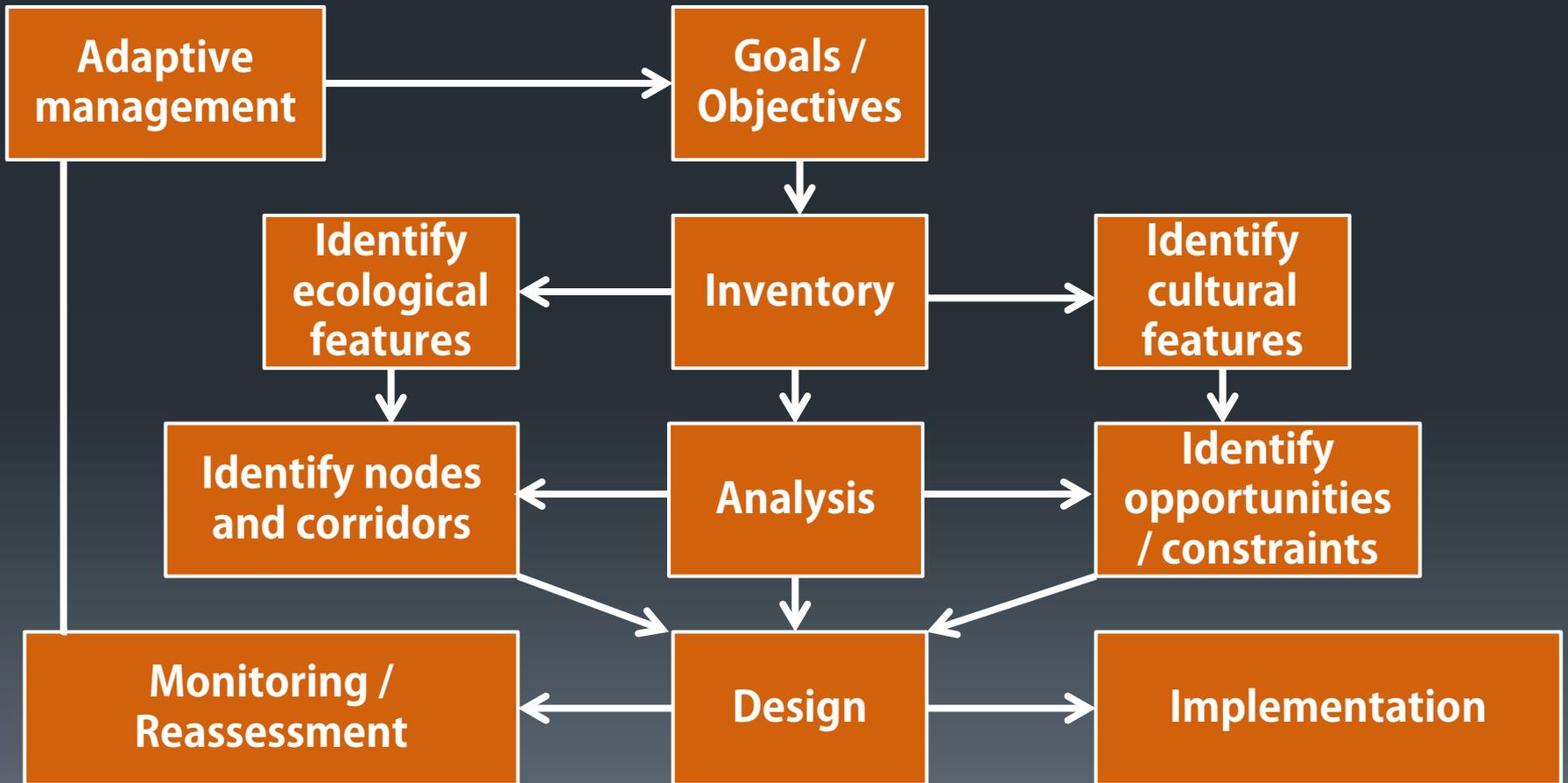
# Term definitions



- **CAD:** Computer-Aided Design
- **BIM:** Building Information Modeling
- **GIS:** Geographic Information Systems
- **Raster:** the use of a grid of pixels to represent images
- **Vector:** the use of lines and polygons to represent images
- **Database:** a usually large collection of data organized especially for rapid search and retrieval

# Overview

## The Design Process



# Goals & Objectives: Going from Business as Usual to Collaboration



*Discussing Water Rights, A Western Pastime*





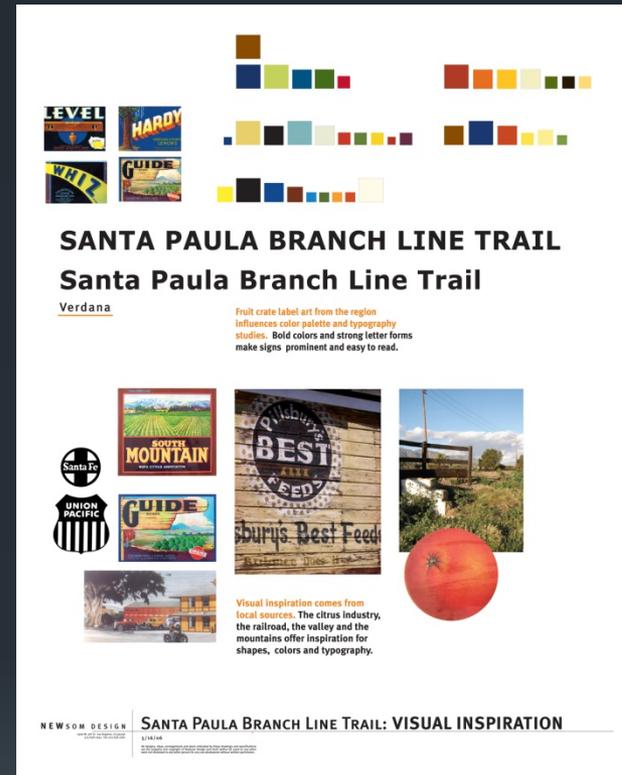
# Goals & Objectives

- Stakeholder Assessment
- Coordinate Project Team and/or Steering Committee
- Determine Project Timeline and Milestones
- Create Design Program
  - Function/Purpose
  - Recreation needs
  - Social equity
  - Ecological considerations
    - Wildlife/Pollinators, Storm water management, CO2 reduction, etc.

# MS Office

<http://www.microsoftstore.com/>

- Microsoft Office is the standard applications for digital document production
- Word (Word Processing)
- Excel (Spreadsheet)
- Power Point (Presentation)
- Other
- From \$6.99/month Office 365 subscription, or \$149 individual license

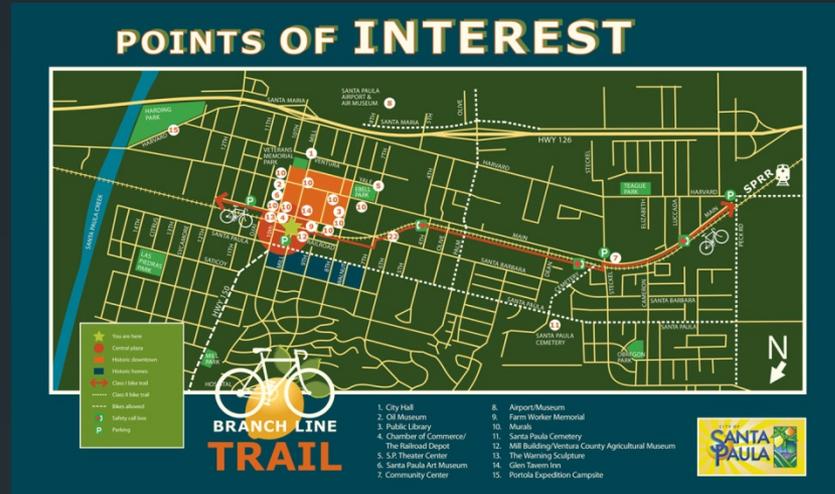


Consolidating Design Ideas

Inventory as Wayfinding-  
Branch Line Trail,  
Santa Paula, CA

# Inventory

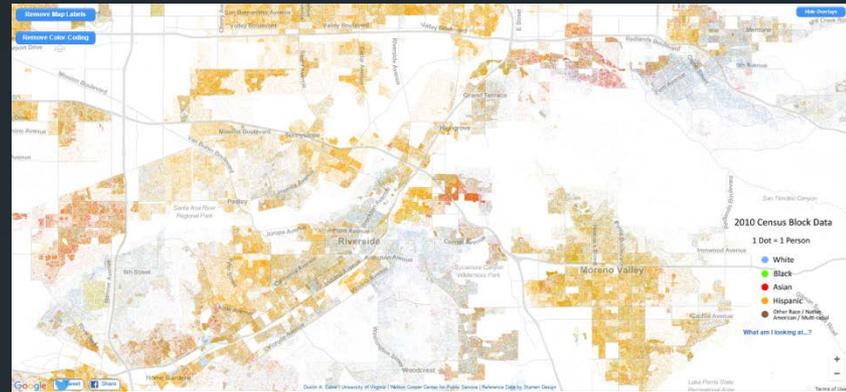
- Land Cover- Vegetation, Water features, Roads, Urban Areas, Geologic Info, etc.
- Land Use- Human uses, activities, or occupancy
- Demographic Data
- Species Data
- Recreational Opportunities
- Existing Bike Infrastructure
- Opportunities for improvement
- Barriers to wildlife/human use
- Protected Land/Use Easements
- Critical/protected habitat





Farmworkers  
Memorial Plaza,  
Santa Paula, CA

- **Cultural geography** is the study of the influence of cultural aspects on the built environment, and the influence of the natural environment on cultures.
- A **cultural landscape**, as defined by the *World Heritage Committee*, is the "cultural properties [that] represent the combined works of nature and of man."
- **Demographics:** characteristics (such as age, sex, race, and income) of a specific group of people



<http://demographics.coopercenter.org/DotMap/index.html>

# Census Data

<https://www.census.gov/geo/maps-data/>

- Free data and mapping tools- GIS data, Interactive maps, Infographics, Surveys, Publications, etc.
- Topics: Population, Economy, Housing, Education, Poverty, etc.
- Helps designer identify potential user groups
- Allows participants to visualize data
- Basis for funding sources/approvals
- Garners community support

# Community Involvement

6 steps to successful community involvement:

- 1) Stakeholder Assessment.
- 2) Organization and Process Design.
- 3) Engage in Mutual Education.
- 4) Frame Issues, Develop Goals/Alternatives.
- 5) Negotiate/Seek Agreement.
- 6) Implementation of Sustainable Agreements.

-J. Loux, 2012



Kellogg Park Community  
Workshop, 2015

# Community Involvement

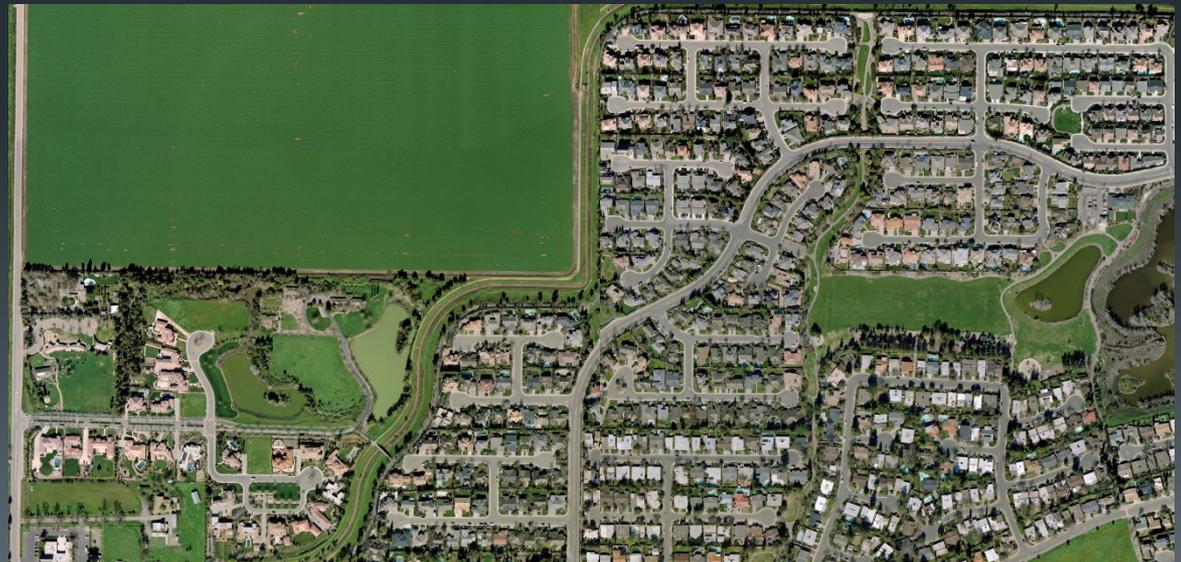
- Every voice counts
- Connect with people on a personal level
  - Use humor
- Educate the public before trying to resolve all of their issues
- Present design alternatives as options rather than suggestions
- Utilize a **facilitator** and **record-keeper** to manage the group and record the meeting minutes, and if possible, design in real-time with the public
- An excellent **facilitator** can be the key to a successful community involvement exercise



Kellogg Park Community Workshop, 2015

# Existing Conditions

- Site Photos
- Aerial Imagery
- Notes/Observations
- Surveys
- Community Input



# Google Earth Pro

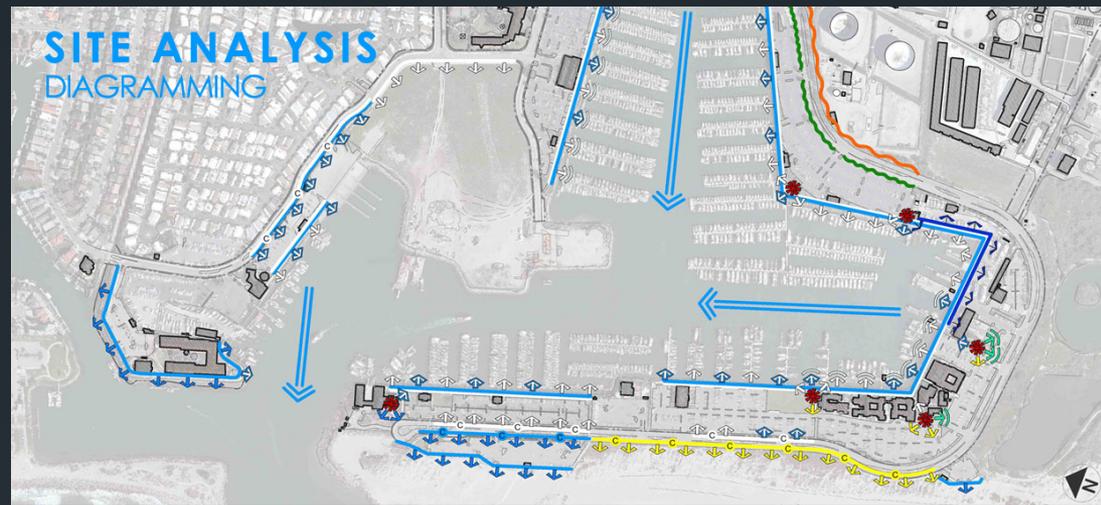


<http://www.google.com/earth/download/gep/agree.html>

- Free! Get advanced business tools in addition to all the easy-to-use features and imagery of Google Earth.
- Aerial and “Street View” Imagery
- Site Photos/Points of Interest
- Compute distances and areas using measurement tools
- Use Movie Maker to produce media collateral
- Print high-resolution images for presentations and reports
- Import large vector image files to quickly map GIS data

Ventura Harbor Village,  
Ventura, CA

# Analysis

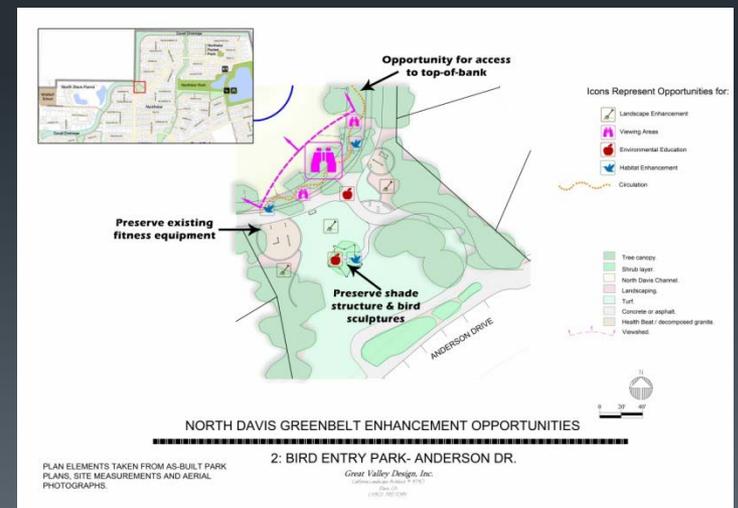


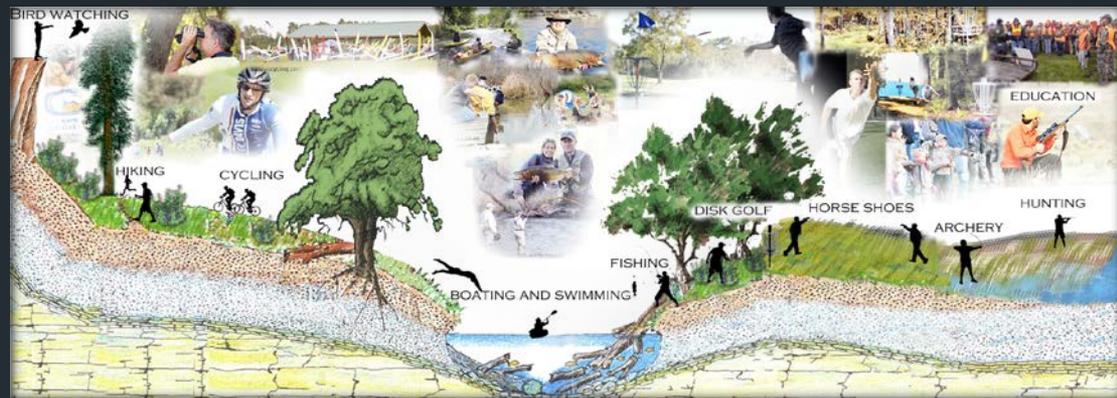
- Document Opportunities and Constraints
- What is the current structure and function of the site?
- Where are the inputs to the site and outputs from the site?
- What are the circulation routes & potential linkages to the site?

Evaluate factors:

- Recreational values
- Ecological values
- Potential environmental impacts
- Get in the field, get big picture, use consultants (soils, hydrology, wildlife), visit site during a storm event, etc.

North Davis Greenbelt,  
Davis, CA





-J. Holvick-Thomas, 2011

# Recreation

- Conduct analysis for as many activities/user groups as possible!
- Utilize community input and inventory data
- Universal Design
  - Consider needs of youth, elderly, disabled, and under-resourced

## Impacts to Wildlife:

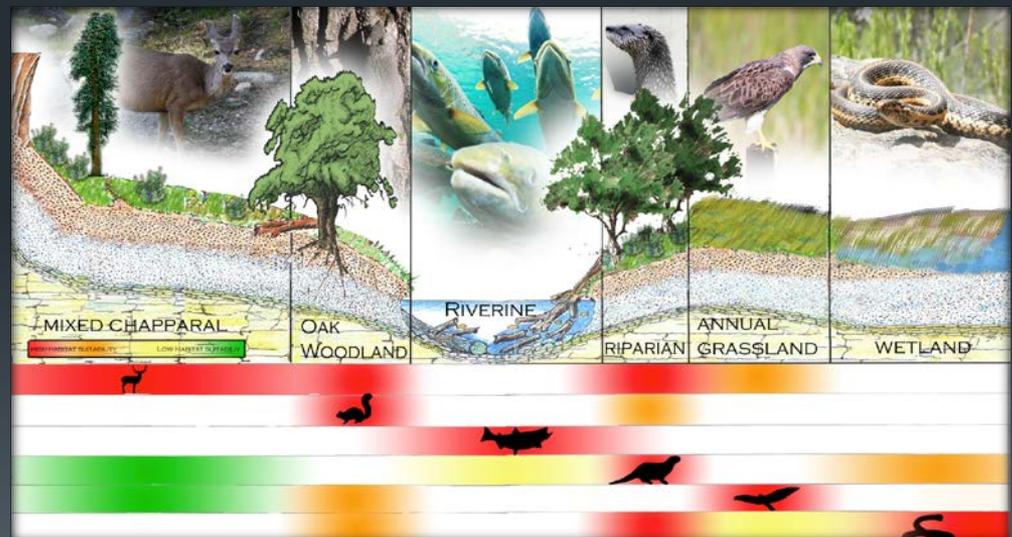
- Animals “remember” harassment or disturbance and will abandon habitat
- Adults teach their young to avoid stressful places



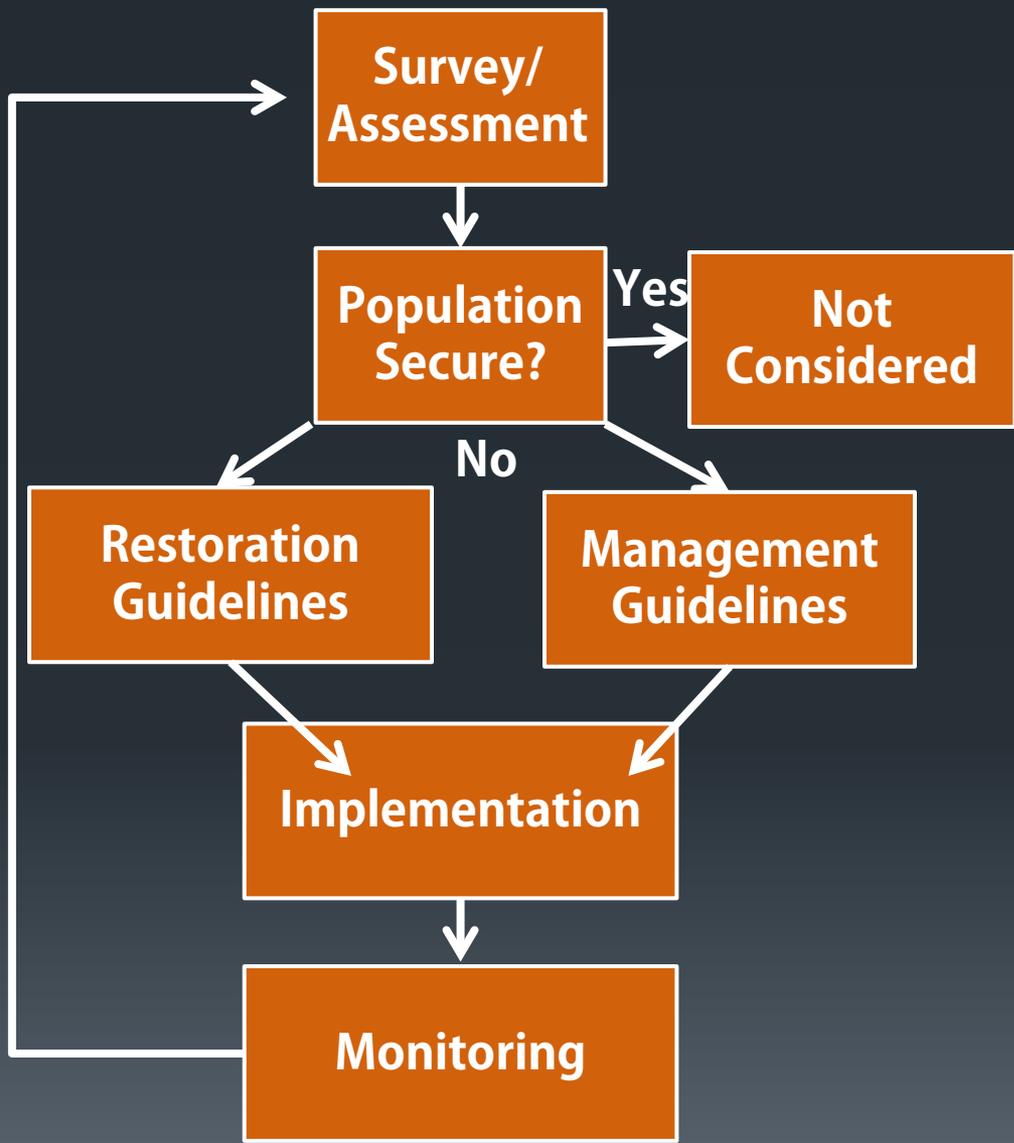
-S.E. Greco, 2011

# Landscape Ecology

- **Landscape:** A land mosaic composed of matrix, patch, and linear elements.
- **Landscape Ecology:**
  - “a study of the structure, function, and change in a heterogeneous land area composed of interacting ecosystems” (Forman and Godron 1986)
  - the study of the arrangement and interactions of functional units of the landscape (Thorne 1993)



-J. Holvick-Thomas, 2011



# Focal Species

- Design for wildlife!
- The first species considered for selection are **endangered** or **threatened** species, as well as **keystone** species, and other species of local importance.
- Individual species are selected to represent **entire habitat types**, therefore the entire ecosystem is represented by your suite of species.
- After selecting the focal species, threats and needs of each species are analyzed, and **management** or **restoration guidelines** are established.

# GIS



## ■ What is GIS?

- A graphic display or mapping component- An integrated database component
- Computer-based systems that permit the capture, maintenance, retrieval, integration, visualization and analysis of georeferenced data” (Sayre 2000)
- Allows spatial analysis
- Provides cartographic and tabular output

### **INPUTS:**

- Map data
- Tabular data
- Aerial photography
- Satellite imagery
- Global Positioning Systems (GPS) coordinates

### **OUTPUTS:**

- Maps, tables, statistics, graphs



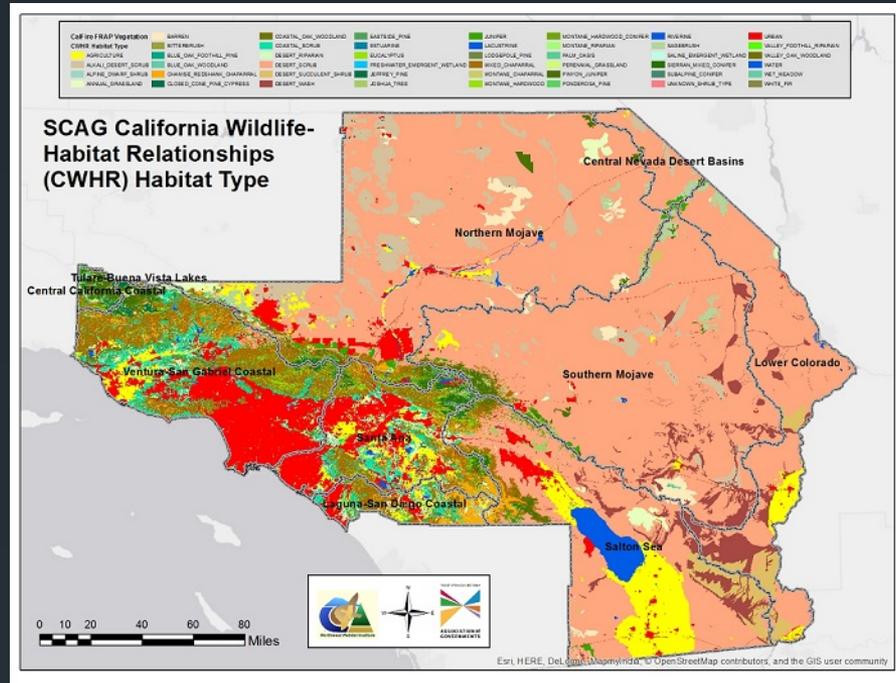
# Landscape Restoration

South River  
Restoration & Trails,  
Santa Clarita, CA

- **Ecosystem:** “a biological community together with its associated physical environment” (from Primack 2000)
- **Ecological Restoration:** "Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."--Society for Ecological Restoration (SER, 2002)
- **Restoration Ecology:** “The study of the structure and regeneration of plant and animal communities, aimed at the enlargement or restitution of threatened ecosystems.”-- (Lincoln, Boxshall and Clark 1998)

# CWHR

- Species Notes
- Range Maps
- Habitat Information
- Species Lists
- Habitat Analysis
- Legal Status
- GIS Data



- For CWHR version 8.2 see: <http://www.dfg.ca.gov/biogeodata/cwahr/>
- On that page, under the “Products” heading, click on: CWHR Version 8.2 Software and User's Manual (2008)
- From the list, download these two files:
  - Link to download CWHR Version 8.2 Setup — Full
  - Link to download CWHR Version 8.2 Users Manual



# Cal Atlas / USGS

<http://www.atlas.ca.gov/>

<http://www.usgs.gov/>

- **Cal-Atlas** is a library of spatial data products of importance to the State of California, providing a simple interface for a large audience
- **Data Available:** GIS Base Layers- Boundaries (state, counties, etc.), Statewide Aerial Imagery, USGS 7.5 minute quadrangles, DEMs (Digital Elevation Models), National Hydrology Dataset (NHD), etc.
- The **USGS** provide free topo maps, aerial imagery / 3D elevations, and other geologic data



Preliminary Sections  
Old Orchard Park Renovation,  
Santa Clarita, CA

# Preliminary Design

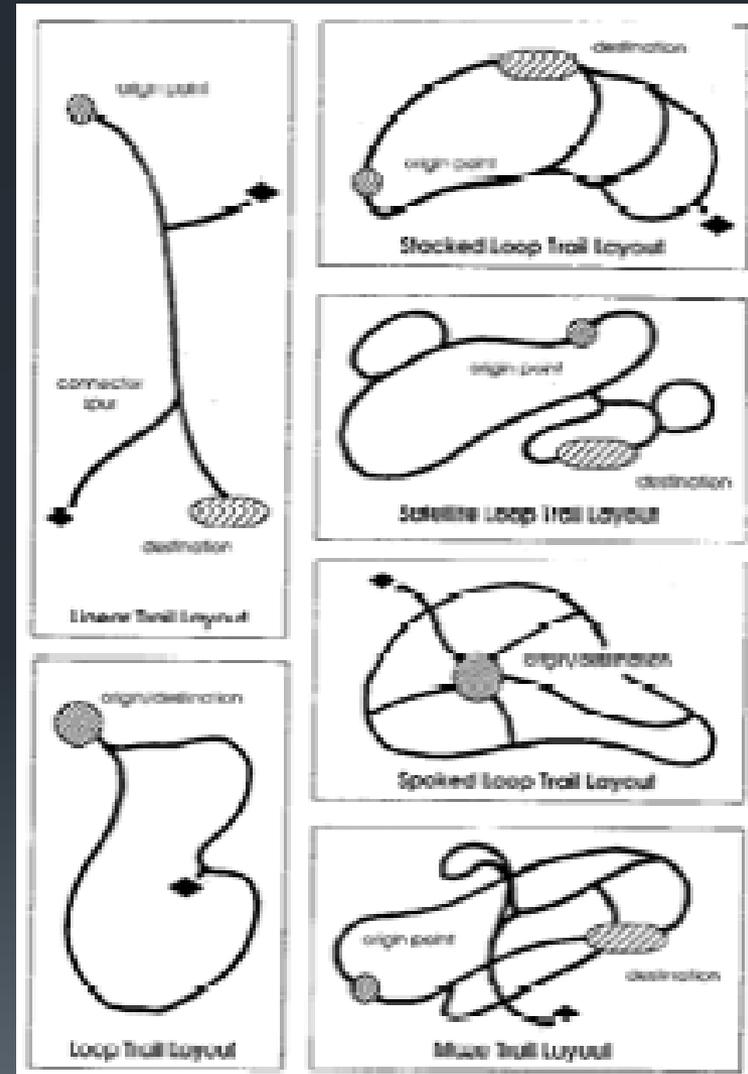
- Conceptual Planning
- Responds to Inventory/Analysis, and Opportunities & Constraints
- Preliminary Costing
- Rough Grading
- Preliminary Circulation
- Develop Site-Specific Alternatives



Newhall Ave Roundabout,  
Santa Clarita, CA

# Trail Design

- Spur trails
    - Least habitat fragmentation
  - Loop trails
  - Radial trails
  - Combination
- 
- Use spur trails to avoid fragmenting habitat and minimize edge effects from disturbance
  - Trails should be well-marked, use barriers to avoid trampling plants



# Design Guidelines to Reduce Site Vulnerability



- Concentrate human use areas
- Use buffers/vegetative screening along trails and roads
- Locate facilities at least 100-300 feet from sensitive habitat areas
- Boardwalks should be designed higher than 3 feet over a marsh surface to avoid shading effects and have railings to prevent wandering
- Create refuge areas to allow wildlife to retreat
- Use permanent water channels as barriers to dogs, cats, wandering

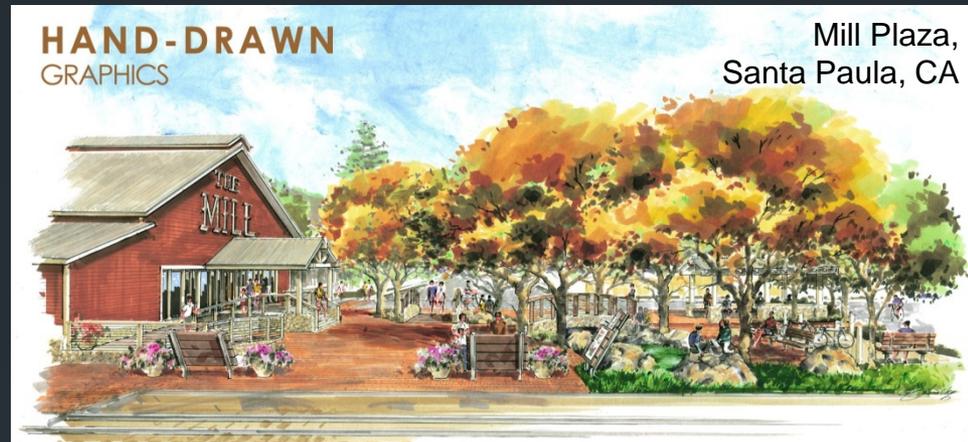
## SECTION/ELEVATION DRAWINGS



# Alternatives

- Loose conceptual designs
- Plan views
- Cross-sections
- Concept sketches
- Elevation graphics
- Select an alternative with advisory committee and/or specialists

## HAND-DRAWN GRAPHICS



Las Piedras Park,  
Santa Paula, CA



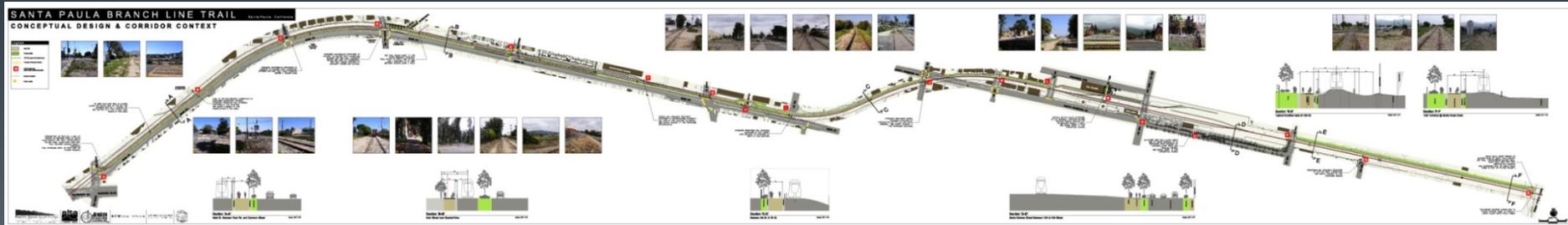
# Adobe Software

<http://www.adobe.com/>

- Photoshop- Raster-based design platform for image/photo editing and composition
- Illustrator- Vector-based design platform for graphic design and illustration for print, web, and digital publication
- InDesign- Design and layout application to create and publish everything from printed books and brochures to digital magazines, mobile apps, and more
- Other
- From \$9.99/month

# Detailed Design

- Develop detailed site plan showing the location of all design features
- Define circulation corridors and land uses
- Specify hydrozones/planting zones
- Create a grading plan
- Coordinate with consultants



Sierra Hwy  
Streetscape  
Improvements,  
Santa Clarita, CA

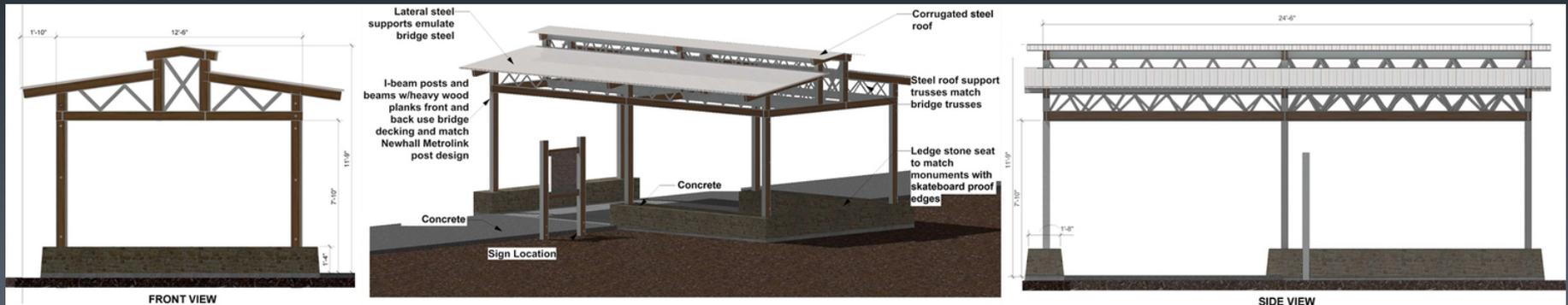


# 3D Modeling

- Help people see your vision!
- Create precise, scaled models
- Generate multiples images from one design
- Build project support with clean graphics



Iron Horse Trail, Santa Clarita, CA



# SketchUp

[www.sketchup.com](http://www.sketchup.com)

- 3D Modeling
- Intuitive, easy-to-learn interface
- Free
- 3D Warehouse- Library of free pre-made digital 3D models
- Best for architectural forms
- Poor rendering quality
- Use with other software for best results



North Davis  
Greenbelt,  
Davis, CA



North Davis Greenbelt,  
Davis, CA

# Rendering

- Take your design drawings to the next level!
- Add entourage- people, cars, animals, sky/lighting
- Refine colors/texture- added realism
- Photoshop
- Lumion
- Image filters
- Other

Newhall Ave Roundabout, Santa Clarita, CA



Hart Park Entrance, Santa Clarita, CA

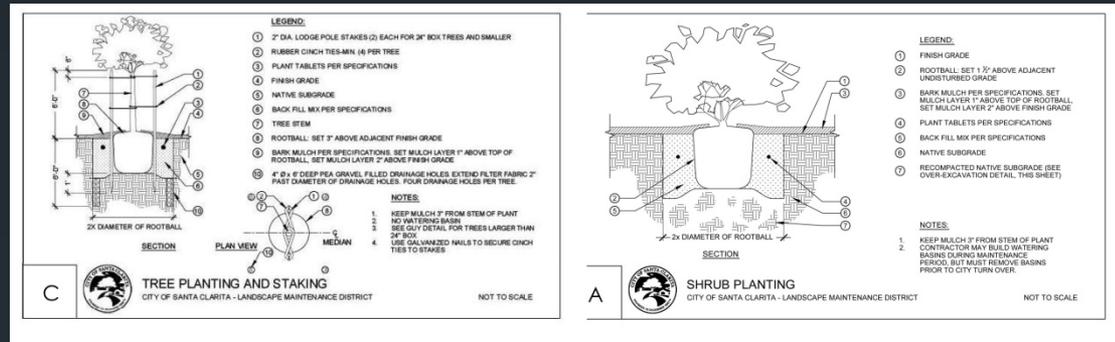


# Lumion



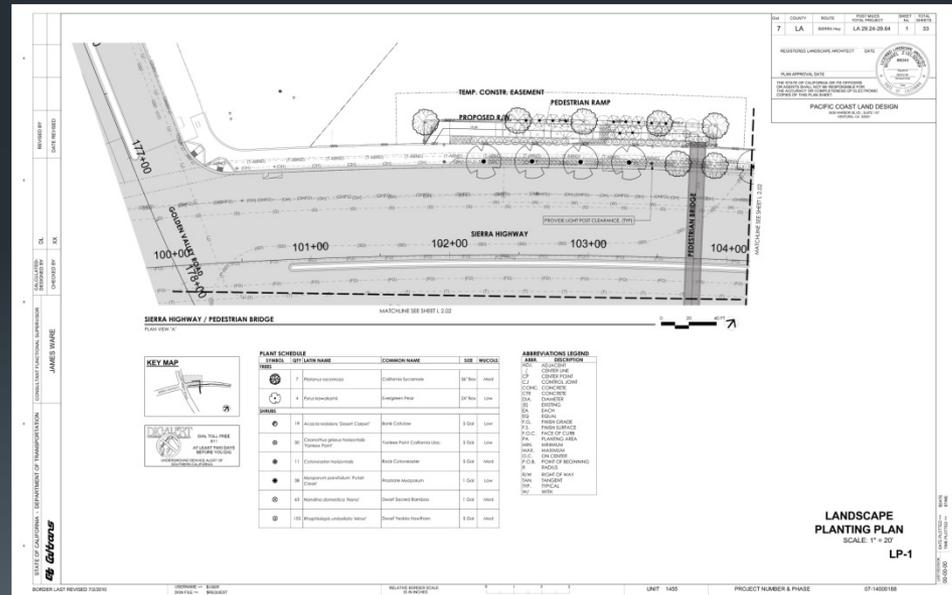
Bridgeview Apartments,  
Piru, CA

- No graphics training required
- Fast, easy rendering of 3D models
- Compatible with all 3D design software programs (i.e. Vectorworks, SketchUp, Revit, ArchiCAD, etc.)
- includes a huge content library with tools, materials and artistic effects
- Suitable for rendering large, complex models

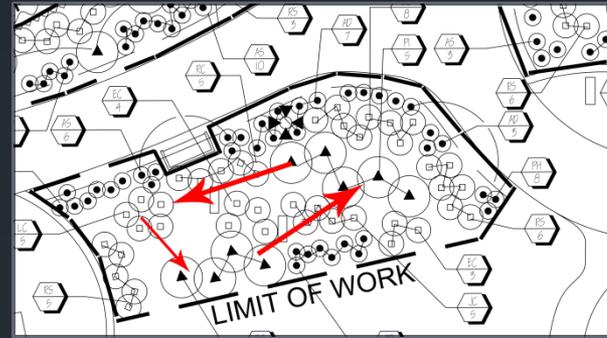


# Construction Documents

- Legally-binding building instructions for contractor
- Grading/Drainage
- Hardscape/Layout
- Planting/Irrigation
- Irrigation Calculations
- Construction Details
- Cost Estimates
- Specifications
- As-Builts



Sierra Hwy Ped Overcrossing,  
Santa Clarita, CA



North Davis  
Greenbelt,  
Davis, CA

# AutoCAD/AutoCAD LT

<http://www.autodesk.com/products/autocad/overview>

- Subscription only
- Industry standard for CAD drafting
- File format: .dwg
- Used for precision drafting and construction documentation
- AutoCAD LT provides professional 2D drafting capabilities for \$15/month or \$360/year
- AutoCAD (standard) allows users to produce 2D and 3D designs and presentation-ready graphics from \$210/month, \$1680/year, and up.

# Vectorworks

<http://www.vectorworks.net/>

- Multi-disciplinary **CAD** and **BIM** software for design professionals
- Excellent color graphics and rendering capabilities
- 2D drafting and 3D modeling capabilities with more “smart” tools for database management and project administration
- Attach data to design elements and use two-way worksheets to generate schedules and reports from your design
- Compatible with numerous import and export file formats, including DWG, VWX, SHX, PDF, SKP, image files, and more



Sierra Hwy  
Pedestrian  
Overcrossing,  
Santa Clarita,  
CA



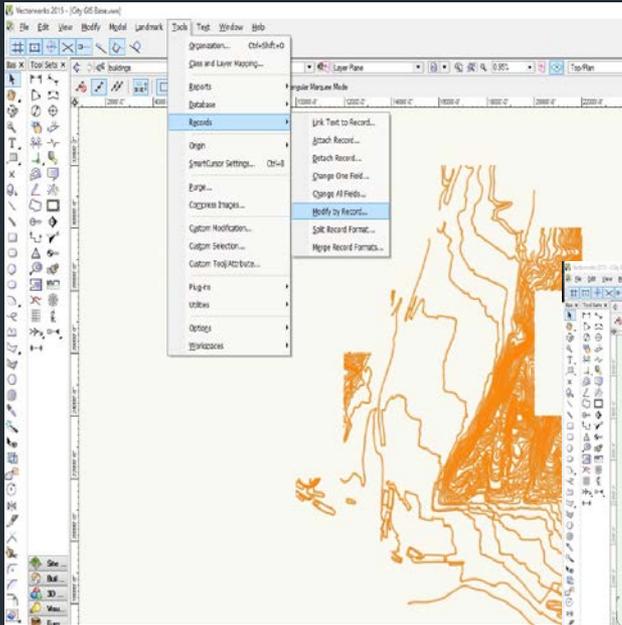
# Why do we use Vectorworks?

- Landmark is well designed for Landscape Architects
- Offers complete suite of functions in one program.
  - Drafting (AutoCAD)
  - Graphic Design tools
    - Layout (Adobe InDesign)
    - Vector (Adobe Illustrator)
  - GIS and Spatial Analysis (ArcGIS)
  - 3-dimensional modeling and rendering (SketchUp, Rhino, 3Ds Max)
  - (B)IM capabilities (Revit)

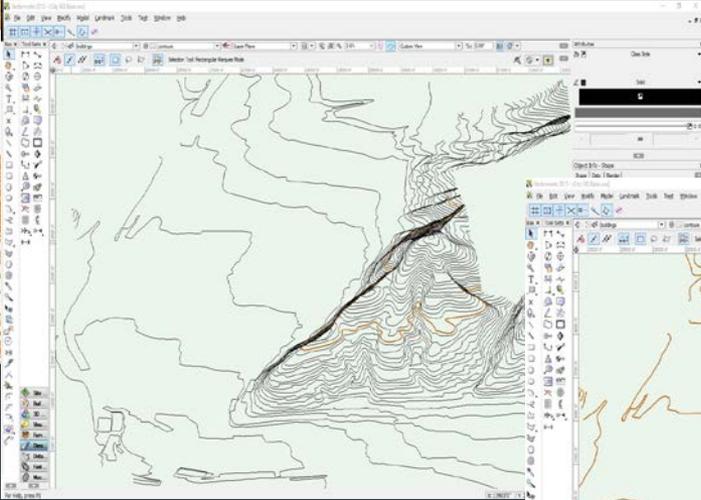


-E. Berg, 2016

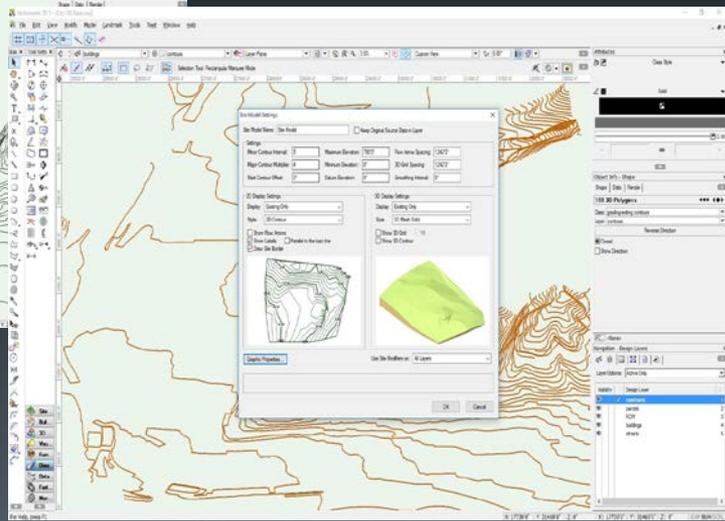
# Contours to Site Model



Import



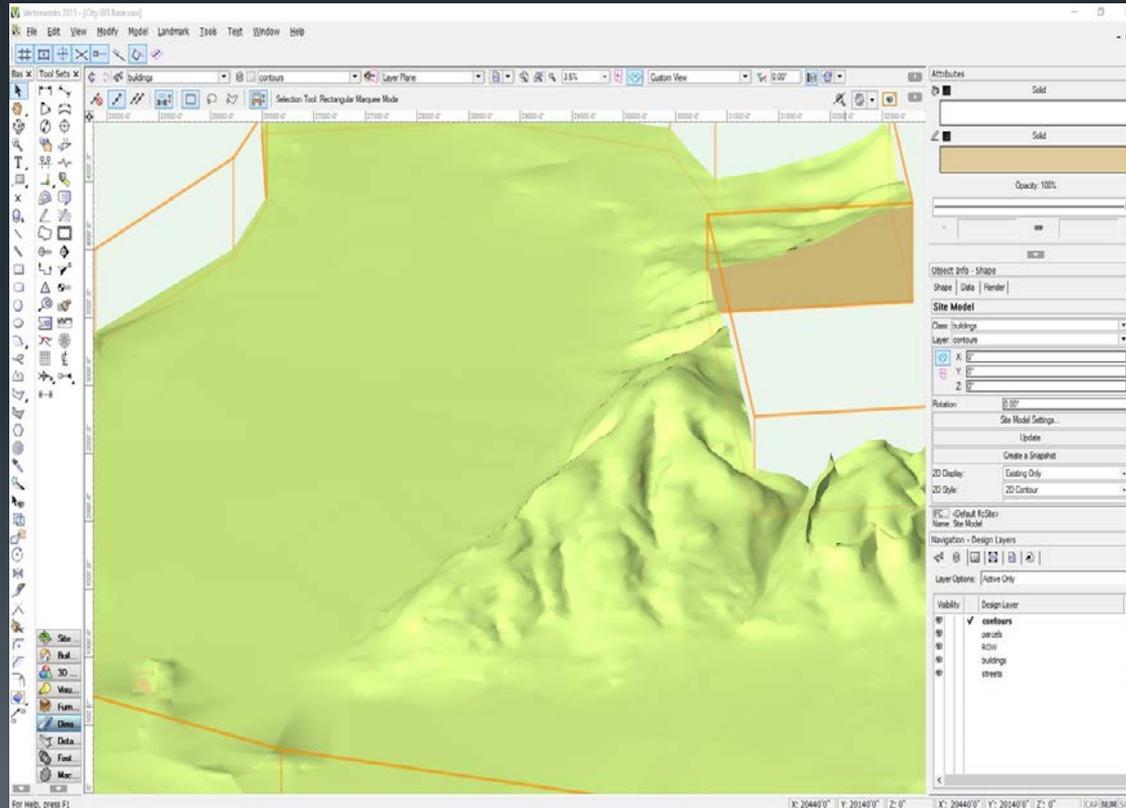
Elevate



Create Site Model

-E. Berg, 2016

# Contours to Site Model

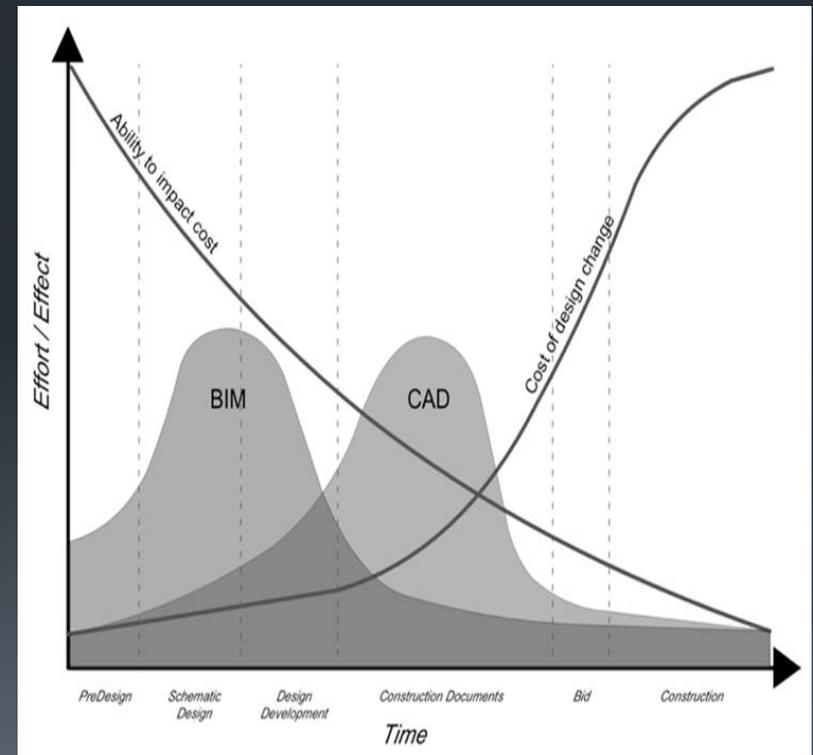


-E. Berg, 2016

# (B)IM and Landscape Architecture

- Benefits
  - Production
  - Smarter/Cost Effective Deliverables
  - Faster production
  - One input - multiple outputs
  - Reduced errors and omissions
  - Project sharing
    - Multiple people on same file
  - Coordinated changes throughout

-E. Berg, 2016



# (B)IM and Landscape Architecture

- Challenges

- Front end loads cost to schematic design
- Data storage and processor requirements
- Steep learning curve
- Validation
- Ownership and Liability
- Data Integration

-E. Berg, 2016



Iron Horse Trail,  
Santa Clarita, CA

# Implementation

- Contract preparations
- Select contractor
- Set-up work schedule
- Site preparation
- Supervision of construction
- Enjoy!
- Post-Occupancy Evaluation

Officials cut the ribbon & the mayor races kids across the bridge



Buff guys ready for a ride



.....then there is the rest of us!



Equestrians have a drop off and a trail along the Santa Clara River

# Conclusion

- Graphic Communication
- A picture is worth a thousand words
- Variety of software/applications for all levels of expertise
- Free software for entry-level design
- Free tutorials via YouTube, etc.
- Cloud-based subscriptions allow for affordable, as-needed licensing
- Use graphics to sell sustainable solutions!



# Trails/Greenways for:

- Transportation
- Recreation
- Connectivity
- Community Pride
- Real Estate Value
- Physical Fitness
- Environmental Health
- Our Children

Iron Horse Trail, Santa Clarita, CA



# Questions?

- Thank you!

Tony Perkins

Pacific Coast Land Design

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